

The SBC Automation Yearbook

**sbc**   
SAIA BURGESS CONTROLS

# Controls NEWS

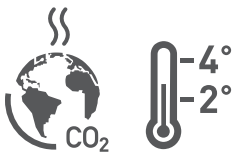
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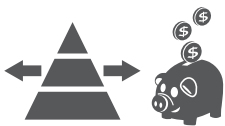
Overcoming challenges  
with **lean automation**



## Problems... ...avoid or tackle?



CO<sub>2</sub> emissions per m<sup>2</sup>  
must fall



More automation  
with less money



Fewer qualified employees

Dear Reader,

This choice confronts us every day. But often we are simply unaware of it. Many serious problems in our working lives can easily be avoided. How?

By accepting the challenges and preparing ourselves for them well in advance. Because sooner or later, any challenge you ignore or put off will turn into a problem that ruins your whole day. Avoiding problems of this type costs you much less energy and effort than tackling them.

Anticipate identifiable challenges and do not optimistically assume that things will «work out all right».

But how should one prepare for such serious challenges as the following?

Energy is becoming increasingly expensive and the weight of CO<sub>2</sub> restrictions increasingly heavy. Today the situation is still bearable. Due to demographic developments, scarcity of resources and rising demand, there will be an increasing need for greater and more complex automation, but there will no longer be the resources for this – quite the opposite.

In 10 years at the latest, the age pyramid will mean that for each specialist retiring from your company, there will only be one half of a qualified engineer coming into the job market.

Such serious challenges turn into problems if you are not prepared to thoroughly question traditional and established structures, processes and thought patterns – if you do not challenge the paradigms. To represent this pictorially, we have turned the old automation pyramid on its head on the front page of this edition of Control News.

However, it is not enough to question old, established practices. We immediately need a new vision and equally new ideas and concepts to replace them. This is represented by the term «Lean». Lean ideas and concepts can be transferred to automation technology – the main topic of edition 13 of Controls News.

I hope you enjoy reading this edition and are inspired by it.

Jürgen Lauber  
Director Saia-Burgess Controls AG



## Recommended reading



### You invest, operate, manage...



#### Maximum value instead of minimum price

Page 5

There is an abundance of money today. Interest rates are low and set to stay that way. So now the new focus is on investing. How do I get maximum value and return for my budget? Better a good, secure return than a quick, insecure one.

#### Lean energy monitoring and control

Page 26

Combine new technology with lean processes for safer, more profitable investment. Do the right thing – and earn money straightaway.

#### Costs and benefits of lean technology

Page 36

How much more does it cost to design and produce a lean automation device? And how much added value does this added expenditure bring the operator/investor? Two real-life customer applications provide practical examples.

#### CERN

Page 57

Europe's largest research centre, with more than 300 buildings, does a complete about-turn. From the frustrating «Cheap in Mind» approach to «Peace of Mind» for all involved with lean, including in automation.



### You plan, advise, calculate...



#### Lean automation = PLC + web + IT

Page 12

Reduce complexity, costs and operating risks by combining the best of all worlds. We explain how this is possible. The effectiveness of the formula is then demonstrated using a large number of reference projects from around the world.

#### KSB PumpManager

Page 32

One of the world's largest pump manufacturers creates an App for Saia PG5® Web Panels, curbing the appetite of energy-hungry pumps and improving their durability. KSB's PumpManager-App uses new «Programmable Functional Controller» technology.

#### 34 km Lötschberg Tunnel

Page 50

There has been further massive growth in the single largest application of Saia PCD® technology. The «Cheap in Mind» products of the original equipment have been replaced with Saia PCD® due to operational needs.

#### HVAC applications in datacenters

Page 124

The article provides basic information about the very specific application profile of datacenters. It focuses on how to implement an appropriate automation/ICA system with Saia PCD®.



### You install, implement, program...



#### Smart RIOs

Page 82

The master/slave model is out. Instead, manager/agent relationships have proven to be more flexible, stable and efficient. This improved «relationship» has been implemented in Saia PCD® systems. Technical background and two interesting Smart RIO applications in tunnels.

#### Roadmaps for Saia PCD® product lines

Page 96

Controllers, web HMIs and energy meters – how has the SBC portfolio changed over the past few years and in what direction will it continue to develop? New products and possibilities for you.

#### Communication in automation – no more «no it can't»!

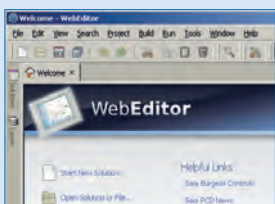
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This is our ambition for Saia PCD® systems in buildings. New communication modules for DALI, BACnet MST-P and M-Bus are presented, demonstrating how our new products maximize user «Peace of Mind».

#### Saia PG5® Web Editor Version 8

Page 114

The new generation software tool for Web HMI/Web SCADA. The current WebEditor has been expanded and maintained for the past 10 years. Now we have completely redesigned it. The primary goal was: «faster, simpler and more efficient to use».



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Why a new class of device? «Lean Automation» aims to provide twice as much automation at no extra cost and with half the number of qualified personnel. This is feasible only if there are new types of automation systems.

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Saia PCD® Web panels have a sophisticated mounting system, so that they can be assembled by anyone – easily and securely.

Products: Touch panels

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This is the essential basis for lean automation.

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Lean automation requires flexible and easy integration of I/O modules in automation stations.

Products: SCADA software for facility optimisation – no licence fee!

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Products: New generation WebEditor for Web HMI/Web SCADA

### **Saia PG5® Web Editor Version 8 114**

The S-WebEditor creates web pages for visualisation. Java or HTML programming knowledge is not required. In 2004 we brought out the first Saia PG5® WebEditor.

Products: Saia PG5® DDC Suite – software library for building automation

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The BACnet Monitor revolutionises the testing of a BACnet BA system at the time of acceptance and during operation. The feedback from the analysis is shown in full and can be evaluated without specialist knowledge. The installation is just as simple.

Products: New PCD7L79xN room controller for «Perfect Fit» automation

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Technical support: New customer training centre in the factory

### **Saia PCD® in data centre applications 124**

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Technical support: New customer training centre in the factory

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It is used heavily but is not being used everywhere.

Lean effect for customer logistics

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Annual Report for our stakeholders

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As in previous years, 2011 was a good year for our company.



« There is hardly any-  
thing in the world that  
some man cannot  
make a little worse and  
sell a little cheaper. (...) »

John Ruskin

1819–1900

more on this individual and the quotation  
on page 5

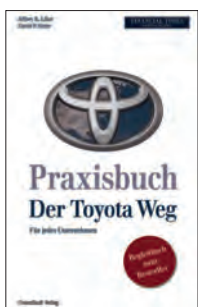




▲ The lean culture hails from Japan



▲ The founding father of lean and one of his standard works.



▲ Ideal reading on the concepts and effects of lean



▲ The aim of lean  
Performance without anxiety and stress

## The lean story

Lean is one of three guiding principles that we sincerely intend to uphold and pursue in the long term. This is expressed in how we cooperate with our environment, how we design our products and the functions they perform. With lean, this is also visible in our production.

Author: Jürgen Lauber



**Controls News 11:**  
Openness, only universal standards, not proprietary ones



**Controls News 12:**  
Quality of automated solutions.  
The «Peace of Mind» guarantee mark



**Controls News 13:**  
Lean automation

In Control News 11 and 12 we provided a comprehensive overview of two guiding principles. In this edition of Control News, we share our deep commitment to lean and tell you about the background of automation. This is not revolutionary, but it is a radical approach to automation and control technology.

### The origin of Lean – post-war Japan

Like Germany, Japan was destroyed after the Second World War. Yet it received no funds from the Marshall Plan (the USA's economic reconstruction programme). In addition, Japan had even fewer natural resources than Germany. It was in this crisis situation, with its major challenges, that the lean approach was developed.

Japan's only capital was human hands and heads. Due to the traditionally close and long-standing ties between employees and employers, Japanese businesses were more consistent and persistent in seeking ways to make employees sustainably more productive. Even today, in Japan downsizing is a last resort in difficult economic times. In western Europe, by contrast, rationalization comes first, with massive investments in automation and machines. Or deindustrialization takes place and production is shifted abroad, like in the USA.

### Toyota:

#### The founders of lean, and a shining example

Under its innovative head Taiichi Ohno, Toyota developed, perfected and distributed worldwide the methods and concepts we associate with the term «lean». Mr Ohno could also be called «Mr Lean». It was thanks to him that, after the war, Toyota went from being a textile machine business to the

licensed producer for General Motors and then the global automobile leader it is today.

For consumers, Toyota's lean business culture is conveyed mainly in the reliability and low service costs of its products. Things are done more simply and securely than elsewhere. For investors, the concept of lean takes the form of profitability, which is higher than for many western European manufacturers.

#### How is Toyota's lean culture apparent?

It is most apparent in the range of production locations as part of worldwide expansion. Toyota deliberately went to places where there was no «old» automobile culture and few «qualified» personnel. Up until this point in the USA, it was generally accepted that cars were only made in the orbit of Detroit. Toyota set up its first production plants in the southern states.

With the ingenious simplicity of lean production, there was little need for rare specialists or expensive technicians. Bad experiences are constraining and ingrained «non-lean» behaviours and thought patterns are more of a hindrance than a help. Toyota's lean culture is also apparent in its external appearance and in the behaviour of its employees. They seem fresh and vital and support each other and the company in a positive way. This is an observation described by Jeffrey K. Liker in his international bestseller «The Toyota Way». He was very impressed with the health, vitality and motivation of even «older» Toyota employees in comparison with the «exhausted and stressed» managers of other automobile companies. He admired the fact that at Toyota there was a lot less whingeing and backstabbing.



# Lean automation

The introduction of lean production leads to a significant increase in productivity, flexibility and speed. Stresses and strains in the factory are simultaneously reduced. The symbol for lean automation derives from this thoroughly positive effect on production:

Author: Jürgen Lauber



▲ The new face of automation

Basically, the symbol is a thoroughly contented positive face for all those involved in automation and control technology, be they planners, investors, operators, manufacturers, integrators, caretakers or end users.

The arrow encircling the smiley shows that lean automation means smiling faces right through the entire life cycle of an installed automation system. The «Lean Smiley» should be the new face of automation. Its connotations are in strong contrast to those currently evoked by the word «automation», particularly in the field of building technology. To achieve the desired effect of lean automation, we deliberately set the bar very high. Our goals are so challenging that they simply could not be achieved by adopting a «business as usual» attitude. In today's climate they are highly ambitious. They have to be, if we want to face up to the challenges of the future. They won't be a problem for those who are adequately prepared.

## What are the aims of lean automation?

Automation should mean that twice the amount of work can be done with half the number of qualified personnel, at no extra cost.

The doubling of automation is the result of new legislative requirements (e.g. obligations of proof), ever-increasing demands for safety and comfort, and in particular a huge drive for efficiency caused by the rising cost of energy and raw materials. Although strong periodic fluctuations may sometimes relax the pressure to take action, on average the price of raw materials continues to rise.

The new and rapidly expanding field of automation is the result of demographic trends. Elderly people living alone should be able to continue living independently in their own homes for as long as possible. At the same time, in ten years two experienced professionals taking retirement will be replaced by just one young trainee who is new to the market. The result is that, on the one hand, the need for automation is growing, while on the other, specialized

professionals are thin on the ground.

On closer examination of the current, much-vaunted hallmarks of automation, such as:

- excellence in automation
- perfection in automation
- totally integrated automation

it is clear that the proposed aim of automation cannot be achieved with any of these attitudes. In fact, they are contradictory. That's why lean automation needs to bring something new to the market.

Of course, Saia Burgess Controls has also utilized the development of lean automation to boost its own business. The operative word here is «also». We apply the lean philosophy across the company. We have internalized the lean way of thinking to such an extent that we always consider the interests and capabilities of the entire value chain. Our aim is to achieve optimum integration from supplier to customer. In our experience, this is the only way to ensure the lasting satisfaction of all parties involved in automation.

Naturally, when it comes to lean, we have something of a head-start on our competitors. This advantage results from the implementation of Lean across all processes in the company. Our company history and range of technologies and products are ideal for lean automation.

Any company today that is still «fat» instead of «lean» won't be able to derive much pleasure from lean automation. It will have problems even understanding lean and will see it as a threat rather than an opportunity.

Which classic manufacturers of automation and control technology are already committed to doubling automation for operators/users at no extra cost? We are. We can see a way to make it financially attractive for everyone.

Demographic development in Germany, a theme for a postage stamp.



▲ In less than 10 years, for each young person who enters the job market, two experienced technicians will retire.

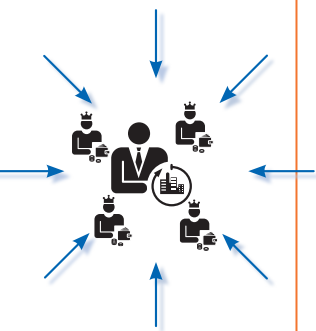


Lean = everyone feels good, plus high performance



## Lean automation – how does it work?

The methods and concepts are basically very simple, requiring nothing more than common sense. There is no magic formula nor any complicated tricks to be learnt. However, implementation is difficult. This is because lean methods and concepts fly in the face of current practice, old habits and thought patterns.



▲  
The operator has daily contact with users and all facilities. His interests should be a point of reference, even at the planning phase.

1. The worker in the factory is the central medium of value creation. All the surrounding externals (R&D, IT, logistics, etc.) are geared to enable him or her to deliver maximum value and quality. Workers are no longer seen as a cost factor and stopgap solution for anything that is not running properly or does not fit. Production workers determine what production equipment should look like and even have the opportunity to build it themselves or alter it. A terrifying prospect for every classic production engineer! In automation engineering, this is called «bottom up» instead of «top down».

► Replace «workers» with «operators, users» for lean automation. The operator/user should be at the centre of automation. The operator of a facility/property is at the centre and has a decisive role. So the opposite of current practice.

2. Lean means moving away from batch production and large batch sizes. Instead, types should be manufactured in a «one piece flow» with constantly enforced change.

► Automation means turning away from the «large project» mentality. Periodic improvements, optimizations and extensions in clear steps are the aim.



►  
**One Piece Flow instead of batch production:**  
a series of small, readily comprehensible projects instead of a grand sweep.

3. The ultimate aim is the synchronization of production cycles. If necessary, fluctuations in demand can be absorbed by buffer stocks. Contrary to the traditional approach, inventory replenishment will be allowed. This goes against the usual business efforts to drive stock down constantly.

► In automation, the traditional approach and business efforts tend towards the cheapest option. Savings, savings, whatever the cost. Lean automation does away with this paradigm. The best and most cost-effective solution in normal operation is preferred.

4. Lean principles are followed rigorously and with conviction, even if at first they do not seem to add up or pay off. Instead of going for short-term effect and taking every shortcut with however many pitfalls, we willingly accept «detours». The result is then suddenly surprisingly positive and much more sustainable.

► For automation, this means for example having a thorough understanding of the use of resources and making them transparent. Even if there is no direct attractive return on investment. It simply makes sense to gain an awareness of resource consumption. This also applies in terms of strict adherence to technical standards (not manufacturer standards!) for all projects, even if in a particular case something else could also work and with lower initial costs.



▲  
Today, providers inundate operators and owners with short-term opportunities and tempting offers, creating risks and cost traps. Lean automation proposes a new way – not simpler, but definitely better.

Heinz Hirschi,  
affinitas Ltd.  
Sustainable business  
development with lean,  
even in automation





# Lean = maximum value and maximum efficiency instead of a minimum purchase price.

With lean production, employees are a key element in generating value, not a mere cost factor. The primary aim is to use available resources to create maximum value and quality. The same is true of lean automation. This means turning away from traditional behaviours and being ready to recognize and question today's reality.

Author: Jürgen Lauber



▲ Complex automation solutions for real estate are treated as commodities at the tender stage (like pig carcasses, wheat or copper) in the futures exchanges of this world.



▲ Ignorance of the process and faulty thinking in automation projects. Everyone knows it, but ...

## I «Cheap in Mind» – the strongest force in construction as a destructive optimum

Automation solutions for real estate are complex and highly individual systems, subject to a constant pressure to innovate. They cannot be described and checked precisely in kg or mm. Yet automation is described in tenders as a commodity for the futures exchange in Chicago. The cheapest wins the contract. The conclusions to be drawn from this have been described many times in the past. For example, John Ruskin, the English writer and social reformer (1819–1900), wrote:

«*There is hardly anything in the world that someone cannot make a little worse and sell a little cheaper, and the people who consider price alone are that person's lawful prey.*

*It is unwise to pay too much, but it is also unwise to pay too little. When you pay too much, you lose a little money, that is all. When you pay too little, you sometimes lose everything because the thing you bought is incapable of doing the thing you bought it to do. The common law of business balance prohibits paying a little and getting a lot.*

*If you deal with the lowest bidder it is well to add something for the risk you run. And if you do that you will have enough to pay for something better.*»

The words of John Ruskin are particularly relevant to real estate projects. This is because of the high life cycle costs in comparison to the purchase cost, and because of the special distribution of responsibility. A great number of different interested parties can be involved in real estate projects. In addition to the people shown in the picture, banks, investors and «project developers» can also be involved. It is typi-

cal of such processes that operators are involved far too late or not at all. Often the operators are not even known at the planning stage. And it's also typical for planners to slink off as soon as handover is complete, as each additional hour reduces the profitability of their mandate. Many planners must also win their engineering contracts through «lowest bidder» tactics. Anyone who does more than the bare minimum is soon ruined financially.

Project	Plan	Implement	Operate
Owner	😊	😐	😞
Planners/Arch.	😐	😐	no longer involved
Buyers/GC		😊	
Operators		not involved	😞
Technicians			😞

▲ **Constellation of errors:**  
Negative consequences:  
victims of «cheap planning» and «lowest bidder»

The powerful buyer who awards everything to the lowest bidder is only responsible for the investment sum until the time of the handover. Once his accounts are done, he disappears from the «life» of the new object. In construction automation the buyer does the same as for simple standard construction: he minimizes the investment sum. That is what he is trained and primed to do. What is not considered is the high leverage of control technology and automation, which influences operating costs, operational quality and ongoing personnel costs.

Depending on the building, construction costs only account for 12–15% of overall life cycle costs. Overall control/automation technology accounts for 1–3% of construction costs. The potential savings from the «lowest bidder» approach are also extremely small. But the consequences and risk in terms of operation is huge. The Americans have a saying for this: «Penny wise and dollar stupid».



▲ **John Ruskin 1819–1900**  
Social scientist; described vividly the economic non-sense of «Cheap in Mind», especially for complex goods and services.

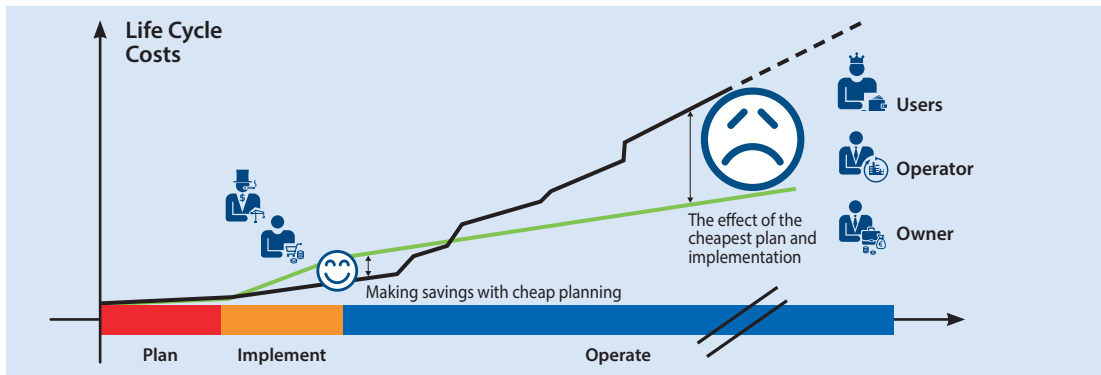
I

**black line:**

development costs for «Cheap in Mind» planning and handover

**green line:**

development costs for «Peace of Mind» planning and handover



▲ The effect on operators and owners when plans and implementation are done on the cheap: operating costs rise and much follow-up work has to be done. In the USA this is called «penny wise and dollar stupid».

II **Courage for reality – the first step from stress to lean**

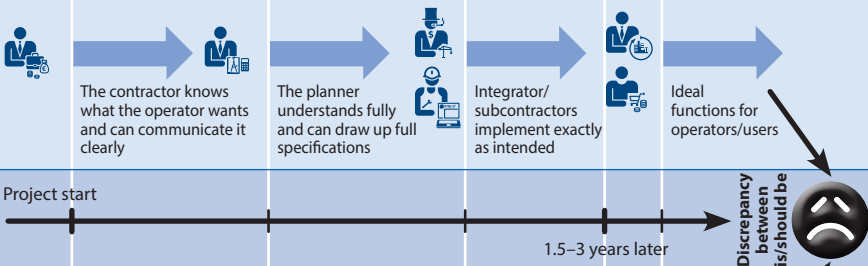
In the automation of Infrastructure facilities, everyone involved begins with an ideal, although they all know that the opposite of this ideal tends to be the rule. The ideal consists in the contractor knowing what is required for subsequent operation and communicating these requirements 100% to a planner. The planner in turn understands the contractor fully and can work up full-scale specifications. The specifications are finally implemented precisely by service providers and subcontractors. Thus the operator gets what he needs.

Since the handover date is approaching imminently and no one wants to admit to making a mistake, the work is accepted despite the discrepancy between the installed equipment and what was actually required – that is, so long as there is no fatal error. The operator must then live with the reality that has resulted from the whole obscure process. Reality means not only the uncertainties of the construction phase and experiences from the operational phase, but also new user requirements and legal specifications that mean changes are needed to the technical installations of the property.

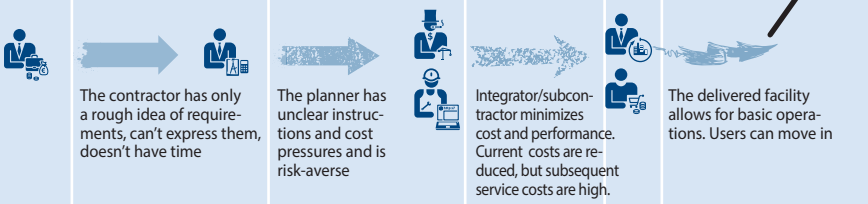
Lean means working on the assumption that many important requirements are not clearly definable in advance, and that there is nothing safer than constant evolution. Those are the core elements of the lean mentality. The adaptability of lean also fulfils the requirement for maximum added value. This can only be achieved if the user/operator has a system that is fully tailored to his or her needs. No ready-made standard solutions in building automation can achieve this. Adjustments are always necessary during implementation and operation. This adaptability consists in correcting separately the effects of planning and bidding practices for each set of works in the run phase. The «non-lean» approach would be to overturn current practice and proclaim a better ideal world of integrated global planning. Lean means accepting reality and working with it.

That is also typical of lean production. In «non-lean» production, mistakes made by employees in manufacturing end in calls for better training and staff. Lean means accepting that people always make mistakes, and minimizing the opportunity for error systematically in the design and manufacturing process. Lean automation means striving for the «perfect fit» of automation for the people and requirements we encounter in practice. What it does not mean is being content with «good fit» automation, and it means no longer having to live with «basic fit» automation.

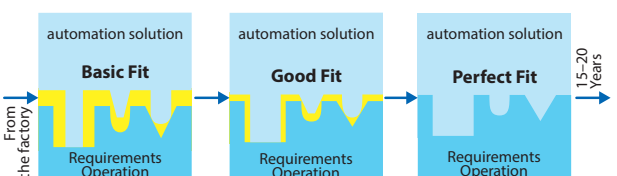
**Unrealistic, wishful thinking as the basis for current processes/standards:**



**The reality is constantly repressed and ignored:**



But the reality looks more like this: The contractor is not fully aware of the operational requirements even at the planning phase. What he does know, he communicates only partially. The planner doesn't understand everything that is said and reasonable efforts to clarify and document all the details are not successful. After handover to the subcontractors/facility construction firm or integrator, the plan is implemented at minimum cost.





### An example for the route to the «Perfect Fit» is the technical equipment of the «Holiday Inn» conference centre in the Westside Centre Bern.

In the first phase following handover, the entire display screen had to be altered and remounted, because it often broke down due to overheating. For wall mounting, the insulation of the wall was probably too thick. Reliability was improved in the six months following handover. Technically, only the «good fit» level was achieved. It worked. The operator now had a technically functional system. However, he had suffered a lot of stress and high staff costs with the «standard off-the-shelf» control panels in the 13 conference rooms. It was clear that conference room users simply could not cope with the preset service menus.

The panels are designed for all kinds of room automation and offer every refinement. This option overload and the fact that the picture did not show the actual room led to users making mistakes and getting frustrated.

This is the opposite of lean automation – every user trying desperately to master the abstraction and complexity of the preset standard control panel. Lean automation would make the panel a «Perfect Fit». It shows the visible room and its equipment precisely. It only offers functions you need as a conference speaker. In the meantime the «Perfect Fit» was achieved. You can read here what the director of the conference centre had to say about it, and how the step towards lean was realized for the conference operations – detailed description on page 88.

Case study



◀ With lean automation, the conference centre «Perfect Fit» was achieved; every browser and mobile device (here the iPad) can be a control station. Every room is illustrated precisely and shows every user group only what they need.



◀ Ms Yvonne Oberföll, Director of the Conference Centre at the Holiday Inn in Westside, with «Basic Fit» automation devices: Standard masks were unusable without training.

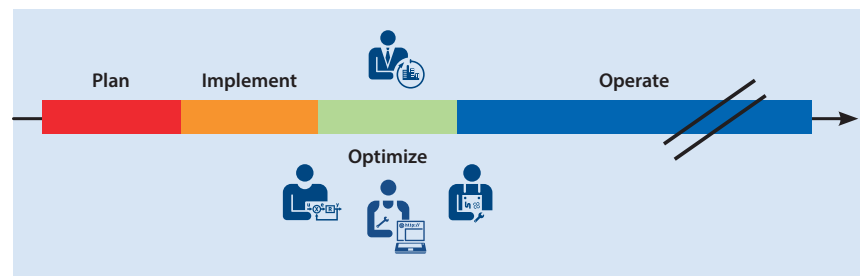
### III Standardize – Optimize – Adapt

The first step towards a lean automation process is to have an optimization phase as a normal component of a project. The operators of a facility do not end up at handover with something «ready-cast in concrete», but rather with something that contains errors and is malleable.

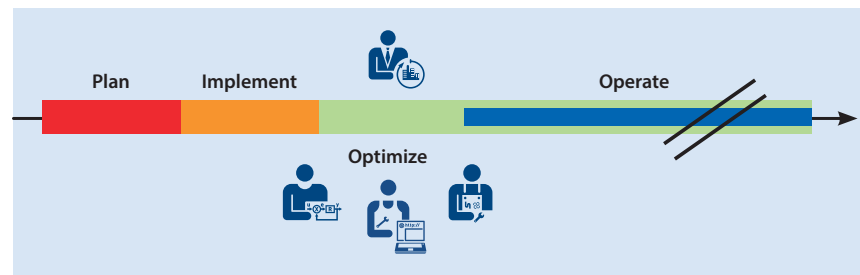
The next mental step is to adjust to permanent adaptability. Nothing is set in stone, and everything must be changeable at any time without major risks and expenditure. In order to guarantee a «good fit» and to achieve the «perfect fit» at a reasonable cost, it is advisable to apply another key lean concept in automation.

### IV Added value margins – stable and integral

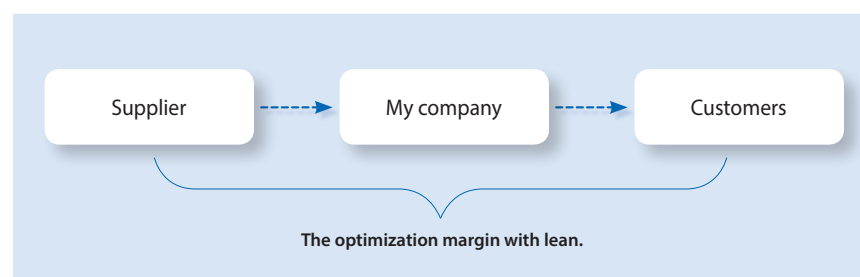
With lean, the optimization range is always the whole supply chain from the added value of the supplier to that of the customer. Individual optimization of a single component of added value has simply proved to be suboptimal or unstable. This realisation has spread from Japan – the birthplace of lean – to the rest of the world. With its blend of the highest quality at low prices, Toyota has pushed the whole automobile industry towards lean and put an end to opportunistic changes of supplier.



▲ In the green phase, the facility is operated with a conscious intention to learn and correct.



▲ Operating phase with a green framework: Adaptations for the «Perfect Fit», regardless of what happens next – throughout the whole life cycle. The basis for this must be laid down during planning and handover.



▲ Only a comprehensive approach can bring significant and lasting efficiency gains.



▲  
«Cheap in Mind» in automation technology means the contractor becomes a «creditor» charging exorbitant rates of interest throughout the life cycle.

Therefore, to automate building developments and operate them throughout the life cycle, one should only choose «suppliers» one knows well and who are close geographically and/or thematically. The companies should know each other as if it were a partnership. They should fit together easily.

Opportunistic «one-off relationships» should be avoided in automation solutions, as should life-long cycles of dependency.

It's like in personal relationships: trust and long-term thinking are fundamental to the best relationships.

Of course, this completely contradicts the idea of the cheapest bidder. Who would willingly be treated in the cheapest way possible or choose the cheapest hairdresser? One-off relationships are, according to game theory, advantageous and sustainable for those who «cheat». Not a good foundation for being happy in life!



### What kills lean automation? What is the polar opposite of lean automation? «No go!»

In the context of construction automation, what is a concrete example of the philosophical musings of John Ruskin, who we quoted above on the subject of «Cheap in Mind»? What makes optimization to «Good Fit» expensive, and the step to «Perfect Fit» practically impossible? The most powerful response to these questions can be found in the subject of software. It is an invisible thing that is as far removed as could be from the world of construction. In the simplest case, with «cheap in mind» handover and implementation for a building's automation system, the application software simply does not become the property of the building's owner. He pays less and also receives less of this invisible stuff. But no one notices for a long time. It's only in the optimization and operation phase that the cost is counted and frustration unleashed – and this time it's massive. In the worst case, the original «solution provider» no longer exists and the operator cannot make any changes. Every tiny defect becomes a major building site.

Alternatively, the application software for the building's automation system was supplied and correctly delivered; but the manufacturer of the automation system has such a clever licensing policy for software maintenance (engineering/programming) that it earns money for every optimization and adjustment. Since these changes are crucial to achieve the «Good Fit» or «Perfect Fit», the manufacturer can claw back the money saved at the time of handover. This confirms the rules of the capitalist economy as described by John Ruskin. Every market player plays its own game. No one breaks the rules. These financial aspects are not in themselves a barrier to lean automation.

The investor reduces the initial investment sum while delivering to the vendor at the cheapest price. The vendor, who has good financial sense, subsidizes the initial equipment and becomes a joint investor in the property. Thus the vendor acquires the moral right to earnings throughout the life cycle. He gets a good rate of return on the life cycle costs for his initial investment.

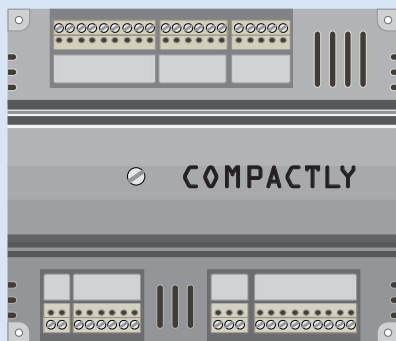
To increase this return and cut risk, the vendor uses the cheapest material and tries to achieve the «Basic Fit» as cheaply as possible. The cheap material soon breaks and can no longer be extended as a dedicated controller or even programmed. So the positive effect is two-fold.

Another good starting point for higher rates of return is the definition of «Basic Fit». This is determined by planners on the basis of the description. «Cheap in Mind» means no money should be spent on planning control technology or automation, and an economically sustainable planner cannot defy the laws of capitalism to produce the required level of performance. This is where the major automation technology manufacturers come to the rescue. They ensure that the planning includes one of their many simple system configurations. This is quickly installed in the construction phase and commissioning, to save costs. The further the «Perfect Fit» is from actual requirements, the higher the future costs incurred over the life cycle.



### Thus «Cheap in Mind» kills of each stage of lean automation, from the initial investment.

Cheap material becomes defective after a few years and causes constant breakdowns. This interferes with the continuity of added value and is «non-lean». Cheap material also involves dedicated devices that are time-consuming to optimize and adjust. Lean means small-scale projects and local implementation.



►  
Dedicated controllers or compact controllers = single purpose. Not for lean automation!  
Works perfectly for the manufacturer, not for the operator!



Dependency on the original creator of software for the automated system dramatically slows the rate of improvement and adaptation. Large outside companies are reluctant to take on small projects, because their own structures have not designed for them and they cannot earn money. So many small improvements are never made and the core benefit of lean is lost.



▲ CERN in Geneva made the transition to lean in 2010.

**P.S:** One of the leading examples of the process described above is the CERN research centre in Geneva. CERN applied the emergency brakes and has now completely changed its process. You can read more about this project on page 57.

**Recommendations:**

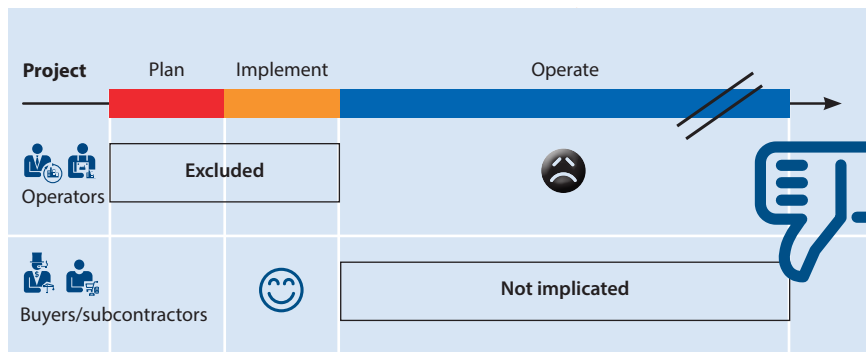
**New processes for lean automation: Competition for the highest degree of competency and efficiency**

«Cheap in Mind» systematically inhibits lean automation. So during planning and tendering, «Cheap in Mind» should be replaced with something more worthwhile and acceptable to all process stakeholders. The first step should be to introduce some kind of «works standard» for infrastructure automation (HVACSE, etc.) and adopt it across the whole property. It is important to maintain this standard for all cases and projects.

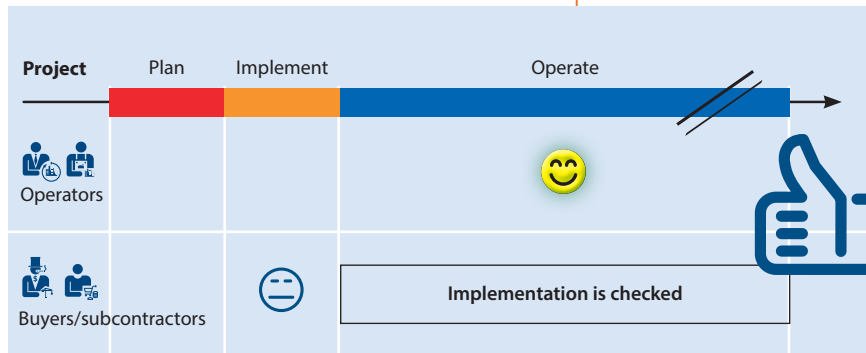
All planning would be based on this standard. This saves planning costs and effectively prevents «externally controlled» basic planning through large manufacturers.

All contracts are bound by this standard. The on-site audit of compliance with the «property standard» by a truly independent testing firm is an integral part of the final inspection. This inspection is merely a spot check – like in lean automation.

The final test of compliance with contractual provisions of the «property standard» is absolutely essential. Only in this way do the buyer/initial investor and the contracted company have sufficient motivation to leave «Cheap in Mind» behind and implement the new property standard. The «Basic Fit» of the automation system is defined in the «property standard» in such a way that it sets out simple, cost-effective optimizations and adaptations that can be applied at any point in the life cycle. Subsequently, operators' interests are protected by the «property standard» for every project, without them needing to be personally involved. In the performance description there is now no longer a competitive mindset along the lines of «Who can get a system through the inspection with the lowest possible initial investment», but rather an effective competition in terms of «Who is the most efficient and competent automation provider on the market?» That's how competition should be. For the standardization of automation in buildings, two good sources of support exist to make things simpler and safer.



▲ **Before**  
«Cheap in Mind» handover without binding construction standards for automation.



▲ **After:**  
«Peace of Mind» handover with binding construction standards for automation. The interests of the operator are mandatory for all projects.

The organization for public contractors in Germany has produced a standard in German and English for construction automation and for BACnet, which is very good and simple to apply. [www.amev-online.de](http://www.amev-online.de)

Even simpler is the use of the «Peace of Mind» specification templates as the basis for property standardization. For this purpose there is also a standard inspection and assessment of implementation by external inspectors, such as TÜV SÜD. Here you can find materials, information and practical examples: [www.pom-automation.com](http://www.pom-automation.com)



## The lean added value chain

It takes a lot more than a single purchase and delivery transaction before operational automation systems start to generate value for their owners. Systems are neither consumables nor commodities. It is much more a question of a chain of several companies that has to hold together for a long time.

Author: Jürgen Lauber

▲ A stable chain is great, but you don't want to be chained up for ever!

The combined performance and efficiency of upstream links in the added value chain ultimately determine its inherent performance. All potential defects and weaknesses must be remedied in their own context. If the links in the chain do not fit together properly, the chain becomes too heavy or unstable. That's why it's important in lean automation structures that upstream links are selected with care. During tendering, suppliers should be limited to qualified, reputable firms that are a good match for your company. If the upstream companies are lean, you are much more likely to end up with a completely lean chain. It's also important that individual links in the chain are sound and sustainable for the long term. Since, like companies, tasks and requirements also change, they should not be welded, but instead remain always detachable as needed. This necessitates the appropriate technical foundations, as described in the «Lean Technology» chapter. It is advisable to work only with products that are sold as part of a solid, stable but detachable added value chain. The Saia PCD® is an example of such a product.

A chain has maximum openness and flexibility when all its links are open. But these qualities are a disadvantage in a lean added value chain. If anyone can hook-up without binding guidelines and controls for technical property standards, the contract will be awarded to the cheapest service provider or production firm.

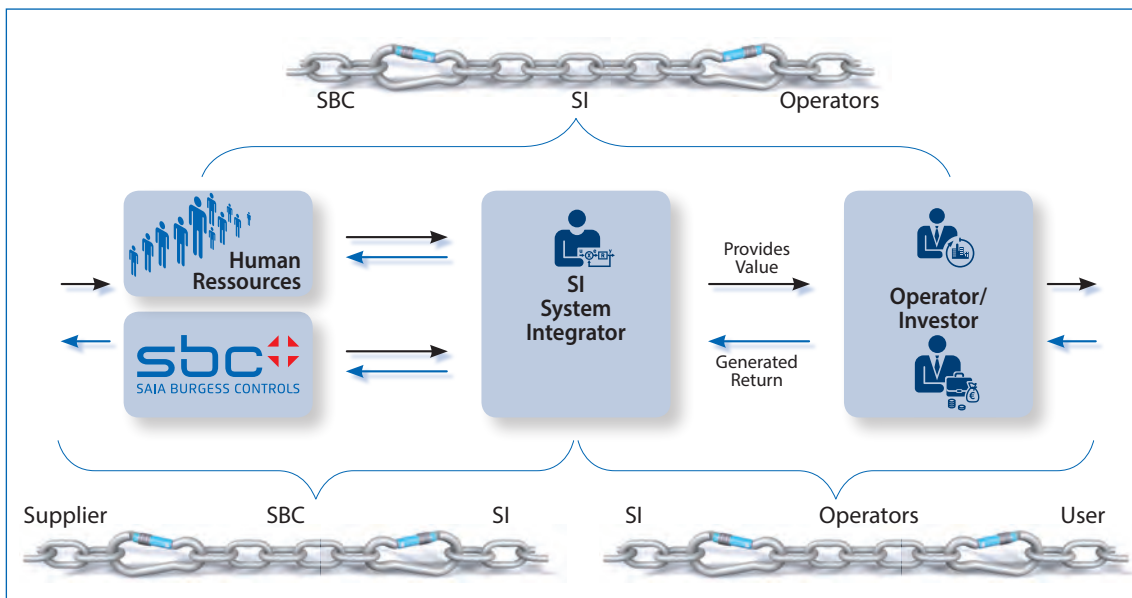
▶ A totally open link in the chain is flexible but not reliable.

▲ Look for solid, sustainable and adaptable partners when creating your added value chain.

An operator or owner just hooks himself up anywhere, or is himself hooked. If in the added value chain everything is left to chance, in extreme cases there may be just one link in the chain. The operator is then hooked to a sole supplier. Or a big weighty company hooks itself on to a «fat» added value chain, and brings everything down with its own weight.

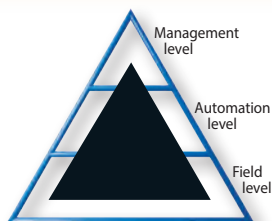
◀ Unwieldy «non-lean» added value chains often draw you in with a «slender» hook-up interface. The «fat end» brings everything crashing down...





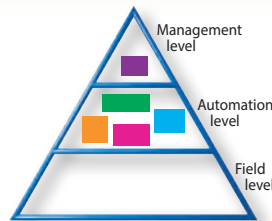
◀ The transition from the lean system to lean automation-solutions has been completed by over 600 system integrators transition worldwide. A suitable partner can be readily linked up with, or unlinked if necessary.

### Lean structuring of the automation pyramid



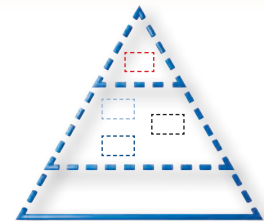
Fully integrated Automation: Prefabricated «cast in concrete» solutions from a manufacturer.

The use of proprietary technology prevents the supply chain from being linked up and separated again at any time. «Fully integrated and ready-made» automation solutions prevent simple customization and process optimization. The big manufacturers of automation technology are only too willing to help cost-pressured planners with basic standard solutions, which then find their way into tenders. These basic solutions are prefabricated as a black box and stored in an engineering workshop. The phenomenon of repetition means the basic solution can be made and sold at a low cost. This is a real coup for manufacturers.



This is the picture when several manufacturers take a «fully integrated automation» or proprietary technology approach when supplying products to a single building. The result is a colourful jumble of self-contained worlds.

Following delivery of the project, changes are inevitable sooner or later. For the most part, such changes are complex and expensive. Why? The «fully integrated» system is a rigid system that is not oriented towards flexibility and adaptability. Furthermore, over the life cycle the supplier will want to recuperate the insufficient margin of the initial contract with lucrative additional contracts. The problem gets even worse when contracts are regularly awarded to the cheapest bidder and after a while there are several brands of automation devices running in parallel in the building. This is particularly the case when each manufacturer takes a proprietary approach with inflexible, prefabricated automation solutions. The result is an unmanageable constellation of automation solutions. Operators and owners become frustrated and operation is experienced as expensive and problematic. Accordingly, they minimize their investment in automation.



Clear structures; but full transparency and openness in every respect

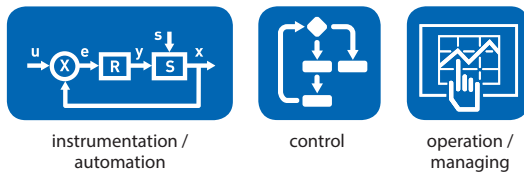
The picture of the lean automation structure differs substantially from the traditional pyramid structure of automation levels. On the inside it is permeable to products, manufacturers and systems. Furthermore, it lends transparency and consistency to the extended automation world, such as office, service, ERP and so on. The optimization phase with lifelong adaptability is achieved through maximum modularity in hardware, software and functionality. That is lean automation as applied to property. Black boxes and fully integrated solutions from a single source have no place here. Every brand, product and function is technically transparent, modifiable and modular. Each individual module is based on the same universally recognized and applicable standards without any proprietary components. Management and control software is also open. It can be supplied by any manufacturer and replaced if necessary. The technical background of the ideal structure of lean automation and how it translates in practice is described in the next chapter: «Lean Technology».

## Lean Technology = PLC + Web + IT

This «magic» formula combines the best of all worlds in every automation device, making them functionally stronger and better. Automation systems built on this basis will be leaner as a result.

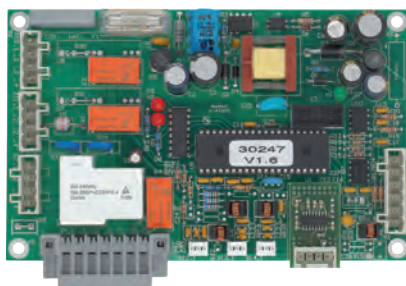
Author: Jürgen Lauber

The decisive components of any automation system are its underlying automation devices. They can only serve as a sound and stable foundation for lean automation if they are based on a lean technical concept. Only then is it possible to achieve a truly lean overall system of automation, instrumentation and control for a property. The ideal lean target – half the number of qualified staff with double the automation at no extra cost – is only achievable with lean automation technology. This is clearly shown by a case study. For the automation of any property, its individual devices, machines, system sections and buildings need core automation functions: instrumentation/automation, control and operation/management.

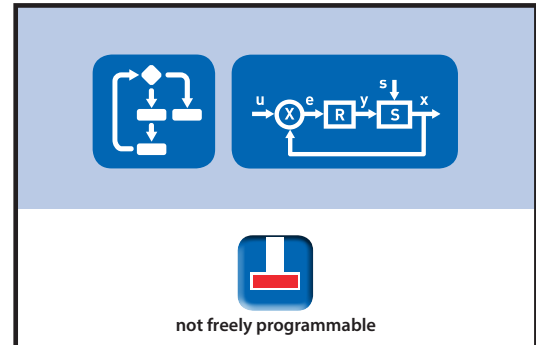


The stability and safety of the whole system is only as good as its weakest element, i.e. the weakest element determines the maximum possible strength of the whole system. An impressive example of this is the 34 km long Lötschberg tunnel in Switzerland. The control engineering was in some places so weak that after only three years of operation the tunnel automation system had to be renovated at a cost of 15 million euro (see page 50).

Much of the control and automation equipment in various plant installations comprised dedicated controllers, some of which were non-programmable. A thick proprietary layer around their actual control functions made external access impossible and so prevented connection to higher-level systems – a functional dead end. «Cheap in Mind», minimal electronics led to many pseudo error messages. There were also far too many genuine failures among the over 1000 installed devices.



Dedicated controller as weakest link in Lötschberg Tunnel



### ▲ Structure of a dedicated controller:

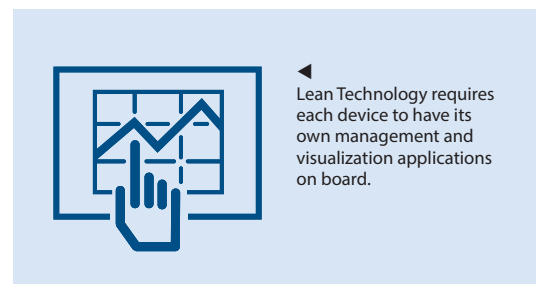
a dead end in terms of function and hardware, cut off from the external environment because of proprietary communication.

After three years the whole tunnel automation system had become hard for the operator BLS AG ([www.bls.ch](http://www.bls.ch)) to run at a reasonable cost.

When renovating the tunnel automation system, a decision was therefore made to follow the lean aims described above. «Cheap in Mind» was no longer the order of the day. Even the internal structure of the newly installed automation devices and control system is rigorously «lean».

The controller directly integrates not only logic and control functions, but also all management and service functions for the corresponding machines and system parts.

Built-in device functions are no longer hidden behind a proprietary barrier.



Lean Technology requires each device to have its own management and visualization applications on board.

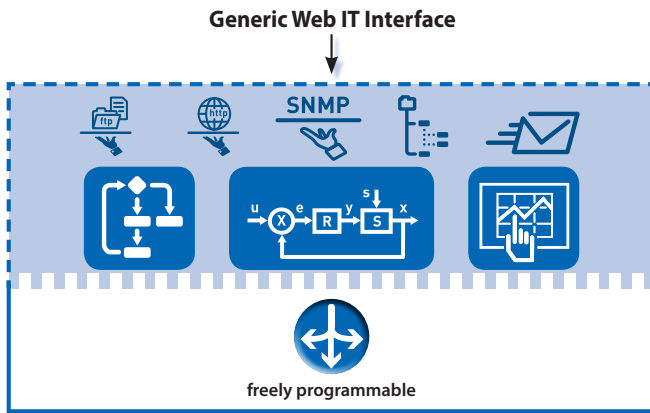
Each device is completely transparent in communication with its surroundings. Standardized web+IT functions have been integrated to provide a bridge between control and management functions and the external automation and operating environment. These web+IT functions are open, internationally recognized and work safely and reliably. The various protocols and server standards (FTP, HTTP, SNMP, etc.) have also been included functionally as the Automation-Server (see page 92).

► **Symbols of the core functions of automation.**  
Instrumentation/automation, control and operation/management.



▲ **Case study automation/control technology:**  
34 km Lötschberg Tunnel



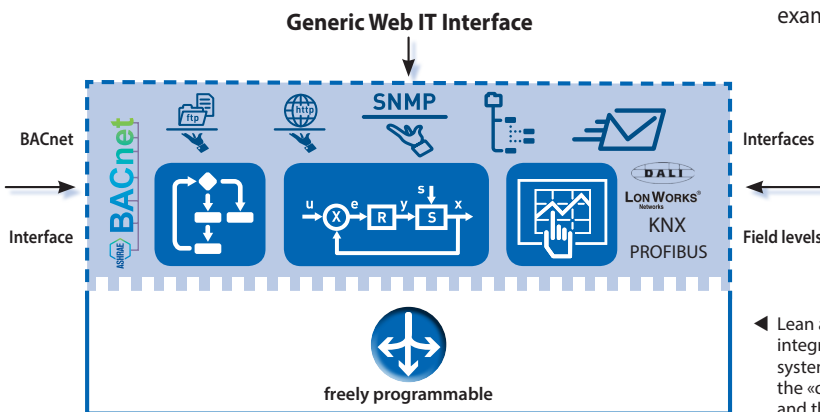


◀ With a basic lean structure, the internal composition of automation devices provides optimum conditions for lean automation.

PCD1, 2 and 3 are lean automation devices



This configuration of devices is not just dry theory. In practice, it has worked very well in diverse applications all over the world. In the Overview on page 61, you will find specific and impressive examples from almost every domain.



◀ Lean automation devices with modular integration of «classic» communication systems. They are the bridges between the «old stock» of traditional technology and the lean system of a building.

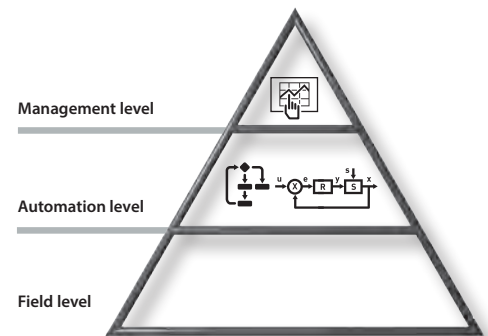
**Lean control/management level**

In classic DDC technology (Direct Digital Control) for the automation of buildings, logic and control is limited to the automation level. This separation ensures safer and more autonomous functioning of the equipment, even independently of a PC-supported control/management level. It is only in process technology that the control loops are also deliberately closed via management technology. The control strategies there are so complex and comprehensive that this is useful and necessary. The design of computer systems for the control room is correspondingly laborious. In the automation of infrastructure projects, an autonomous automation level has been relied on for some time.

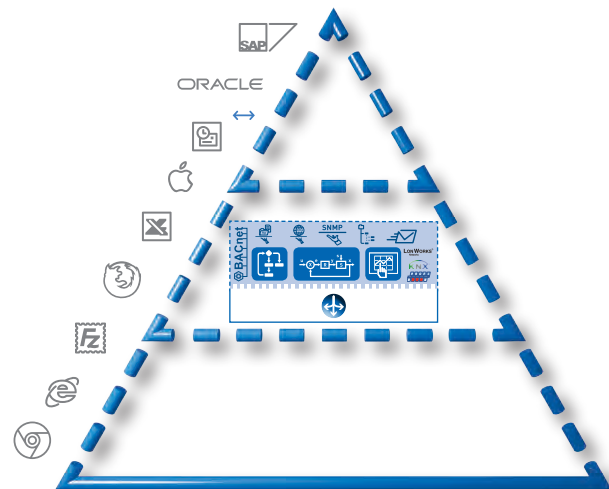
With lean automation devices things have gone a step further, in that each automation device is equipped with management and control functions. An overarching, separate control level is then just optional. In most buildings, it can be dispensed with altogether. However, if PC-based control/management software is used, it is easy to install and exchange. The optimum lean situation is achieved where there is an automation system with lean automation devices that are freely programmable and modular.

Boundaries and barriers are broken down in the automation pyramid itself and a natural integration is achieved into the user environment. Without specialist software, proprietary interfaces and constant Windows updates that cost time, nerves and money, you are one step closer to the goal of lean automation.

This has been part of daily practice at the University Hospital in Tel Aviv for several years.



▲ The classic automation pyramid: separate core functions at different levels and in different devices; the levels are sealed off from each other and the environment.



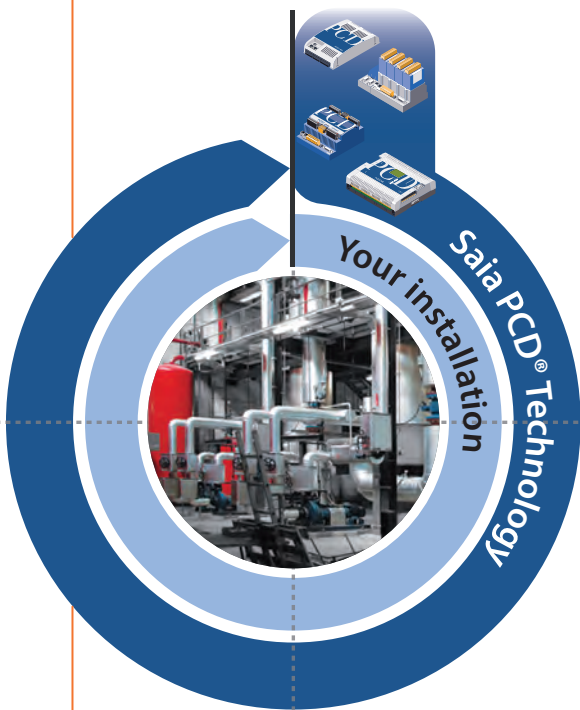
▲ Ideal picture: Lean automation device in the automation pyramid. Fully integrated & transparent, even outside the automation environment.

**Lean automation: the same life cycle for automation technology and equipment.**

Once the technology is installed, no further work should be needed for the rest of the life cycle (Fit and Forget) – but if anything is required it can always be done at low cost (No risk, No limits).

Control and automation electronics should have the same life cycle as the system technology. They must always be adaptable and expandable at any time in the life cycle. Therefore they should be modular and of PLC quality.

The compatibility and free portability of equipment/machine software is assured for an entire product generation of 18–25 years. This only works if you are the exclusive developer of the engineering software and make consistent use of «interpreted code». This requires more hardware resources, but ensures the portability of user software over several controller generations.



▲ **Lean technology**  
The life cycle of automation technology = equipment cycle

Life cycle inspection of Saia PCD® control devices. Maximum profitability through investment and know-how even outside the automation world.

Of greater interest than dry theory are two real-world examples from the process industry and the large building that houses the University Hospital in Amsterdam:

A process plant used in industrial cheese production worked for over 20 years without a hitch. After flooding due to bad weather, the Saia PCD® returned to normal operation, but corrosion of bus connectors started to cause a number of failures. Saia PCD® controllers with several thousand real I/Os had to be replaced with devices from the latest generation. Thanks to compatibility between device generations, the replacement work could even be carried out during operation, without stopping production, and with minimal investment costs. Even in the University Hospital in Amsterdam, 15-year-old equipment was modernized without the need to start from scratch.

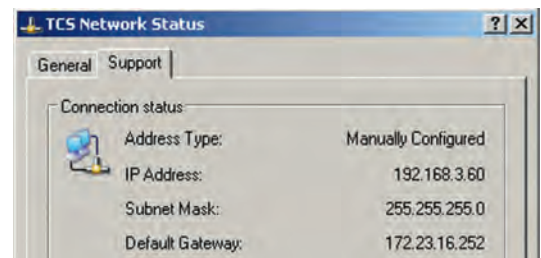
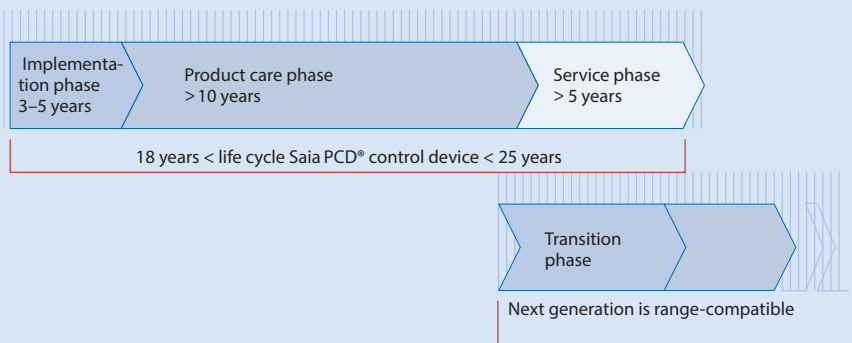
These examples from practice show that Saia PCD® technology is absolutely «lean» in the context of the life cycle. The complete modularity of the hardware and its virtualization vis a vis application software pay dividends to the customer by ensuring less stress, bother and cost.

**Lean technology: service**

One of the key aims of lean automation is to provide automation solutions that require half the number of qualified service personnel despite the higher degree of automation. How is this done?

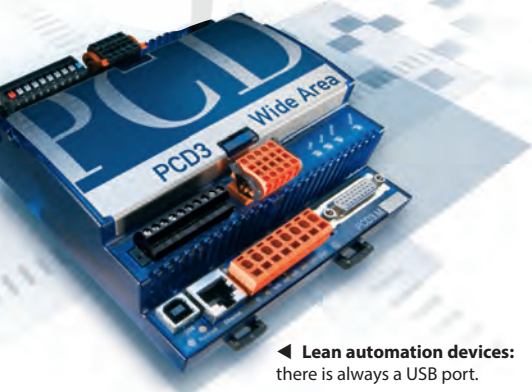
It is an advantage if existing ethernet network connections do not need to be opened or changed to carry out service and analysis work. It means that service personnel do not need any special network knowledge (IP, DHCP, etc.).

Open network connections alone generate many error messages that have to be processed. How many network failures are due to faulty input or mistakes? How much stress does this cause, and how much time does it waste? Lean automation should eliminate this problem source while still using Ethernet.



▲ Service personnel should not have to bother with this template!

The solution is simple – each automation device must have a standard USB port in addition to the Ethernet. As a universal interface, USB is always operational, everyone has it and it carries no serious risk of error. The only manufacturers who would dispense with a USB port are those who build minimum-cost equipment to make large amounts of money on service.



◀ **Lean automation devices:** there is always a USB port.

### The opposite scenario: «non-lean» technology

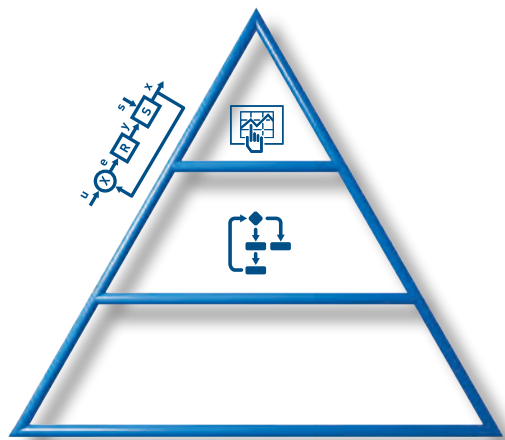
In contrast to the lean technology described above, we include here a number of examples of «non-lean» technology. In these cases, the comprehensive aims of lean automation cannot be achieved and circumstances actually work against them.



### Non-lean

#### Control loops closed over control levels – «non-lean» because of the lack of transparency and a guaranteed cycle of forced innovation

How can you lower costs for automation devices and force customers to be loyal? An example would be the use of PC technology's superfluous computing power at the control/management level for simple control tasks at the field level. Software updates and operating system upgrades mean cyclic insecurity, stress and expense. Due to the short life of PC technology, PC hardware has to be changed between three and five times during the life cycle of an automation system in a building. These are the most annoying highlights of automation that is anything but lean.



▲ **Source of the problem:** The control loops are closed over the control/management levels.

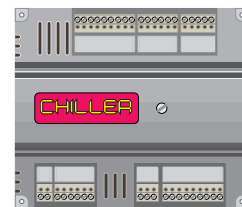


### Non-lean

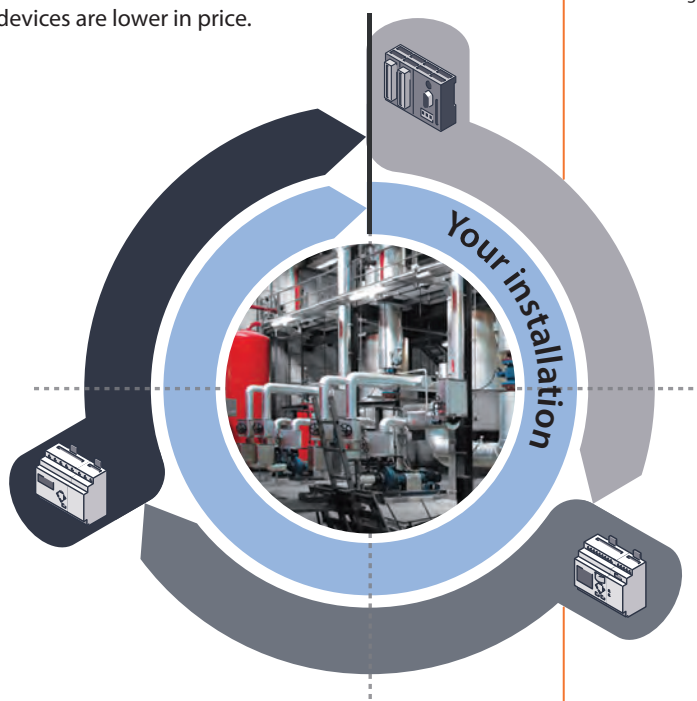
#### Dedicated controllers represent an enormous risk and are extremely costly when they fail

Moreover, the «Perfect Fit» status is not achievable, because the automation system cannot be adapted simply or securely.

If the entire functionality of a piece of automation hardware is contained on a circuit board, development and production will cost less than connecting individual system modules via a high-quality connector system. Moreover, the majority of dedicated controllers are not freely programmable. Their limited functionality cuts costs on presales, support and distribution. That is the main reason why dedicated devices are lower in price.



▲ Example of a dedicated controller in refrigeration technology.



▲ Dedicated controllers often have to be replaced 2 or 3 times over the life cycle of an installation

There are many disadvantages to dedicated controllers. Often, the fixed I/Os already prove to be insufficient at the first adjustment or expansion. This results in limited communication options. So dedicated controllers can be sold two to three times over the life cycle of the facility – a lucrative business for the manufacturer.



When there are electrical faults and failures due to I/Os, dedicated controllers again have definite drawbacks. Instead of one I/O module, the entire device including CPU must be replaced. This requires service personnel with specialist knowledge, carries a higher possibility of error and costs more. When the replacement device is not fully compatible in terms of functionality and programming, software engineering is required. The smallest thing can turn into a major project requiring qualified specialist personnel and long shutdown periods. Anything but «lean».



**«Self-build» control devices are not lean as there are multiple opportunities for error, unclear responsibility and too much small print.**

How can you win the control panel manufacturer as a sales partner when dealing with investors and operators? That is the question asked by many electronics manufacturers.

The answer: Hand over some added value and much of the responsibility to the control panel builder. That reduces the cost of materials in his calculations. At the same time, he gains access to the lucrative after-sales business. To service this kind of «non-lean» technology, his own specific technical qualification is needed, for which he is well paid. In practice, these are the home-made control units, which consist of horizontally arranged slices of electronics.

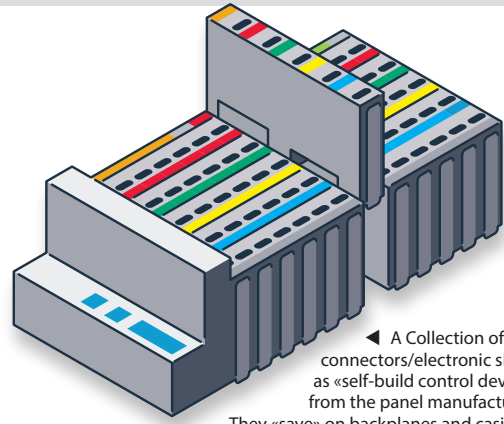
It is such a simple and profitable model that there is now a vast array of products on the market that qualified electrical specialists eagerly recommend to operators, investors and planners.

The target audience believe they are buying control and automation equipment. But there is no mention of this on the manufacturer's page. There people can read about bus terminals, intelligent bus couplers and I/O systems – but the word «PLC» is deliberately avoided. That would require delivery of a proper device, meeting the relevant quality standards for PLC equipment (IEC 61131-2). But such a device only exists in the eyes of the expectant beholder – nowhere else.

What is the technology behind these «Made by the panel manufacturer» automation devices, and what are the implications in terms of achieving the aims of lean automation?

You save on a backplane and module carriers. With qualified, careful electrical specialists for assembly and innovative contact technology, you can save on the cost of a robust, solid casing and expensive plugs.

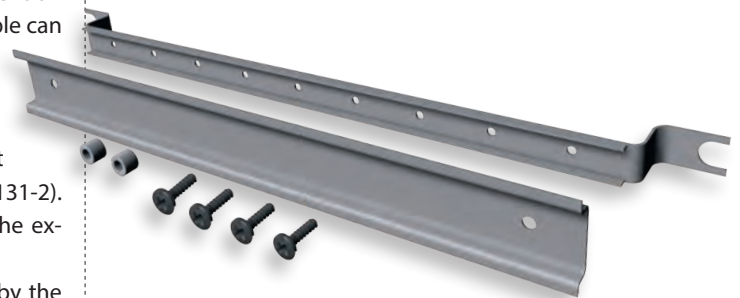
The DIN rail becomes the backbone of the «self-build automation device».



◀ A Collection of bus connectors/electronic slices as «self-build control device» from the panel manufacturer. They «save» on backplanes and casings. The DIN rail must look after that.

The manufacturer delivers building blocks, or modules, a special high-grade DIN rail mounting and a comprehensive manual for assembly and operation. The core of this homemade «self-build controller» is the DIN rail. Everything else is built onto it. In mechanical and electrical terms, it is both the backbone and also the Achilles' heel of the system. The largest manufacturer of slice kits for self-build controllers stipulates in the operating instructions for each slice that the DIN-rail must be obtained from the manufacturer, or alternatively that the cabinet must be removed by the manufacturer's engineer, because otherwise the whole system is not CE-compliant. The same applies, of course, to every modification made during the life cycle.

If these very restrictive conditions and 46 pages of assembly instructions are not followed, CE compliance is lost!



▲ The DIN mounting rail is the backbone of «self-build automation devices» from the control panel manufacturer. It must be obtained from the electronics manufacturer, which in practice is almost never done. The rail, as the backbone, must not be bent, but no one notices this at the time of inspection. When the mounting tension of initial acceptance subsides, some rather worrying effects and problems arise and their causes are difficult to pinpoint.

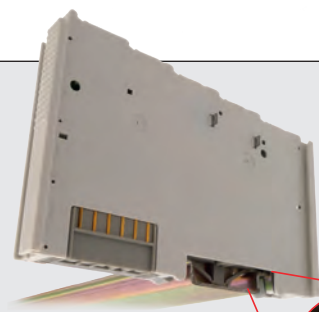


▲ Front image: Tangle of cables in a slice-type control system. Horribly complex and error-prone when it comes to servicing.

In addition to the manual for all the slices, there are 46 pages of information to increase reliability.



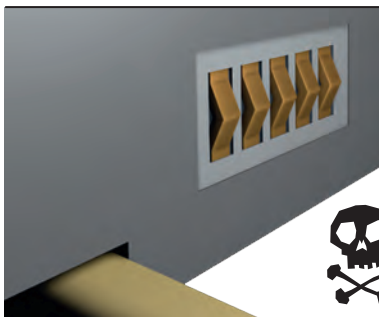
not resistant  
insulating  
slices (found in  
be ruled out that  
the component  
should be installed  
stant. Generally speak-  
materials should be used  
forementioned materials






DIN-Rail

**The Achilles' heel of the system:** the ground connection of individual bus terminals on slice.





-  **Attention:** The bus terminals should not be placed on the gold spring contacts in order to avoid contamination and scratches
-  **Attention:** Dirty contacts can be cleaned with oil-free compressed air or with ethyl alcohol and a leather cloth.
-  **NB:** It is important to ensure proper contact between the rail and contact rail.



**▲ Non-lean**  
Leather cloths are required by assembly personnel; also non-greasy compressed air, alcohol and clean working practices are prerequisites for electrical assembly.

**What if the technical instructions in the manufacturer’s manual cannot be checked?**

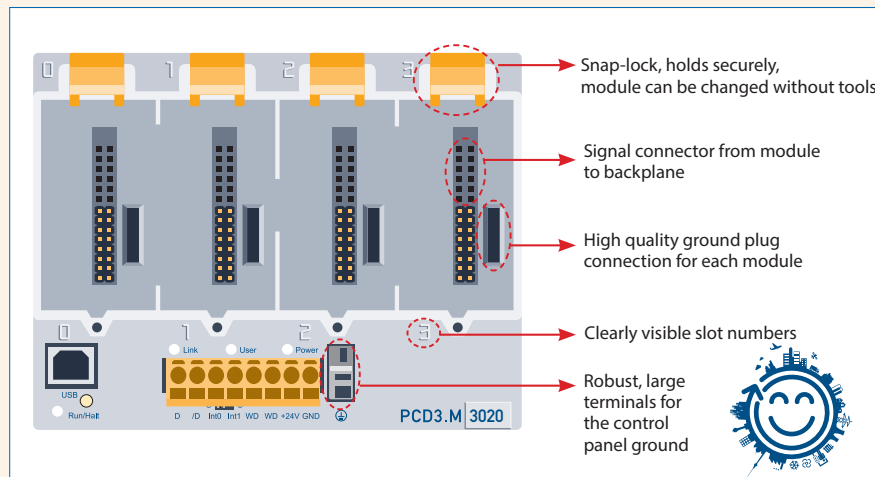
Last but not least, such self-build control devices have more than one Achilles’ heel. The individual slice-type bus terminals are each hooked up to the next terminal and connected together with spring contacts on their sides. That is why the slices should never be placed on a rough or dirty surface, and always handled with care and non-greasy fingers. If this instruction is not followed, the advice is to

clean the contacts with alcohol and leather cloth. When everything is clean and correctly assembled, it would be ideal if nothing went wrong: to change a single module, you need to read and understand 46 pages. The probability of error is also very high, as every wire has to be plugged back in correctly – particularly if staff are unskilled and unmotivated!

**Lean automation devices compared with «non-lean» self-build, slice-type collections**

Automation devices structured according to lean principles are designed to have easy, reliable possibilities for assembly and service. It is good to be able to recognize a lean design. The following is a description based on the PCD3.

The automation device needs a stable backbone in the form of an integrated casing with backplane bus. Each interface module is inserted into a module slot marked in large letters. Everything can be done straightaway and without error: no tools or special knowledge required. There is no Achilles’ heel or 46-page instructions for assembly containing one warranty exemption after another. The control devices function reliably as a system for 15–20 years and are simple and quick to extend.

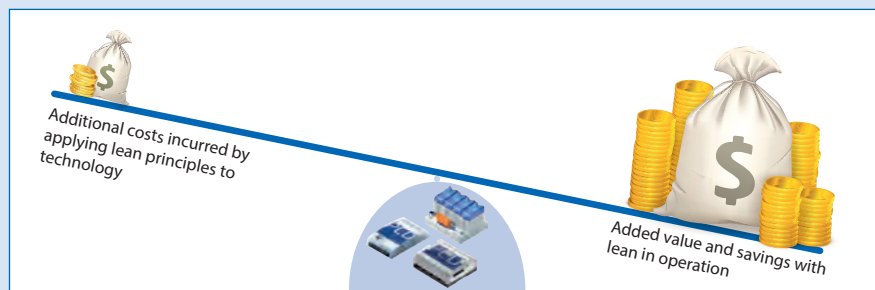


**▲ Front view of PCD3.M CPU sockets**  
A little extra expenditure on design and materials ensures optimum functionality for today and for future generations. Regardless of the quality of the rail, care of the installation and the specific qualifications of personnel, the major sources of error are eliminated by the system. That is what lean means to us.



**Summary: Lean automation technology**

Lean design means automation technology with huge benefits. Slightly higher costs for design and manufacturing are more than balanced out after only a short time in operation. With «Cheap in Mind» design, although the initial investment is lower, this is at the expense of later operators and owners.



**▲ The additional costs of lean automation provide a huge benefit compared to «non-lean».**

## Lean products: Examples

Lean automation sets itself an ambitious target: with half the number of qualified personnel, it should be possible to double automation at no extra cost. We have committed ourselves to lean concepts and aims throughout our company. This is most apparent in the type of products we produce for automation technology. A small selection of new products and development projects is presented below. They are a powerful demonstration of how we are working to promote lean automation.

Author: Jürgen Lauber

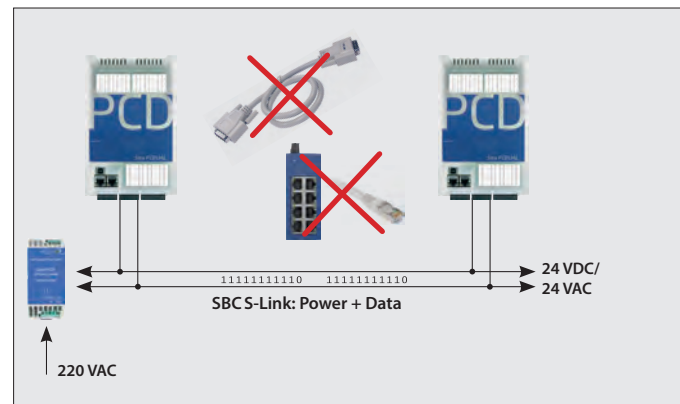


### Example 1: Lean communication between controllers

*SBC S-Link: Thanks to data communication via the 24-volt supply cable, no additional cables, plans, special material, training etc. are needed.*

Since summer 2011, pilot installations for a new type of communication between control technology devices have been running. For the first time therefore, the new PCD1 line now has the «SBC S-Link» option. S-Link stands for Supply Link. The 24-volt supply cable between devices is also used for data communication. There is no longer any need for a separate RS-485 or Ethernet cable for communications between SBC automation devices.

This is an absolute novelty in an industrial-quality automation system. All devices are plugged into the same voltage supply, which also carries communication. For further information see page 90 of Control News 13.



▲ Schematic diagram of «SBC S-Link»: System design with PCD1. Communication happens without a dedicated cable connection.



▲ The SBC S-Link options module for PCD1



### Example 2: A dedicated device that is freely programmable and expandable

*Lean: Everyone can use it to produce solutions quickly and reliably. «Basic Fit» status can be attained immediately and everything is in place for «Perfect Fit» automation.*

When it comes to energy saving, it goes without saying that «fat, complex» technology has no place. It must be lean. The system should cost little right up to final installation and existing staff must not need any special knowledge to operate it. At the same time it must be adaptable and extensible, because the best ways of sustainably improving energy efficiency can only be identified when data has been collected over a long period of time.

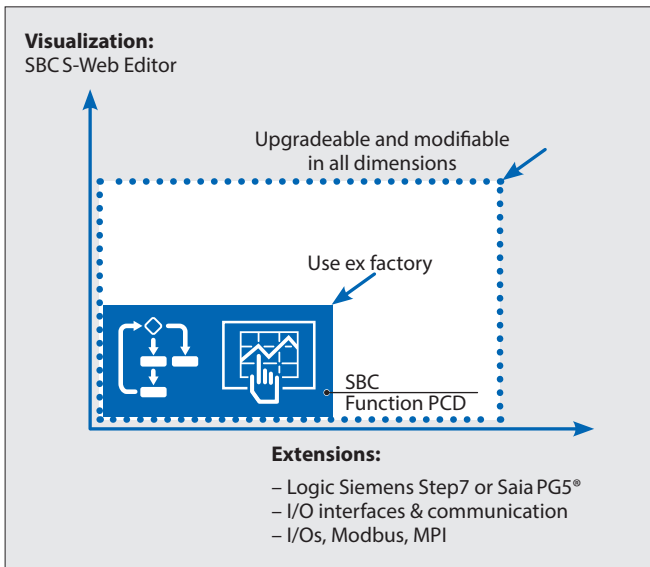
With the SBC Energy Manager and associated bus-based energy counters, Saia Burgess Controls has created the perfect lean monitoring and control system. The system was launched on the market in 2010. It was even sold via a webshop – with remarkable success. The first 20 «pilot purchasers» commissioned the system practically on their own and to their complete satisfaction. We surveyed the first 20 purchasers by telephone or in person and received very positive feedback about this lean system. Everyone managed to cope without any specific training. A system that is easy to get up and running is not in itself lean. Simplicity alone is not enough, just a necessary foundation. The decisive factor is the system's ability to have sufficient basic functionality to achieve «Basic Fit» status rapidly. At the same time, it must be so flexible and open that «Perfect Fit» status can be achieved with certainty for all user groups and requirements.

«Out of the box» technology can be used instantly: just unpack, install, and use, without engineering or programming.



◀ System picture S-Energy manager 5.7" with bus-coupled energy meters





▲ The S-Energy Manager runs 1:1 even on mobile end-devices. With iTunes, the S-Energy app is available at the low price of 0.79 EUR for all participants.

◀ To achieve a sustainable «Perfect Fit», adaptability and expandability must be present in all respects throughout the 15 to 20 year life cycle.

**Example 3: Free management/control software for the optimization phase**

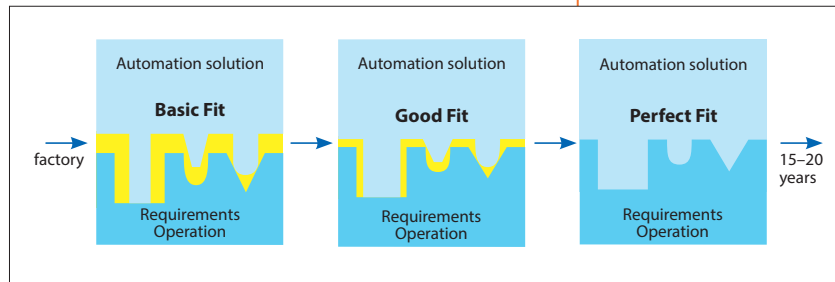
*Lean: After acceptance, a facility is not finished, but rather at the beginning of the optimization phase. Optimization of the whole automation system must be simple, cheap and secure throughout the life cycle.*



One of the fundamental principles of lean automation is to set up the project process so that a comprehensive optimization phase is planned from the outset. In this context, it is vital that during the implementation phase a technology is used that can be modified and extended very simply, cheaply and safely. Otherwise, during tender and award of contract, unforeseeable or undefined requirements become an expensive afterthought or completely impossible to implement. They become an annoyance throughout the operation phase. In order to allow an optimization phase throughout the life cycle of 15 to 20 years, modular, freely programmable devices in industrial PLC quality are the tried and tested tools for all automation levels.

But what about cross-plant optimization over the entire automation level, with a large number of control and automation stations?

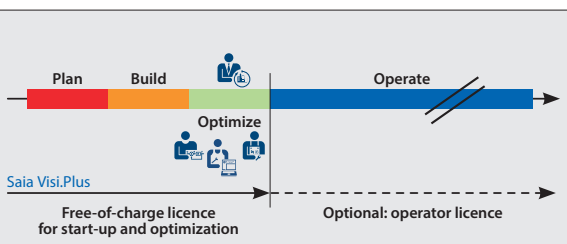
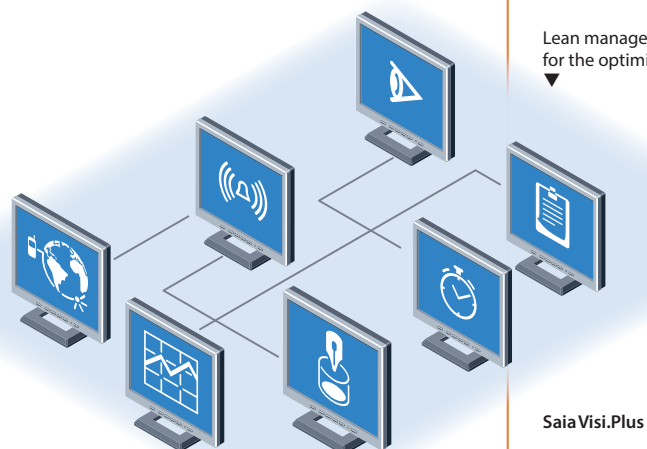
To make continuous «Lean» integration possible, Saia Burgess Controls offers the PC-based management software, «SaiaVisi.Plus». This was developed especially for managing multiple SaiaPCD® automation devices. SaiaVisi.Plus supports the user even at the



engineering phase of the automations level and during start-up. Since 2011, SaiaPCD® system integrators and qualified operators have been able to use SaiaVisi.Plus at no licensing cost for the entire optimization phase.

▲ «Basic Fit» straight from the factory – then experience is accumulated and adjustments made «Perfect Fit» throughout the life cycle.

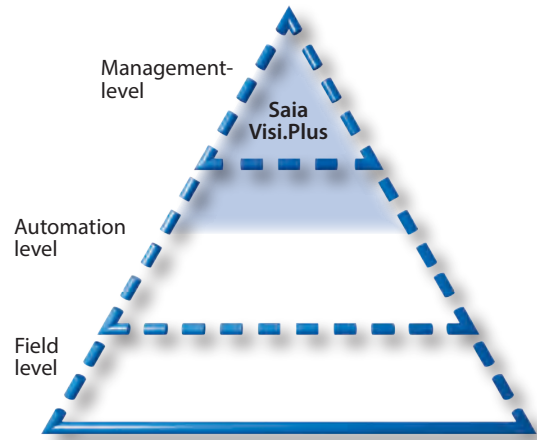
Lean management level for the optimization phase



▲ In the green «optimization» phase, the facility is operated with a conscious intention to learn and correct.

A licence must only be purchased when an operator or owner decides to use SaiaVisi.Plus as the long-term management/control system.

Up until that point, SaiaVisi.Plus is simply an integral part of the lean SaiaPCD® automation system and can be used free of charge. For a manufacturer that is lean and has subscribed to lean, lean automation does not stop with hardware or acceptance. Only when «Perfect Fit» status has been achieved after the optimization phase, i.e. when all the requirements of the current operator and users have been met in full, is the cornerstone of lean automation in place. PC software such as Saia Visi.Plus makes optimization secure at no extra cost, even for complex facilities and buildings.



▲ SaiaVisi.Plus is based on the engineering of Saia PCD® automation level, so that the optimization tool can be used free of charge, with little effort or trouble.



#### Example 4: A completely new product line under development – specially designed for lean automation

*Lean technology is robust and flexible in installation and operation. Sources of error and complexity have been systematically eliminated. Now everyone can automate.*

Our existing technology and product range based on the formula «PLC + IT + Web = Saia PCD®» already corresponds well to the ideal lean automation device. However, the design means that an automation panel and qualified personnel are required for assembly. To eliminate this restriction we have begun to develop a completely new product line. The SBCE-Line devices are fully compatible with DIN 43880 and can be handled reliably by any interested party. They are just as effective in the electrical distribution panel as in the automation control panel.



Sample SBCE-Line 35 mm width case



#### Design study:

SBCE-Line products in the electrical control panel with 17.5, 35, 70 or 105 mm construction widths.

The SBCE-Line is the first product line on the market to have been wholly developed for lean automation and to comply with DIN 43880. It breaks with all the paradigms for electronics installation technology currently on the market.

The products have an attractive look and feel and are full of new, innovative technology. We took inspiration from our neighbours the Swatch Group (20 km from us as the crow flies).

- The products are developed and manufactured according to strict PLC device hardware standards IEC 61131-2. We are remaining true to ourselves. Once installed, they have no expiry date.
- Hot Plug allows modules to be removed under tension. That makes changing them simple, quick and safe. We have therefore implemented a feature that is otherwise only known in process automation and is relatively costly.
- Simply snap on the DIN rail, tighten a screw and you're done. This connects the device to the power supply and the communication bus (see also Appendix SBC S-Link page 90).

In brief: We have packed all the new technology of the last 5 years into this new line, along with all our innovative spirit. Be excited – in 2012 the first products will be launched.



▲ The SBCE-Line, version for automation control panel.

# The path to lean

## Personal experiences with lean

How did the author experience his own path to lean? What did Saia Burgess Controls go through as a company in the changeover process and what are the consequent results and perspectives?

Author: Jürgen Lauber

The beginning for me was an invitation from our new owner in summer 2006 to attend an intensive week of lean training in Japan. It was the express wish of my boss that I should experience Japanese production culture in the country itself and at first hand through an institute that grew out of Toyota. I «avoided» the suggestion for another year. The trip in October 2007 was a culture shock for me there was no adviser, no powerpoint presentations, no patent solutions I was simply «forced» to go to a different Japanese manufacturer every day (e.g. Hitachi, Toyota, a large confectioners, etc.) to see production, have a look around and reflect. Pencil, paper and flip chart were the only tools. When I came back from the trip, I resolved to apply what I had seen and learned. I put more people in the factory. Without more staff it simply wasn't possible to start applying the basic principles of lean production. Our costs went up and no one could calculate any ROI. At the same time we (like Toyota) had begun to build our means of production individually using the «Creform» Material Handling System. A substantial proportion of our old production equipment was replaced in this way. Dedicated items, such as trolleys, massive tables and welded devices disappeared into oblivion in their hundreds in the following years. They had been replaced with simple, but by no means «cheap» solutions.

Why the expense? We wanted our future production to be highly flexible and adaptable. Everything in the production process should be a 100% match for the application, so as to achieve «Perfect Fit». From then on it was our production colleagues who decided how things would be completed rather than specialists and engineering experts drawn in from outside. Simple, practical solutions on the ground instead of complex, theoretical solutions from above – bottom up, instead of top-down.



**The Creform workshop for lean production resources:**  
All production equipment is made to be the «Perfect Fit» for tasks and users.

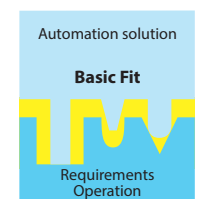


### The Creform Workshop: Our base for lean production

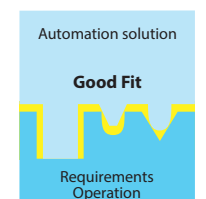
In 2008 we began sending 3 or 4 colleagues per year to experience a week in Japanese production plants. All key staff members could therefore experience lean production and Kaizen in situ, where it all began.

At Saia Burgess Controls we reconfigured most of our production in accordance with lean methods and concepts. The before/after comparison speaks volumes.

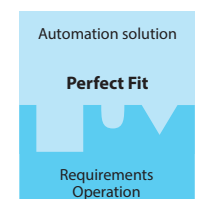
◀ **Creform:** the lean basis for Toyota's production Creform – Standard structure – Modular devices for lean production. This is a picture from Saia Burgess Controls production.



**Basic Fit:**  
Basic function achieved



**Good Fit:**  
Optimization completed



**Perfect Fit:**  
no gaps





**SBC Production before lean:** Distributed units and lots of material in circulation = fragmentation of responsibility.



**The same production configured as lean:** A single person can create a complete product in a few minutes – from the assembly of the printed circuit board to packaging for dispatch.



▲  
People feel better with Lean  
– less hectic, less stress,  
fewer grey areas.

At the beginning, every change was viewed with scepticism and lots of counter-arguments were put forward. During implementation, 3–5% of employees had problems and were not compatible with lean methods of working. For the remaining 95% of staff, the switch to lean proved to be a very sustainable and positive experience.

They feel they are taken seriously as drivers of added value, rather than unavoidable overhead costs as previously. It is very impressive to see how quickly and confidently new employees cope with «lean» production processes. Exceptionally dedicated specialist personnel are no longer needed. Qualification takes less time. Apart from teething problems, quality and productivity matches that of long-serving staff!

**Measurable experiences and perspectives of Lean**

The effects have been just as positive for the company as for staff. This fact can also be measured and expressed in financial terms.

An example is the processing time for complete production of a device, including all the necessary circuit boards. For small devices, this has been reduced from an average of 17.5 days to 3.8 days.

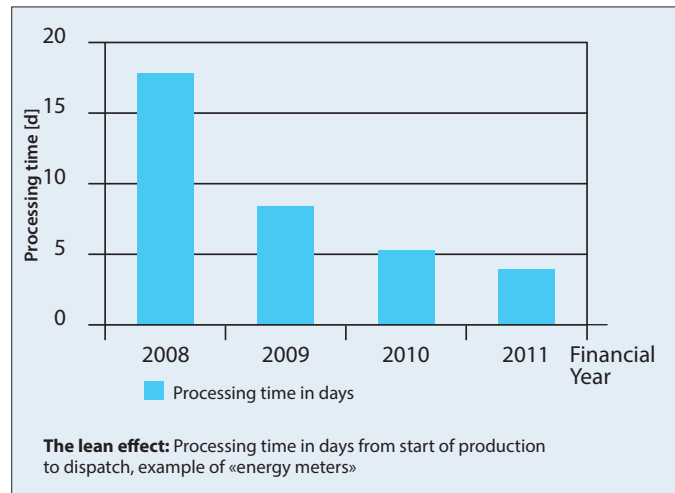
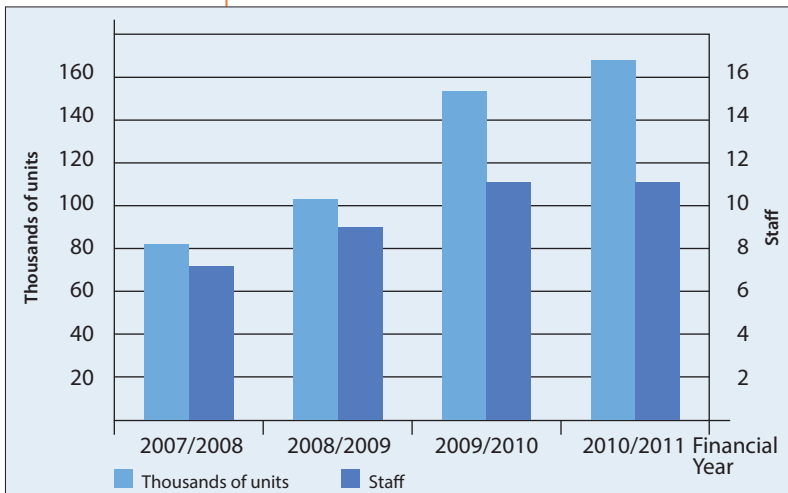
Simultaneously, capital expenditure for goods in the warehouse or in progress has decreased by 30% in 3 years, while production volume has grown by 40% during the same period.

Delivery performance and reliability actually increased, with lower stock levels and reduced work-in-progress volumes. 80% of deliveries from the factory were made within 48 hours and, in general, over 95% of deadlines were met.

**The meaning of Lean for our company**

Switching to lean has made our factory in Switzerland so efficient and fast that, even with today's very strong Swiss franc, we have managed to cope very well indeed. Following on from these successes, we have now started extending the application of lean beyond production and into all other areas of the company. This should allow us to continue growing sustainably in line with demographic trends, reducing resource use and maintaining healthy profitability. The key to our growth lies in rigorously designing and orienting our products for lean automation, because lean automation has the same positive effects for our customers as lean production has for us. «Lean» will become ever more established.

▲  
**Lean:**  
Energy meter production,  
volumes and staff numbers.  
24% efficiency increase  
between 2008 and 2011.



Interview

INTERVIEW

## The path to SBC as a lean company

### Perspectives of an independent external auditor to ISO 9001

About him: Hermann Widmer is approved for the certification of management systems to ISO 9001, ISO 14001, OHSAS 18001 and ISO/TS 16949. Since 1993 he has worked at the SQS (Swiss Association for Quality and Management System) as a senior auditor carrying out so-called third party audits as a neutral, independent auditor.

#### Mr Widmer and Saia Burgess Controls:

Since 2002, he has reviewed the implementation of the management system at Saia-Burgess Controls AG during the annual two-day maintenance audits. Every third year recertification takes place across the whole

management system, for which another, independent auditor is used. By 2009, these audits took place on the basis of the management system C-Net 1.x version. In 2010, business processes and organization took a more systematic approach to Lean. Accordingly, the management system C-Net was replaced with a new Lean version 2.0. Successful ISO 9001:2008 certification of the Lean Systems was completed in December 2010. The first maintenance audit took place in November 2011.

Owing to his profound and longstanding knowledge of the company, Mr. Widmer was able to answer the following questions to evaluate the visible progress.

#### How would you describe the company's development since its first audit in 2002?

I think that the decision to introduce the new, process-oriented C.Net management system was a crucial step in the company's development. In my view, the way the processes were presented, with their sequences and interactions, was excellent for corporate activity. The processes were presented transparently and the process owners have profiled new, useful tools year after year and built them into the process to improve user-friendliness. This is only possible when the company management uses the management system, which was very noticeable in this case. That also made it possible to make a number of organizational changes (e.g. production factory 1 or 2) and thereby achieve permanent efficiency. Furthermore it was clear that the workplace benefited from modern facilities. This meant that staff skills were continually being improved.

#### What is your assessment of the company today?

I think the company is in a very strong position. It has a stable and expert leadership, well qualified personnel, a great product range with established customer value, and efficient production with custom manufacturing penetration. In contrast to other companies, it has grown consistently down the years. That is conclusive proof that many processes are effective and efficient.

#### What has changed in the QM system since the switch to lean production?

With the introduction of lean principles to the current management system, many processes have been changed. Processes were analysed and those considered a liability were thrown out to improve efficiency. The result of this was that the processes were presented differently and the «One Piece Flow» principles were integrated. This made it possible for us to manage existing growth in many manufacturing domains and to significantly improve processing times (e.g. with the KANBAN system) in our high-revenue areas (e.g. PDC3). This further improved transparency (e.g. Shadow Boards, work list displayed on screens) and led to almost paper-free production and good material flow.

#### What is your experience of the change towards a lean enterprise?

In addition to the progress already mentioned, I have been struck by the fact that «Lean» is a focus in all processes, not only in added value processes (e.g. in complaint handling). The aim has been to streamline and standardize the processes (e.g. the HR processes) and to increase efficiency that way.

#### What do you think of lean as the basis for a whole company, not just production?

It is a modern, comprehensive approach to increasing efficiency and effectiveness in all processes, and thus company performance.



Hermann Widmer

**SQS**

Swiss Association for Quality and Management Systems

## Kaizen in Lean companies

«Radical democratic» innovation process with ultimate «radical consequences» implementation of developed standards.

Author: Heinz Hirschi/affinitas ag

### Hyperinflation of the KAIZEN concept

Continual improvement processes (CIP), the 5S method, Just in Time...these are all classic methods applied by companies looking for an efficient way to add value. Since Toyota is known worldwide as a successful model of «lean» for quality and productivity, suddenly everyone wants to get in on Toyota's recipe for success. Kaizen is a key element of this. Few people know what that really is, but everyone's doing it. So the term Kaizen («changes for the better») is passed around a lot. It is widely used in Europe as a showcase for all kinds of optimization programs and activities. The reality in many companies is that the good old CIP continuous improvement process has simply been renamed «Kaizen». That's great, but it doesn't have a lot in common with Japanese methods.



Not lean: the management goes through the operation looking for improvements.

### Real Kaizen is radical and uncomfortable

A substantial and in-depth approach must be applied. Real Kaizen means deconstructing processes and activities ruthlessly down to the most detailed level, in order to put them back together in a better way and ultimately standardize them. The standards must be established and «pushed through», which is not always a pleasant process for managers. The extent of this deconstruction process is realized by constantly asking the question «why?» This in turn ultimately leads to the best possible solution, which then serves as the foundation for further improvements.

It is a cyclical process that in practice occurs jointly with staff in workshops, directly in production or in offices that are undergoing optimization (Genba, Japanese «at the site of happening»). The «bottom-up» approach applies here. Staff agree on the working method, leading to greater acceptance and sustainability.

Real optimization is initially possible in the operation phase rather than the planning phase, as no one can see the unforeseeable. Bosses and «wise old men» are deliberately eliminated in the workshops. Power and knowledge come «from below», from the foundation.

### Kaizen at SBC

Each year SBC staff undergo a week's training in Japanese facilities. Twice a year, the «Great Master» Moro San comes to local workshops in our Murten facilities. This ensures that we don't drift into pleasant, boss-led CIP methods.

In these workshops, SBC staff have a deep personal experience Genba-Kaizen with the Master. His Socratic approach to dialogue<sup>1)</sup> is very direct and based on constant questioning. So the focus is on solutions rather than problems. Real flexibility accompanied by practical and instant implementation is required – that's how lean is achieved.

Why is it done this way? What is the benefit of adding value to your work? How do I fix the problem? How do I achieve this goal?... Question after question, until you really get to the root of the problem and the approach to finding a solution is improved. All steps and activities are broken down, analyzed and evaluated. Anything unnecessary is eliminated, activities are combined in new ways and tested and then improvements are implemented immediately.

<sup>1)</sup> **The Socratic approach:** The aim of the Socratic dialogue is the common understanding of an issue on the basis of «question and answer». So the answer often provokes the next question. So by asking questions rather than by telling your interlocutor, you increase their capability for insight. (source: Wikipedia)

Kai  
改  
Change

Zen  
善  
Good



For staff members taking part in such a workshop for the first time, this questioning feels alien, at times burdensome and even frustrating – until you realize the intention behind it and the results that can be achieved. This leads to a new mindset, as one is drawn into this procedure and is challenged. The aim has to be to inculcate these founding principles into staff members from all areas. Only in this way can the whole company become lean.

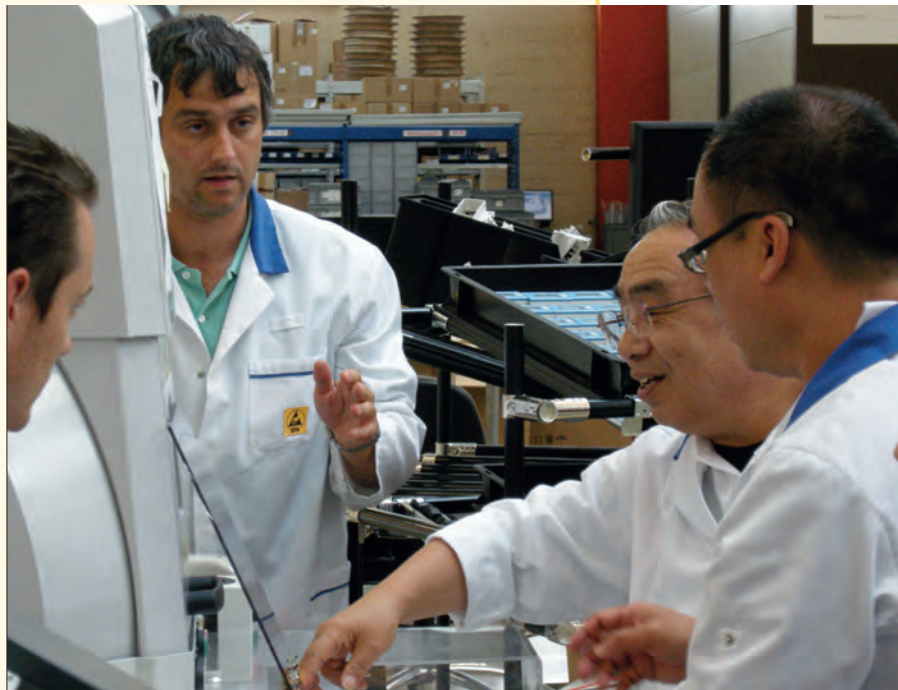
The aim should not be simply to adapt and optimize what already exists. No – the concept of the process must be questioned and altered. Often profound changes are needed to ensure sustainable improvements.

The example of superficial process improvements often cited is that of the industrialization process. In most manuals, this process is described as a sequential process designed to optimize cycle times, improve planning, etc, but in reality never happens. By contrast, industrialization is a generic cyclic sequence; it makes production as quick as possible, ensures experience can be checked and applied directly to one or more real-time revision loops until the release of production. This cyclic sequence has to be adjusted and be highly flexible.

### Examples of Kaizen in SBC's practice

In SBC's SMD production in Murten, the setup time for the provision of the components in the family setups was reduced from 3.5 hours to 1.5 hours.

In an additional workshop, the so-called «pit stop» for type changes to the SMD assembly lines was reduced from 1 hour to 35 minutes. Even in the first workshop, the target values set by the workshop team of 20% and 25% time savings were easily outstripped. This is thanks mainly to the strong personal support of Kaizen Master Mr Moro. Only a consistent approach that focuses on problem definition, root cause analysis and problem solving leads to sustainable improvements. With an average of 30 family setups and hence 30 pit stops per month, 72.5 hours per month were saved, during which time employees were free to perform other value-adding activities and the machines were also available for further production. These results are motivating and make you want more.



**The simple methods of Kaizen master Moro San:** Always questioning, disassembly of items into their component parts, focus on solutions (workshop results, see box).

If you think and behave as before, the potential for improvement can only partially be realized. Typical «Kaizen-killers»:

- It costs money; the status quo is not integrated enough and there is too rapid an investment in new operating facilities and equipment.
- It takes too long; there is no direct implementation of the improvements.
- You need specialist personnel; the solution approach is too complicated.

### Summary – becoming a lean company

You can't become a lean company without «real» Kaizen. Only an approach that is «radically democratic in finding solutions» and «radically consistent in the implementation of standards» leads to substantial and sustainable improvements.

The best way to learn it is to work with the Japanese. You learn it like in the old films. It's a potent medicine that works wonders.



Material trolleys for lean production: built for «Perfect Fit» – flexible, always adaptable and extensible.



Classic trolleys in production

# Lean energy monitoring and control

## The basis for secure and economical energy efficiency gains



▲ An ISO 50001 energy management system can be implemented without grandiose and expensive software solutions.

Energy management can be implemented either way. There is a great temptation to knock the issue on the head with a single, all-encompassing, all-powerful software solution. Years of experience and expertise can be bought in to shorten the personal learning curve. This current way of addressing energy management completely contradicts lean thinking; a long-term, sustainable approach is very uncertain.

Why is that so?

Author: Peter Steib

### Introducing energy management in house instead of «outsourcing»

Energy management should not be a closed case, but rather a continuous process. Modern buildings and industrial plants are flexible structures and are subject to continuous change. Buildings are renovated, rebuilt and extended. Machines and equipment are extended, moved in house or taken out of service. Here we sketch a rough picture of what happens when «Totally Integrated» energy management is introduced by the state. After a short while, the original system no longer matches the operational reality and costly improvements are needed. That's unfortunate if you are then relying on external specialists and are not yourself an active player. The introduction and especially the maintenance of a «Totally Integrated Power Management» is very costly and requires careful planning with specific objectives. And this at a time where neither is ex-

perience and knowledge about the current situation available nor about the resulting goals. In the absence of experience there is no guarantee of success, to say nothing of the return on investment (ROI). Often, therefore, the projects fail, and never become more than good intentions.

For those who understand energy management within the context of «lean», the first step is to develop an understanding of the situation. It is quickly recognized that most operators of real estate and industrial facilities already have the best experts in energy consumption at their disposal – their own operational personnel. People who interact daily with machines and installations develop a feel for the processes and know their weak spots very well. What is missing is the quantification and visualization of energy consumption. For the process of greater energy efficiency to become established, companies have a need for a simple measurement and visualization technique that can be applied and mastered primarily by employees. Only when specific numbers are available, initiated measures can be assessed and first successes may be recorded.

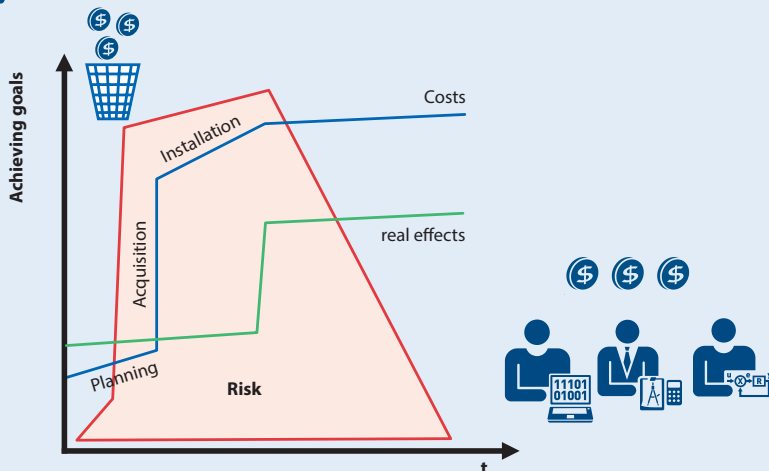
S-Energy from Saia Burgess Controls is an easy-to-use system that fully corresponds to the above requirements. It includes energy meters with an established technology, as well as control panels with evaluation and analysis functions, which work without local configuration and are ready to use immediately after turning on.

Thus equipped, the in-house electrician can install the first electrical energy measurement and display the consumption. After just a few days, feedback is obtained and the measures implemented begin to have an effect. Step by step, staff get to grips with the equipment and find themselves on a learning curve. It follows that by proceeding in this way, investment costs and risk are kept within acceptable limits. Thanks to the great flexibility of S-Energy, the system can at any time be adjusted, rebuilt or extended using in-house resources and without external help. S-Energy is ideal for continuous improvement and the ongoing extension of energy management in controlled steps.

### Putting all eggs in one basket:

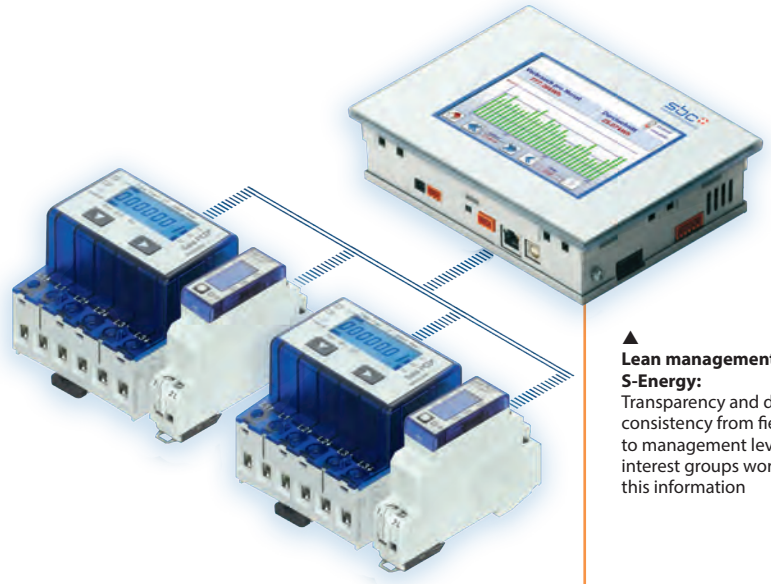
Investment without any guarantee of success. A high initial investment with an even higher risk – energy management in one fell swoop. Implementation and adjustments during operation require expensive experts.

### Total integrated Energy Management



**Expanding energy management and linking it with automation**

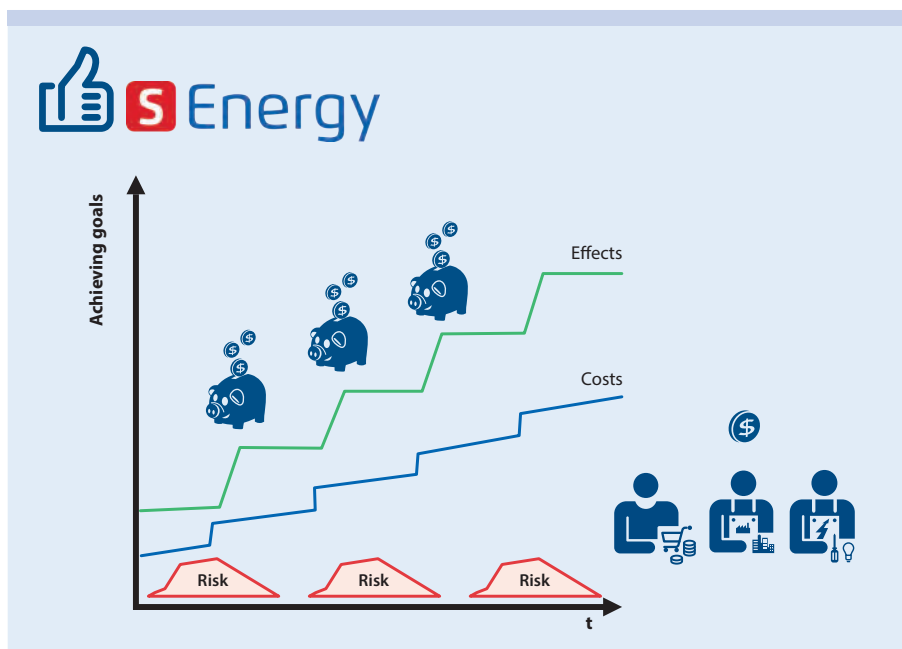
Even though at the outset the simplest available system can ease implementation, the gradual introduction of energy management must not lead to a dead end or create an obstacle to further expansion. In this initial phase, all the relevant energy users are gathered. Initial savings result from the identification and elimination of malfunctions as well as behavioral changes. If, for example, specific energy values should be used to calculate manufacturing costs, affect finance and accounting, or if through automation further efficiency gains are made, then simple measurements are no longer enough. It is a significant advantage when the system installed has its own interfaces and allows for expansion. S-Energy is a solid technical measurement basis for the further development of energy management. Collected energy values can be made available in Excel-compatible CSV-data or via SQL database for further analysis and processing. In automation projects, S-Energy shows the extent of its PLC-technology heritage: The programmer is free to design and adjust the user interface and function of the S-Energy Manager. A data exchange with other controllers is ensured by the support of common bus protocols. It is no coincidence that S-Energy fits seamlessly into the SaiaPCD® automation world. Thus an action is recorded at the control level from pure measurement and observation. Thus the energy management develops from a pure measuring



**Lean management with S-Energy:** Transparency and data consistency from field level to management level. All interest groups work with this information



and monitoring to a complex control system. What might begin as a simple inventory opens the door for automation projects for better energy balance, eventually leading to reduced energy consumption, lower costs, less CO<sub>2</sub> and cleaner consciences. Although Fukushima is now out of the media glare and has adopted an attitude of «keep calm and carry on», it is true that anyone who ignores the subject of energy today is storing up problems for tomorrow.



**Evolutionary steps rather than investment jumps.** Implementation of energy management in small, manageable steps, with a negligible limited risk leads to concrete results. First savings set up step by step. A controllable technology, such as S-Energy allows safe walking through the learning curve for operation with its own staff.





## PFC came out of PLC. Saia PCD® become SBC Functions-PCD

Why a new class of device? «Lean Automation» aims to provide twice as much automation at no extra cost and with half the number of qualified personnel.

This is feasible only if there are new types of automation systems. Author: Jürgen Lauber



At its simplest, automation uses the old-style «dedicated controller» type of device. These provide a fixed set of functions. Thus anyone without special skills or substantial training can achieve basic functioning of control and automation solutions. Lean Automation means having the possibility to optimize functionality and expand freely. For the life cycle of the facility, an automation system must always be modifiable and upgradeable so it can be adapted to changing operating conditions. That's not possible with dedicated controllers. Freely programmable PLC technology is much more flexible.

But it requires a specialist programmer. It is too demanding for those without specialist qualifications. The available products are not really suited to lean automation. So a whole new class of device is needed. Evolution, not revolution, is required. The existing PLC (Programmable Logic Controller) has given rise to the PFC (Programmable Function Controller). Saia PCD® developed into SBC Functions-PCD. This combines the advantages of dedicated controllers with the strengths of PLC technology. Weaknesses and disadvantages are eliminated.

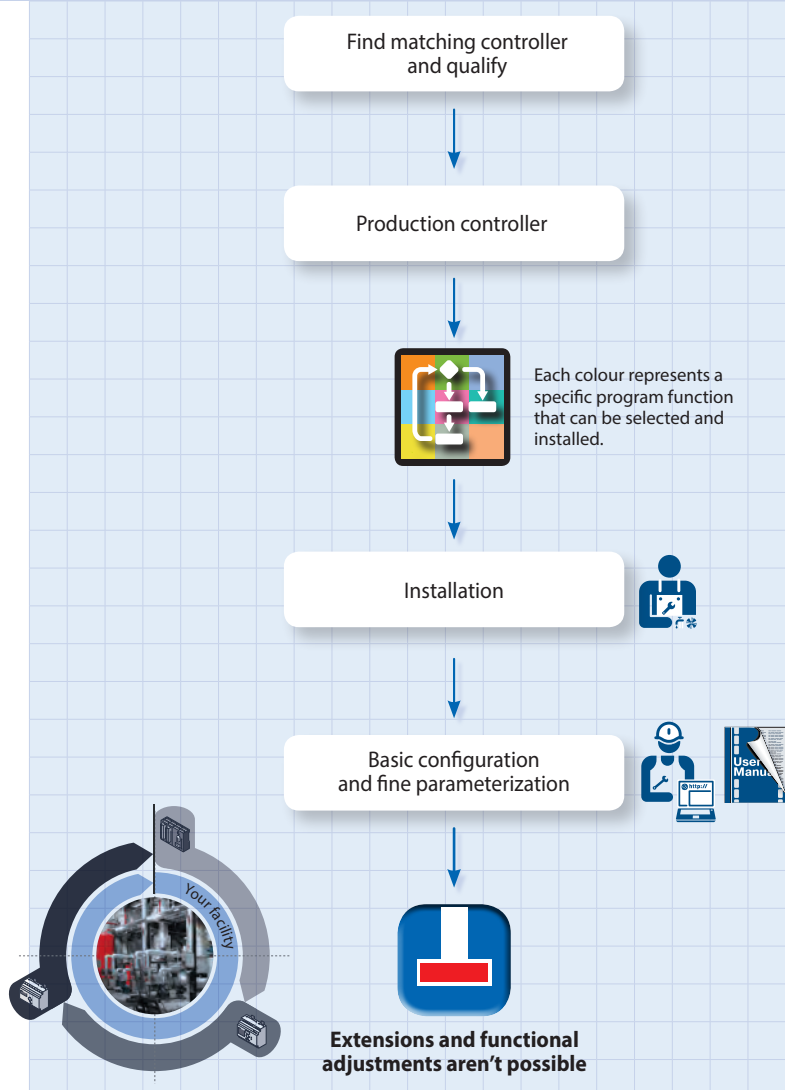
### Workflow description:

#### Automation with dedicated controls

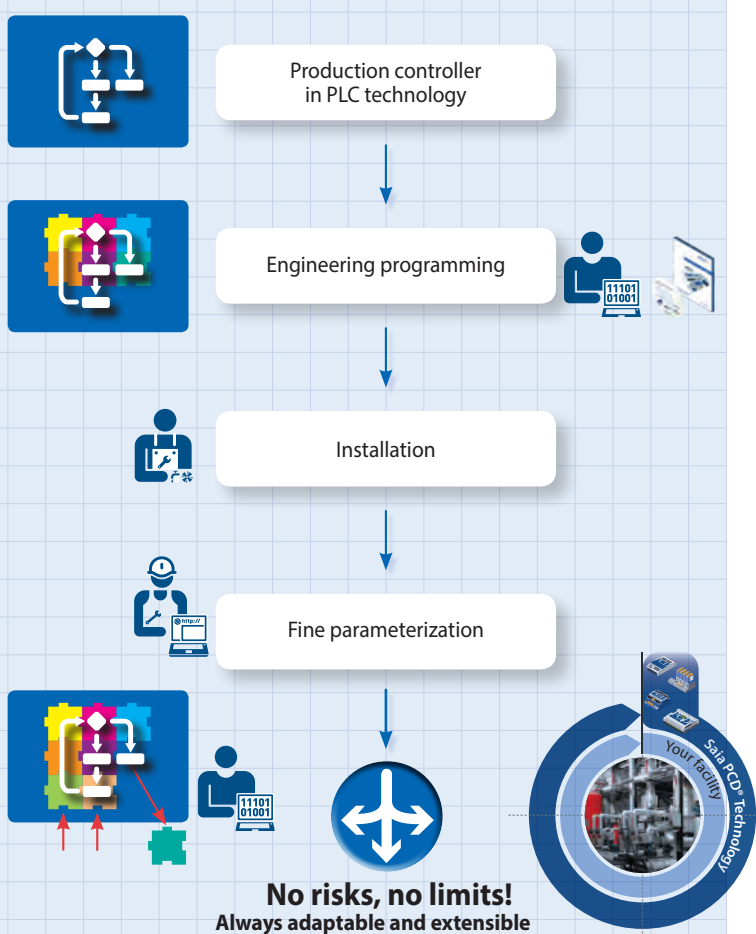
A device manufacturer takes a cheap hardware and equips them with classic features. A program is written in order to cover a wide variety of possible applications that can be realized with the integrated I/O level. The fact that the dedicated controller has to cover such a range of applications means that its internal structure is often confusing. Expertise and time is needed to choose the «right» controller. Once it has been chosen, it is configured according to hundreds of parameters for individual use. A thick manual and configuration software are required in order to master the complexity of the choices available.

If the dedicated controller is used in a real facility and correctly configured by service technicians, the equipment will run without individual programming or special software engineering.

In Direct Digital Control for building automation, there is a particular form of the dedicated controller. Instead of delivering the hardware with the programmes already installed, the required program components are selected from facility displays using application software and loaded onto the controller. But the device is not freely programmable.



It's a tantalizing path into a functional impasse.



**Workflow description:**

**free programmable modular PLC**

The manufacturer supplies a hardware platform and provides engineering software and standard software modules for application development. To create the application requires a technician familiar with the graphical engineering and programming system. After installing the hardware and loading the application into the controller, the system can be optimized by a service technician via web browser.

With Saia Burgess Controls and the Engineering Software SaiaPG5® Controls Suite the application can be adapted or extended over the entire life cycle of the application. Any time the modules blocks can be rearranged or added. This is necessary if the plant is to be extended with new functionality or new hardware. With appropriate programming knowledge, you can create your own modules if no standard modules exist. Specific functions and new requirements can also be packaged in the new software modules.

The hardware platforms of the SaiaPCD® controllers are much more powerful than a dedicated controller and are built in a modular design. These are mandatory prerequisite for ensuring that the hardware platform can be kept up to date over 15 years.

The only disadvantage of the PLC technology is that it cannot be used without engineering and programming skills. At the time of delivery from the factory, the PLC is «empty» and still must be programmed.

◀ The secure way to a sustainable solution

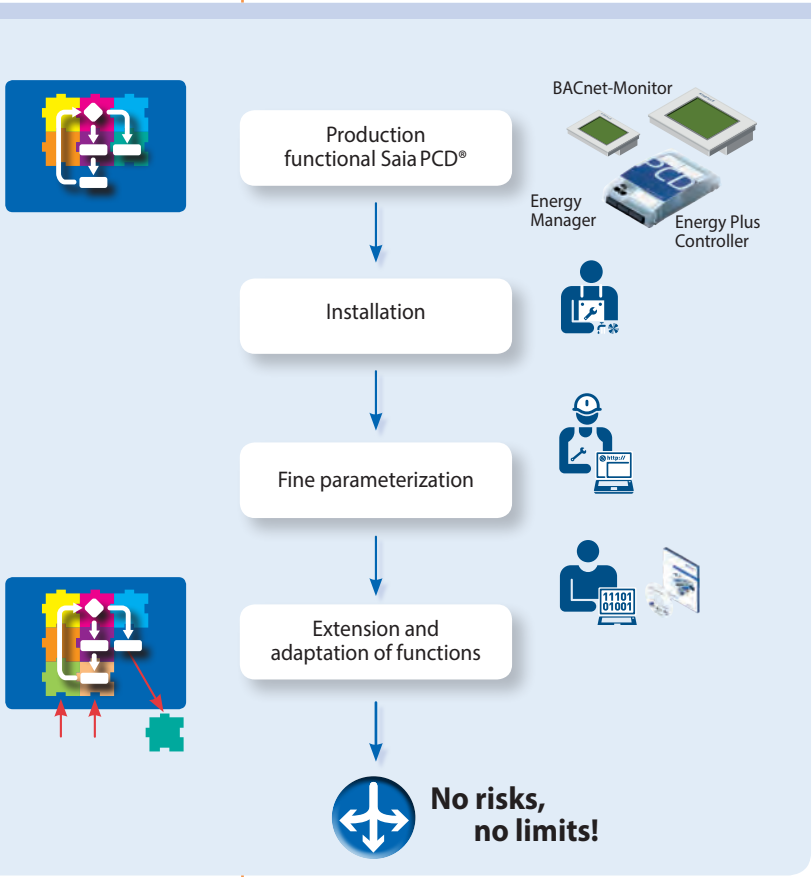
**New workflow: SBC Function-PCD**

The SBCFunction-PCD is a new class of control and automation devices – PFC (Programmable Function Controller) is derived from the PLC (Programmable Logic Controller).

The SBCFunction-PCD comes equipped with factory-standard application software. The hardware platform is very powerful and leaves plenty of room for enhancements and changes throughout the life cycle of a plant.

During commissioning and service the SBCFunctions-PCD behaves similarly to a dedicated controller. Thanks to the manageable core functionality, it is easy and safe to handle. Moreover the SBCFunctions-PCD is free programmable. Therefore, it is not necessary to install a comprehensive application at the point of delivery that covers every type of user requirement, and that is hardly manageable with complex parameters and configuration tables.

The pre-installed core application can be extended at any time using Saia PG5® Controls Suite engineering software to include more functions. The possibility of changing and adapting the application freely at any time is the reason for keeping the pre-installed core application simple and manageable. Requirements that were not foreseeable at initial installation and additional requests from the operator can easily and safely be implemented at any time. The first product that Saia Burgess Controls has produced in this form was the SBC S-Energy Manager. Plans are under way for the BACnet™ monitor and the Energy Plus controller based on the PCD1.



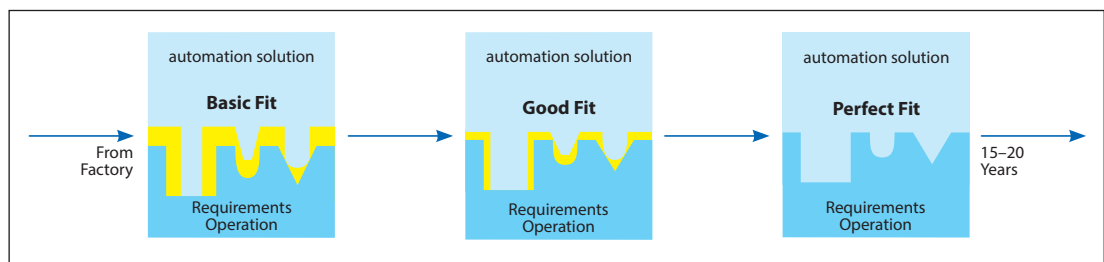
◀ SBC Function-PCD enable everyone to find a solution quickly and safely. An expert can then make changes and extensions if required.

**Summary SBC Function-PCD**

SBCFunction-PCD are lean automation in its purest form. The engineering time for a «Good Fit» and «Perfect Fit» automation solution is much shorter in comparison to equipment based on standard PLC technology. This saves money and time. Many complex functions are al-

ready installed and can be used straight away, so that few qualified personnel resources are needed. Adaptations and extensions are possible over the entire life cycle, meaning that «Good Fit» and «Perfect Fit» are easily achievable. This significantly reduces long-term operating costs and increases user and operator satisfaction.

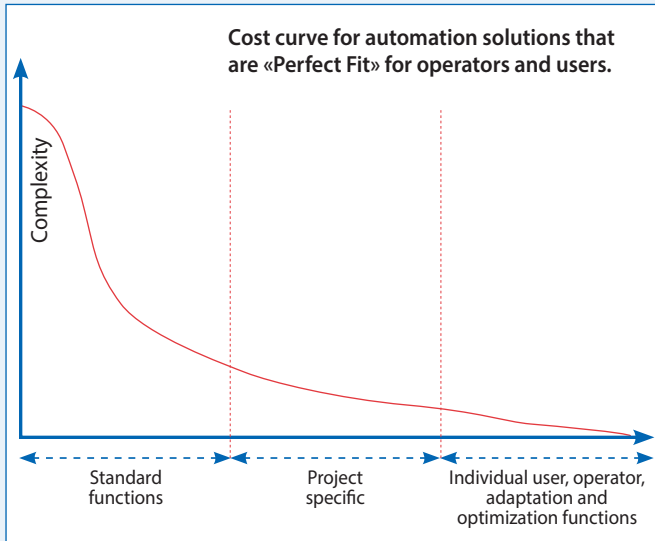
► **Lean automation:** safe and efficient in achieving the «Perfect Fit» – as defined by operators and users





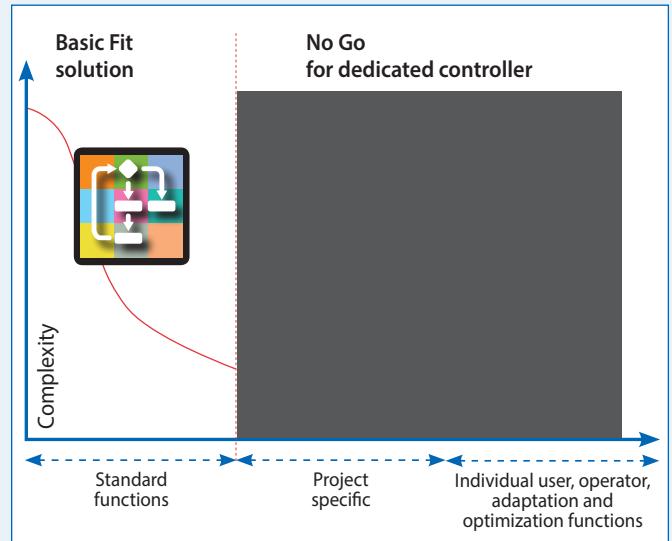
**Analysis of application software development effort**

Here we consider SBC Function-PCD from an integration perspective rather than in terms of workflow: What is the cost and what control and automation expertise is needed?



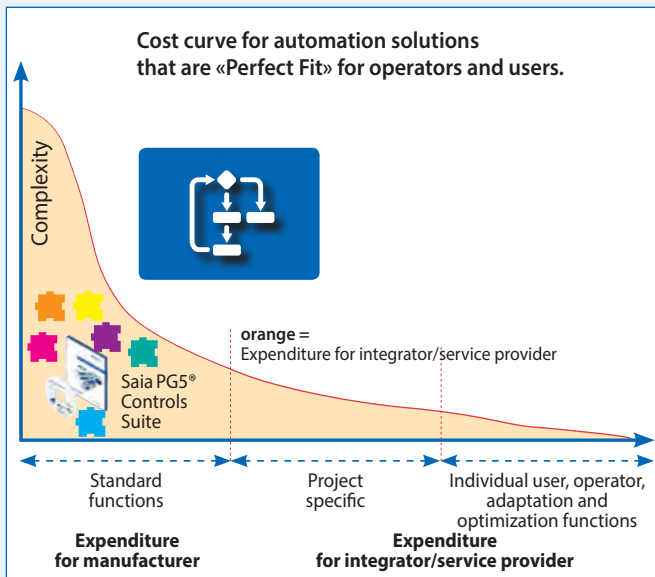
▲ The area under the curve represents the effort it takes to create the application software for an automation solution.

The basis of this analysis is the average overall cost of creating application software for a project – regardless of the technology. This is shown as the area under the curve of complexity. Complexity includes the programming expertise required to perform a function. Initially there are some tricky functions requiring a lot of system and programming skills. These are mostly the general, standard features used in many applications. The project and target group-specific functions are often technically less sophisticated, but from the perspective of users and operators they are all the more important. Thus less extensive programming and system expertise is required.



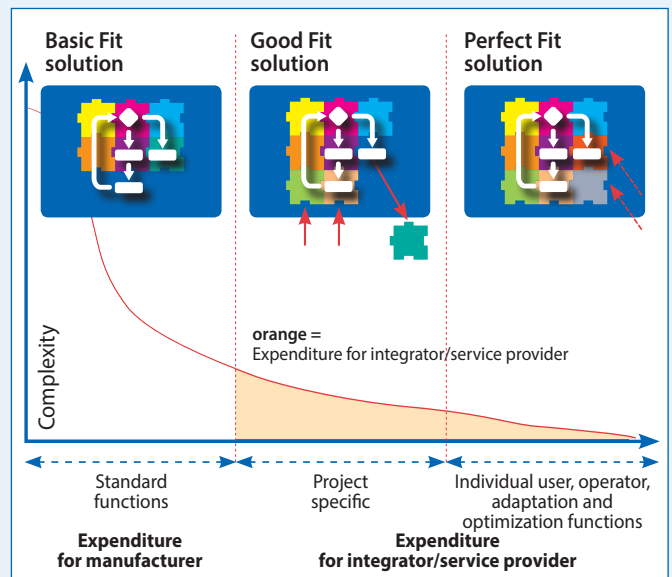
▲ Dedicated controllers do not allow for the implementation of project-specific functions. Adjustments to individual target groups and specific optimizations are not possible.

In a solution with dedicated controllers, all possible applications have been included as standard by the manufacturer. There is no programming effort. That means that operators and users must content themselves satisfied with the existing functions of the automation solutions. Specific adaptations are not possible. In terms of lean automation, only «Basic Fit» can be achieved.



▲ Freely programmable modular automation stations require more expertise and time than dedicated solutions. The integrator creates project-specific application software and loads it onto the «virgin» automation equipment.

With freely programmable, modular controllers of industrial PLC quality the system dictates that when implementing an automation solution, more time and expertise is needed than for dedicated controllers. That makes it easier and safer to achieve «Perfect Fit». The application is fully modifiable and extensible, so that operators and users get a customized solution.



▲ The SBC Functions-PCD combines the advantages of a dedicated controller with those of a freely programmable controller. The disadvantages have disappeared.

With solutions involving the SBC Functions-PCD, basic effort is as low as with dedicated controllers when the pre-installed functions are optimally adjusted to the user. Unlike dedicated controllers, a SBC Function-PCD is extensible and adaptable, but also includes using SBC standard software tools. The core application remains the same and further software building blocks can be added. These can be taken from a standard library or developed for the purpose.

**KSB PumpManager**

Example

**SBC Functions HMI with KSB App: The iPad/iPod model applied to automation**

As one of the world's leading pump manufacturers, KSB has excellent system skills. As a system provider, KSB implemented SaiaPCD®-Controllers and knows from its own practical experience the advantages of the successful formula of SaiaPCD® = Web + IT + PLC.

To increase the lifetime and create a basis for energy optimization of KSB pumps, KSB has a PumpMeter component in its programme.

The device captures the most important operating data and transfers them to an RS-485 interface and the modbus protocol. Then what happens to it?

Basically, any KSB customer can read the operating data and store it, analyse it and process it further. In practice, however, it has generally been the case that the effort and expertise required for individual solutions are far too high.

That's why customers weren't quick to adopt the PumpMeter, despite its advantages. An adaptable standard solution for pump management was required and so the KSB PumpManager was born, based on positive experiences of SaiaPCD® in the background. It is based on the SBCS-Energy-Manager with integrated functions-PCD (programmable with Siemens Step 7).

All web and IT functions for S-Energy-Manager are now not only used for reading the SBC Energy Counters, but also for capturing pump operating data using the PumpMeter (Modbus via RS-485). KSB does not currently want to position itself as a controller provider on the market. With integrated control, visualization and management functions, KSB products should offer significant added value for customers and sales arguments in KSB operations.

To promote this, KSB has also created a Pump Manager App. The App was created with standard SBC software tools and extends S-Energy-Manager to include a monitoring and optimization function for KSB pumps. Saia Burgess Controls sells the HMI device platform and ensures the correct function of the KSB PumpManager.

With this new constellation of options resulting from cooperation between KSB and Saia Burgess Controls, any interested technical party can now optimize pump operation in terms of energy and lifetime. They can manage their pump facility with a screen on site, in any LAN browser or any mobile device equipped with a browser. If the management and operation of the pumps is automated, this can be done directly using KSB PumpManager. The S-Energy Manager, as the basis of the PumpManager, has an integrated SaiaPCD® function that is freely programmable with Siemens Step 7 and that can use onboard I/Os directly.



▲ Pump, drive and PumpMeter (see display)

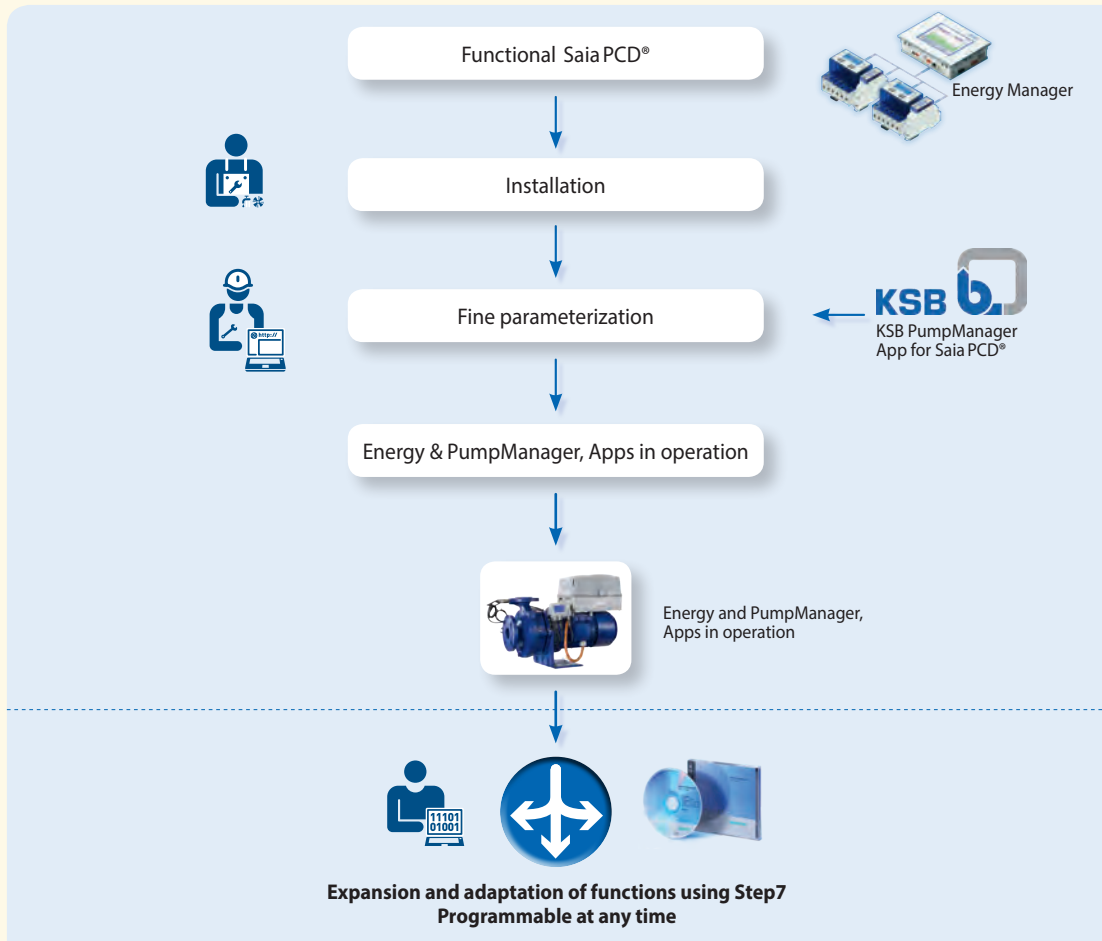


▲ KSB PumpManager based on SBC Functions-PCD is also freely programmable with Siemens Step7.



▲ SBC Functions HMI as KSB PumpManager with the KSB PumpMeter in the KSB Development Centre.

▶ An example of the Programmable Functional Controller (PFC) simple, fast and safe for the Pump Management System – always functionally extensible using programming processes.



# Control/management level with Saia PCD® «doesn't work» almost doesn't exist!

With Saia PCD® automation stations, the whole management level can be custom designed. Anything that serves the customer is possible – from small-scale equipment to widely distributed equipment.

Author: Jürg Beyeler

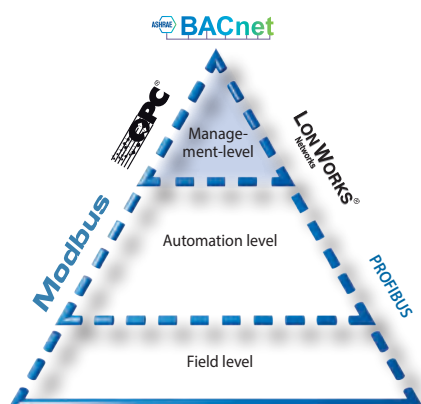
A control system should be adaptable to the skills and requirements of all operators dealing with it. It must be scalable and extensible at any time.

– The combination with Saia PCD® control technology makes it possible to implement traditional Supervisory Control and Data Acquisition (SCADA) software at any time. Saia Burgess Controls works closely with a range of manufacturers to ensure good functional integration and efficient and secure engineering.

That's how we operated in the past and we will continue to do so in future. However, it doesn't represent progress towards lean automation. But we can achieve that through the following basic capabilities of Saia PCD® automation technology:

- Every automation device has integrated SCADA functions and can supply these as a server to any connected browser device. So a completely separate SCADA system is unnecessary.
- SaiaVisi.Plus SCADA software, developed especially for managing multiple Saia PCD® automation devices, can be used without license costs during the commissioning and optimization phase. To improve the efficiency of the building, there's no need to buy and install further equipment.

**Classic SCADA systems –  
in conjunction with all professional systems  
and good software manufacturers**



▲ By supporting virtually every communication standard on the market, many different control systems can be installed.

Supporting conventional SCADA systems is not progressive in terms of lean automation. It is necessary, since Saia PCD® automation devices are used in practice with many different SCADA systems. The use of open communication standards ensures that a PC-based SCADA software can be easily embedded and changed if necessary. For that reason, Saia PCD® systems support virtually every communication standard on the market. Moreover, recognized manufacturer-independent control and management systems also have dedicated software tools for communicating with Saia PCD® automation devices.

SBC cooperates actively with many control/ management system manufacturers and forges links at all levels of business to ensure customer satisfaction.

A Saia PCD® customer should always be able to install control/management software that is ideally suited to them and their project. Here is an example from our practice:

## ► La Chaux-de-Fonds Hospital

The hospital undertook comprehensive renovation of building automation. The ever-increasing requirements for building technology in hospitals and clinics could be met fully using Saia PCD® automation devices and ControlMaestro technology. BACnet ensured communication between Saia PCD® and control system.

## ► Aquazoo Löbbecke Museum in Düsseldorf

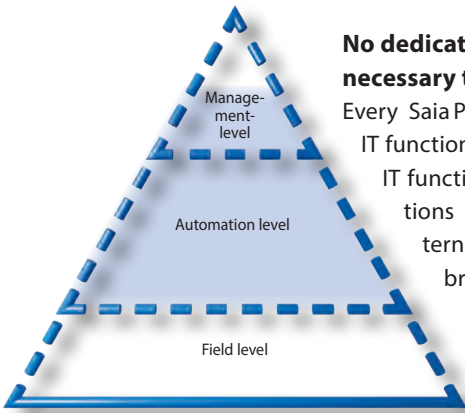
The museum embarked on modernization of building technology. The focus was on reducing energy consumption. A specific challenge was that the building had to be renovated during operating times. Because of the animals, shutdowns were not possible. Visualization was carried out using Wonderware inTouch via OPC.

## ► EDEKA Central Administration in Hamburg

Basic renovation of building automation in the office wing of EDEKA Central Administration in Hamburg covered the following equipment: heating, air conditioning, lighting, sliding gates, door closing devices, fire alarm systems and electrical peak load optimization. Integration in the open, manufacturer-neutral building IBS SCADA technology from INGA was achieved using SBCS-Bus protocol with appropriate drivers.







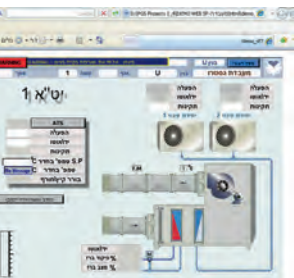
**No dedicated management software is necessary thanks to web and IT technology**

Every SaiaPCD® automation device has web and IT functions as standard. The integrated web and IT functions offer a wide range of communications options according to recognized international standards. Each PC and each browser-capable end device is therefore a «SCADA station». Thanks to this possibility, an upstream SCADA system is no longer required, and can even be dispensed with altogether in many buildings.

This technology is now being used successfully by many customers. Some of the most fruitful projects are described below.

The system integrator LCS uses the technology in the Sourasky Medical Centre (TMC) in Israel. In Israel's largest immunotherapy center, SaiaPCD® automation devices with web and IT functions offer control, data capture, trending information, fault reporting and data access. The simple handling of incoming data and the efficient processing ensure the highest level of operating safety. In addition, the combination of robust PLC functions and advanced IT performance features the architecture and integration of the overall system. This optimal solution was implemented comprehensively from the outset, to the total satisfaction of medical research personnel, service personnel and the management.

▲ SaiaPCD® with integrated web and IT functions replace upstream SCADA systems.



▲ Plant display with Hebrew text (free choice of language) from the PCD in the Sourasky Medical Centre



▲ The control panel is located on the roof of the hospital under the fierce sun rays of the Middle East: that posed a challenge for the PLC technology!



▲ The largest immunotherapy centre in Israel relies on the web and IT functions of SaiaPCD®.

CERN, the European organization for nuclear research, is the largest particle physics research center in the world. CERN has over 300 facilities around Geneva, Switzerland. CERN runs the whole building without SCADA System or BACnet. Standard web and IT technology in all DDC automation stations are the solution. More details on page 57.



With the new exhibition and the «Pilatus» mountain range in the background, Lucerne has one of the most beautiful exhibition backdrops in Europe. Increasing numbers of visitors and growing strain on infrastructure have persuaded the Lucerne Messe AG to invest in additional exhibition halls and up-to-date building technology.

SaiaPCD® systems were chosen as the automation component. Competitors proposed expensive control systems.

But it was SBC web concept that won the contract. Thanks to the web and IT technology in SaiaPCD® controllers, no upstream SCADA system was required. The web concept convinced them!

During construction, the exhibition halls, a foyer and a restaurant will be fitted with SaiaPCD® automation devices and operated via the web interface. To serve the infrastructure, managers and technicians were given the same web interfaces.

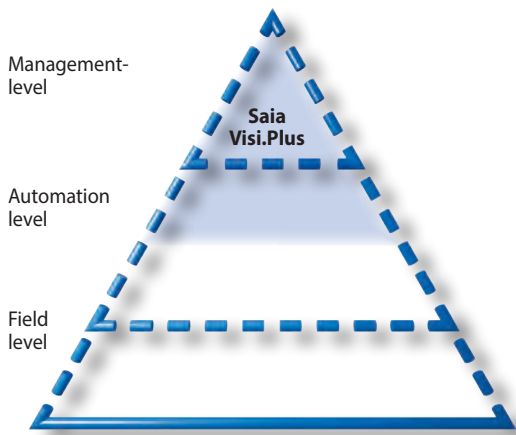
**Beat Bucheli**  
Head of Hünenberg Office, IReL AG, System Integrator



*With web and IT technology, customized management system software and PC were unnecessary.*



**License-free control/management software for the engineering and optimization phase**



A fully integrated management system: Saia Visi.Plus

Even during commissioning and optimization, the implementation of SCADA functions can provide greater transparency and streamline the work process. For optimization over a long period of time and for managing multiple SaiaPCD® automation devices. Operators only have to pay a reasonable one-off charge if they intend to use it over the long term.

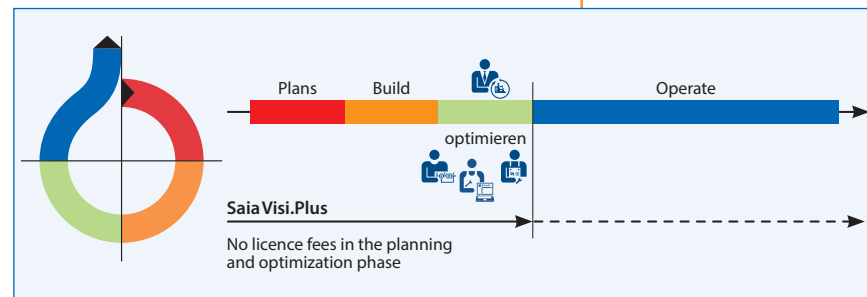
By using SaiaVisi.Plus in the implementation and commissioning phase, the management level is within easy reach with minimum expenditure.

A major advantage of this is that, since 2011, the «Engineering Edition» of the visualization and management software can be installed for system integrators for the whole optimization period. The integrator has all the important information without the need for additional expenditure. The integration in the engineering flow also convinced Fraport AG to optimize and operate the new A-Plus terminal with Visi.Plus.

With a high number of SaiaPCD® automation devices, there are advantages that go beyond the integrated SCADA functions of individual SaiaPCD® devices with web and IT capabilities.

That's why SaiaVisi.Plus software is provided free of charge. This PC-based software from Saia Burgess Controls is contained in the PG5 license and was developed especially.

The distinguishing feature of Saia Visi.Plus is that it is available free of charge during engineering, commissioning and optimization. A reasonable one-off license charge is only payable if the software is used on a long-term basis.



**Migros Westside Bern – the largest shopping and experience mall in Switzerland**

Different user zones are monitored and controlled by a total of five independent SaiaVisi.Plus control systems with a common data point volume of 12,000 DP. Operating conditions are permanently available via web panels and a comprehensive SCADA system via a connection to a network of SaiaPCD® systems with TCP/IP communications over Ethernet and fiber optic cables.



Migros Westside Bern: A SaiaVisi.Plus control system was installed here.

**Refrigerators in a supermarket in Sweden**

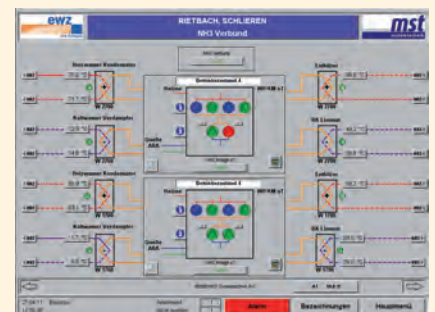
ICA Kvantum is located with other businesses in a new shopping arcade and operates four sophisticated refrigerator machines in its supermarket. The dynamic display of all processes and trend curves for all temperatures measured and alarm handling takes place through visualization and management system software, SaiaVisi.Plus with Web-Server.



Four sophisticated refrigerators are monitored with SaiaVisi.Plus in a supermarket in Sweden.

**Elektrizitätswerk der Stadt Zürich (ewz) (Zurich's municipal electric power company) and the Schlieren-Rietbach Energy Network**

The Elektrizitätswerk der Stadt Zürich ewz produces, handles, distributes and processes energy. Since 1998 it has also included contracting facilities. Warm and cold transfer stations are fully monitored by SaiaVisi.Plus, so that maintenance can be carried out quickly in the case of a fault. The operating data from the substations are automatically monitored and flash up if there is an anomaly.



One of approximately 300 SaiaVisi.Plus service displays of the Elektrizitätswerk der Stadt Zürich.

## Cost-benefit analysis

This analysis shows the additional costs incurred by the manufacturer – and the added benefit for the user – when automation systems are designed consistently for long life cycles.

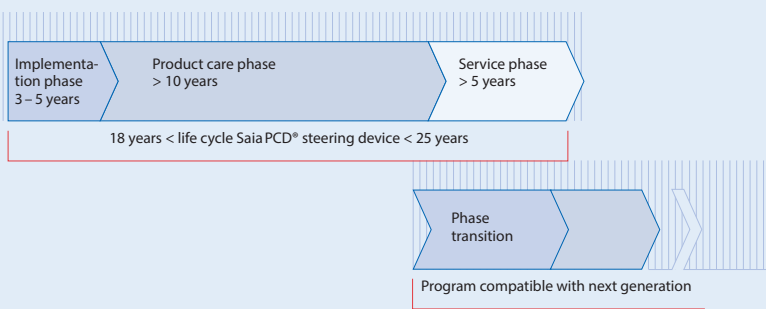
Author: Jürgen Lauber



▲ Additional costs and added benefit with lean automation technology

For more than 30 years Saia Burgess Controls has been promoting long life cycles and highly portable automation solutions. This is evidenced in the control range with PCD1, PCD2 and PCD3, as well as the accompanying application software. The term «life cycle» is not a tautology – the life cycle, or length of the usage phase, is significantly longer than with conventional automation solutions. This means that during the usage phase, additional investment is necessary. Saia Burgess Controls automation solutions, however, are designed to last for the typical length of the usage phase. The question is, what is the additional cost for a manufacturer who chooses a «life cycle commitment» rather than suppliers with cheaper and shorter-lived automation technology. The two memorable customer examples below show how this additional expense for the manufacturer translates into added value for the user.

▼ The life-cycle approach of Saia PCD® controller devices



▲ The Saia Burgess Controls «Life Cycle Commitment» has been part of the market for over 30 years.

### What do the additional manufacturer costs cover?

Automation technology manufacturers who provide a «life cycle commitment» incur additional costs for:

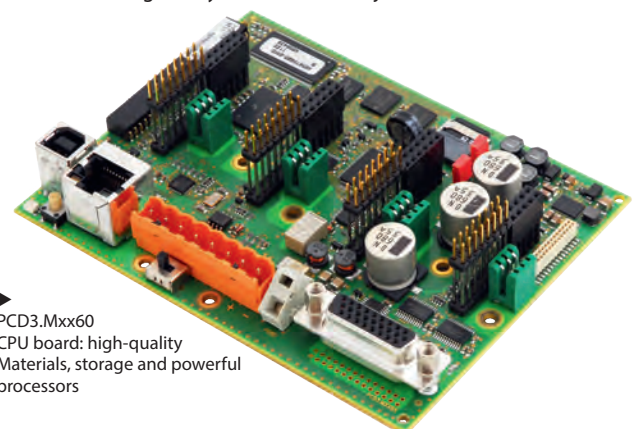
- hardware development and maintenance
- production and service capability
- development and maintenance of software tools.

### More expenditure on hardware compared to cheaper methods

Saia Burgess Controls now makes SaiaPCD® automation devices with double the storage capacity than is currently needed for the operating system and application software. This forward-thinking measure takes account of the fact that a control series will acquire extra functions during its life cycle. If the operator wishes to use new functions five years after installation, it must be possible to update the operating system appropriately. Saia PCD® have the necessary extra storage space in reserve. Saia PCD® have sufficient free space on board thanks to their more powerful processors and computing power. That is the ideal starting point for Saia Burgess Controls promise that the application code can be ported to all types of device for decades to come with minimal extra cost. This is possible thanks to the decoupling of the application program from the hardware level. During application development with the Saia PG5® Controls Suite, the program code is not created for a specific CPU processor, but for a standardized virtual runtime environment – SBC Virtual Machine. From the perspective of application development, it therefore doesn't matter what hardware is running on the virtual machine. This advanced technology has been used in SaiaPCD® controllers for over 25 years. Application programmes created decades ago can run faultlessly on the newest CPU generations. Visualization requires better computing performance in comparison with systems that have a hardware-level code.

Greater expenditure on hardware means that consideration must be given to the availability of electronic components in the future. Short-lived special chips, that can perform almost any function at little cost, make no sense here. These chips are ideal for consumer products that have to be replaced every couple of years anyway. For industrial use, it's important to pay attention to the compatibility of functions and codes over decades. That's why Saia Burgess Controls works only with components from manufacturers who are also industry-oriented.

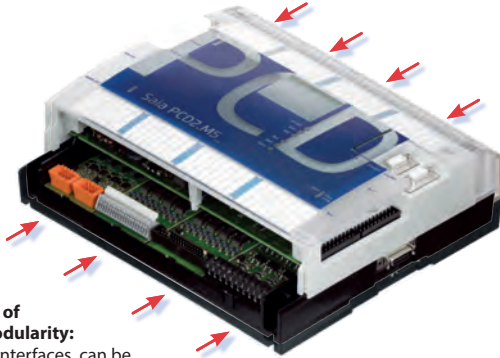
To ensure a long life cycle, hardware adjustments must



▶ PCD3.Mxx60  
CPU board: high-quality  
Materials, storage and powerful  
processors



also be possible, for example those relating to a new bus system or connection technologies. In such cases, adjustments and extensions to firmware and application software alone are not sufficient. The key is to ensure that the hardware is highly modular using a variety of electromechanical plugs.



► **Example of PCD2 modularity:** up to 12 interfaces can be operated in parallel; extensible to 1024 I/O

**Additional expenditure on production and service capacity compared to cheaper methods**

Even at the outset of the first development step, Saia Burgess Controls engineers must take account of the long usage time – on average 20 years – with regard to test and inspection equipment. Thus all production goods from the last 20 years must be stored efficiently. With discontinuation after 10 to 15 years, the product is



▲ One of our carousels with testing equipment for decades-old devices.

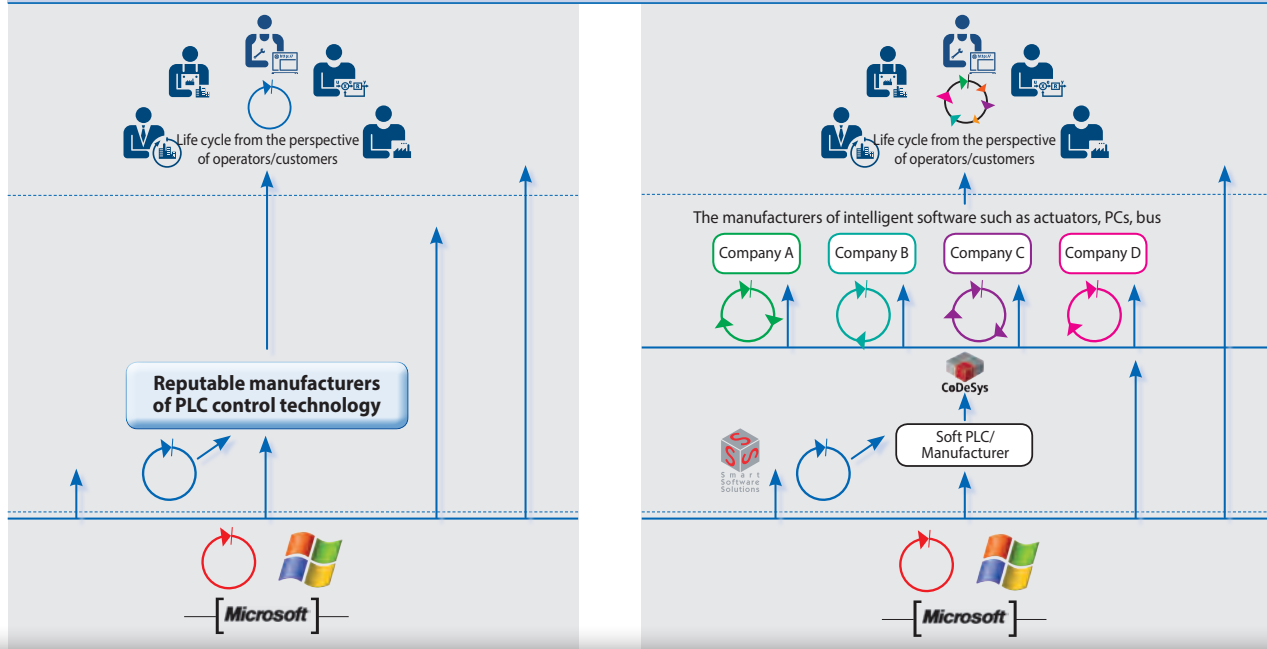
no longer recommended for new installations. But as part of our service commitments, we keep for several years enough material for any repairs or replacements. In addition, technicians who know the old device ranges in detail are always present. Companies that perform the service well before the end of the typical useful life can save on these extra costs.

**Additional costs on software development and maintenance**

All the reputable controller manufacturers have long since mastered the core components of the «runtime system» (logic machine), the «engineering tool» (programming environment) and the control hardware. There's a good reason for this – they have the monopoly over hardware and software in house and can carry out maintenance independently of third parties. The development and maintenance of software – the engineering tools and runtime system – require comprehensive expertise on the part of the manufacturer, which translates directly into higher personnel costs. Many smaller firms do not have this expertise, or want to save on the extra expenditure. But they nevertheless want to provide control technology, and of course at cheaper prices than those of reputable manufacturers. The software is treated as a necessary evil.

So companies draw on the PC technology, terminals or driver technology from software products known on the market as «SoftPLC» or «SoftLogic». The systems are from quite well-known software companies such as 3S, KW-Software and Information team, to name the most famous brands of the German-speaking world. These software PLCs are then embedded into actuators, bus terminals or drives (Embedded PLC). Then the engineering tool is given its own name, and the component supplier can enter the market as an automation system supplier. Outsourcing core competencies results in substantial savings for the cost minimizer. But in this constellation it is not possible to get the life cycle of an automation system under control – the interdependencies and interactions are myriad.

**The source of compulsory investment by facility operators in automation systems**



▲ The life cycle of the control systems of reputable manufacturers (Rockwell, Siemens Simatic, Schneider, etc.). Only for the Windows life cycle is innovation compulsory.

▲ Each additional step in the creation of added value and each component supplier has its own, autonomous life cycle for some of its products. The operator therefore sees far too many opportunities for innovation, which it then has to run after.

### What is the purpose of a long life cycle and a high degree of portability?

Is the extra effort justifiable? In abstract terms, a longer life cycle enables a product to be used for a long time without problems, and to be adjusted or extended at any time to meet new requirements. The initial investment and the acquired expertise can be used for a long time and therefore increase profitability.

Portability means that the application software, and the investment in development and expertise, can be used not only for one product line, but for all of

the manufacturer's devices. There are no functional boundaries or barriers between small, medium and large devices. Only the computing power, expandability, and the number of I/Os will be different due to construction.

Hundreds of Saia Burgess Controls customers have taken advantage of the possibility of porting existing application software from «old» automation devices to new generation ones when modernizing Ethernet-capable controllers. Below are two good illustrations from our practice:

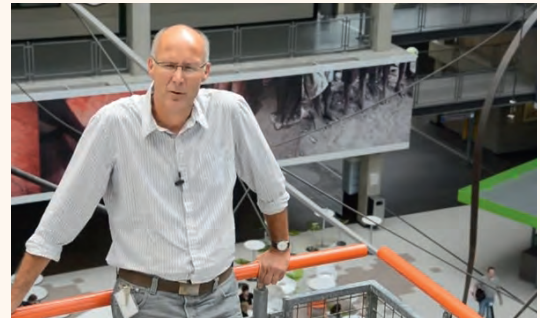
## 1 Academic Medical Centre Amsterdam

The AMC is a facility housing 8000 staff and 1000 beds. The integrated teaching and conference facility can house up to 15000 people simultaneously at the hospital site. This really is a massive building, and a complex one, because it is a teaching hospital. Building automation is provided using 320 SaiaPCD® automation stations with some 18000 I/O points. Systems from JCI, Honeywell and Siemens are also installed in individual sections of the building. When the 15-year-old SaiaPCD® systems were modernized with the new generation comprising web and IT technology, the operator was very pleasantly surprised at how quick, cheap and secure the transition was from «old» SaiaPCD® to the newest-generation devices. It was something he had never experienced with competitors. As a result, the facilities that had equipment from other manufacturers were updated with new PCD3 automation stations and SBCWeb panels. Thus even these facilities of the AMC have a good life cycle and are open to whatever the future brings.



▲ Hospital Amsterdam  
www.amc.nl

▲ Aerial view:  
AMC Hospital Amsterdam



▲ Tom Emke, Technical Manager of AMC Hospital Amsterdam



▲ The AMC building The AMC building automation system offers many functions, including peak shaving for electricity and gas consumption.



▲ Primary facility at the AMC hospital with «veteran» PCD4 and PCD2 in the control panel.



## 2 Industrial cheese manufacturer Bustaffa

This is a great example of the benefit of a long life cycle and the secure portability of the application code.

Bustaffa in Montova (Italy) have buildings in which 1000 staff daily produce 24 000 kg of cheese, with an annual turnover of 400 million euro.

Since 1989, all the automation at Bustaffa has been carried out using SaiaPCD® controllers.

In total there are 60 SaiaPCD®-CPUs with 8350 I/O points in operation 24 hours a day, seven days a week, 365 days a year.

In 2008 a storm resulted the fabric being heavily flooded. The control panels containing the PCD6 controllers were briefly flooded with dirty water.

The 14 controllers affected did work again once they had been dried out, and production was immediately restarted. However, the flooding caused corrosion of the contacts led to intermittent faults that reduced production reliability. That is not an acceptable long-term situation, particularly in food production.

The proprietor of Bustaffa, Mr Romani Freddi, thought he was facing a major problem. He would have to invest millions and shut down his business during renovation. Because of the startup and transient phase of the new system, product quality and quantity will be on high risk. A nightmare for owners and operators.

Thanks to the life cycle and portability commitments of Saia Burgess Controls, the upgrade was carried out at a fraction of the cost without any loss of production. During operation, 14 PCD6 controllers over 20 years old were replaced with seven newest-generation PCD3 controllers. The programmes were ported over and new web and IT functions were added.

### Summary

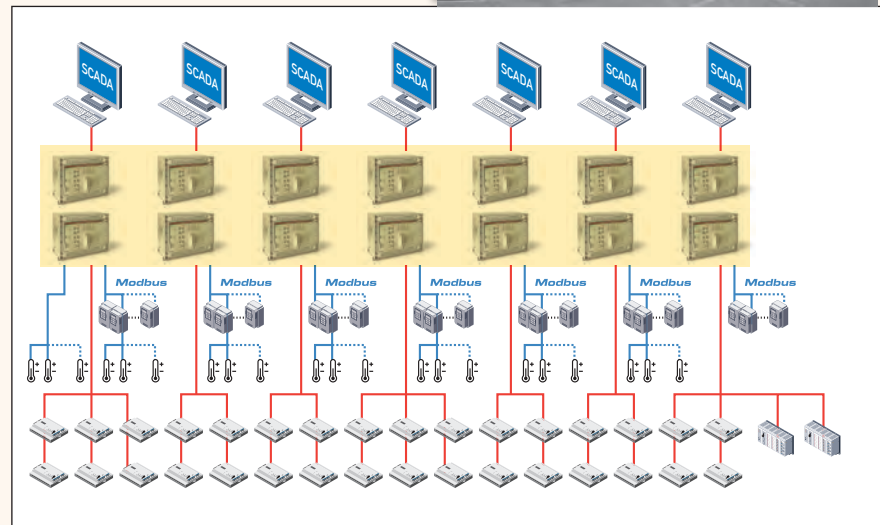
The additional costs for an automation system supplier to provide a long life cycle and high portability is very small. It is therefore incomprehensible that investors and operators do not invest in such qualities for their systems. The savings for users are ten to 100 times higher than the extra costs for the manufacturer. In a case like Bustaffa, the savings (and therefore the benefit) runs into the millions of euros.

So far we have only looked at the financial aspect. Users must decide how much added value they gain from peace of mind and less stress in their daily business.



▲ Products by Bustaffa

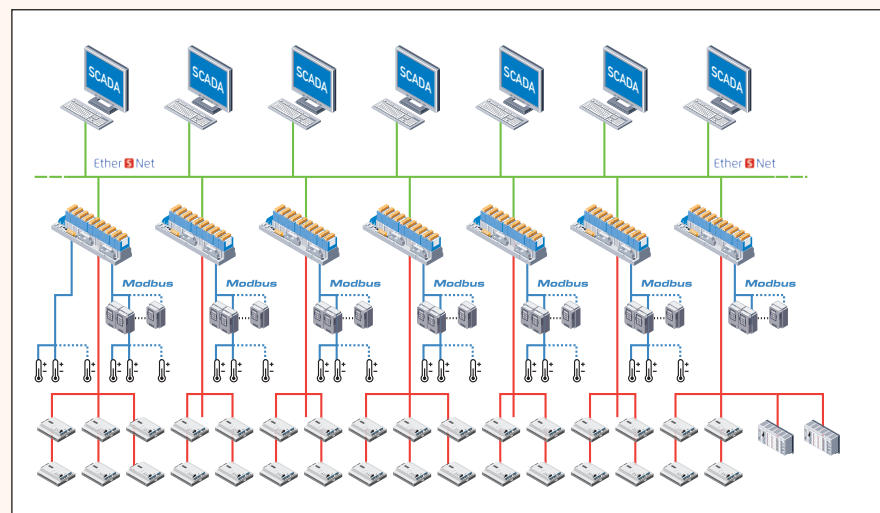
Romani Freddi, proprietor of Bustaffa cheese production



▲ The 20-year-old Bustaffa automation system – the PCD6 with yellow background – had to be replaced due to water damage.



▲ Production by Bustaffa



▲ The Bustaffa automation system following repair of water damage. Renovation was carried out during operation without any production shutdown. The SCADA system remained unchanged.



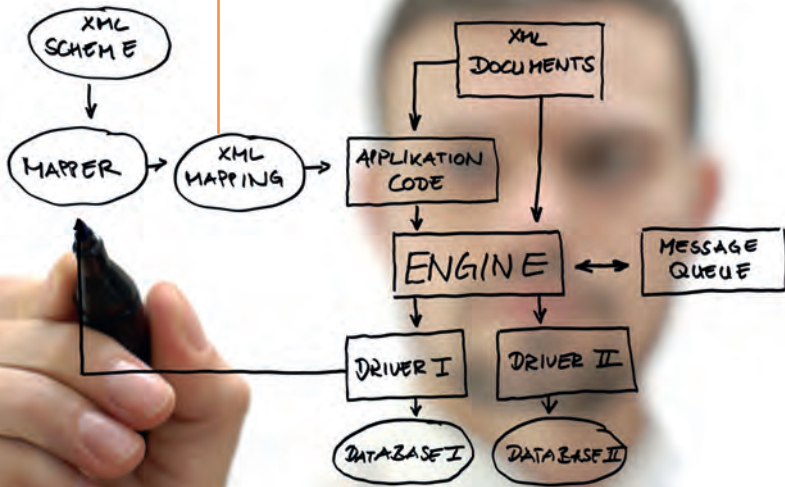
Wikipedia:

Engineering is the discipline of applying scientific and practical knowledge, in order to design and build systems that safely realize improvements to the lives of people.

# The path to automation solutions: simple, secure and always open.

S-Engineering describes the basic properties and methods, by which, efficient automation solutions with SBC hardware and software products can be realized quickly and reliable. S-Engineering differs fundamentally from that, what other manufacturers are offering. Even if these differences are not tangible or visible from the outside – they definitely exist, and they are significant.

Author: Yusuf Koer



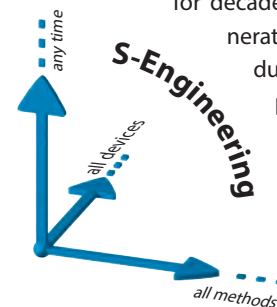
and programmers can give rein to their skills. They can even build their own MyAutomation suite. S-Engineering is perfect for everyone's needs.



## 2. All methods for all devices at any time

The combination of three statements creates a special space for Saia Burgess Controls customers. Different methods for implementing control and regulation technology solutions can be combined easily.

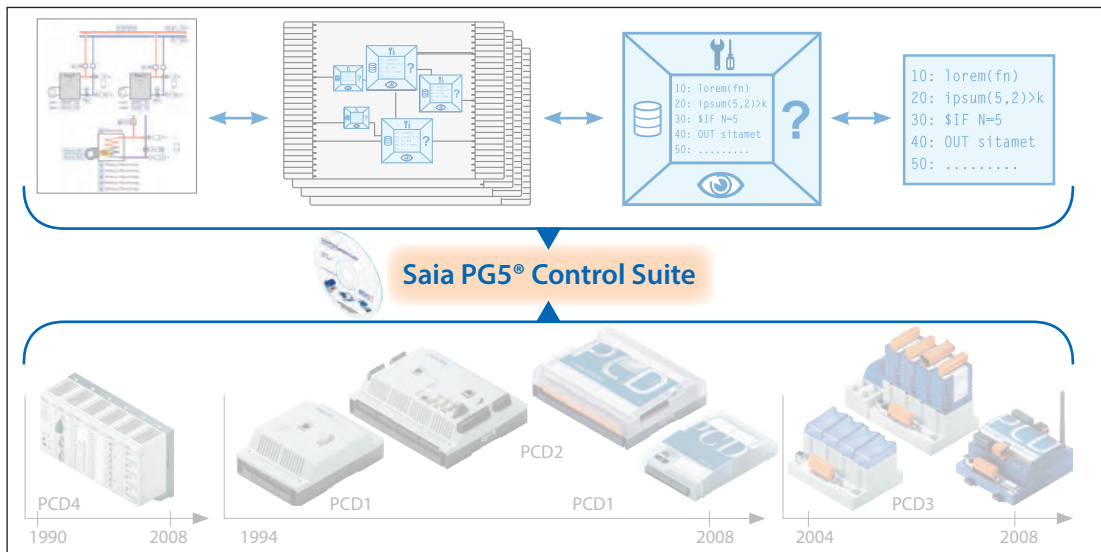
For all SaiaPCD® device types, the methods are the same and the software code generated is freely portable. And this lasts not just for a short time but for decades, spanning various generations of the device. Individual aspects are offered by plenty of other suppliers, but the combination within the S-Engineering solution space is unique.



S-Engineering offers a unique set of positive qualities. It combines the advantages and strengths of other systems and leaves their disadvantages behind.

## 1. Anyone can create and adapt with S-Engineering automation solutions

SBC software tools such as SBC Controls Suite can be used by virtually any technician. It's easy to get started and use. At the same time, software specialists



A software engineering system for all methods, all devices, and all time.

### 3. Top-down and bottom-up with a single system

There are development tools for control programs that generate hardware-dependent, hieroglyphic-like source code from plant displays. It often only runs on a single dedicated controller type. This type of programming is a top-down approach. The automation pyramid is filled from top to bottom. Alternatively, there are systems in which the engineering starts with the individual hardware module. It continues with the realization of control functions... and ends with the creation of plant displays and alarm functions. The automation pyramid is filled from top to bottom.

With SBCS-Engineering both approaches can be used to find the optimal, individual application. SBCS-Engineering makes top-down and bottom-up advantageous, because Saia PG5® basically has no hardware-dependent source code, but rather a portable intermediate code. Also, no tapeworm code is created from plant displays. The intermediate step is realized through graphical objects. Thus the application is much simpler and more comprehensible.

### SBCS-Engineering and efficiency – analogous with building a house

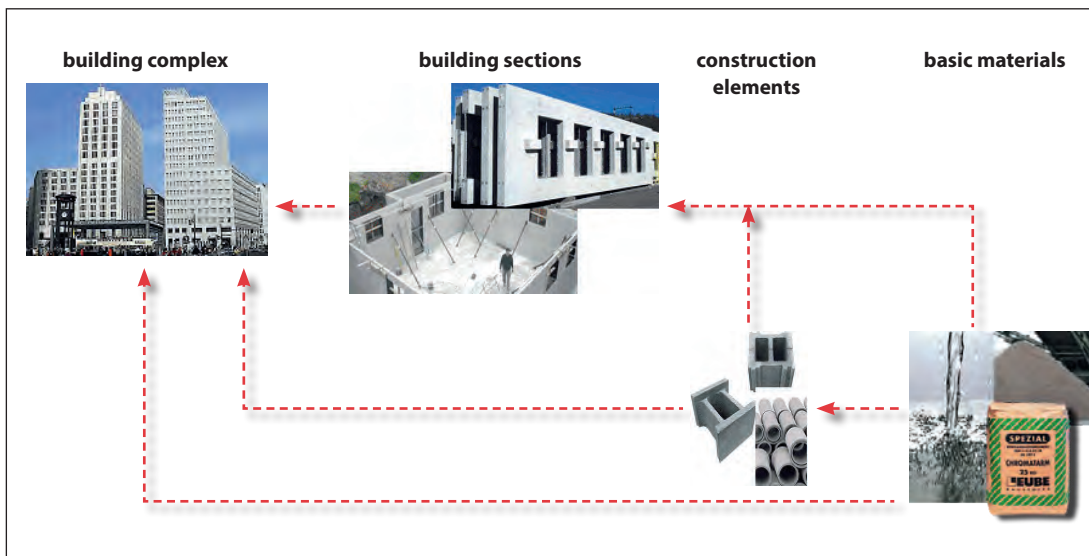
To be able to work efficiently with S-Engineering of the start of project implementation, we provide a wide range of installation templates (e.g. DDC-Suite), graphical object libraries and function modules – they are well documented and have been proven a thousand times over.

Anyone who wants to can use SBCS-Engineering tools to adapt this foundation and apply their own expertise to create modules and system standards. Thus every customer is different from other SBC users in terms of efficiency and skill. SBCS-Engineering = Lean Engineering

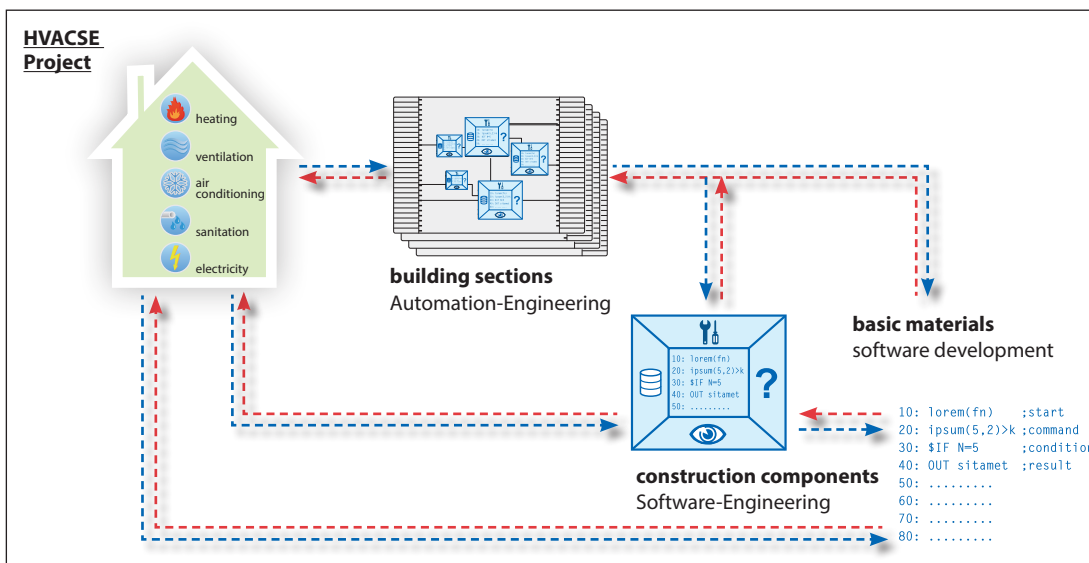
To see how S-Engineering works in practice:  
[www.pcd-demo.com](http://www.pcd-demo.com)



▲ **Bottom-up and top-down engineering:**  
 Available in any hybrid form; it's not «either or» but «and also»



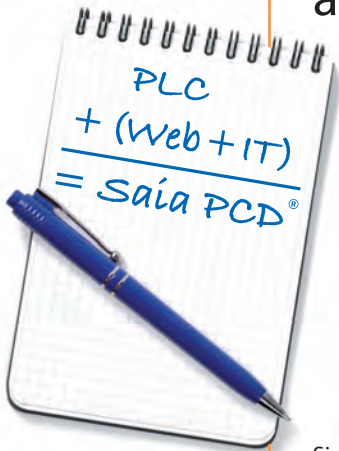
◀ **How to build a building:**  
 The combination of various materials and methods ensures efficiency and simplicity.



◀ **It's the same with a S-Engineering project:**  
 the program commands are the sand, and the syntax is the cement. FUPLA pages are prefabricated elements – but they can be at any time broken down into component parts, and also altered.

# Service provision with S-Energy

## Increase energy efficiency and earn good money at the same time.



Automation professionals are now entering a new field of activity. As a result of the events in Fukushima, the pressure to reduce energy consumption has increased dramatically. What's needed are solutions and services that make more effective use of existing resources – especially in automation. The scalability of the S-Energy concept opens up a whole new set of possibilities for system integrators.

Author: Peter Steib

Since 2009, Saia Burgess Controls has become more engaged with energy monitoring and energy management. Under the motto «Doing the right thing saves you money» we presented our image of energy management in Control News 12. At the time the emphasis was on environmental protection, and only with the events of 2011 have we begun to completely rethink our energy supply. Today it's about ensuring security of supply as well as meeting climate change goals. In the face of reduced power generation capacity and a network infrastructure that is not expanding to meet demand, energy conservation is not a luxury but a necessity. Politicians have already responded: Tax breaks and grants for energy intensive businesses will only be granted to those with an energy management system who measure consumption demonstrably and completely.

The pressure to improve energy efficiency therefore increases continuously, and this has implications for

automation. Although at the outset the pure measurement and visualization of energy consumption results in initial saving, at the end of the chain there is usually an individual energy management solution at the automation level. For optimum energy use knowledge of the controlled process are essential. It therefore makes sense for the automation supplier to provide energy optimization. For system integrators this provides new areas of activity and a welcome chance during projects to offer appropriate energy management in addition to pure automation. It's good when you can rely on automation technology where an energy management system has been built in already. With S-Energy is a whole tool kit of components and functions available that fit seamlessly into the world of automation. Whether a simple energy monitoring system «off the shelf» is enough, or whether customized requirements need to be taken into account, S-Energy offers the appropriate form, fit and function for each level.

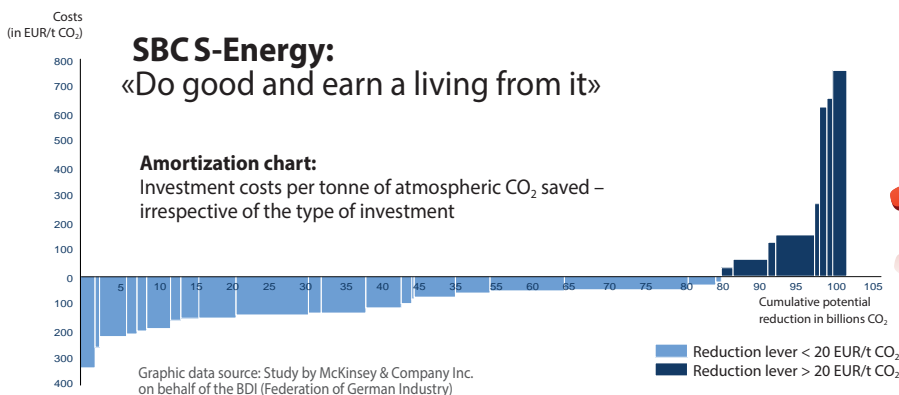


**Old goals with new challenges:**

The motivation to save energy is no longer justified only by climate change; it's now also a question of compensating for reduced plant capacity and outdated network infrastructures.

2010

2011







▲ Earning money through energy efficiency

### Basic Fit: Standard product S-Energy Manager opens the door

With the S-Energy Manager we have entered uncharted territory in that it is the first time we have offered a turnkey solution. Previously, we produced controllers, I/O modules, communication modules – in short components that can only perform their intended function with appropriate programming or engineering. Unlike the S-Energy Manager: it is box-ready, just install it and you can already see power consumption and cost. Ostensibly, the target group is more in-house electricians rather than external programmer with engineering knowledge. What is our aim here?

In the meantime the awareness to attend to energy efficiency has been rising steadily. Industry operators and operators of buildings would like to reduce their energy consumption sooner rather than later. But where to begin? They do not have their own experience to draw on; commercially available solutions require high investments before a single euro can be saved. So it's not surprising that many struggle to make a decision and ultimately carry on like before. With the S-Energy Manager we provide exactly this target group with a ready-made tool for energy monitoring that can be installed with minimal investment and few resources. Even if there is at first no mention of automation and engineering, the subjects of energy efficiency and management need only be placed in the company once and the user begins to gain experience. This lays the foundation for later stages of development – which will require the expertise of automation professionals.

### Good fit: Adjusting S-Energy Manager

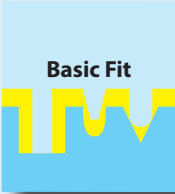
The appetite comes with eating, so it is with energy management. At the outset, comprehensive collection and presentation of consumption data is perfectly sufficient. It has already identified potential savings or expensive failures of equipment and machinery. Then comes the client's wish to adapt monitoring to meet their own needs. It might be that the operational values are to be calculated,

or a particular form of presentation is required, or special switch-off mechanisms are to be created. Here the S-Energy Manager comes into its own, for it is not a dedicated solution, but based on SBC-based PLC technology. Although it is a complete, operation-ready energy monitoring solution, it can be expanded and adjusted to provide individual functions and services. The same technologies used in the SBCWeb-Panel and the Saia PCD®-controllers are also used in the S-Energy Manager. Thus the user interface takes the form of web visualization, and energy values are read and processed by the PLC programme. Both the web project and the PLC program are available in source code and can be modified with the Saia PG5® Web Editor and programming tool.

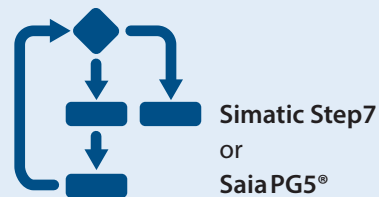
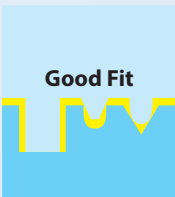


◀ Awarded by «Building Efficiency Dialogue Frankfurt 2011»: the Saia Burgess Controls Partner concept wins the «best service» category.





◀ **Basic Fit:**  
S-Energy Manager and energy meters offer operation-ready basic functions for an easy start to energy management.



◀ **Good Fit:**  
A Logic Controller PLC built in to the S-Energy Manager allows the programmer to implement additional features. The programmer has access to three digital inputs, three counters, and three relay outputs, as well as all the consumption values from the energy meters. Even the user interface can be customized using the S-WebEditor.



◀ **Perfect Fit:**  
With a wealth of communications interfaces, web and IT functionality and unlimited programmability, Saia PCD® controllers make 100% adaptable energy management solutions a reality.



► **Bustaffa cheese factory** | Mantua, Italy

**How can the automation of a production plant be completely modernised without losing a single day of production?**

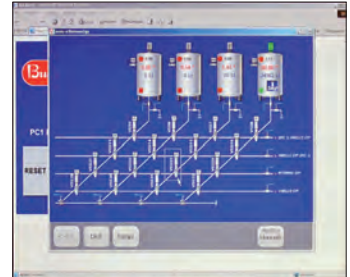
After major water damage in the controls area, Bustaffa decided to renew all electrical cabinets and to modernize the automation at the same time. They obtained quotations for this important project from many automation

suppliers, but none of them except SBC could guarantee continuous production and compatibility with the existing SCADA system. The transfer from the old PCD4/PCD6 generation to PCD3 went according to plan and re-

spected all technical, timing and financial aspects of the project to Bustaffa's full satisfaction. A performance made possible by the long life cycle intrinsic to the SaiaPCD® controller families.

- Production plant ◀
- Renovation ◀
- Production process ◀
- Life cycle ◀

Project realized by  
Artika Automazione,  
Italy



► **Marc Cain building** | Bodelhausen, Germany

**POM certified HVAC and room control for the head office of this international fashion company for a better climate and low energy consumption**

The performance requirement for the automation of the building was set at a high level right from the beginning and the «Peace of Mind» certification from TUV was the target to achieve. Thanks to this approach, the design study

integrated all HVAC aspects of the building into one single and flexible control project. The thermal energy production for example comes from various sources and its distribution is controlled to minimize energy consump-

tion. In a complex installation, this is only possible thanks to the ability of the controls system to integrate seamlessly all devices independently of their communication possibilities.

- POM ◀
  - HVAC ◀
  - Energy ◀
  - Building automation ◀
  - Office building ◀
  - Room control ◀
- Project realized  
by Henne & Walter,  
Germany



► **Biokimica** | Pisa/Italy

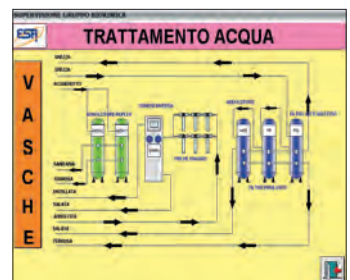
**The market leader in chemicals for the leather, textile and laundry industry relies on Saia PCD® for production processes and HVAC**

Biokimica and its system integrators have long understood the benefits of using SaiaPCD® industrial designed controllers to manage heterogeneous processes, covering applications ranging

from chemical reactors, to water treatment, heating, ventilation and lighting. They extensively use the web and IT features of SaiaPCD® controllers. For example to exchange data with the

AS/400 for the recipes management, to inform and guide operators on the production lines or to collect data on the local flash to back up data for the traceability of all batches.

- Production plant ◀
  - Water treatment ◀
  - Energy ◀
  - Data logging ◀
  - Chemical reactors ◀
  - Lighting ◀
  - Web + IT ◀
- Project realized  
by ESA srl, Italy



### ► Academic Medical Centre | Amsterdam, Netherlands

**One of the top ten academic hospitals in the world relies on SaiaPCD® controllers for better climate and energy savings**

AMC wanted to refurbish and extend the controls systems, step by step, over several years, without having to worry about the costs and difficulties of possible changes in the production of automation stations. They



started using SaiaPCD® controllers in their buildings, processes and utilities in 2000. More than 10 years later, the choice is still considered the right one, proven by the transparent integration of the newest SaiaPCD® genera-



tion, the general use of Ethernet, data logging on flash and the reliability of the installed base. The communication capabilities of SaiaPCD® to connect all systems make the life of the system integrator simpler.



- Hospital
- Renovation
- HVAC
- Energy
- Sterilizing
- Data logging
- Communication

Project realized by Regel Partners, Netherlands

### ► Bodelschwing-Haus Wolmirstedt Foundation | Wolmirstedt/Germany

**Refurbishing an HVAC installation without changing either the communication wiring or the existing installation to achieve better comfort and simpler operations**

SaiaPCD® controllers replaced the various other systems installed over the years in all the buildings of the foundation: the headquarters, swimming pools, workshops and residences. Thanks to the various communication possi-



bilities on board of any SaiaPCD® controllers, communication solutions could easily be found to exchange data over the existing cabling irrespective of its condition and length, and Ethernet could still be used for new seg-



ments. The integration of the existing Wilo heating system and the new biothermal power station was easy. The operators are particularly satisfied with the reliability and ease of use of the new system.



- Building automation
- Residential
- Renovation
- HVAC
- Communication

Project realized by NOWUS Automatisierungstechnik GmbH, Germany

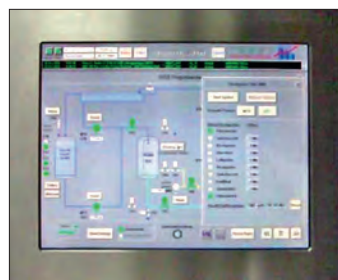
### ► Aquazoo Löbbecke Museum | Düsseldorf/Germany

**Water treatment & filtering; optimization of costs & energy consumption by modernizing the equipment**

Approx. 450 species of animal live in a total area of 6 800 m<sup>2</sup>. In the 25 themed display rooms, visitors can see 80 aquariums holding a total of 613 000 litres of water. The modernization of the analogue technology was carried out in ongoing operation as it was not possible to shut



down the equipment due to the animals. The aim was to optimize costs and energy consumption by modernizing the equipment. In the tropical hall, the air temperature is a constant 25°C and the humidity is 80–100%. It rains in this hall several times a day using specially



treated water. Every hour, 80 000 litres of water flows through pipes, is filtered, cooled or heated and pumped to its destination. Special requirements: Visualisation of Wonderware InTouch via OPC and setup of communication via FND with the city's own data centre.



- Building automation
- HVAC
- Connection to the BMS via OPC
- Renovation
- Water treatment
- Public building

Project realized by Kirschbaum & Rohrlack GmbH, Germany



► **Wusys Rechenzentrum** | Frankfurt/Germany

**Complete energy management and reporting for the data centre to optimize energy usage and achieve full electricity cost transparency for the invoicing of hosting services**

Wusys wanted to manage the global energy needs of data centres: monitoring and optimising PUE, managing all thermal aspects and all primary safety elements such as leakage detection and connection to the fire detection equip-

ment. Wusys operates several data centres and collects data via SNMP. Thanks to their standard communication capabilities, SaiaPCD® controllers were used to bridge the gap between the IT world and the HVAC/electrical world. The ad-

dition of SBC energy meters to the solution was quite natural and the whole system delivers on Wusys' management stations all relevant management, safety and billing data needed to profitably operate the data centre.

- Data centre ◀
- Energy management ◀
- PUE ◀
- SNMP ◀
- Energy meter ◀
- Web + IT ◀

Project realized by isplan, Germany



► **Johnson Electric** | Shenzhen/China

**The first step in energy management starts with the measurement, visualization and analysis of energy consumption. A wise saying which pays.**

Johnson Electric, the global leader in electric motors, equipped a first factory with 74 SBC electricity meters connected to SaiaPCD® controllers for data collection and communication to the ERP to detail the analysis down to the value adding

processes and machines. The quick set up of the installation made it possible to get live data in a very short time. The immediate results were impressive and made it possible to correct electrical installation problems such as low cosφ. JE de-

tected inefficient equipment components and replaced oversized pieces of equipment with ones of a suitable size. The return on investment of this installation was less than 3 months: enough to motivate JE to start in other factories as well.

- Production plant ◀
- Energy management ◀
- Energy meters ◀
- ERP ◀
- Web + IT ◀

Project realized by Johnson Electric, Hong Kong



► **Lötschberg Base Tunnel** | Switzerland

**The third largest tunnel in the world, 34 km in length, built to cross the Swiss Alps, relies on SaiaPCD® controllers to guarantee the correct functioning of all technical installations**

Every 333m, cross tubes connect the main tunnels and house, in air-conditioned technical containers, all the equipment related to fire protection, radio networks, lighting, CCTV and ventilation. In total, 30000 I/O points are perma-

nently controlled and monitored by SaiaPCD® controllers. The first refurbishment of these installations has been carried out to eliminate obsolete material from various suppliers. Thanks to our long life cycle approach, SaiaPCD® were chosen

to replace these devices, meaning an extension of the controls network to 100000 physical data points. Proof that the slightly higher expenditure on quality products pays off in the long run.

- Railway tunnel ◀
- Life cycle ◀
- Air conditioning ◀
- Radio ◀
- CCTV ◀
- Fire protection ◀
- Lighting ◀

Project realised by BLS, Switzerland





## ► Lucerne Conference Centre | Lucerne, Switzerland

### The renovation and expansion of the Messe Luzern AG conference centre achieved the Minergie standard and revitalized this important meeting place

With an area of 13000m<sup>2</sup> and four halls, the conference centre in Lucerne provides technology speaking a state-of-art exhibition space, able to fulfill all usage requirements. The different events also call for flexible lighting, ventilation and air conditioning in order to reach the Miner-



gie Label certificate. The integration of the building services equipment was consistently planned with bus technologies, such as DALI for lighting and MP Bus in the HVAC subsystem, right into the SaiaPCD<sup>®</sup> controllers. This was possible with minimal effort, including the operation of all



equipments with web technology. The extremely high level of flexibility intrinsic to our programmable controllers and our open web technology, which removes the need for large investments in expensive visualization systems, were decisive factors in the winning of the contract.



- Conference centre
  - Building automation
  - DALI
  - MP Bus
  - Minergie
  - Programmable controllers
  - Web visualization
- Project realized by Irel AG, Switzerland

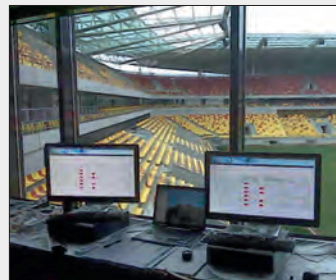
## ► New stadium | Le Mans/France

### Web + IT features included in SaiaPCD<sup>®</sup> controllers are extensively used in this prestigious project in Le Mans

The architectural design of the new stadium required automation equipment to be able to support the operations in the various configurations. The management and control of power distribution, lighting, heating, ventilation and



water needed special attention. SaiaPCD<sup>®</sup> were used for the control requirements and a redundant Ethernet network guarantees the communication between all stations. The visualization is totally web-based, from operator pan-



els to PC stations. A total of 4500 variables are directly logged in the controllers in SD flash cards so that backup data can be provided in the event of any data transmission problem.



- Stadium
- Data logging
- Web visualization
- Lighting
- Energy distribution

Project realized by Garczynski Traploir, France

## ► Alfen | Almere/Netherlands

### Building 10,000 charging stations for electric cars in the Netherlands including the design-in of compact and MID-approved energy meters from SBC

For charging electric cars and other vehicles ALFEN provides a complete series of charging solutions. Their goal is to create 10000 electric charging points in public places in the Nether-



lands by 2013. This will create a solid basis for a dense national infrastructure for electric cars. To bill the energy supplied correctly, ALFEN needed a compact, cost-effective and MID-approved



energy meter. The ALE3 3-phase meter in a 70 mm housing was selected for that purpose and has already been used for the first one hundred units installed in the Netherlands.



- Charging stations
- Electricity meters
- Electric cars
- Billing

Project realized by ALFEN, Netherlands



## The route from «non-Lean» to «Lean»



The mistakes from the construction phase are being corrected. After 2 years of operation, the railway company BLS started to plan the project «New tunnel control technology».

Author: Rolf Müller

The Lötschberg Base Tunnel was built in Switzerland as a double-tube single-track railway tunnel between 1999 and 2007 and has been in operation since 16 June 2007. It crosses below the northern Alpine range in Lötschberg. On the north-south route, the approx. 34 km long tunnel brings about a significant increase in efficiency for freight and tourist traffic. The hub of Switzerland has become even more attractive as a result of this significant increase in capacity for in-

ternational rail traffic. However, as the operator of the tunnel BLS Netz AG found in the first two years of operation that the maintenance costs for the infrastructure technology were twice as high as the pure operating costs (management, energy). In order to place the operation of the tunnel on an economically viable footing, after three years of operation BLS Netz AG decided upon the project «New tunnel control technology».

Rolling motorway (RoMo) at the south portal



As part of the European high speed rail network for passenger and freight traffic between the North Sea and the Mediterranean, the Lötschberg Base Tunnel that crosses below the Alps is the central piece of the jigsaw.



### From the political process to the construction of the tunnel

Switzerland does not want to be a road corridor for 40-tonne lorries but decided, in pioneering referendums, in favour of developing rail transport.

- 1992: Referendum on Alptransit Decision with the EU (EU Transit Agreement)
- 1993: Referendum on NEAT (New Alpine Rail Axes), loan of 30 billion Swiss francs for the development of the railways over the next 20 years
- 1994: Referendum on the Alpine Initiative (no further expansion of trans-Alpine roads in order to protect the Alps)
- 1995: Founding of the tunnel construction company BLS Alptransit AG and start of construction of exploration tunnel
- 1999: Start of construction of Base Tunnel
- 2005: Base Tunnel breakthrough ceremony
- 2007: Opening ceremony and start of operation

### Realisation 1999–2007

BLS Alptransit AG was responsible for the building of the tunnel as the constructor. The top priority for the constructor was to keep within deadlines and budgets. The tunnel was roughly divided into three system areas: Tunnel Shell, Technical Infrastructure and Railway Technology.

#### Tunnel shell

- Construction of tunnel
- Drainage
- Caverns
- Cross tubes

#### Technical infrastructure

- Water supply
- Building ventilation
- Low voltage power/lighting
- Air-conditioning
- Safety installations/fire protection
- Speakers/video
- Doors and gates
- Evacuation
- Radio

#### Railway technology

- Track
- Overhead contact system
- Safety systems
- Train control system

▲ System areas in the Lötschberg Base Tunnel



**Key tunnel data**

<b>Length</b>	34.6 km, of which 19.5 km is single track (2 tunnels are bored but have not been equipped) and 15.1 km is double track
<b>No. of cross tubes</b>	104 (connections from one tube to another)
<b>Temperature</b>	35 °C
<b>Humidity</b>	80%
<b>Construction time</b>	8 years (1999–2007)
<b>No. of trains per day</b>	110 (40 passenger and 70 freight trains)
<b>Construction costs</b>	CHF 4400 billion

The individual subsystems in the technical infrastructure were tendered separately. In the original equipment SaiaPCD® are used in the ventilation/air-conditioning, radio and fire detection subsystems. The subsystems were constructed by three different system integrators using SaiaPCD®. However, five other control products from different manufacturers were installed in the other subsystems. These were generally low-cost compact devices, some of which were dedicated devices and could not be programmed.

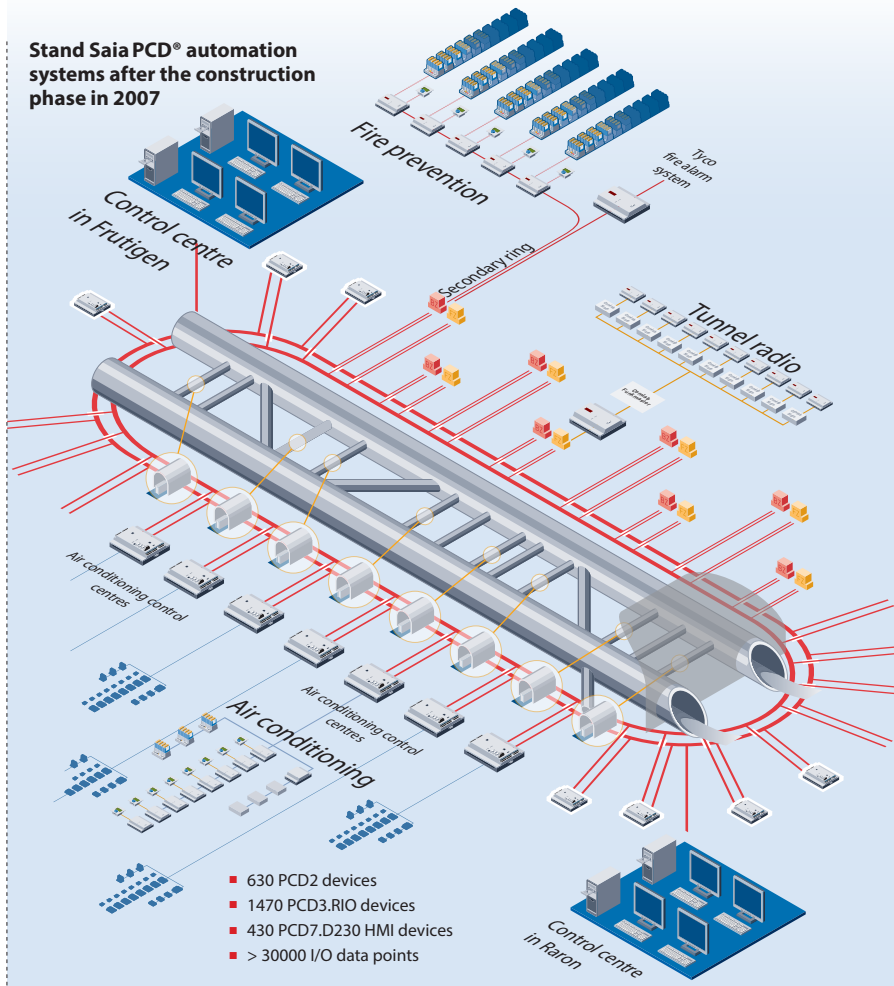
**Phase of operation 2007– 2010**

The constructor's top objectives were met. The tunnel was completed on time and under budget. All those involved were highly lauded and the contractor received an award.

The constructor fulfilled its goal when the tunnel was put into operation. It completed its work and handed the tunnel over to the operator's maintenance team: BLS Netz AG.

The initial euphoria did not last long. The tunnel has extensive safety and railway equipment. It is very complex and must also be reliably and securely available 24/7, 365 days a year. The failure of any single component may result in an interruption to operation.

Over 1000 automation devices from different manufacturers are used in the subsystems for water supply, lighting, low voltage monitoring, doors and gates. All of them are low-cost compact devices that met the specifications of the original tender. Some of them are dedicated, proprietary devices that cannot be programmed. These devices are connected somehow to the control system via complex structures, gateways, converters and multiplexers. Direct communication between the subsystems is not possible though. Requests from one subsystem to another always have to go the long way round via the control level. This results in an excessively high volume of data traffic and a lot of false messages, together with a high risk of communication breakdowns. And this involves a proportionally high volume of work for the maintenance team. Overall, the task seemed almost impossible and resulted in a high level of frustration among the staff.

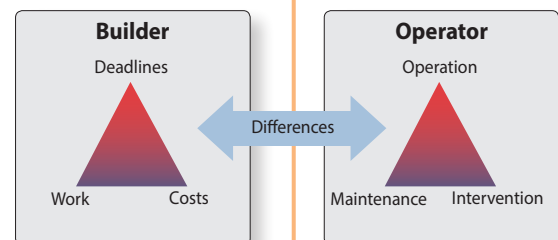
**Stand Saia PCD® automation systems after the construction phase in 2007**

▲ During the construction period, between 2004 and 2006 Saia Burgess Controls supplied numerous Saia PCD® systems to control the ventilation and air conditioning systems and to monitor the 1500 switching cabinets and the fire detection and radio equipment. The switching cabinets can be found in the 104 cross tubes and in the 8 large tunnel caverns.

During the planning and construction phase there were hardly any meetings with representatives of the future operator. No time was allowed for this. Everything just came second to the objectives of «keeping within deadlines and budgets». The components that were installed were those that were available at the relevant time and could be obtained for the cheapest price. Conflicts were therefore inevitable. The «Cheap in Mind» technology installed is now causing constant stress for the maintenance team.

After just two years of operation, as the operator of the tunnel BLS Netz AG found that maintenance and repairs to the structures that had been handed over were not economically viable in the long term. The costs of maintaining the technical equipment are twice as high in comparison to the pure operating costs (management, energy). On top of this there is the considerable strain on staff in terms of the headaches and stressful situations arising as a result of the deficiencies of the tunnel technology. After examining the situation closely, BLS Netz AG has identified a sizable optimization potential of several million Swiss francs.

The 104 cross tubes contain a total of 1500 switching cabinets for the technical infrastructure, most of which are air-conditioned. The cross tubes can also be used for evacuating people; one tunnel then serves as an escape tunnel for the other.



▲ Differences between builders and operators: conflicting interests and priorities

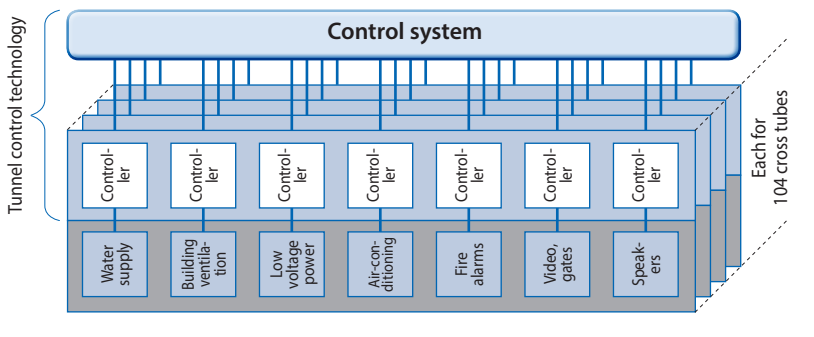


### Correcting the mistakes from the construction phase:

#### New tunnel and control technology 2010–2012

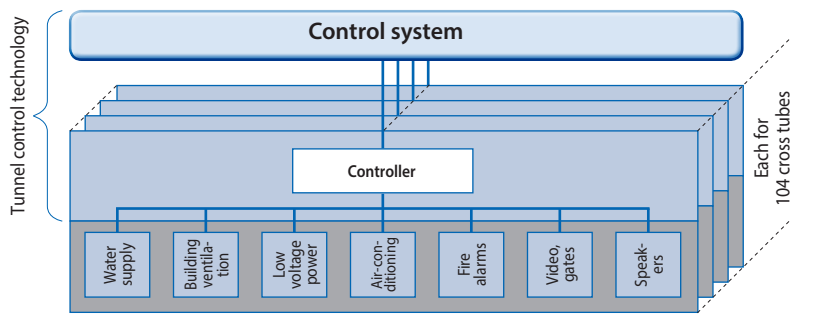
In 2009, two years after the start of operation, BLS Netz AG started planning the correction of mistakes from the construction phase. The focus was on the

Graphics: Source: BLS Netz AG



**Status quo**  
Situation from the construction phase

- The technical infrastructure was set up in a proprietary manner according to lots for specialist sectors.
- The tunnel control technology is unnecessarily complex and unmanageable.
- The tunnel operators are not adequately supported by the tunnel control technology.



**Goal**  
To correct the mistakes from the construction phase

- The numerous proprietary interfaces from each of the 104 cross tubes are replaced with a single Ethernet interface:
- The operation of the tunnel becomes permanently secure and reliable
  - Increase in transparency and improvement in efficiency through improved remote diagnostics
  - Significant reduction in costs in maintenance

proprietary automation systems. They are inaccessible and inflexible and also only «speak» their own language which cannot be understood by other systems. These proprietary automation systems needed to be replaced with open systems that meet widely used and recognised standards. The changeover work has to be carried out during ongoing operation. Another major challenge is the integration of available systems, actuators and sensors into the existing switching cabinets. Before the start of the project, BLS evaluated which systems could be used to achieve the objectives. No other system offered better conditions than SaiaPCD® for meeting the high expectations. In addition to all the regulation and control functions, it was possible to directly integrate support and management functions for the corresponding subsystems. Thanks to the builtin web technology, any subsystem can access other subsystems quickly and directly without any detours. BLS saw in SaiaPCD® technology complete transparency, flexibility, interoperability and openness.

#### The following advantages were decisive:

- SaiaPCD® offers all the necessary interfaces and protocols to integrate devices, systems, actuators and sensors into the existing switching cabinets.
- The existing previous-generation SaiaPCD® systems can easily be replaced by the latest-generation systems without a great deal of effort. The original investments such as the I/O modules and the application software therefore continue to pay off.
- With SaiaPCD®, BLS has the greatest possible degree of independence. Generally speaking, any SBC system integrator can provide support during subsequent alterations.
- BLS sees Saia Burgess Controls as a flexible and reliable partner, and sees SaiaPCD® as an automation system that guarantees robustness, innovation and long product life cycles.

Through this project, Saia Burgess Controls again received a major order for the Lötschberg Base Tunnel. The «Cheap in Mind» minimal version is being replaced by «Peace of Mind» technology.

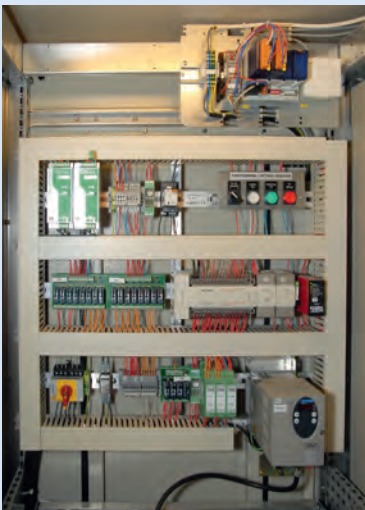
In order to the devices from the construction phase that were already installed, Saia Burgess Controls supplied a large number of SaiaPCD® automation systems for the «New Tunnel Control Technology» project. The changeover work on the Lötschberg Base Tunnel is largely completed.

Through the «New Tunnel Control Technology» optimisation project, security and availability, as well as economical maintenance management, have been assured for the long term.

#### ◀ Prime example of lean automation:

The switching cabinets after the changeover work are much leaner than the original ones from the construction phase. A lot of additional hardware that had become superfluous has been removed. This step alone has drastically reduced the risk of faults.





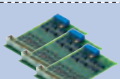


Switching cabinet before the changeover work



Switching cabinet after the changeover work



**Final status in 2012 after the changeover, total list of materials: Saia PCD®**

	350 pcs. Saia PCD® automation systems PCD2.M120/M170/M480
	370 pcs. Saia PCD® automation systems PCD2.M5540
	250 pcs. Saia PCD® Smart Ethernet RIO PCD3.T666
	1,500 pcs. RS-485 RIO PCD3.T260
	3,500 pcs. various PCD2 input/output modules
	7000 pcs. various PCD3 input/output modules
	450 pcs. HMI PCD7.D230

▲ Altogether about 100 000 sensors and actuators are connected to Saia PCD® systems.

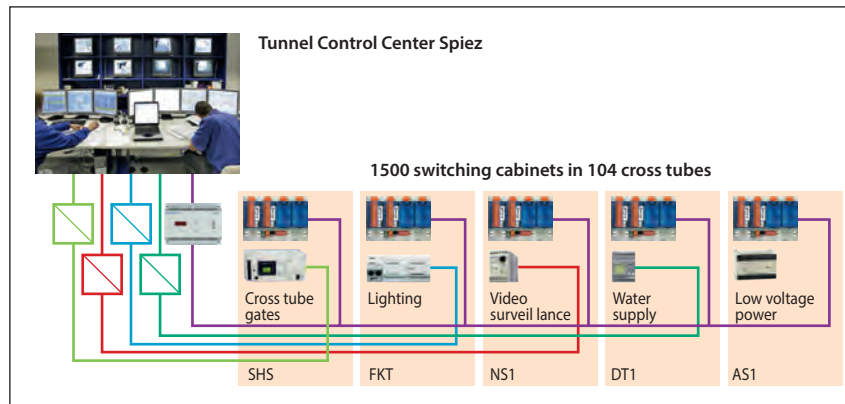


▲ One of 8 tunnel caverns. The railway technology is housed in the air-conditioned stainless steel containers.



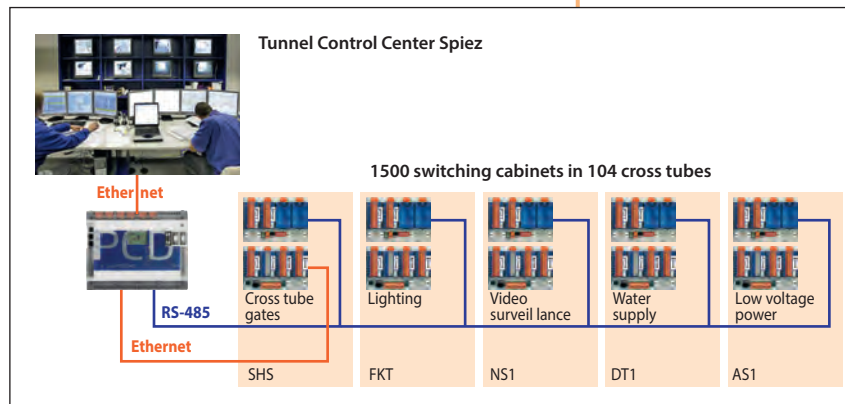
▲ One of 104 cross tubes. Up to 15 switching cabinets can be found in each cross tube.

**Topology in the cross tubes after the construction phase:**



▲ Over 1000 compact automation devices from different manufacturers result in complex and unmanageable structures.

**Topology in the cross tubes after the changeover work:**



▲ Consistency and transparency replace boundaries and hurdles – thanks to industrial PLC technology with integrated standards from the web and IT world.

**The railway company does not just want lean technology but also wants to become a lean company itself**

On 23 March 2011, Saia Burgess Controls had the opportunity of welcoming the entire management of BLS Netz AG (including the board of directors) to Murten. The main reason for the visit was not the Lötschberg Base Tunnel project but the visitors were principally interested in SBC electronics manufacturing and the lean methods used. The top management of the second largest railway company in Switzerland is seeking inspiration from a medium-sized industrial company that is perceived by all levels at BLS (including the very highest) as innovative, creative and reliable.

We received the following letter from one member of the management board after the visit:

« *Many thanks for the extremely interesting tour of your company. We were very impressed by your consistent focus on lean production and the underlying culture. We are still at the beginning of this process, whereas Saia Burgess Controls already has crucial years of optimization behind it.* »





## SBC S-Energy technology in harsh Chinese industrial environment

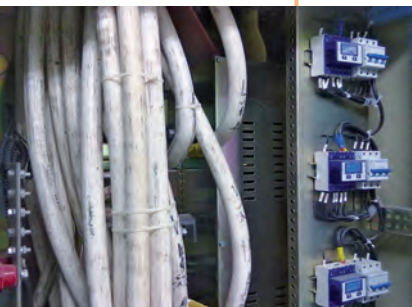
Energy management in harsh industrial environment – Johnson Electric manages to reduce the energy requirements using brains and smart ideas. High investment?

Wrong!

Authors: Daniel Ernst/Peter Steib



▲ PCD3 to record meter values – everything is not always installed entirely in line with standards



▲ Energy counters in the main distribution board directly next to the high-current cables

With 30 000 employees at its main location in Shenzhen, China, Johnson Electric produces more than three million small motors a day. The electricity requirements correspond to the consumption of nearly 50 000 German households. It is evident, at first sight, that there is considerable potential for savings here. Johnson Electric identified this potential and found in Saia Burgess Controls a strong partner for optimizing its energy efficiency.

### Energy monitoring in a challenging environment for people and technology

The main challenge for a targeted optimization of the energy requirements is precise knowledge of the actual situation. For this purpose, the energy flows must be recorded and visualized. The potential for savings can be identified and the appropriate measures defined using an analysis of this data. In order to carry this out quickly and cost-effectively one S-Energy Manager, over 270 SaiaPCD® Energy meters and three PCD3 devices for data recording were installed in the extensive industrial facilities. Even in the harsh environment of a Chinese factory, it was possible to connect the

large number of energy meters to the S-Energy Manager without any problems using several hundred meters of bus cables. And this was possible even though unshielded bus cables were laid next to high-current cables and induction furnaces. The S-Energy panels are equipped with an intuitive user interface. This meant that the employees were able to start recording the energy flows straight – away without any training period and could therefore begin identifying potential for optimisation immediately.

### Save energy through evolution, not through investment

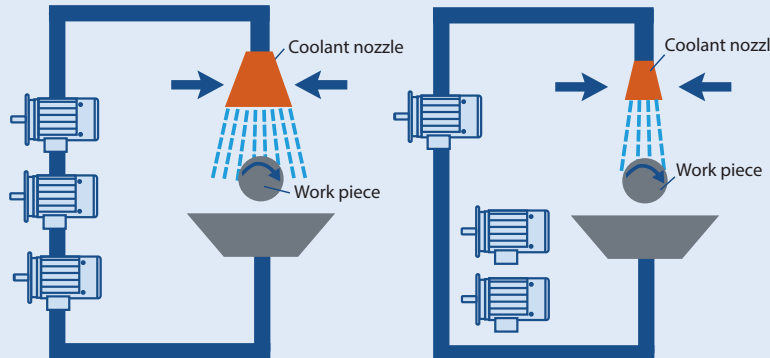
This is the motto that Johnson Electric has followed in optimizing its energy efficiency – and it has achieved with considerable success. By simply recording and analyzing the energy flows and implementing straightforward measures, the employees were able to reduce energy consumption in the manufacture of motor shafts by 3 % – and were able to do so without any investment to speak of. The individual measures are described on the next page. As a result, over EUR 40,000 of energy costs can now be saved every year, but this is not the end of the story.

Incidentally, this does not only work in China. A considerable potential for savings was also found at Johnson Electric in Switzerland following the steps taken in China and this potential was converted into successful savings measures.



### Reducing the flow of coolant through the system

The CNC lathes used were designed for work pieces with a maximum diameter of 26 mm, which, accordingly, have to be subjected to substantial cooling. As Johnson Electric only manufactures small engines with a maximum axle diameter of 8 mm, the amount of cooling lubricant required could be reduced by 2/3 by scaling down the diameter of the coolant nozzle, and cooling could therefore be carried out using just one pump instead of three. This made it possible to not only save energy but also to save on maintenance costs and meant that spare pumps could be provided.



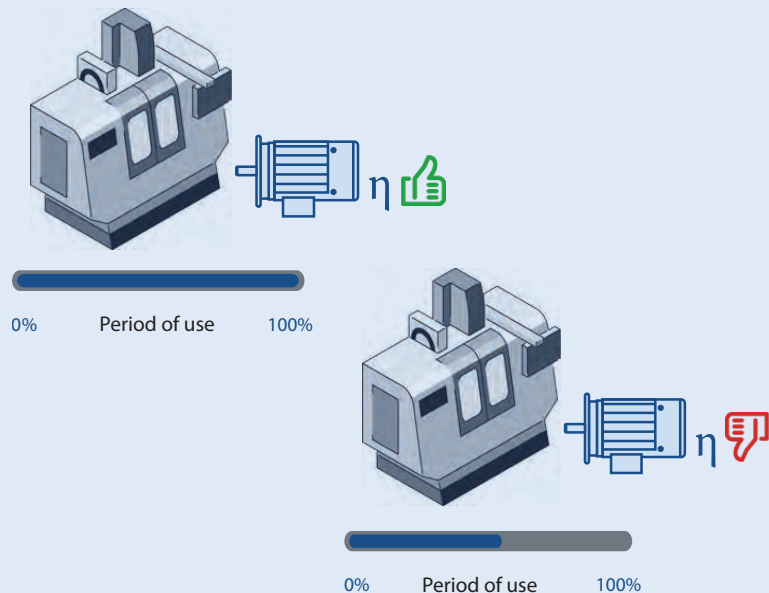
#### Savings per annum (12 machines):

Saving	2975 €
Investment	- 234 €
<b>Result</b>	<b>2741 €</b>

Amortisation period	1 month
Energy saving	24,192 kWh

### Minimizing the operating time of inefficient motors

Coolant pumps with a high and a low degree of efficiency were built in to similar circular grinding machines. In order to guarantee a long working life for the efficient motors, these coolant pumps were swapped so that the circular grinding machines with a long service life are cooled using pumps of a high quality and vice versa. It was possible to save a great deal of energy by reducing the working life of the «poor» pumps.



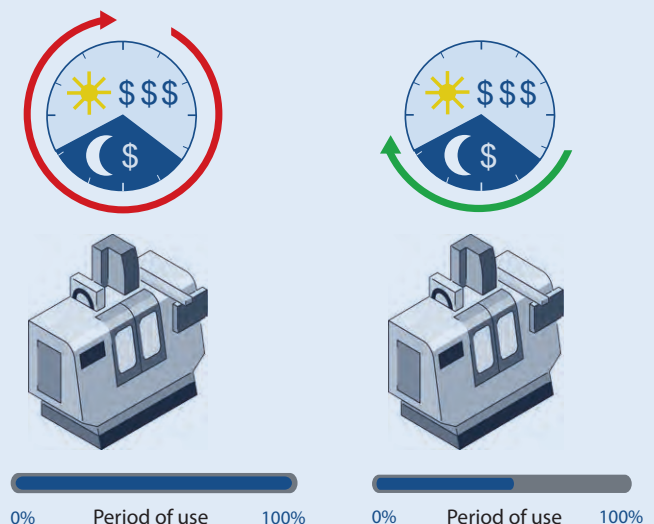
#### Savings per annum (5 machines):

Saving	1218 €
Investment	- 61 €
<b>Result</b>	<b>1157 €</b>

Amortisation period	< 1 month
Energy saving	9,900 kWh

### Use of low electricity rate times

In China there are different electricity rates at different times of the day and these rates differ dramatically. In order to be able to better take advantage of the cheap rates, the shifts are planned in such a way that the machines with short periods of use are only used at cheap electricity times. This measure makes it possible to save energy but also to save a lot of the costs for this.



#### Savings per annum (52 machines):

Saving	20123 €
Investment	- 5298 €
<b>Result</b>	<b>14825 €</b>

Amortisation period	4 month
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## Operators of large properties are choosing Saia PCD®

The first Saia PCD® BACnet® controllers in use at Fraport. Author: Stefan Pfützler



To avoid being tied to individual suppliers, operators of medium-sized and large buildings are increasingly opting for the open communications standard BACnet®. For several years this has been the established standard at Frankfurt Airport's Fraport AG and much effort and commitment have been put into ensuring that this standard is upheld. To this end, requirement profiles have been defined for all supported BACnet® objects and BACnet® services, achieving a uniform standard on which to use BACnet® controllers in a building with diverse automation systems from several manufacturers.

Saia PCD® systems have been BACnet® enabled for more than five years. In 2008, the controller platforms PCD2.M5 and PCD3 were successfully certified according to the BTL standard. In September 2008, as part of BACnet® implementation at Frankfurt Airport, Saia-Burgess Controls AG was invited to submit its PCD3.M5540 BACnet® controller to comprehensive testing. Approval was granted on 19 June 2009 and announced in Controls News 12. With this approval we were able to win the initial tenders for modernization work on Terminal 1 in partnership with our certified system integrators CMS-electric GmbH from Flörsheim am Main. We started with two small projects and now have the contract for the new Pier A-Plus building.

With an investment volume of nearly EUR 500 million, the 790-metre-long building Pier will be completed in autumn 2012. The foundation stone was laid on 1 September 2009 and once completed, it will handle an additional 6 million passengers per year. A total of seven wide-bodied aircraft will be able to dock at the gates of the new pier. Four of these gates will each be fitted with three passenger boarding bridges and will therefore also be able to accommodate the Airbus A380. Alternatively, up to 11 short-haul aircraft could also dock at these gates. In conjunction with Menerga's central ventilation systems, CMS-electric GmbH has equipped the heating, cooling and smoke extraction controllers with Saia PCD® system technology throughout Terminal A-Plus, including the connection of individual zone control units. Around 30,000 hardware data points are processed directly by more than 250 PCD3.M5540 controllers and over 160 Micro Browser panels (5.7" and 10"). All communication at automation level is based on BACnet. It is not just the project size and number of data points that make it interesting, but above all the technology used and its full integration of BACnet® communication on the basis of one standard.

After completion of the new terminal, we would be delighted to provide a detailed application report for this project with Fraport AG's approval.

Construction site for the 790 m long Pier A-Plus





## «Peace of Mind» at CERN in Geneva

With the «Peace of Mind» concept, CERN is focussing on total independence, with the aim of further developing the automation of building infrastructures to its own advantage

Author: André Gross



▲ Reception building for visitors. Management of lighting with SaiaPCD®



Logo © CERN

With 430 industrial buildings, CERN has had to double its reception capacity since the inauguration of the LHC. Today's infrastructure has to ensure that more than 10 000 scientists can conduct their research without any problems.  
[www.cern.ch](http://www.cern.ch)



The World Wide Web arose from the need for data exchange among physicists. In the context of infrastructure management, the need for openness and the use of common standards by the majority has led to a decision in favour of automation systems from Saia Burgess Controls. One of the main priorities of the Peace of Mind concept that Saia Burgess Controls is introducing for the automation of the organisation's buildings and infrastructures is the further development of applications by several independent system integrators throughout their entire life cycle. The hope for this project is that it should spell the end of any dependence on a single, irreplaceable provider (which has often been observed) and provide the freedom to develop automation systems further without any restriction in terms of requirements. The owner wins on all levels: flexibility, speed, selection of providers and, finally, on a cost level. Long-term progress towards independence and flexibility naturally requires the selection of equipment that guarantees flexible, open and sustainable automation. The SaiaPCD® automation systems fulfil all these conditions.

### First steps with CERN

The management alone of more than 400 properties with their associated infrastructures is a challenge. If you add to this the technical developments, budgetary constraints, economical use of energy and optimum utilisation with heterogeneous systems, the

problem that would have had to be solved by awarding everything to an external specialist becomes hard to manage. That is why one of the priorities for CERN was to regain total control, without having to do away with the existing system. In its POM presentations, Saia Burgess Controls offered CERN solutions for all the demands that CERN had made for the desired internal takeover. Three projects to test the SBC equipment and partner services were set in motion immediately.

### The first projects

Elitec SA, a certified SaiaPCD® system integrator, quickly demonstrated its expertise in the first heating projects for buildings 864, 42, 14 and 35, and also in two heating installations for the large district heating production centres on CERN premises, the headquarters of Meyrin (3 × 15 MW) and Préveessin (3 × 7 MW). These large district heating production centres were tested by inspection bodies such as ASIT in Switzerland and DEKRA in France with regard to the built-in checks of the heating installations.



**ELITEC** Automation  
ELECTRO INDUSTRY TECHNOLOGY

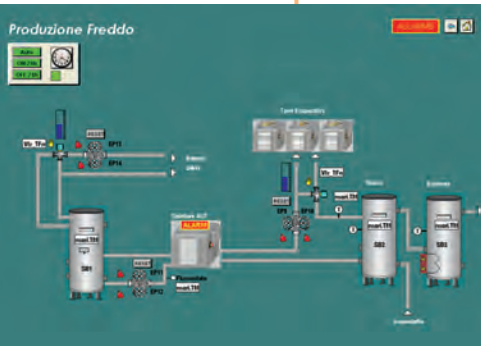
Elitec SA was primarily set up in 1994 for the manufacture of electrical control panels and in the years since has developed, together with its 17 employees, into one of the key players in the field of building automation and technology in the western, French-speaking part of Switzerland. Elitec AG is one of our successful certified system integrators and was able to prove its expertise at CERN.





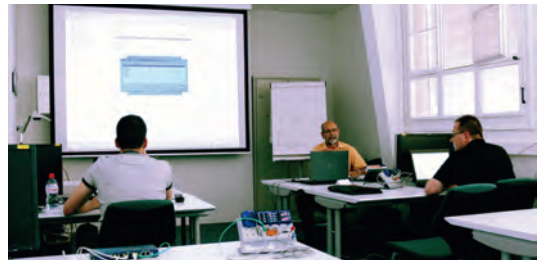
### Internationalization of demand

Additional projects were carried out abroad: The company Nerling/D undertook a clean room project and MCM Impianti/I undertook the restaurant extension (Building 501). Other installation projects by Saia PCD® system integrators are also underway in France, Italy and Germany. The universality of Saia PCD® automation systems and the more than 600 system integrators in Europe enable CERN to award contracts for projects in all member states, without restriction.



### Transfer of expertise to the operator and general contractor

CERN wanted to manage all its projects and systems autonomously or together with partners of its choosing. An important point here was the further development of the expertise of CERN employees; the individual training programmes offered by Saia Burgess Controls engineers were used as a basis for this. These training sessions covered all aspects, including the selection of equipment and its programming, communication and web and IT functions. Today the CERN teams control their systems completely autonomously, from planning and programming to maintenance.

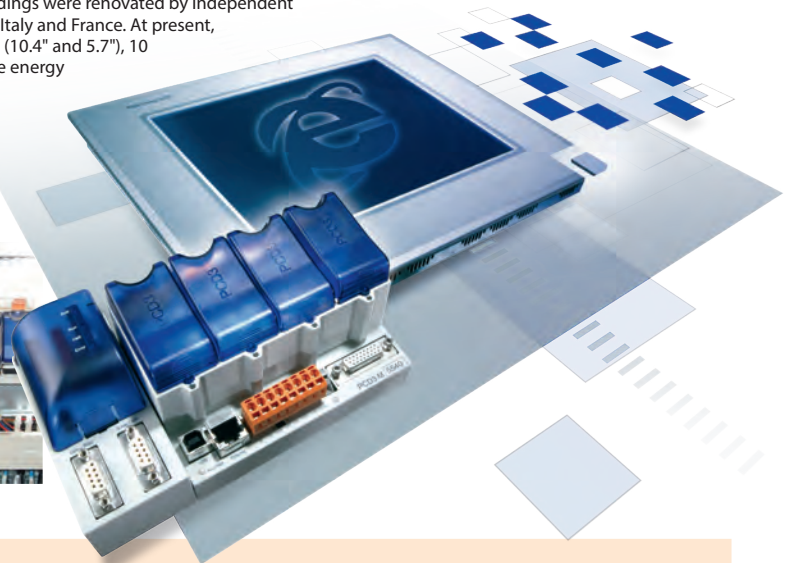


▲ SBC Workshop

▲ International extension of the restaurant in Building 501 with the Italian Saia PCD® system integrator «MCM Impianti»



In the first year, seven of the organisation's buildings were renovated by independent system integrators from Switzerland, Germany, Italy and France. At present, 10 PCD3.M automatic machines, 10 web panels (10.4" and 5.7"), 10 intelligent Smart RIO stations and 6 three-phase energy counters (S-Bus and M-Bus) are installed, and these can be used to manage the heating, air-conditioning, ventilation, sanitary and electrical installations (roller shutters and lighting).



### The results

The initial results show that achieving independence and autonomy takes a great deal of effort in the early stages. Things that were previously conveniently assigned to subcontractors and hidden in invoices now had to be acquired as new competences and know-how in the area of automation. However, the standards integrated into the Saia Burgess Controls automation systems make it possible to develop competences that normally belong to the automation profession on the basis of an engineer's normal level of technical knowledge, particularly as regards the area of communication and ITC and web interfaces. This represents a definite time saving. Once this stage is over, as key players the CERN teams will take on the role of decision-maker in their

projects, from planning to implementation, usage and maintenance. Their control over the entire chain means that they are more free to choose projects and partners, can take advantage of competition and, where necessary, can arrange for new participants to be trained on Saia Burgess Controls.

From a technical point of view, CERN has advanced and opened up in a way that has motivated the organization. The goals set for the first year have been achieved. The Saia PCD® equipment meets and even exceeds the criteria set by CERN, particularly in the clean room and the heating installations. All the requirements were met and the tests were passed. The greatest strength of the SBC concept is still the virtually unrestricted integration, not only of new systems but also of existing systems.



**The future: standardization of the automation and energy management architecture**

After the pilot phase, CERN will standardize architectures (e.g. DALI for lighting), equipment (e.g. PCD3.M5540 and Smart RIO PCD7.T665, Web Panel PCD7.D410) and the associated application libraries, such as DDC Suite, in order to retain control over all the systems and future developments and, at the same time, be able to work together with a wide range of international providers with SaiaPCD® equipment. CERN is planning to modernize the lighting concept. A pilot project using the technology and the new DALI EN 62386-103 standard in the multi-master version is underway with the aim of being able to program lighting scenarios according to certain predefined criteria. These scenarios involve the use of presence detectors to optimize energy consumption. One project will focus on logging energy consumption. The meters installed for the projects send their data directly to an SQL database. Here too, CERN was impressed by the «lean» approach of the S-Energy concept, which means that CERN can develop a concept completely autonomously with its own team. CERN also wanted to take advantage of the possibilities of the web/IT technologies that are available in all SBC systems, and to have access to its data from anywhere, thanks to the benefits of the World Wide Web invented by CERN physicists. As the saying goes, we render unto Caesar the things which are Caesar's.



picture © CERN

▲▶ The latest technology showpiece in CERN: the Large Hadron Collider (LHC) with a circumference of 27 km with which we will gain new insights into our universe.



picture © CERN



▼ CERN united members from 22 nations



picture © CERN

**Conclusion**

With building and infrastructure automation systems based on industry and ITC standards, an operator or general contractor can manage his entire requirements for automation and data transfer efficiently. The CERN case study is typical and shows the advantages that are available to everyone. The initial investment soon pays off, particularly with regard to the know-how that makes it possible to correctly choose the most advantageous options in the long term, while the ability to develop the concepts as needed without any major impact on costs, deadlines or the existing system has proved beneficial. For Saia Burgess Controls, the decision made by CERN represents an additional motivation to continue to drive their developments forward towards even greater flexibility and transparency, particularly where the monitoring of communication networks or the management of energy resources is concerned.



## Energy recording in the City of Zurich

Zurich – the largest city in Switzerland. IMMO (the property administration organisation of the City of Zurich) manages more than 1,600 buildings, of which up to 200 are fitted with energy recording equipment from Saia Burgess Controls. Author: André Gross



### VISCOM ENGINEERING AG

SBC system integrator has developed, implemented and supported a monitoring system in operation.

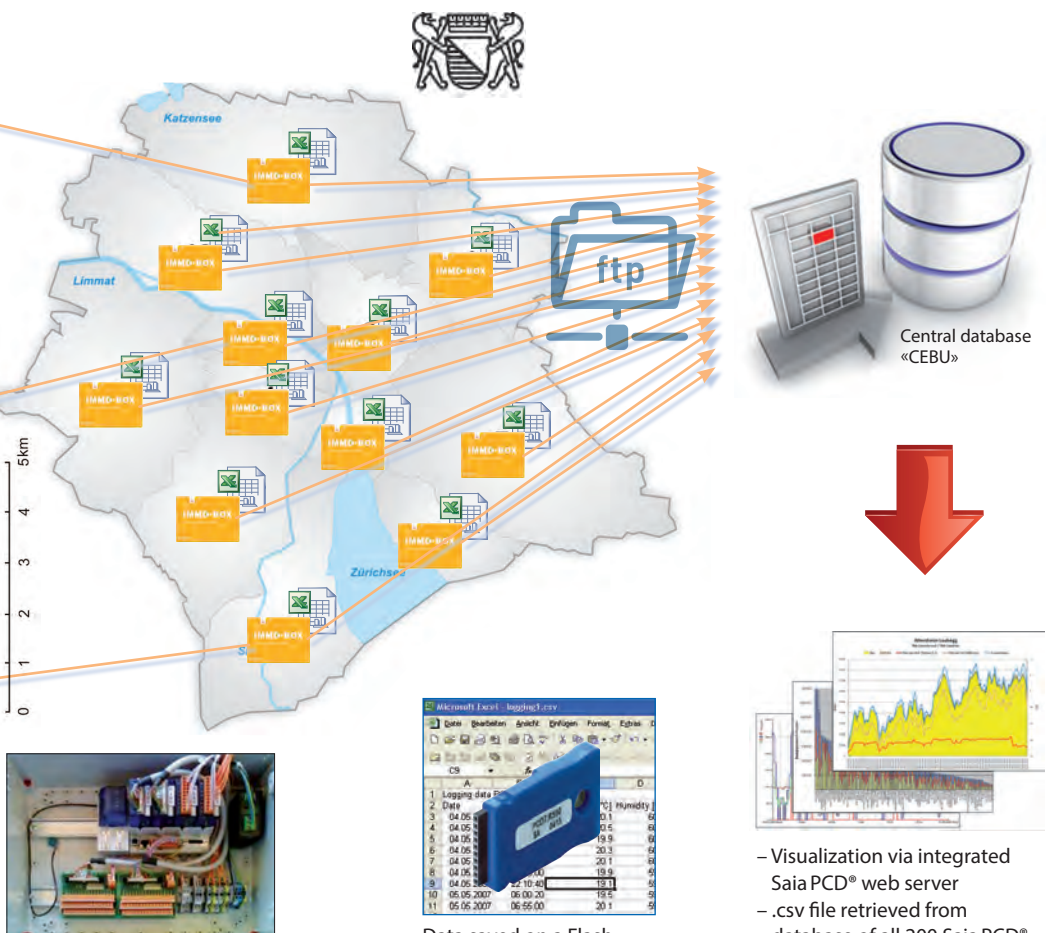
For 5 years, the canton of Zurich has included the canton's major users of energy in an energy saving program. The property management organization of the City of Zurich manages more than 1600 buildings as a representative of owners (schools, old people's homes, nursing homes, administrative offices, sports facilities, swimming pools, etc.).

As part of a major energy consumer agreement with the canton, the decision was made to record energy information for the 91 largest of these buildings and to analyze this information accordingly (consumption of water, electricity and heat) with the aim of achieving an average annual saving of 2%. This aim was achieved within the first 4 years.

Viscom Engineering AG won the tender with PCD3 controllers, data logging by means of CSV files and web services. PCD3 collects data from 10–60 measurement points using M-Bus and pulse input points,

generates a file for the day in CSV format using these measurements and displays the current values on an integrated website. Once every night, an external database «CEBU» retrieves the file for the day from each branch office and integrates it into the database. This is then used to analyze the energy consumption of the different buildings and to compare buildings in the same portfolio. At present, 110 Immo boxes (property boxes) are already installed. This figure could rise to approx. 200 boxes in the final phase. The City of Zurich has been able to enhance existing buildings with energy data logging equipment and has now been able to use this information to take specific energyefficient measures. These data are permanently reviewed and compared. This helps to quickly detect and correct faults and irregularities.

Conclusion: Cost and energy savings are also beneficial for tax payers!



### View of the inside of one of the 200 immo boxes

- 1x PCD3.M5540
- Connection for max. 20 M-Bus meters
- 32 digital inputs for plus meters

**M-Bus**

M-Bus meter



# Collection of project examples from 2009–2011

## A combination of strengths and functions

From a technological viewpoint, the combination of PLC + WEB + IT on an industrial platform such as Saia PCD® is a technical cornerstone for lean automation. The cooperation between Saia Burgess Controls and more than 600 companies working in the field of system integration for the automation of infrastructure facilities.

Author: Patrick Marti



Happiness throughout the entire life cycle is created for operators of buildings if the strengths of local and competent integrators are combined with those of Saia Burgess Controls in projects.

### A model that works perfectly all around the world and ensures satisfied users.

Extract from list of 2010 project examples: The «PLC + WEB + IT» combination of technology and the «SBC+SI» combination are working extremely well around the world. A lean success model.

#### Saia Burgess Controls: extract Project List 2010



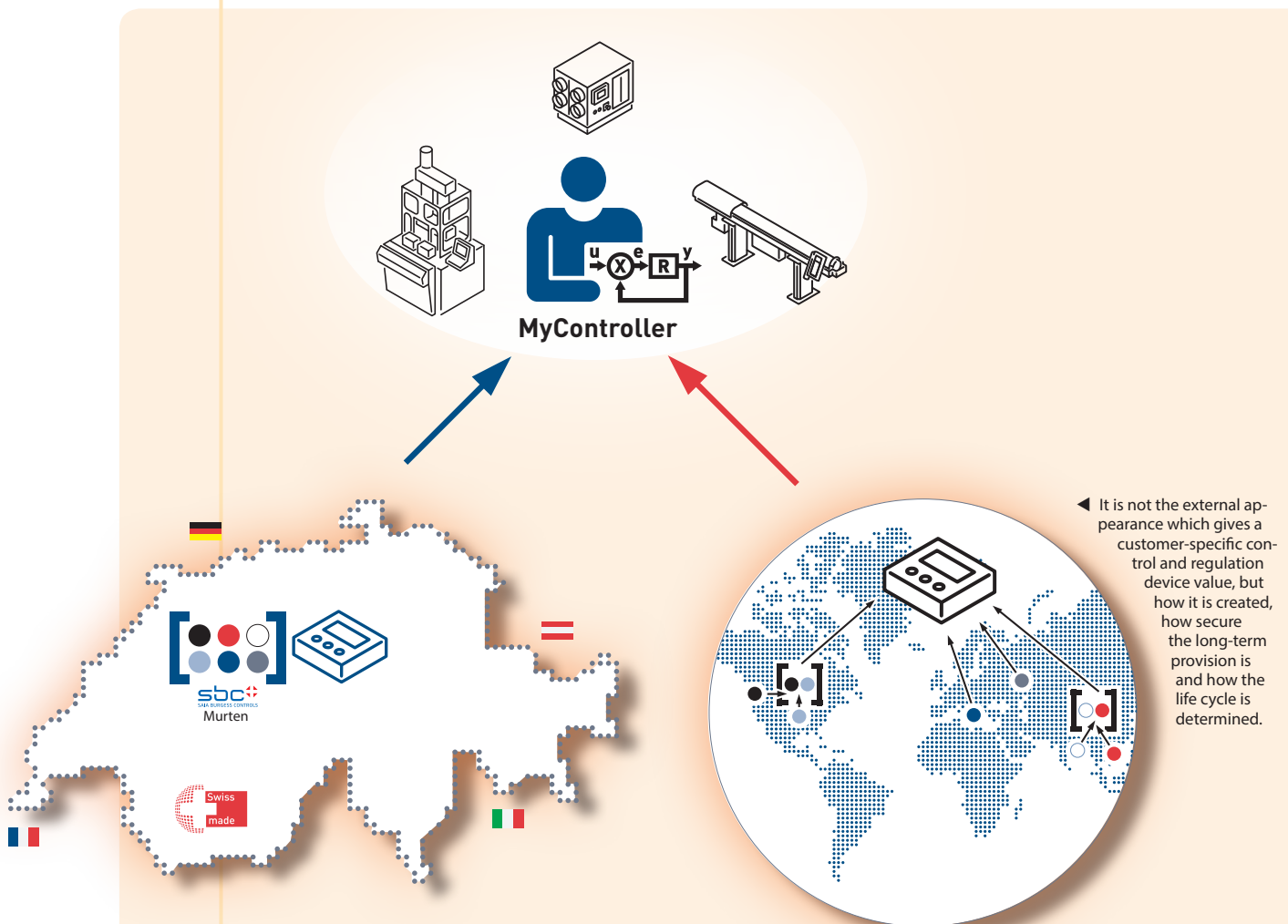
Country	Project name, location	Application	Type of products used (family, no. CPUs, no. I/Os)	«Other information, comments (communication, specialties...）」
Austria	Fernkälte Wien = District Cooling Vienna, SMZ Ost	District cooling	PCD2.M480 Master + 6 × PCD3.M5540 + VISI.Plus Large + Web, 600 DP	1 × PCD2.M480 Master + 6 × PCD3.M5540 + VISI.Plus Large + Web, Profi S-Net and Ethernet
Benelux	ASML Cleanrooms, Veldhoven	Cleanrooms and climate	11 × PCD3.M5340 + PCD7.L602 + PCD7.D410VTCF	Expansion of ASML plant
Benelux	Flora Holland Flower auction, Naaldwijk	S-Energy	× AWD3 S-Bus	Pilot Voltage-monitoring via S-Bus to PCD3 and iFIX
China	GuangDong railway transfer Centra building air-condition mainframe energy save, GuangDong	Energy save		–
China	GuangXu Power Plant Air-Condition Controls, GuangZhou	Air-Condition Controls		–
Czech Rep	Faculty hospital Plzen, Plzen	Control of 10 aircondition units and heat exchanger	PCD2, 7 × PLC1, 680 I/Os	Control Web
Czech Rep	Heating plant Dvur Kralove, Dvur Kralove	Control of 24 local heat exchangers distributed in the town	PCD2, PCD1, 24 × PLC1, 960 I/Os	–
Finland	Heating Powerplant	District heating and electricity	6 × PCD3.M6540	with GSD SCADA System
France	Sanofi ULC / Montpellier	Haevac Management	PCD3.M5, PCD3.R6, AWD3, PCD7.D4, 1000 I/O	Modbus TCP
France	Stade du Mans	Electrical Management	7 × PCD3.M5, PWS	Web, IT, SD, PWS
France	Stérilisation CHU Toulouse	Haevac Management	1 × PCD3.M5, 8 × PCD3.M3	Bacnet with PCVue 32 and Server Web with MB
Germany	Airport Frankfurt	Ventilation System LZ24/25	PCD3.M5340	<b>A total of 500 data points</b>
Germany	Audi Ingolstadt	Building	PCD3 Web-panel	
Germany	SAP Mannheim / ALKO	BACnet, Web, Romutec	PCD3.M5340 and PCD7.D457VTCF	Reorganization of the SAP head-quarters in Mannheim. Entire HVAC was renewed.
Hong Kong	Redevelopment at 84-86 Tai Kok Tsui Road, Tai Kok Tsui, Hong Kong	BA System		–
Italy	Bio gas generator plants	Builder of Biogas plants and other applications related to removable energy and energy efficiency	PCD1.M2, E-meter	First application made with PCD1, using IT functionalities for remote controlling via Web. Energy meter is also mounted in. Reference on Youtube
Italy	IVECO (Suzzara factory)	Energy management	PCD3, PCD1, Energy logger, E-meters	The project was discussed directly with energy manager of the factory. Scalability and flexibility of our proposal was the winning key. Youtube and PPT in preparation
Italy	Leroy Merlin Headquarter (Milano)	Energy control for data centers	PCD1, PCD3.T665	DIM module. 19" rack with inside a PCD2.M5540 for data center control. The winning features are the IT capabilities of our systems (Web Server, File systems, E-Mail, Trend/Alarms, SNMP, SNTP) and the high number of communication interfaces. The customer started also using our energy meters. Youtube ref. in preparation. Sample of 19" rack PCD2 given to SBC Murten.
Norway	FAN Optimizer	Belimo MP Bus VAV interface	PCD3.M3020 with PCD3.F281(60 PCD3/108 PCD7.F281)	All units delivered, engineering starts February 2011 (Done by MWA)
Norway	Brunvoll	Starter Cabinet	PCD3.M3120Z05/PCD3.T665/6.50 IO	Competition from Omron. Big potentials in Future, convert from PCD3.M3120Z05 when PCD3.T66x is official
Poland	Data Center / Warsaw	Monitoring of data center installations	PCD3 Compact	SBC Web/IT technology used, Modbus RTU for Power Meter, web based HMI application, GSM SMS alarming, local web based access via company intranet
Poland	Telemetry and heating chambers controllers, EPEC	Heating chambers with telemetry	PCD3.M5540 × 1, number of I/O: 40	S-Bus, M-Bus, AS, Profibus DP.
Switzerland	Pilatus Kulm Hotel- und Seminar-Räume	Building Automation	PCD3 / WEB-Panels / Energy meter	In preparation to become a reference object and visitig object with our VIP customers
Switzerland	Spital Herisau	HLK	12 × PCD3,	about 1300 DP
Slovenia	Hotel Groups, Portorose	Lights and HVAC	PCD3.M33..+PCD3.R600, 1460 I/O	KNX gateway → WEB visualisation in the reception of lights and HVAC of hotel rooms
Spain	Hydraulic power generation, Aragón	Control and supervision of electric power generation plant	PCD3.M5540, 200 I/O	

For reasons of confidentiality we cannot generally disclose the list of project examples. However, upon request you can ask for the lists for 2009, 2010 and 2011 from your local Saia PCD® representative.

## Peace of Mind (POM) for customer-specific control and regulation devices as well

With 'Peace of Mind', Saia Burgess Controls has developed a concept for satisfied operators of automation solutions. The use of recognised standards, openness and flexibility is decisive here, as well as taking into account a system's entire life cycle. SBC is the right partner for anyone wishing to use these benefits for customer-specific controls on their own machines and devices. With the business model featuring a central location for development and production, SBC is offering significant benefits offers decisive advantages compared to local decentralised and global market model alternatives. The graphic below provides an initial point of reference.

Author: Günther Bredl



### Starting point, origin and impact of a current decentralised global market model

A manufacturer of machines and devices works with long-term objectives. Since he relies heavily on the selection of control technology, the supplier should meet various requirements so that this dependency is not made worse by further risks. It is important that at least the following points are taken into consideration and checked:

1. Does he have the required in-depth technical skills himself?
2. Can he constantly ensure a high quality standard?
3. Which control mechanisms are offered?
4. What position of sustainability does he have on the market?
5. Can he offer shortbrief and rapid information and decision-making channels?

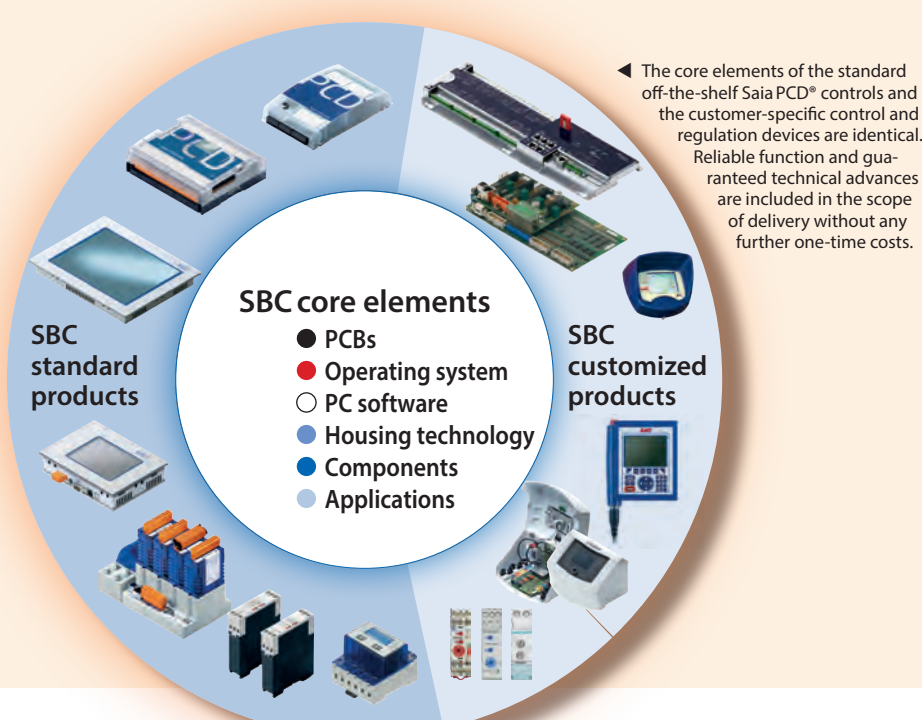
In this 5-point check we have not excluded or forgotten the issue of costs – quite the opposite. From our daily customer contact by means of talks and discussions, we see that as ever the lowest price is still the deciding factor. We are entirely convinced that looking at things from this angle – purely looking at price – is much too restricted. Depending on the level of technical complexity and the speed at which a product is enhanced further developed in technological terms, the economic disadvantage of this method is steadily growing. Pressure on the purchase price means pressure on the material and manufacturing costs for the suppliers. The manufacturer must realise that the supplier will attempt to offset the cost pressure. So he may use outdated technology, or cease in-house development of key product elements, or stop producing them in his own factory. Instead, due purely to cost considerations, he will distribute part or all of the value-added chain around the world. Even more seriously, if purchase price alone is considered, product maintenance costs and the risk of taking a technological step backward will be ignored. If the manufacturer then realizes that such business arrangements can involve costs he has not calculated, that processes are error-prone and further unforeseeable risks likely, he broadens his perspective. The long-term consequences such as high additional costs or, in extreme case, also a loss of image, cannot be foreseen. The manufacturer must at least be clear that through the classic purchase price policy, the supposed cost and price benefits of the present will be carried over into the future as a burden.

**Saia Burgess Controls long-term business model**

Saia Burgess Controls has been dedicated to looking at costs from a wide angle for many years now. We have incorporated 'Swiss reliability' into the way we think, act and work and have further developed this via the POM (Peace Of Mind) approach. Saia Burgess Controls has been structured in such a way that all the core elements of control technology, such as operating systems, communication, software tools, boards and housing are developed centrally at a site in Switzerland. The complete production of automation devices and technical support for customers takes place at the same site. We also make use of the geographical concentration of activities in the sense that those with overall responsibility for the complete value-added chain sit in open offices amongst their employees and can always be reached. The opportunities provided by this close cooperation guarantee our customers short information paths and rapid decision-making processes. For series production customers who evaluate the entire life cycle of a product, we therefore offer an attractive constellation with long-term economic and technological benefits compared to the alternatives available on the market. A visual summary of these benefits are is shown once again in the diagrams below.



▲ We have a good grasp of all the core elements of a customer-specific control system since we develop everything ourselves: software, firmware, hardware, tools and housing technology.





## Waves with Saia PCD® Soldering machines for lean production

ERSA GmbH, headquartered in Wertheim/Germany, is Europe's largest manufacturer of soldering machines. In the third year of the cooperation, the third wave soldering series-production machine has already been fitted with Saia PCD®.

Authors: Patrick Lützel/Rolf Müller



▲ ERSA headquarters in Wertheim/Germany

The requirement for flexible, lean production methods calls for innovative solutions. As part of our reorganisation of production towards lean methods and increased efficiency, ERSA has learned what we expect of small lean machines.

The aim was to move away from batch production with large batch sizes towards a «one piece flow». The intention was to create several small production islands to produce for continually changing types of devices and modules to be produced.



▲ ETS330  
Compact double wave soldering machine with PCD2 CPU and SBC 5.7" MB panel



▲ ETS250  
Compact wave soldering machine with Saia PCD®

### Lean production needs high quality lean machines

We have now reorganised the bulk of production towards lean methods and concepts. A number of new, small soldering machines have been purchased and put into operation. The time which followed was equally exciting and instructive, both for our supplier ERSA and for SBC.

As a «global player» in the electronics industry and a leader in technology for large machines, ERSA has realised that its innovation roadmap needs to be adapted as regards small machines. Our aim is that the machines for the small production cells are not simply slimmed down and thus made cheaper, but that these have the same features and are regarded as highly as the large high-end machines.

### Saia PCD® in ERSA innovations as well

After nearly 3 years with our cooperation, ERSA has already converted 2 types of series machine to Saia PCD®: ETS250 and ETS330.

The increase in value achieved is considerable: Thanks to integrated web and IT standards, up to 100 soldering programs can now be managed and backed up in Excel, diagnosis and trends visualised and weekly programs created by the operator himself. If desired, this can also be without a HMI on the machine, but instead via the customer's corporate network using PCs or mobile devices (iPhone, iPad).

▶ **Innovative workflows thanks to web and IT technology in production at SBC:**  
Weekly programs are created and statistical evaluations visualised using industrially «packaged» iPods.



As the first pilot customer, ERSA used the Saia Burgess Controls Power CPU PCD3.M5567 in its new Powerflow eN2. This 3rd machine type with SaiaPCD® is now nearly ready to go to market. ERSA is so inspired by the performance that this CPU will also be standardised on the other 2 machine types. ERSA benefits from our innovations and uses these in the life cycle of its machines. This means that its machines will be cyclically increased in value, with the minimum effort for integration.

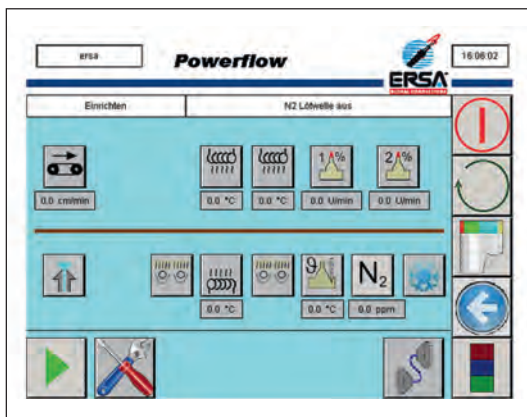


▲ **Powerflow eN2**  
Compact full tunnel wave soldering machine with SaiaPCD®

By using lean automation devices, ERSA has taken an important step towards strengthening and securing its leader position. We are expecting another step soon: Small lean machines which can fully meet the requirements of a flexible lean production system.



◀ Prototype Powerflow eN2 with SBC power system PCD3.M5567



◀ ERSA web control pages for the 5.7" SBC Micro-Browser panel PCD7.D457VTFC





## HVAC/Sanitary and energy technology combined in one system

Saia Burgess Controls is a supplier for the leading European heating manufacturer.

Author: Rolf Müller

Vaillant's most innovative product is currently the micro-CHP system known as ecoPOWER 1.0. With an electrical output of 1 kW and a thermal output of 2.5 kW, the system is particularly suited to use in homes.

ecoPower 1.0 works with an overall efficiency of 85%. Those producing electricity and heat in this way save a good 30% on energy compared to a modern gas or oil heating system.

The System and Energy Manager (system controller) from Saia Burgess Controls is a cut above the rest.

### 10-year cooperation

The cooperation between Vaillant and Saia Burgess Controls has now lasted over a decade. The turn of the millennium in the heating sector was characterised by the dawn of a new era which was to revolutionise the electricity and heating market: the fuel cell heating appliance, praised as the innovation of the century. According to ideas at the time, tens of thousands of these devices should already be on the grid by now. But reality caught up with us a long time ago – the project is still only in the development and demonstration phase in all leading supplies.

Over this period, both companies invested huge amounts resources in the fuel cell heating appliance project and thus also created the basis for the ecoPOWER 1.0 system. In so doing, Vaillant has come to know and appreciate SBC as an innovative, flexible, reliable partner which brings with it 10 years of shared history.

SaiaPCD® have been used at all development, prototype and field test levels as the energy manager of the fuel cell system. The continually changing requirements had to be met at all times without having to write off prior investments. Step-by-step, Vaillant has been able to use and also codetermine our innovations.

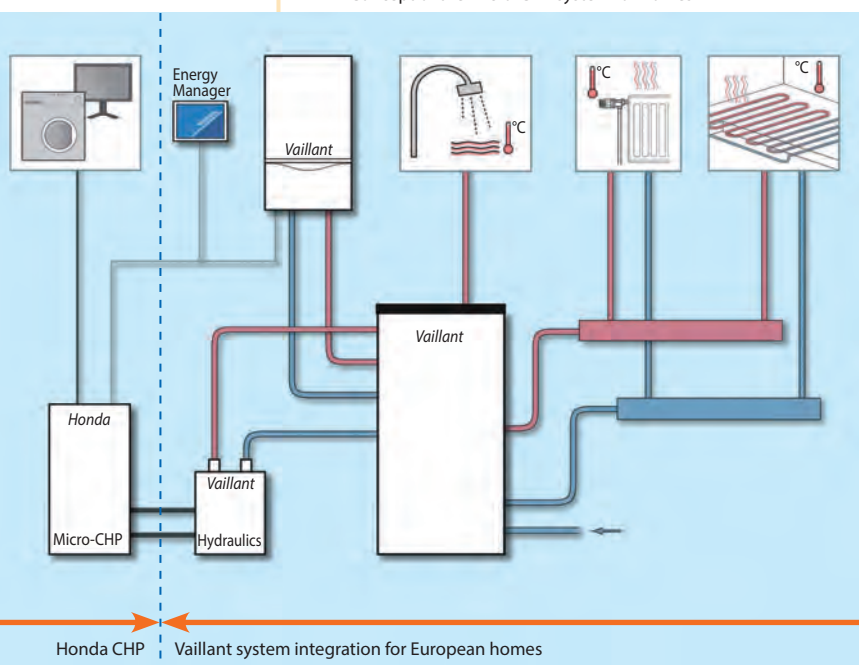
- 1 Peak load gas-fired header
- 2 System controller
- 3 Honda micro-CHP
- 4 Heat recovery module
- 5 Boiler



▲ Micro-CHP system from Vaillant

Source: Vaillant-Group

### ▼ Concept of the micro-CHP system for homes



Honda CHP    Vaillant system integration for European homes

Source: Vaillant-Group

The System and Energy Manager from Saia Burgess Controls, based on standard SaiaPCD® technologies, is a cut above the rest.

### System and Energy Manager for the Vaillant-Honda micro-CHP

Based on the establishment of mutual trust, this step was only logical in order to use the experience collected in the Vaillant-Honda micro-CHP project as well. Despite the extremely varied technology for fuel cells, the requirements for higher-level energy management remain practically identical. Vaillant's greatest challenge was to integrate Honda so that it was compatible with the other Vaillant standard components. This, in turn, is the primary task of the System and Energy Manager.

Vaillant had the highest requirements right from the start: As a premium system, it was to offer the highest level of operating comfort, reliability, longevity and maximum energy efficiency. At the same time, it was to be affordable for everyone. In just under 2 years after the start of development, these objectives were achieved with the sales release in the summer of 2011.



**The following system components are connected to the System and Energy Manager:**

Component type	Component	Connection
Heat generator	Honda micro-CHP	CAN
Heat transfer	Heat recovery module	Sensors/actuators
Additional heat generator	ecoTEC condensing boiler	eBUS
Heat buffer	Hot water buffer storage	Sensors
Heat outlet 1	Drinking water station	eBUS
Heat outlet 2	Mixer circuit 1	Sensors/actuators
Heat outlet 3	Mixer circuit 2	Sensors/actuators
Control unit 1	Remote control	eBUS
Control unit 2	Customer PC, iPhone, iPad	Ethernet
External interface 1	DSL router	Ethernet
External interface 2	Service notebook	Ethernet



▲ System and Energy Manager with 5.7" touch-panel and rotary wheel for parameter settings

A highly-performance system is offered here with the aim of saving energy. Optimised as per requirements, it not only generates heat for consumption but at the same time creates electrical power for more than half a family's annual requirements. All boards and components of the System and Energy Manager are based on the standard technologies of SaiaPCD®. These are assembled at our plant in Murten on a production line created specifically for this product in the housing constructed by Vaillant, according to lean methods, and in a «one piece flow», checked, packaged and then delivered directly to Vaillant's central warehouse. The System and Energy Manager is not only the system's brain, but also its calling card. With the Saia PG5® WebEditor software tool, Vaillant has developed an extremely attractive and intuitive user interface in web technology.

These superb Vaillant web control pages will not just stay in the basement. Soon every customer will be able to buy the Vaillant ecopower1.0 App in the Apple Store and thus monitor and use the system from anywhere using his iPhone or iPad.

With this project, Vaillant has deliberately not tendered for 'Cheap in Mind' technology, but instead wanted a system which would be fully open to the outside. The SaiaPCD® automation server, with web, FTP and http server, SNMP, etc. meets these expectations in full.

**Vaillant wins the «German Sustainability Award 2011»**

Under the patronage of Chancellor of the Federal Republic of Germany, Dr. Angela Merkel, Vaillant won the German Sustainability Award 2011 for ecoPOWER 1.0. This award honors companies who combine economic success with environmental protection in an exemplary manner. ecoPOWER 1.0 will significantly reduce resource consumption and CO<sub>2</sub> emissions. This system is therefore making a sustainable contribution towards the turnaround in energy policy in Germany.



1 Standard SaiaPCD® CPU board  
2 1-phase SBC energy meter  
3 Vaillant-specific I/O board

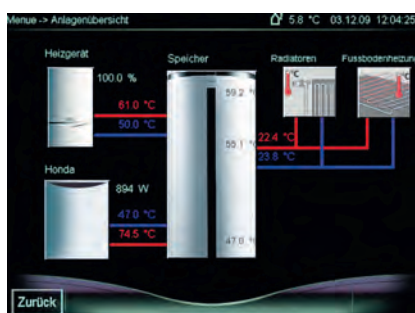
◀ With the standard Saia PG5® WebEditor, Vaillant has implemented a highly attractive user interface for the 5.7" VGA display and for the iPhone and iPad, with external graphics support.



▲ System and energy manager assembly line for the Vaillant-Honda micro-CHP system: The SBC boards are assembled and tested according to lean methods on the production line created for this product



Source: Vaillant-Group



Source: Vaillant-Group



Source: Vaillant-Group

# For the third time since 2010: three-day international forum for building automation

Jointly developing awareness, transparency and dynamics.  
Author: Jürgen Lauber



Home page of the Forum 2010 reporting website

For the third time since 2010, Saia Burgess Controls is organising an event with a structure and objective like no other: a three-day forum that brings together planners, operators and integrators for intensive discussions, workshops and fascinating plenary speeches. This event also includes tours of interesting properties and the exchange of experiences with operators and owners.

The style of the forum enables attendees to not only deal with specialist topics but also develop new personal contacts and trust-based relations. The response to the event is extremely positive. To safeguard the event's personal and intensive character, the number of attendees is limited to 120.

The topics covered, statements made and opinions expressed during the workshops and plenary speeches are documented on extensive websites, where they can also be discussed.

With almost 10000 visits per year, these websites are more popular than those of the most famous trade magazines.

Take a look! Doing so is well worthwhile for anyone interested in automation, energy and sustainability.



Home page of the reporting website Forum 2011

Invitation page of the building automation and energy forum from 28 to 30 June 2012 in Bern/CH





# Working together to achieve more and set more in motion!

**Cooperative relations have to be based on far more than just short-term economic opportunities.**

Author: Jürgen Lauber

## Why cooperate?

How can companies that operate large properties/technical installations modify and improve their automation technology for their own purposes without having to create their own electronics and software? How can a company that does not generally purchase installed automation projects or independently carry out system maintenance as a service business, test (added comma after business for more clarity) revolutionary innovations in the field?

This is only possible through cooperative relations. Despite being a highly innovative company, Saia Burgess Controls is not involved in project business. No large companies that operate properties still develop and produce their own automation technology.

## Is cooperation subject to prerequisites?

Successful cooperation depends on far more than just a joint aim. Trust is a particularly key element, as is ensuring that there are no general corporate conflicts of interest.

The partners must trust each other so that everyone does their best to achieve the aims without legislative or legal force and abides by this principle for a long time. All cooperation partners must be set up for the long term and calculable. The representatives of the companies involved must get on well and enjoy one another's company. For reasons of objectivity, however, they should not be friends privately.

There should be no strategic conflicts between the cooperation partners in achieving the aim. For example, it does not make sense for operators and owners of properties aiming to reduce their life cycle costs to cooperate with companies whose business model is based on generating high revenues during systems' operating phases. This means that any manufacturers that operate an OEM and service business make unsuitable partners.

►  
**Forum 2011, building automation /**  
**Bernd Hanke, Head of Department,**  
**Airport Facility Management AG:**  
 Gives great speeches at user forums  
 within the scope of cooperative relations.



## Cooperation – an expression of trust and attractiveness

In recent years, we have entered into a growing number of cooperative relations on an international level. This shows that we are an attractive partner and enjoy people's trust. We are delighted to be able to work with highly demanding and critical partners to achieve a variety of aims. We believe that this imposes a great obligation upon us, which we want to fulfil. Due to our global renown and size, we have established the following cooperative relations with German companies in an exemplary manner for many projects in many different countries around the world.





### Cooperation to ensure the reliable and smooth operation of large BACnet systems

BACnet offers a broad range of standardised functions, many of which are neither expedient nor necessary for individual operators. Anything superfluous makes operation more complex and increases costs. In many areas, however, BACnet provides a great deal of flexibility and room for interpretation.

These two aspects make it highly advisable to define an automation standard that is valid throughout the property and implement this as a planning specification. Operators/owners can then use BACnet expediently and without ties to specific manufacturers.

Customers can use the results of the official test laboratory WSP as a basis for determining the basic abilities of devices in relation to BACnet. A BACnet certificate confirms which functions these devices support. But how can owners/operators ensure that the planning specifications in a project are actually realised? And how can they ensure that these specifications are also adhered to throughout the entire life cycle? This is particularly critical if manufacturers with their own service personnel also conduct system maintenance within a property. The following three companies are working with us to develop a practical, simple and reliable solution for operators of large BACnet systems:

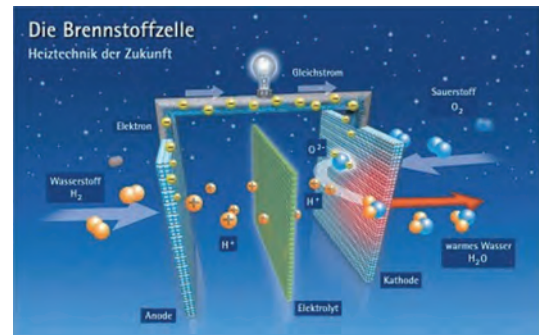
- Frankfurt Airport (Fraport)
- VW AG Wolfsburg plant/VW Kraftwerk GmbH
- STRABAG Property and Facility Services

An additional function BACnet monitor is being implemented on the basis of the SBC web panel. We are working with the partners to create a specification sheet, conduct initial testing and carry out endurance testing in large «multi-vendor» BACnet systems. No-one can make a product like the BACnet monitor on their own.

### Cooperation since 2001 – reducing CO<sub>2</sub> and energy costs through combined heat and power

We have now been working with the major heating companies BAXI and Vaillant for 10 years to test and launch innovative energy supply systems. Initially, the focus was on fuel cell systems although the scope of the cooperative relations has since grown.

# BAXI



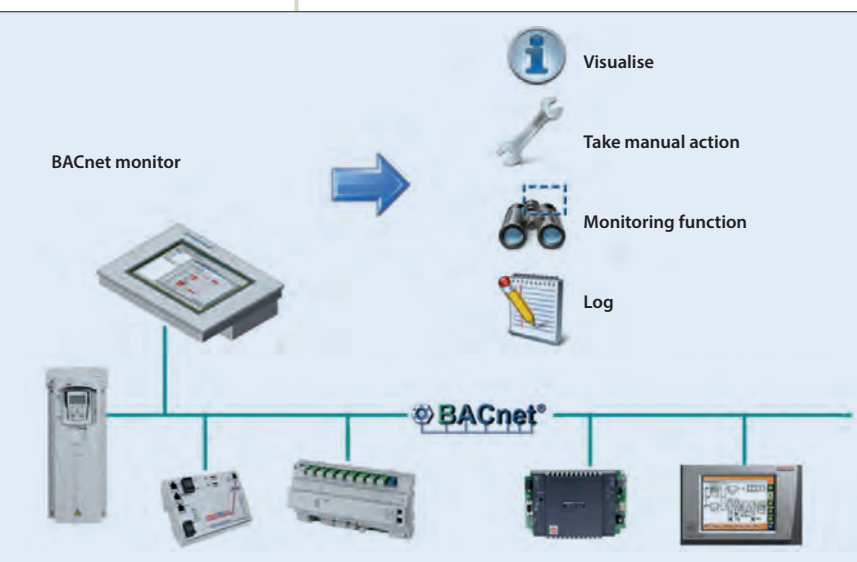
▲ BAXI fuel cell system

It took 10 years for the two cooperation partners Vaillant and Saia Burgess Controls to truly harvest the first fruits of their work. During this period, we assigned a senior application engineer to spend more than 50% of his time working within the scope of the cooperative relations and many special electronic modules were developed. The first major result came in 2011 with the launch of a mass-production Vaillant-Honda combined heat and power system for private homes.

For Vaillant, the cooperation has also paid off from a reputation perspective. In November 2011, Vaillant received an award from the German government for the most sustainable product on the market. None of the companies involved could have achieved such success on their own.



## STRABAG



▲ One aim of cooperation: the reliable and smooth operation of heterogeneous BACnet systems



▲ Fruits of 10 years of cooperation: Vaillant receives the award for the most sustainable product

### Cooperation to raise awareness of and implement useful standards

AMEV ([www.amev-online.de](http://www.amev-online.de)) is a public sector organisation in Germany and is jointly run by all bodies such as municipalities, states and the central government. Working groups made up of specialists define technical standards to be used when equipping public properties. The result of this is a guide line building automation and, in particular, on the use of BACnet. Since 2010, we have been working with AMEV to provide information about and implement the technical specifications and Publish the AMEV regulations on our website. In a large, annual forum lasting several days and involving planners and integrators, we offer the AMEV representatives the opportunity to present their standards to a broad audience.

The aim of the cooperation partnership is to promote sustainable building automation and thus increase the use of automation.

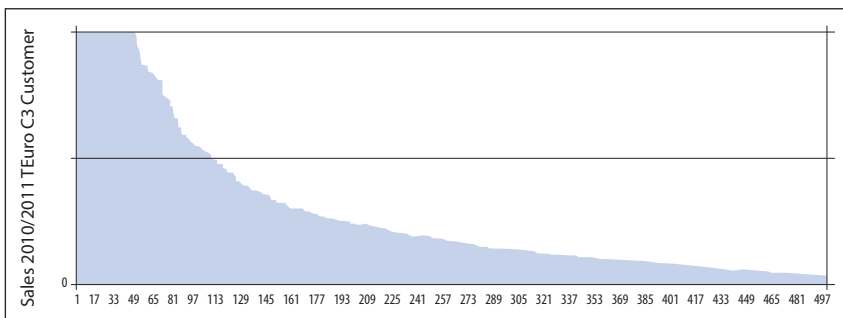


▲ [www.amev-online.de](http://www.amev-online.de) (home page)

### Cooperation for the purposes of business development with independent system integrators

We are not involved with project or plant servicing businesses. To enable SaiaPCD® systems to be used in properties, we successfully cooperate with system integrators.

System integrators are usually small to medium-sized companies. Their business capital is their skills



in the field of ICA/ automation technology. They are highly efficient and offer excellent proximity to the operators and owners both geographically and thematically.

In years 2010 and 2011, we increased our business with system integrators by more than 20%, and our partners grew with us – the number of certified SaiaPCD® system integrators only increased by 5% over the same period.

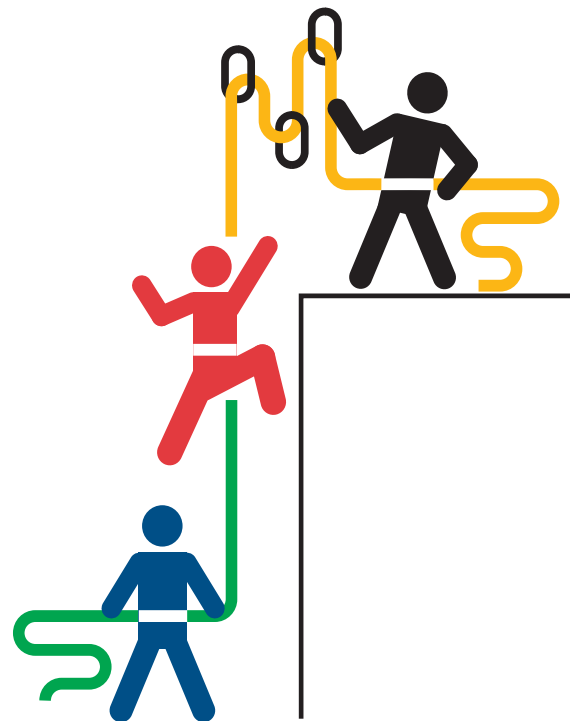
As companies, system integrators are independent of us. However, dependency still exists in every specific project, as with a rope team climbing a steep face or a glacier. Each person must be able to rely on the others. Errors affect everyone equally.

Rope teams – a classic form of cooperation



This is how we run our project business: we will only reach the summit (satisfied operators/owners) by working with planners and integrators

Revenue distribution of DDC device hardware among 500 system integrators in CH/D/F/I/NL: quality not quantity!



## HSG Zander

### Cooperation for the general increase of resource efficiency in properties

From a global perspective, reducing the consumption of finite resources by increasing efficiency is a top business priority.

If property owners all have to plan, implement and operate their own measures to increase efficiency, these will usually no longer pay off. This disparity between collective and individual interests leads to stalemates. The cooperation partnership between HSG Zander (1.3 billion euro facility management company) and Saia Burgess Controls aims to resolve this issue. We want to jointly develop systems and methods that make it possible to achieve resource efficiency economically, profitably and in all areas.

## HSG zander

HSG Zander benefits from the cooperation partnership as it can develop a new field of business and successfully differentiate itself in the highly competitive facility management market.

Saia Burgess Controls benefits by the ability to roll out the new lean automation product range SBCE-Line in all areas.

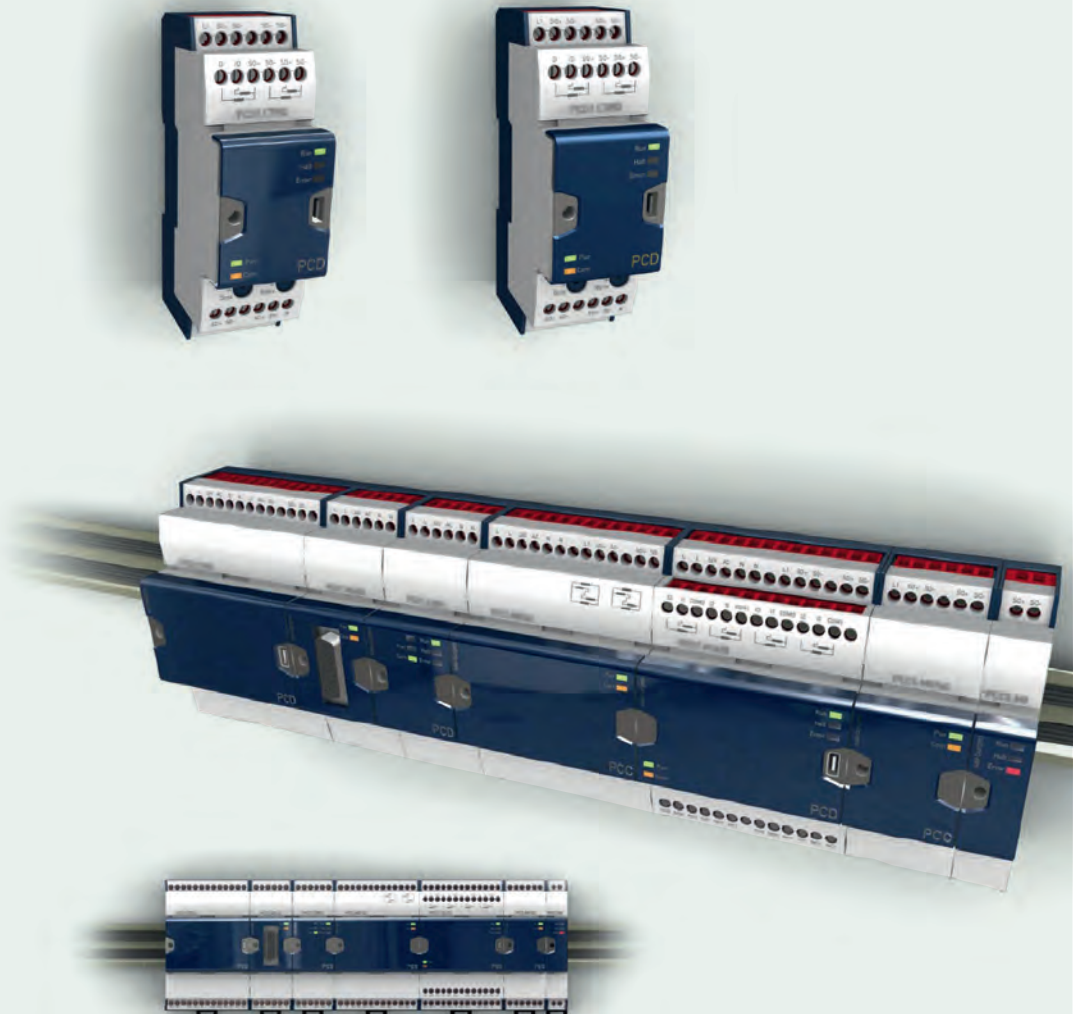
▶ Test installation with «conventional» Saia PCD® technology in the HSG Zander head office in Neu-Isenburg



## SBC E-Line

▶ The new SBC E-Line provides the basis for the economical and efficient use of resources in properties.

# E-Line





# Saia Burgess Controls and Saia PCD® win further awards for building efficiency!

Awards for Saia Burgess Controls and Saia PCD® of which we are particularly proud!

Author: Sandra Neuhaus



◀ Frankfurt Messe Congress Centre, Frankfurt/Main

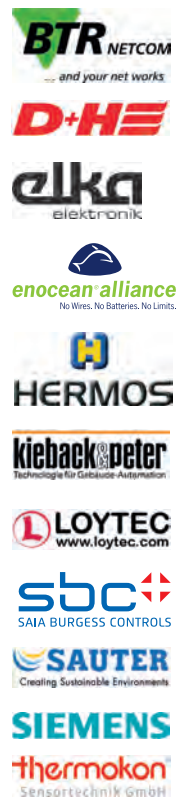


▲ Winner certificate for the PCD3 as the best automation product

Once a year, a major operator/planner conference on building efficiency is held in Frankfurt am Main (Germany). This focuses on the question of how technology can be used to operate buildings more efficiently – not only in terms of resource consumption but also personnel requirements and maintenance costs. In this regard, the independent conference judging panel also launches an annual competition, with the awards presented during the conference. In 2010, we won the award for the best automation product; the Energy Manager enabled us to achieve gold in the manufacturer Olympics. In 2011, we won the best service concept award. These awards reassure all customers that use the Saia PCD® in their projects and properties that they have made a good, objective choice – for today and the future.

### Best automation product: PCD3.M5540

In late 2010, the PCD3.M5 controller won the best automation product award! The decisive factors included the strong communication options and the many different functions offered as standard, such as the AutomationServer.



▲ Conference sponsor list





# Lean automation through a well-coordinated value-added chain

How is this promoted by Saia Burgess Controls?

Author: Jürgen Lauber

Efficient and stable value-added chains are created through the good coordination and synchronisation of all parties involved.

This is not achieved through occasional visits, training sessions, websites or documents alone; intensive, face-to-face discussions between operational managers are also required. We use multi-day forums to promote the coordination between operators, planners and integrators at management level. At the same time, we have also offered dedicated two-day «camps» for our customer's ICA specialists in our plant in Switzerland since 2009. We invite interested SaiaPCD® users to spend two days directly exchanging ideas with development engineers and our technical support team employees. The attendees work together to focus on new and interesting questions and develop solutions.

During the event, Saia-Burgess Controls AG provides a look behind the scenes at its plant and the participants show us, their «colleagues» how they use our products. We gain a better understanding of their needs and take a more targeted approach to product development. In turn, the participants learn a great deal from one another and take new information from us home with them. Productivity is increased, unnecessary circuitousness and misunderstandings between the plant and the operators are avoided and a solid foundation is created for lean automation.



Images of everyday work at the technology camps



## Technology camp

### ▼ Home

Agenda

### ▼ Topics

Automation server  
BACnet  
Troubleshooting & diagnostics  
IP services & security  
IP extension  
Open data mode  
SaiaPCD® performance  
SmartRio  
Wide area automation

### Customer presentations

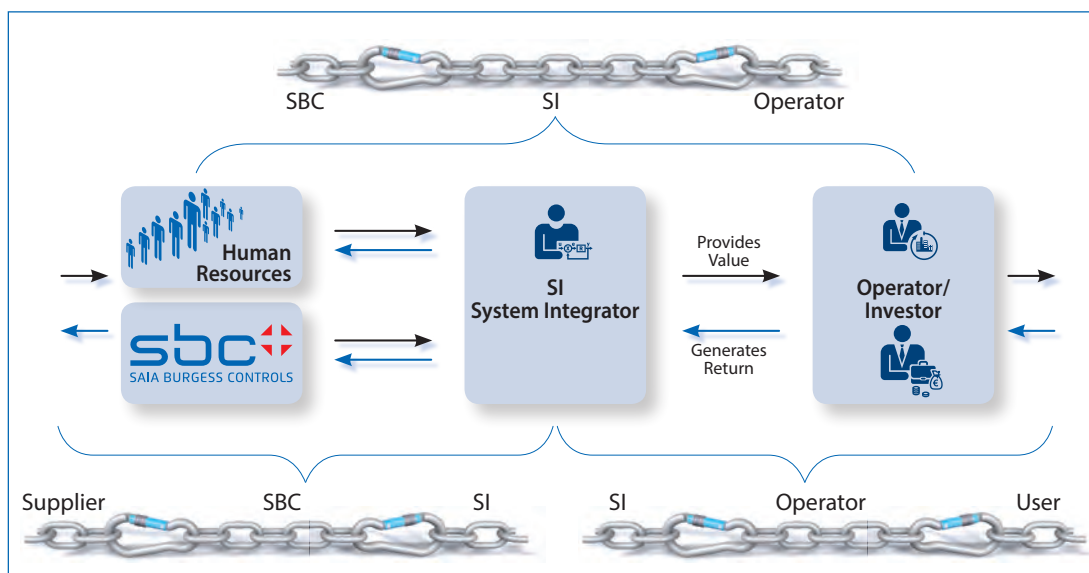
### ▼ Media

Jan. 2011  
Feb. 2011  
June 2011

▲ Navigation tree for the technology camps website



◀ The technology camps improve the integration and coordination between integrators and manufacturers.





## Spectrum of opinion

### What users think about technology, products and our company.

At this year's Building Automation Forum in Berne, Saia Burgess Controls customers unanimously reported positive experiences with SBC – interviewed on video for personal vieWing.

Author: Peter Steib

It admittedly makes us proud to hear statements like «The SBC controller offers outstanding flexibility – other manufacturers simply can't compete» or «What makes SBC different? Speed, flexibility and innovation». And we are particularly delighted when these statements are made spontaneously by our customers.

We used this year's «International forum for building automation and sustainability 2011» in the Bern Westside leisure and shopping centre to ask participants who already work with Saia Burgess Controls

for their objective opinions in front of a rolling camera. We asked them what they thought were the most important innovations, about their experiences with using these new technologies, the importance of the POM concept, or simply about their cooperation with Saia Burgess Controls.

The result was unfiltered customer opinions, of which we do not want to deprive you. Take the time to form your own opinion and be inspired by the many valuable experiences and suggestions in our videos.

**Stefan Färber**  
Chief Operating Officer wusys GmbH,  
IT service provider



#### The SBC controller offers outstanding flexibility

«The SBC controller offers outstanding flexibility. Other manufacturers are simply unable to offer it in this form. It's just important for standard protocols to be understood within the IT so that individual adjustments to interfaces can be made. The SBC controller is extremely flexible with regard to individual protocols and interfaces.»



cnen1376a

**Bernd Hanke**  
Operations Manager Fraport AG,  
Facility Management,  
Frankfurt Airport



#### Fast, flexible, innovative and with a reasonable cost framework

«I believe that it's precisely because you're still a medium-sized company rather than a group (groups often stand in their own way), that makes you what you are: fast, flexible, innovative and with a reasonable cost framework.»



cnen1376b

**Johannes Utner**  
Owner Utner GmbH,  
System Integrator



#### Peace of Mind – that's what I like

«As you can see, the ability to monitor a system over its entire life cycle (...). It's worth investing more for peace of mind by saying, I won't necessarily save ten or twenty percent on the set-up costs, but I'll instead save 80 or 85 percent on the life cycle costs. That's more worthwhile (...). This is something that interests the operator himself, and it's important to be there with advice at the outset, when the operator is setting up an installation, as he is immediately open to this system.»



cnen1376c



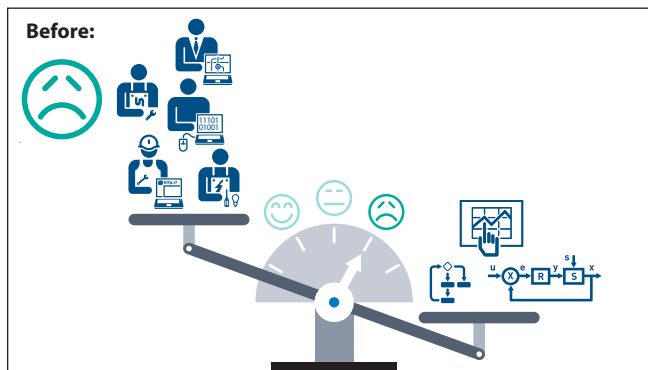
## New SBC Training centre

Getting started, getting better on Controls!

Author: Jürgen Lauber



▲ Entrance of the new European ICA Training centre in Murten/CH



▲ On arrival at the Controls Training centre, participants are not yet familiar with the ICA technology, nor with practical project implementation for building installations.



▲ On returning from the Controls training centre, you can carry out your first real operational projects and modify, optimise and upgrade existing building installations.

As described in the Editorial, it is important to tackle challenges aggressively. Anyone who is well prepared can prevent unavoidable challenges from becoming serious problems.

With our new SBC HVCSE training, we have invested in helping our customers overcome the following serious challenges:

1. Pressure on margins when implementing projects
2. Lack of qualified ICA personnel

The pressure on margins can be combated through greater efficiency or better skills (differentiation Characteristics). The lack of qualified personnel can be combated by providing those with lower or other specialist qualifications with specific training on ICA technology.

Our former training program was aimed at qualified, experienced ICA engineers. The objective was to ensure they were skilled in solving problems through the use of the Saia PCD® system.

With the new training centre, we now offer targeted courses that make solution implementation and commissioning more efficient. They therefore work directly towards improving service providers' margins.

Furthermore, practical courses with a duration of up to four weeks are now available to prepare people with no prior ICA experience to work on projects. On completing the course, you should be able to carry out your first ICA projects with Saia PCD®.

The new training centre is directly attached to the Saia Burgess Controls factory and Head Office. This means that practical energy management experience can be acquired using live installations and real data instead of just dry theory. Details of content and available equipment can be found on page 126 in the article by the training centre management.

As Murten is located in the multilingual country of Switzerland, we are able to offer courses in German, English, French and Italian.



# «Peace of Mind» guarantee label

## Report on status and further development

Summary: the tendering and audit system has been developed, tested and made fully functional. Now it is to be rolled out to a broader audience and handed over to neutral organizations.

Authors: Jürgen Lauber/Patrick Lützel

In 2010, we presented this new guarantee label for installed, ready-to-use building automation solutions in Control News 12. What has happened since?

**1** Intensive use has been made of the tendering texts and TÜV Süd has conducted several audits. The auditors have received training and we have learned how we can improve the process. Meanwhile, under pressure from renowned property operators, even established competitors have been «motivated» to offer the «Peace of Mind» quality standard for large projects, for example the Potsdam state assembly.



POM-Klassifizierung	No Go	Neutral	Small	Teil	Large	Prüfung	POM Punkte	Punkte mit Güte	Punkte mit Güte / 111 Güte
POS <b>POM Punktezahl</b>	-3	0	1	2	3				
<b>3. Bedienen / Beobachten</b>									
3.1 Webbasierte Bedienung	Nein		Ja	Ja inkl. Alarmung	Ja inkl. Historie		2	X	
3.2 Bedienung vor Ort	LCD Textpanel		Graphik >= 3.5"	Graphik >= 5.7"	Graphik >= 10"		3	X	
3.3 Landessprache	Nein		Ja	Wählbar	Wählbar (csv, Datei)		3	X	
3.3 Klarheit	Nein		Einzeilig	Zweizeilig	Beizeilig		2	X	
<b>4. Betrieb + Wartung</b>									
4.1 Software Versions Prüfung	Nein				Ja		2	X	
4.2 Restore Applikation	Nein	Hersteller	Fachmann	Jeder mit PC	Jeder ohne PC		2	X	
4.3 E/A Tausch ohne Spezialwerkzeug	Nein	Hersteller	Fachmann	Jeder	Jeder - Hot Plug		2	X	
4.4 Verfügbarkeit SW Topi Endkunde	Nein	Lizenz > 5000,-€	Lizenz > 2000,-€	Lizenz < 2000,-€	3 Monate kostenfrei		2	X	
4.5 Historische Daten und Parameter	Nein	Ja			Excel Format		2	X	
4.6 PDF Help / Docufiles	Nein				Ja		2	X	
4.7 Unterbruch Netzwerke	Nein	Spezialkabel			Standardkabel		3	X	
4.8 Wiederverwendbarkeit Anwendersoftware	< 3	> 3	> 5	> 10	> 15		2	X	
4.9 Portierbarkeit Anwendersoftware	Nein		1	2	3		3	X	
4.10 Struktur Anwendersoftware	Text Code	Funktionsplan			Grafische Templates		0	X	
<b>Gesamt</b>									
Prüfergebnis: <u>85, Gold</u>									
Nummer Plakette: <u>P2N-001043</u>									
Ort: <u>Hilden</u>									
Datum: <u>23.10.10</u>									
Prüfer: <u>Heide</u>									



▲ Example of an exemplary automation solution at a German savings bank

**2** In June 2011, during the forum on building automation and sustainability held in Switzerland, we had a discussion with planners, operators and integrators about «Peace of Mind» as a guarantee mark. One outcome of this discussion is the revised POM site with new content and a new layout, now available not only in German but also in English. The POM audit has also been made even more «neutral» and the strict criteria have been adapted for «Gold» status.

www.pom-automation.com

**Peace Of Mind**  
Qualitätslabel für nachhaltige Gebäudeautomation

Startseite Über POM Richtlinien der Garantiemarke Zertifizierung Presse Referenzen Kontakt

**Automation mit gutem, sicheren Gefühl für Investoren, Betreiber und Planer**

Kaum eine Gebäudeautomation läuft in der täglichen Nutzung zur Zufriedenheit des Betreibers. Die Ursache für Ärger, Stress und Mühsal liegen in der ausschließlichen Fokussierung auf die Errichtung eines Gebäudes. Was jedoch bei der Anschaffung gut und billig erscheint, entpuppt sich im späteren Betrieb nur allzu oft als teures Kostengrab.

Peace Of Mind tritt dem entgegen und betrachtet die Gebäudeautomation unter Berücksichtigung des gesamten Lebenszyklus einer Liegenschaft. Im Rahmen eines Qualitätslabels stellt Peace Of Mind Richtlinien und technische Anforderungen auf, welche einen kosteneffizienten Betrieb der Liegenschaft über den gesamten Lebenszyklus gewährleisten.

Magazine & Fachzeitschriften:  
Control News  
Building Automation  
FACILITY MANAGEMENT  
g+h  
GD  
WIRTSCHAFTSINFORMATIK  
HLH  
Fachzeitschriften  
Der Immobilien Verwalter



Following the BA forum 2011, the discussion continued with user/operator organizations. As a result, ownership of the guarantee mark is to be transferred from Saia Burgess Controls to a vendor-neutral organization. This was the aim from the outset.



In collaboration with well-known universities, ICA planners and practical users, we continue to expand POM and minimize stress, trouble, toil and added costs systematically for end-customers and operators:



**a** Energy management in accordance with the new DIN EN 16001 or ISO 50001 creates uncertainty for operators and leaves many unanswered questions. POM will define useful specifications in this regard.

**b** BACnet is a complex topic and operators can quickly find themselves stuck. POM will make strengths and weaknesses transparent.

**c** Integrating a wide variety of plant groups within a property tends to be an unfamiliar challenge for end customers. The contents of the POM specification preliminary texts define a framework for specifications and thus become a binding cross-plant property standard.

In the three points a to c above, we work on a country-specific basis with mainly independent partners to create more transparent quality and reliability in building automation. For Germany, this partner is the renowned TÜV Süd GmbH. For Switzerland it is the independent institute iHomLab at Lucerne University of Technology and Architecture.

## Peace of Mind

«Peace of Mind» is a new, vendor-neutral quality label (guarantee mark) in building automation. It can only be used for non-proprietary, open automation solutions and not for any specific product.

«Peace of Mind» stands for the systematic minimization of worries, trouble and toil for operators and investors through the concrete, technical definition of permitted automation technologies – to apply throughout the whole life cycle of an installation.

Anyone using the «Peace of Mind» guarantee mark for quotations and project planning is obliged to satisfy all the specifications of the preliminary tender texts.

It is left up to every interested planner, investor or operator whether they adopt the «Peace of Mind» specification for themselves in full or only in part. No indication of origin/source is required.

By adopting the texts, they can effectively and confidently call for state-of-the-art technology from contractors for their projects.

Everyone who satisfies the POM guidelines is entitled to use the «Peace of Mind» logo.

«Peace of Mind» tender texts are available under [www.pom-automation.com](http://www.pom-automation.com)

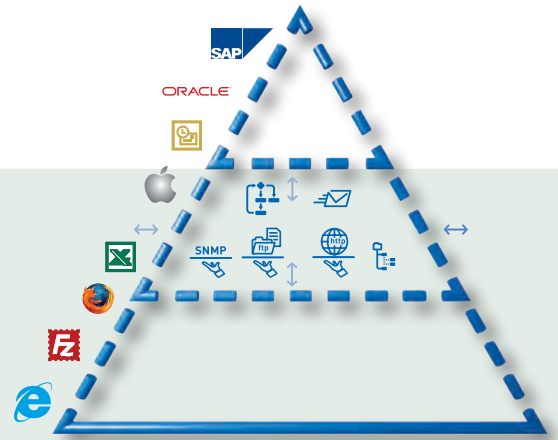


# The four cornerstones «Peace of Mind» in automation

1

## Openness and flexibility in all directions combined with generally accepted, standard technologies

Building automation is not a separate, peculiar world defined by the supplier concerned. Instead it is open and has both inward and outward permeability with many possibilities for different configurations.



2

## Differentiation between the development process for an automation solution and its maintenance or operation

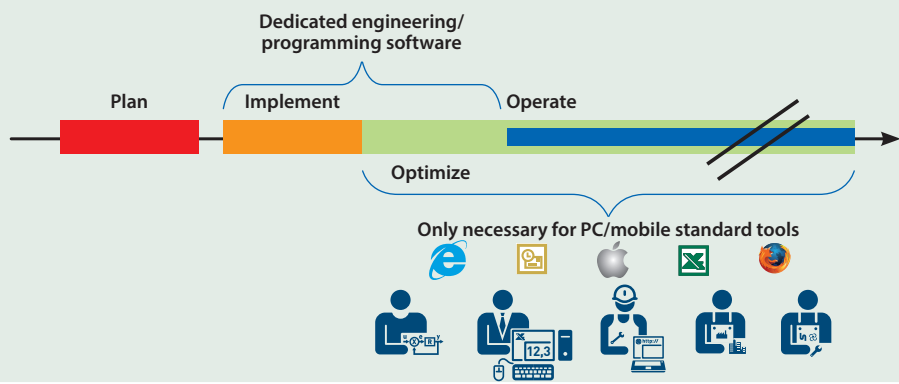
The user and operator should not have to use proprietary software or hardware for maintenance and optimization; the technology and standard software already available in-house will suffice. The technician only needs proprietary development tools for development work. No other groups of people are subject to this requirement.



## Application software that is freely expandable at all levels by many engineering companies

For the operator this means freedom of choice when selecting service and solution providers – as well as the certainty that someone will always have time for them when they need help.

3



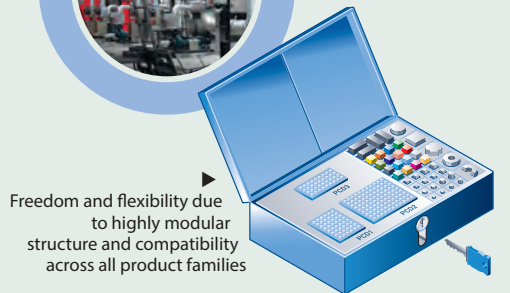
4

## Modular hardware with same life cycle as system – no risk, no limits

In building automation, there are always some things that cannot be foreseen during the construction, commissioning and optimization phases. Requirements change in the utilization phase; building automation has to be adapted to the demands of standards and installed technical equipment. This must always be possible simply, quickly and without risk. In your building you therefore only install technology that can be expanded with modules and modified at any time over the plant's life cycle. Compact, dedicated automation devices can be suitable for production machines and other machines, but not for projects.



Automation devices and system both have a life cycle of 15 to 20 years



Freedom and flexibility due to highly modular structure and compatibility across all product families



## Lean automation with Smart RIOs

Anyone wanting to achieve more automation with less time, cost and effort has to leave the beaten track and pursue new directions. The Smart RIOs are far more than just another Ethernet remote I/O system and differ from classic remote I/O systems in many ways. They can be programmed like a PLC and are therefore the ideal solution for distributed automation in line with the lean philosophy.

Author: Urs Jäggi

### Saia PCD® Smart-RIOs compared to classic remote I/Os

Classic remote I/O systems have a central master and independent «dumb» slaves. The application program solely runs on the master, whose I/Os are distributed to the slaves (I/O mapping). If the master or the connection between the master and the slaves fails, downtime occurs. The RIOs are not able to work autonomously.

With the Smart RIO concept, Saia Burgess Controls takes a new approach and has created the PCD3.T66x in a new Smart RIO (S-RIO) device class «made for distributed automation». In addition to the master (manager), the concept also includes intelligent RIOs (employees) who can work and communicate independently – including without a boss. Similarly to the normal working world, the master (manager) manages the application programs (tasks) and delegates them to the Smart RIOs (employees). These then conduct the assigned tasks independently. Even if the master (manager) is not present, the S-RIOs (employees) still continue to work. Furthermore, the S-RIOs can independently communicate with each other or other network participants and exchange data.

From the perspectives of functionality, programmability, commissioning and service, the Smart RIOs therefore offer far more possibilities and convenience than conventional remote I/O systems. The S-RIOs from Saia Burgess Controls represent real technological progress for users and operators.

### Integrated PLC functionality makes Smart RIO the smart automation device for lean automation

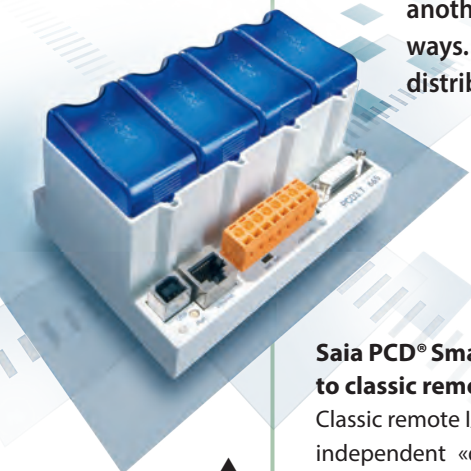
The new Smart RIOs have several unique functions that are not available with conventional remote I/O systems: in addition to the classic functions of a decentralized I/O station, Saia PG5® application programs (IL, FUPLA, GRAFTEC) can also be simultaneously executed. The Smart RIO can therefore work autonomously and even take on demanding management and control functions. Even if the manager fails on occasion, the (sub) processes continue to work unhindered on the S-RIOs or can be brought into a safe state.

### Central program management for greater convenience during commissioning and servicing

The application programs are centrally managed by the «Smart Automation Manager» (S-RIO master) and distributed to the S-RIOs. The fact that the application programs do not have to be individually loaded in every station saves time and money during the programming, commissioning and servicing stages. Even after replacing hardware, the configuration and application programs are automatically transmitted to the new S-RIO by the «Smart Automation Manager». Neither a specialist nor a programming tool are required to this end. Selected Saia PCD® CPUs and, in the future, SBC Micro-Browser panels can be used as the manager.

### Smart RIOs speak many languages

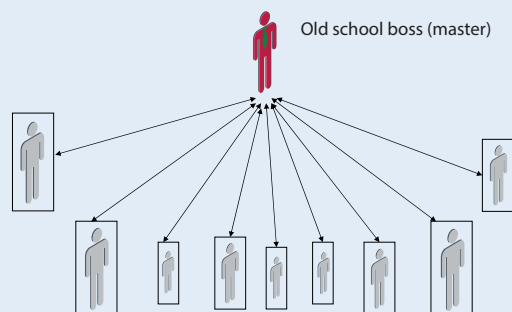
In addition to the normal data exchange with the «Smart Automation Manager», the Smart RIOs also support additional communication protocols such



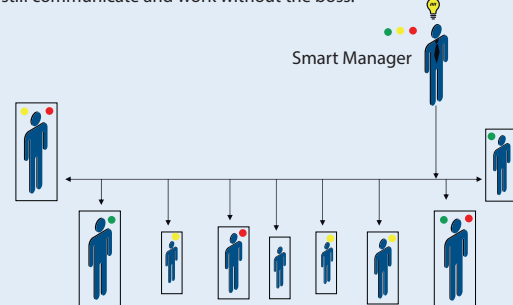
▲ First Smart RIO version on the basis of PCD3

► Classic remote I/O system compared to the innovative Saia PCD® Smart RIO concept

**Typical remote I/O working relationship:** one central «Master», multiple «dumb slaves». Nothing works without the boss.



**Smart RIOs working relationship:** manager delegates and monitors tasks, taking action if required. Participants can still communicate and work without the boss.



as the Modbus TCP for data exchange with other 3rd party systems. The PCD3.T666 also makes it possible to use other serial interfaces (RS-232, RS-485...) directly on the Smart RIO. M-Bus and DALI modules are also available for the S-RIO. These communication skills even make the Smart RIOs suitable for decentralized data capture and light

management. Thanks to the innovative functions and properties, Smart RIOs are also suitable for applications which other manufacturers can only realise with complete control systems. The comprehensive functionality combined with the attractive price makes the Smart RIOs unique.

**Saia PCD® Smart RIOs in use**

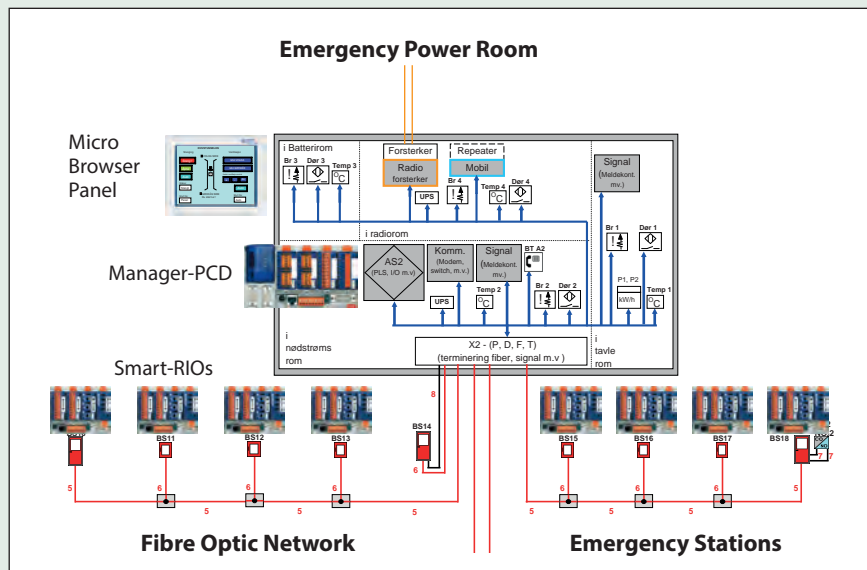
The first systems were supplied in late 2010. Since the successful completion of the pilot phase in summer 2011, the new Smart RIOs PCD3.T665 and PCD3.T666 have been available without restriction. In the first year since the launch, over 1000 Smart RIOs have already been used by our customers in the broadest range of projects. Below are three interesting examples from Norway, Switzerland and Germany:

**1 Road tunnel, Norway**

Over 80 PCD3.T665 Smart RIOs are used in the tunnel's emergency stations to monitor telephones, fire extinguishers etc. The Smart RIOs act as conventional, decentralized I/O stations without their own application program.



▲ ► More than 80 PCD3.T665 Smart RIOs are used in the emergency stations of a road tunnel in Norway for monitoring telephones, fire extinguishers etc.

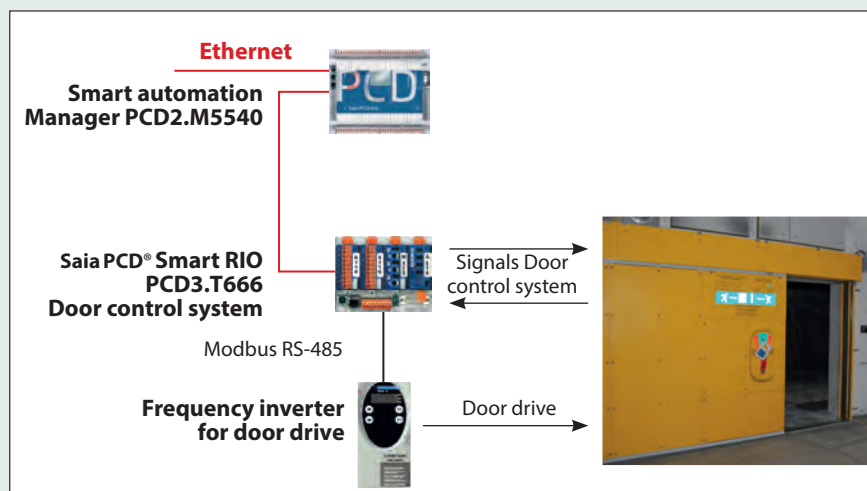


**2 Lötschberg Base Tunnel, Switzerland**

During the construction phase of the Lötschberg Base Tunnel, a 34 kilometre railway tunnel, Saia Burgess Controls supplied over 2000 SaiaPCD® systems between 2004 and 2006. Following several years of operation, a new optimisation project was initiated for the management and control technology. During this project, the tunnel operator is once again opting for the SaiaPCD® technology from Saia Burgess Controls. Existing complex structures are being simplified through the replacement of proprietary, dedicated systems with SBC systems.

The future door management in cross tubes is controlled by over 200 PCD3.T666 Smart RIOs, which replace a small compact control unit from another manufacturer. An application program created with Saia PG5® Fupla runs on the Smart RIOs.

The Smart RIO PCD3.T666 is responsible for the entire monitoring and control of the doors. The door drive's frequency inverter is controlled via the integrated RS-485 interface by means of the Modbus protocol.



▲ Smart RIO PCD3.T666 in use in the Lötschberg Base Tunnel for monitoring and controlling the doors in the cross tubes. The application program for the RIO was created using Saia PG5® Fupla.

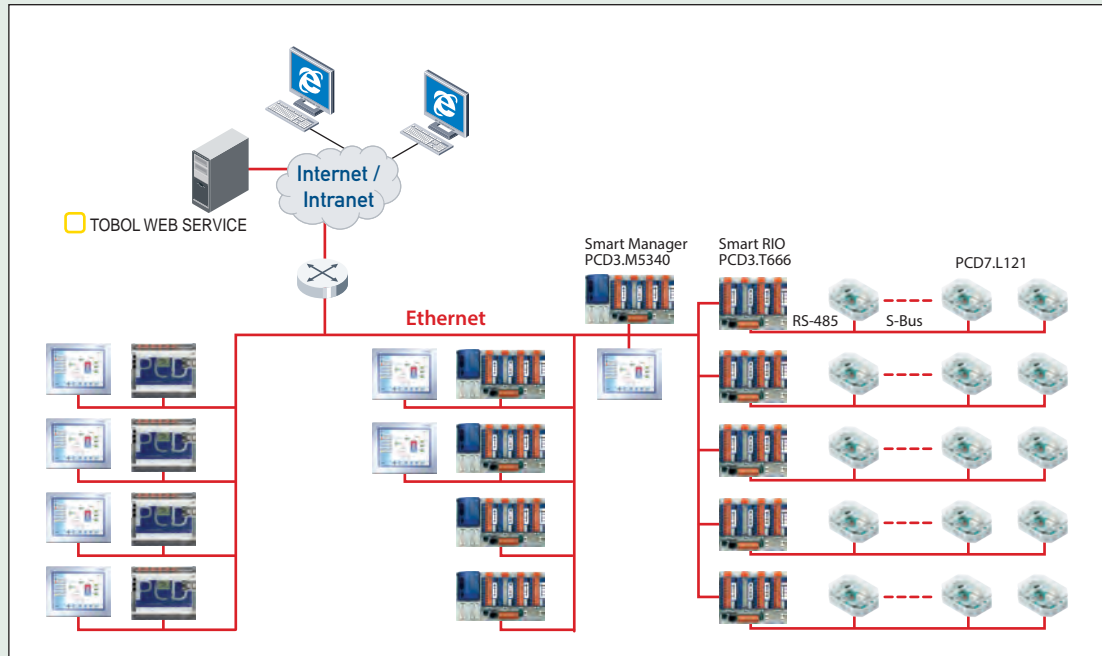
## 3

**Renovation of Giessen Hospital, Germany**

During the renovation of a four storey building wing, SaiaPCD® systems were used to manage the heating, ambient indoor climate conditions and ventila-

tion. One smart-RIO PCD3.T666 was installed for each floor. Additional PCD7.L121 S-Bus I/O modules are connected via the integrated RS-485 interface.

**Network topology  
Giessen Hospital:**  
the cabling costs could be vastly reduced through the decentralisation of the inputs/outputs with the PCD3.T666 Smart RIOs and the PCD7.L121 S-Bus I/Os.

**Two versions: PCD3.T665 and PCD3.T666**

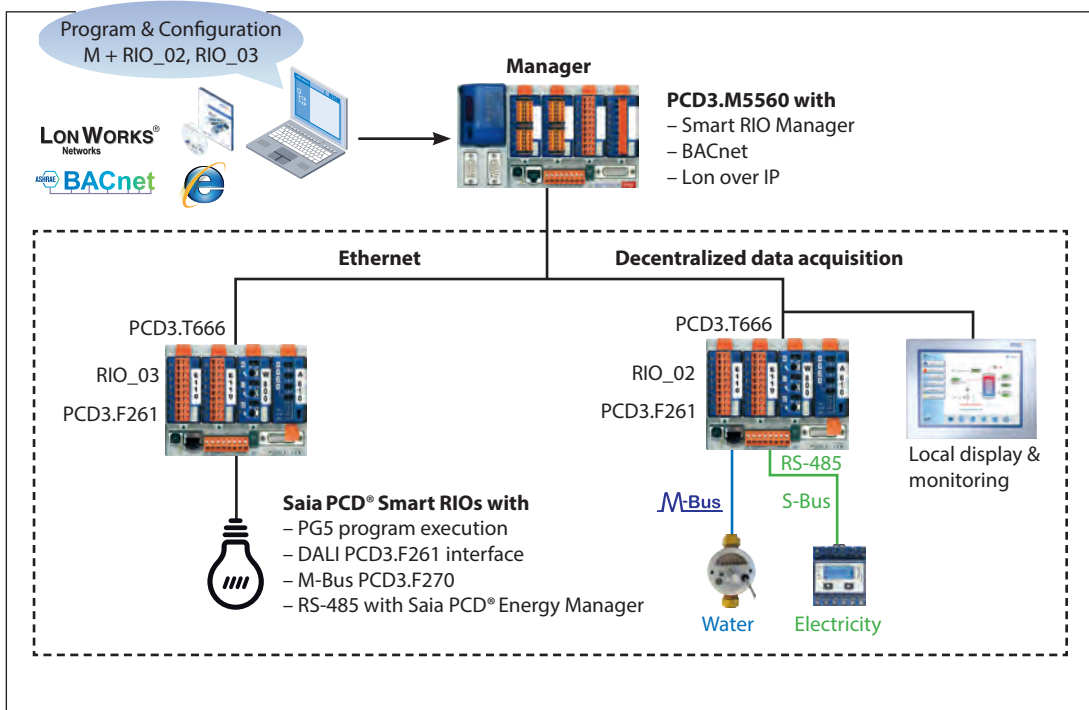
The Smart RIOs are available in two versions. These differ in terms of their communication properties and the available program memory.

Properties	PCD3.T665	PCD3.T666
Program memory	32 kB	128 kB
Onboard file system for web pages and data	512 kB	
Onboard RS-485 interface	No	Yes
Special module	PCD3.H1xx	PCD3.F1xx (I/O slot 0) PCD3.F27x M-Bus PCD3.F26x DALI PCD3.H1xx
Differences from a normal PCD3-CPU	<ul style="list-style-type: none"> <li>- no battery → no remanent data</li> <li>- no real time clock → software clock synchronised by the manager</li> <li>- no watchdog</li> </ul>	

Both S-RIO types can be used with or without an application program. No application program is required if the S-RIOs are used as simple decentralized I/Os. In such a case, it suffices for the I/O mapping for the data exchange to simply be configured in the RIO network configurator.



Thanks to the ability to use the additional serial communication interfaces, the Smart RIO PCD3.T666 can also be used for decentralized capture of data consumption data capture (M-Bus module, energy meter via S-Bus) or light control (DALI).



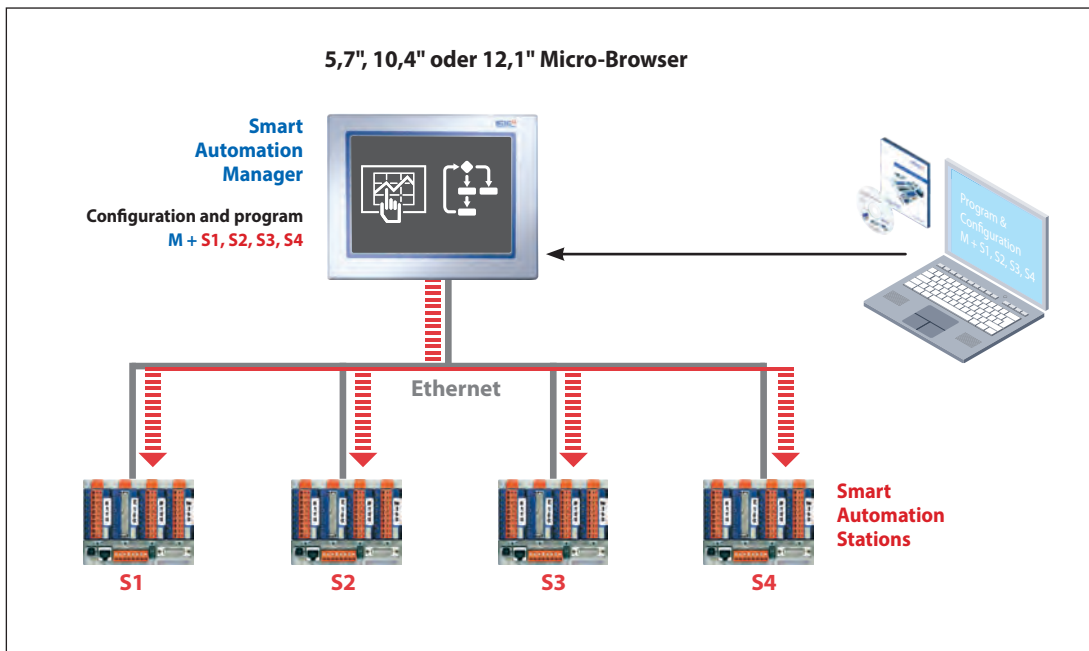
◀ Example of an application with PCD3.T666 as a light control with DALI module PCD3.F261 or consumption data capture with M-Bus module and S-Bus energy meter on the integrated RS-485 interface.

**Outlook: programmable SBC Micro-Browser panel as «Smart Automation Manager»**

The programmable Micro-Browser panels can now also be used as the manager station. The Smart RIOs act as decentralized I/Os for the panel. The panel manages the application programs and acts as the automation manager, including for visualization. The programmable panels are available with display sizes 5.7", 10.4" and 12.1".

**Changing IP addresses on site without a programming tool**

The application project is created in the office. However, the available IP addresses are only known once the system is commissioned or are changed at a later time for some reason. To do this, a programming device is no longer required



▲ Programmable Micro-Browser panel as «Smart Automation Manager» for the management of the application program and visualization purposes.

## The iPad and iPod in the field of automation

Many people are talking about it – for us and our customers, it is already part of everyday business

Five years ago PDAs were something used by only managers and techies. Internet access on the mobile phone was slow and rarely necessary. Since then, Apple and Steve Jobs have changed our world. Today there are few remaining mobiles without a touch screen, WiFi and, of course, the Internet; the word «app» is universally understood and iPads, not merely as secondary devices, are often making PCs redundant.

Author: Kostas Kafandaros



▼▲ MB App & MB App Lite, 500 installations in the first year



▼ S-Energy App for only € 0,79



### Why should Saia Burgess Controls deal with these devices as a PLC manufacturer? What do they have to do with automation?

The answer is that they enable us to overcome obstacles. They build bridges between the different worlds – the worlds of offices and industry, of mobile and stationary applications. And that is good news for automation!

### Bridges between two Worlds

The office area is a domain that is dominated by PCs and Microsoft whereas industrial and building installations contain freely programmable control technology, DDC controllers and industrial HMI devices. For visualization, operation and data exchange in particular, this means that it is often necessary to deal with other devices – which also means different tools, programs and operating philosophies.

The web-HMI concept acts as the basis for overcoming these obstacles. The visualization is no longer specifically created for every end device but is instead stored once, centrally on the controller's web server. The same, platform-independent user interface is available to all operators via the web server. Managers receive the same image on their PCs from the office PC via a standard browser as caretakers receive locally on the switching cabinet with an industrial Micro-Browser web panel



Mobile

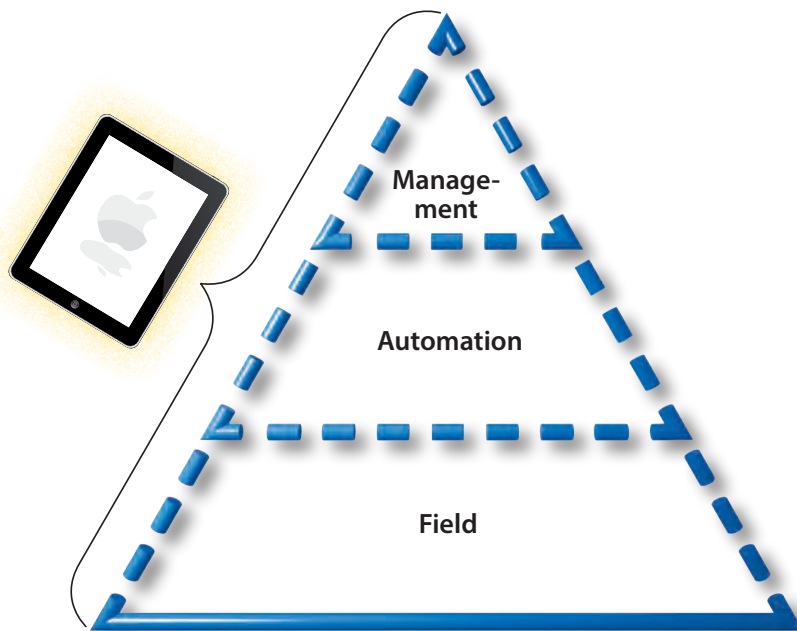
A mobile device for use in offices and industry



Industry

Stationary

Office



▲ **iPad:** a single operating device breaks down the boundaries between the automation levels.

Thanks to the iPad or iPhone, the final obstacle of the end device hardware has now also been overcome. Managers and caretakers have the same mobile device, which they can use along the entire automation pyramid. The management, automation and field levels can all be accessed in a standardized manner using a single operating device.

Thanks to wireless LAN (WiFi) and new mobile telecommunications standards (3G), the machines and systems can be accessed from almost anywhere. Service technicians can check the settings from anywhere and take action if necessary while operators can retain a clear overview of their systems at all times, even when not on site, and access the key operating data.

#### What are the benefits in practice?

At Saia Burgess Controls, we have tested and introduced the principle in Production (see Control News

12, page 59). Production staff can conveniently record downtime and its causes on an iPod instead of having to run to the nearest PC. That definitely saves time!

However, the iPad is not only technically impressive – it is also a visually attractive device. In building automation in particular, it can make a stationary HMI device redundant. Why would you install a wall-mounted operating device if you have an iPhone or iPad on hand? The managers in the Holiday Inn hotel in Bern Westside thought the same. The stationary operating unit of the EIB/KNX-controlled conference rooms was summarily replaced with a modern, web-based controller using iPads. Full details of this solution can be found in the article «Mobile conference room operation» below.

Everything mentioned above also applies to Android devices. A Micro-Browser app for the Android platforms is launched since 2012.



▲ **Production sites:** iPod in a case suitable for industry



▲ **Production sites:** operating data capture with the aid of an iPod



ANDROID





## Mobile conference room operation Web technology and the iPad

The minimalistic design offers added convenience and time benefits for operators and customers. In the Holiday Inn hotel in the Bern Westside shopping centre, a fully graphical operating interface was created as a mobile alternative to the standard operating unit with black and white icons.

The joint iPad and PC operation of the conference management system has made the technology comprehensible.

Author: Rolf Nussbaumer



It all starts with clarification. True to the lean approach, all good consulting services should start with the basic understanding of our clients needs. This was also the case in this case study project. After meetings with the hotel management and staff, it was clear that the existing room technology operating concept was burdensome for both customers and staff. The graphical implementation of all the room technology made it «leaner» to operate, or in other words, more user-friendly!

As the popular saying goes: «Pictures say more than a thousand words». This is also the key to achieving satisfied customers and less work for operators when dealing with building technology. From a technological perspective, this means flexible and open automation technology with fully integrated web and IT technology. In other words, the features of automation and operation which have a major effect on sustainability and efficiency combine the values that represent the idea of «Peace of Mind». Fewer concerns when dealing with technology!

In the current example with the existing EIB/KNX installation technology, open SaiaPCD® automation technology was used to build a bridge from conventional static technology to the open and flexible world of the internet and IT. The simple wireless operation via iPad is a major success and has boosted motivation throughout the entire hotel industry.

The Holiday Inn Westside on the outskirts of Bern has 11 modern conference rooms, which are regularly used by business customers. Despite the modern equipment, the hotel customers were often unable to use the stationary technical controls.

As stated by Oliver Bittner, General Manager of the Holiday Inn Bern Westside....

«Frequent questions about how to operate the installed wall-mounted devices and their unclear icons overwhelmed the conference room users and often led to unnecessary staffing requirements.»

Each of the eleven conference rooms has its own stationary EIB operating unit. Individual rooms can be tailored to customer needs by opening partition walls, however, the rigid wall operating unit requires a great deal of operator discipline. Despite the partition wall status message (open/closed), the inflexible light, shade, ventilation, temperature and presentation technology always has to be operated using precisely the «right» touch screen even though up to three touch screens are available when the partition walls are open. With flexible web technology, this is no longer the case!

To prevent the need to remove or modify the entire existing operating system, which acts as an additional fall-back, the conference rooms on the second floor (Room 9/10/11) were retrofitted with an additional WLAN network connection.



A modern PCD1.M2120-CPU with an integrated web server and 8 MB memory for images and graphics was retrofitted with minimum effort. This created the basis for accessing the room functions via wireless LAN and mobile iPad operation.

All EIB/KNX communication was mapped in the Saia PCD® and linked to the systems. The new graphical operation was fully developed in parallel to the existing operating system. The room users and Holiday Inn employees can therefore access the system functions simultaneously and in a mobile manner. This makes the hotel staff's work far easier and creates stress-free conference room management. However, the decisive advantages are the time savings and efficiency.

As stated by Ms Obervöll, Head of Conference Rooms: «Thanks to the new technology, there are far fewer questions about its operation, which has in turn led to relaxed and satisfied clientele.»

In addition to the wireless operation via iPads to monitor the current room situation and create preconfigured settings for desired room scenarios, the entire technology can also be monitored and controlled from the conference room head office via a PC.

Thanks to the «http-direct» function, the conference room management can use a PC and standard browser to quickly and easily establish the necessary settings at any time via preconfigured links. This flexible technology impresses everyone involved and makes life simpler.

The final part of the service provided by Saia-Burgess Controls AG was to monitor the solution's success through a customer survey. Both the hotel management and general hotel staff stated that they were extremely satisfied with the solution, and the feedback from the hotel and conference guests was thoroughly positive.

The flexibility of the web technology means that even the hotel management's future operational and functional requirements can be met. The lean solution offers sustainable use thanks to a flexible and open automation solution.



▲ Yvonne Oberföll, Head of Conference Centres for the Holiday Inn in Westside: «The new technology has vastly reduced the number of questions about how to operate the conference centres and therefore reduced the workload for our staff.»



▶ Web-HMI operating interface with «perfect fit» for every room and every user group. Precise room operation for the conference rooms.



▶ PCD1.M2120 EIB/web connection to the existing EIB network

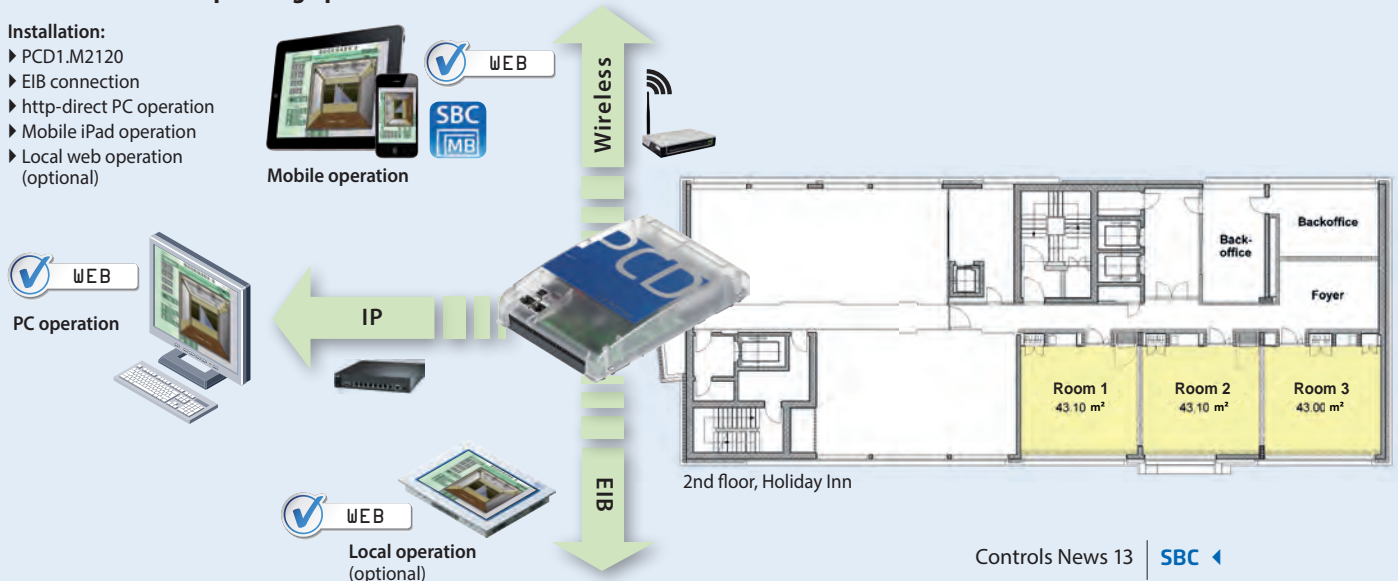


▲ Bookmark conference room with web technology operation via iPad

**Conference room/operating options**

**Installation:**

- ▶ PCD1.M2120
- ▶ EIB connection
- ▶ http-direct PC operation
- ▶ Mobile iPad operation
- ▶ Local web operation (optional)





## SBC S-Link lets energy and data flow along the same line

In vehicle construction, the general trend is to use the power supply lines for data transfer as well. The main reason for doing this in the automotive sector is to reduce vehicle weight. The size of the cable harnesses and the complexity during troubleshooting also play a role.

Authors: Kostas Kafandarlis/Andreas Pfäßli

### SBC S-Link: operating principle

Saia Burgess Controls can also see the enormous potential for optimization in the automation environment of using a single cable for both power supply and communication – and is presenting the perfect solution with the communication interface S-Link (Supply-Link).

In the S-Link, the data signal is modulated via a carrier frequency on the power supply line. This technology is also known as powerline communication. In contrast to the network communication commonly used in the consumer market, which is designed for 230 VAC supply lines, S-Link also works with 24 VDC as well as the 24 VAC lines commonly found in building automation.

One of the two conductors is used as a reference potential while the information is modulated onto the other conductor with a fixed carrier frequency. S-Link can therefore be used as a half-duplex communication channel for single-master systems. If a protocol is used which contains a 'token passing' mechanism, for example, a multi-master bus system can also be developed. No additional control lines are required.

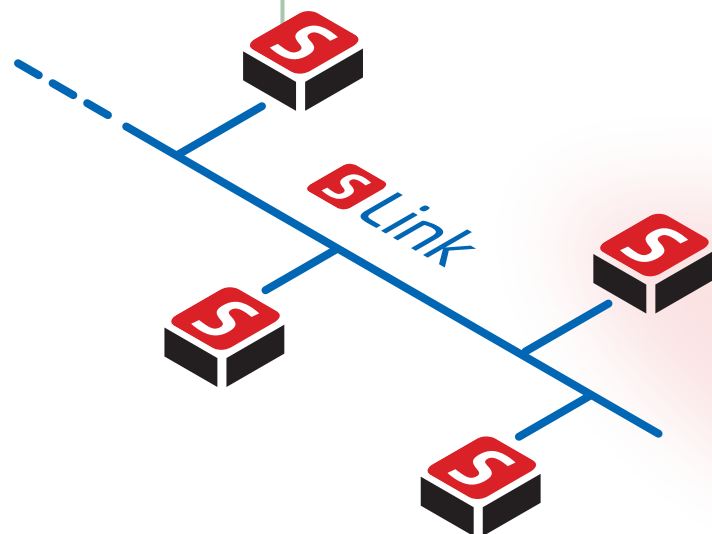
### Easy to install and user-friendly

S-Link enables data communication via a device's two conductors of the power supply. As the power supply line and communication line for a bus system are installed simultaneously, the amount of installation work is vastly reduced. Where four lines were previously used, two lines now suffice. In particular, when installing bus systems with multiple participants, major benefits are offered in terms of the installation time if only one line has to be fed to the participants. In larger bus systems, the benefit of material savings also plays a role.

### SBC S-Link interface for the PCD1.F2300

If you look at the existing market, you will find solutions for network communication via 230 VAC power lines – internet from the plug socket. This relates to the transmission of large data volumes with a high transfer rate. Sophisticated error recognition and correction algorithms ensure that the information is correctly interpreted by the recipient. In the field of 'smart metering', which includes intelligent meters for water, gas, electricity and heat, only a small data volume with a low data rate is transmitted. The focus in this area is on the robustness of the system, which transfers measurement data securely and reliably even if there is severe interference on power supply lines.

In designing the PCD1.F2300, Saia Burgess Controls has developed a power supply module with an integrated S-Link communication interface for the PCD1.M2xxx. As an efficient and robust solution, this enables data transfer with simple protocols such as the S-Bus or Modbus. The PCD1.F2300 is inserted into the first socket of a PCD1.M2, making it possible to connect the PCD1.M2xxx to an 18–48 VAC or 20–60 VDC power source. In addition to the power supply for the PCD1.M2xxx, a 24 VDC pickup is also available for supplying external I/O stations. This can be loaded with up to 9 W. To prevent the PCD1.M2xxx from being switched off in the event of an overload, this output is short-circuit-protected. In addition to the power supply, a useful signal is modulated onto the power feed, thus enabling communication via the feed lines between several PCD1.M2xxx devices at up to 115.2 kb/s.





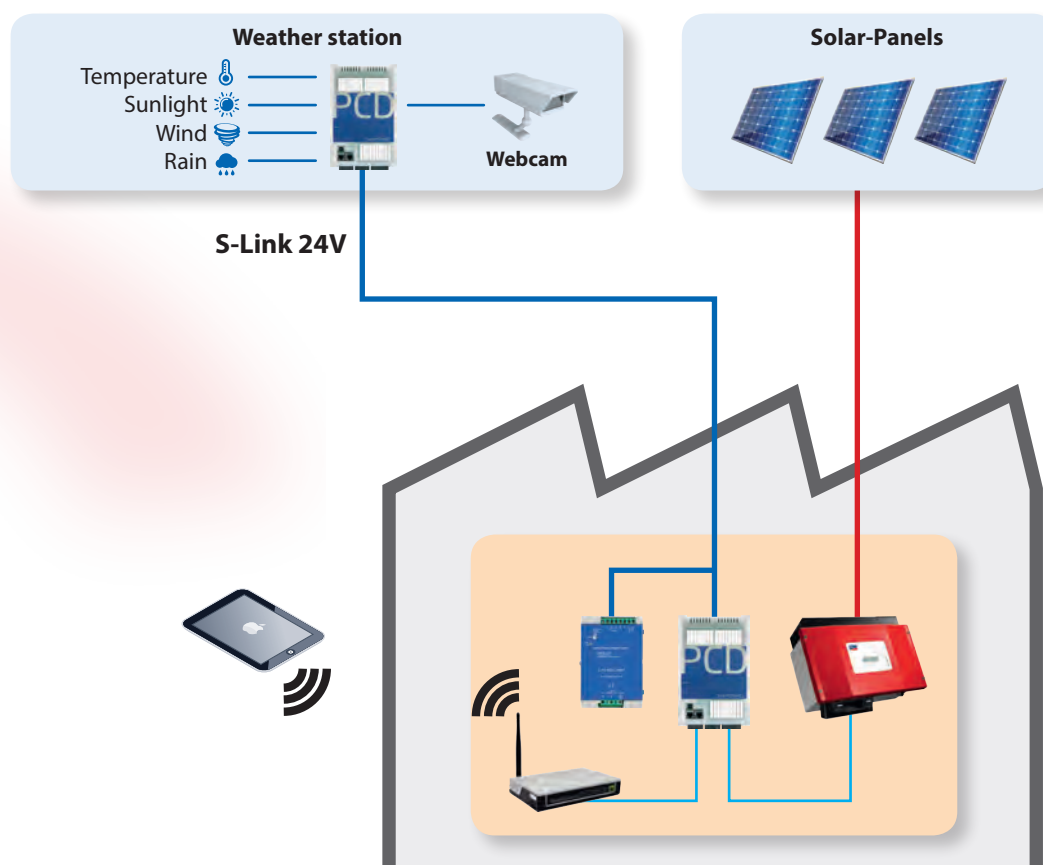
The speed is therefore similar to that of an RS-485 interface, i.e. between the typical applications for smart metering (10 kbit/s) and network communication (>10 Mbit/s).

### Limits and rules of thumb

The thresholds of this kind of system are based on the cabling, loads and interferences on the power lines. Several rules of thumb must be observed when planning and installing the cabling. The signal transmission quality largely depends on the signal attenuation. This is caused by the line attenuation and capacitive loads, such as input capacitors of several nanofarads. Ideally, these are inductively isolated in the respective loads. If this is not intended, the level of interference can be reduced by adding a short 10–40 cm stub cable to the main power line. The S-Link interface is suitable for applications with cable lengths of up to 100 m. The key factor in this regard is not the cable length between two communicating components but the total cable length. The maximum permissible cable length also reduces depending on the number of components and loads.

### Test installation

The new photovoltaic system on the roof of the Saia Burgess Controls Plant II in Murten was a good opportunity to use S-Link in a real life situation. In addition to the solar panels, a weather station with a webcam was also installed on the roof. A PCD1 reads the weather station data. As there is no 220 V or 24 V supply available on the roof, the components were supplied by the switching cabinet on the second floor. The PCD1 on the roof reads all the weather data and transfers this together with the webcam images via S-Link and the S-Bus protocol to another PCD1 on the second floor. This acts as a data concentrator and additionally collates the data from different energy meters and the SMA inverters. The SMA-own protocol is used for the latter. All of this data is visualized on a Saia PCD® Web panel in a further switching cabinet.



◀ Diagram of a real S-Link application for industrial use



## AutomationServer

### The successful concept is further developed

A lean automation device has to adjust to the operator and user's existing operating resources and ensure data exchange without a need for proprietary hardware or software. In the Saia PCD® automation stations, this is ensured by the Automation Server, which acts as a form of universal access to make all the data externally available.

Author: Urs Jäggi

The AutomationServer functions are now used in almost all projects with SaiaPCD®. This offers major benefits for the system operators. Following the success of the concept, the AutomationServer was upgraded to include further standard technologies from the world of IT such as an SNMP agent (Simple Network Management Protocol).

#### HMI, control and management functions are integrated into the automation device

The prefabricated objects and templates enable the efficient use of the AutomationServer functions. Appropriate automation functions are available for all the server modules such as the web server, FTP server and SMTP client. In addition to the standard control and regulatory functions, HMI and management functions can also be directly conducted in the controller.

Examples in this regard include the integrated alarm manager and the trending module. Alarms are recorded and managed in the controller and not in a PC-based management system. Process data can be directly displayed in trend curves from the controller and archived in Excel-compatible CSV files on the large Flash memory modules. The functions are realised quickly and easily with the appropriate FBox function libraries. In addition to the PLC functionality, the application objects also contain the applicable web-HMI templates, which can be displayed with a PC with a standard browser or with the SBC Micro-Browser web panels. In many cases, this makes additional, external PC-based SCADA systems redundant. Furthermore, all data are always stored on-site in the controller. No information is lost even if the communication with the higher level PC system fails.



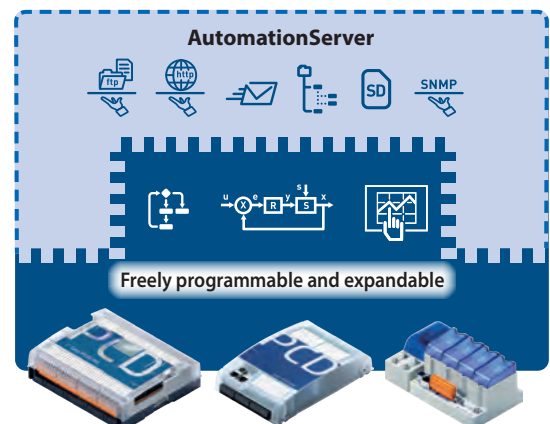
▲ AutomationServer now also available with an SNMP agent for integration into IT management systems.

#### Saia PCD® with AutomationServer

##### Optimum integration of the AutomationServer combined with powerful control application

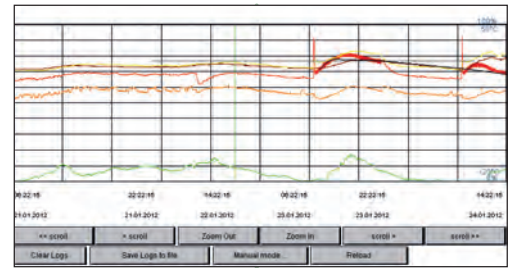
The AutomationServer offers vital automation device functions, making it an integral part of all SaiaPCD® control systems. It incorporates common web and IT technologies and forms the open interface to the user and operator's tools and platforms. However, the AutomationServer with SaiaPCD® offers far more than just an open interface. Specially adapted automation functions and objects form the perfect counterpart for control uses. Only with these can the AutomationServer be optimally and seamlessly integrated into the SaiaPCD® automation device and efficiently used.

► **Saia PCD® with AutomationServer.** Optimum integration of a server combined with a powerful Controls application. HMI, control and management functions are integrated into the automation device





ID	Alarmed	Time On	Time Off	ACK	Counter
1	Temp1 alarm!	1990.04.01 05:22:50 PM	1990.04.01 05:23:20 PM	NAK	12426
2	Temp2 alarm!	1990.04.01 05:22:20 PM	-	NAK	12426
3	Temp3 alarm!	1990.04.01 05:20:20 PM	1990.04.01 05:22:20 PM	NAK	1014
4	Temp4 alarm!	1990.04.01 05:22:20 PM	-	NAK	1040
5	Temp5 alarm!	1990.04.01 05:10:20 PM	1990.04.01 05:19:20 PM	NAK	1517
6	Temp6 alarm!	1990.04.01 05:02:21 PM	1990.04.01 05:19:20 PM	NAK	178
7	Temp7 alarm!	1990.04.01 05:18:20 PM	-	NAK	180
8	Temp8 alarm!	1990.04.01 03:42:22 PM	1990.04.01 04:46:21 PM	NAK	206
9	Temp9 alarm!	1990.04.01 02:38:23 PM	1990.04.01 04:46:21 PM	NAK	106
10	Temp10 alarm!	1990.04.01 12:30:28 PM	1990.04.01 04:46:21 PM	NAK	82
11	AlarmName_11	1990.04.01 05:14:31 AM	1990.04.01 04:46:21 PM	NAK	26
12	AlarmName_12	1990.03.31 11:42:41 PM	1990.04.01 04:46:21 PM	NAK	13



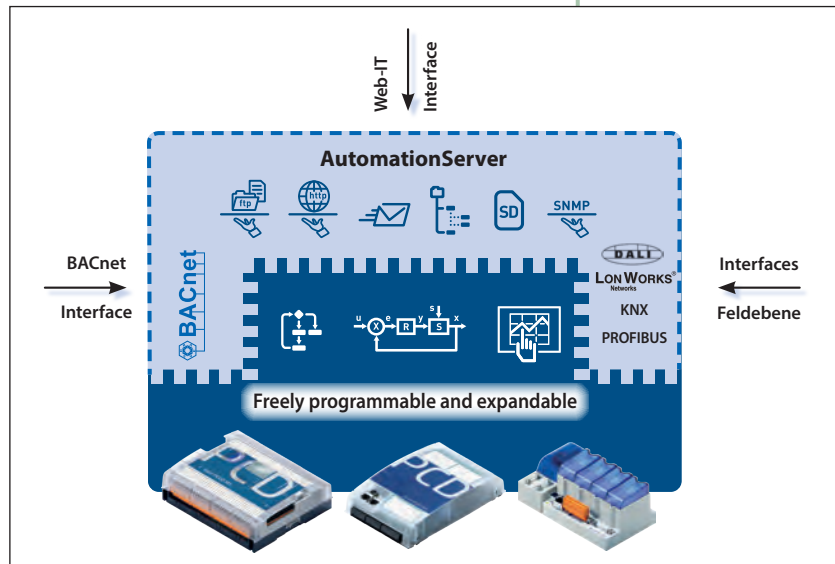
▲ HMI, control and management functions, such as an alarm manager and a trending module with historic data recording, are integrated into the automation device and can be displayed and managed using a simple standard browser or Saia PCD® Micro-Browser web panel.

**Flexible and expandable**

The programmer can adapt and expand the available automation objects using the SaiaPG5® programming tool. As is necessary for a lean automation device, the SaiaPCD® controllers can be freely programmed and expanded. Application programmers can also create their own application objects and web-HMI templates.

**AutomationServer combined with established communication technologies**

A further advantage of the SaiaPCD® with AutomationServer is the ability to combine web and IT technologies with classic automation technologies such as BACnet, LonIP and Profibus. In many applications, combining standard web and IT technologies with specific automation standards is necessary and useful. As per the «lean» spirit, SaiaPCD® systems can also be retrospectively and modularly fitted and operated with additional communication interfaces.

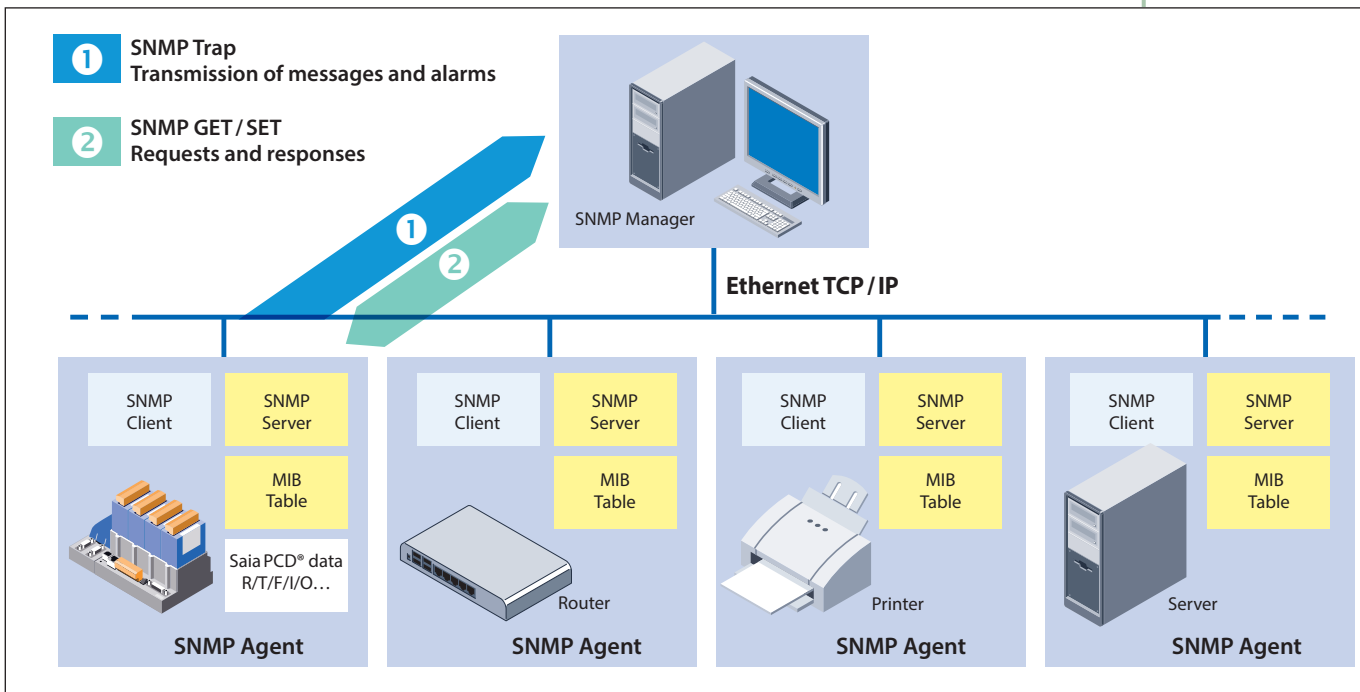


**SNMP agent for the incorporation into standard IT management systems**

In the world of IT, SNMP (Simple Network Management Protocol) is a commonly used standard for managing network devices such as printers, routers, switches, servers and the like.

▲ Saia PCD® Automation Server combined with classic communication systems from the world of automation

IP network with a central SNMP manager for monitoring and managing the connected network participants, the agents





The central SNMP manager enables IT managers to monitor and manage the devices (known as «agents») on the IP network. In the event of a fault, the agents send trap messages (text messages) to the SNMP manager. The manager can access the agents using GET and SET commands and request further information, set parameters or trigger actions.

An SNMP manager is comparable with a control management system from the world of automation. In systems that already have an SNMP manager, it is therefore also expedient to monitor and manage the automation devices in the same manner.

**SaiaPCD® with AutomationServer and SNMP agent function**

The AutomationServer of the SaiaPCD® controllers supports the SNMP agent function in versions V1 and V2c. System statuses and data can be sent to one or more SNMP managers via trap messages (text and data). To this end, AWL commands and FUPLA Fboxes are available in the SaiaPCD® controllers.

The SNMP manager can access the media of a SaiaPCD® controller via GET and SET commands. The data structures of the SNMP agents are defined in MIB files (Management Information Base). The standard Saia PG5® MIB file provides access to all SaiaPCD® media. The Saia PG5® MIB generator can be used to generate application-specific MIB files that only provide the selected SaiaPCD® media with icon symbol names.

**The AutomationServer in real-life use**

The use of the AutomationServer with integrated web server and SNMP agent has now become standard in projects with SaiaPCD® controllers. The functions are used for the different applications in innumerable projects

Below are two typical examples:

**Energy data capture and monitoring of a data processing centre at the company Wusys in Frankfurt**

The energy consumption of the server system is measured using SBC Energy meters, recorded in the SaiaPCD® controllers via the S-Bus and transmitted to Wusys operator platforms via SNMP. Further to the energy consumption, the ambient conditions and data from the cooling systems are also recorded and monitored by the SaiaPCD® controllers. This data is also transmitted to the operator platform via the SNMP protocol. The system servicing and maintenance occurs is made using a standard browser via the SaiaPCD® controllers' integrated web server.



▲ Server room in the Wusys data processing centre  
Over 500 energy meters and controllers without a control system

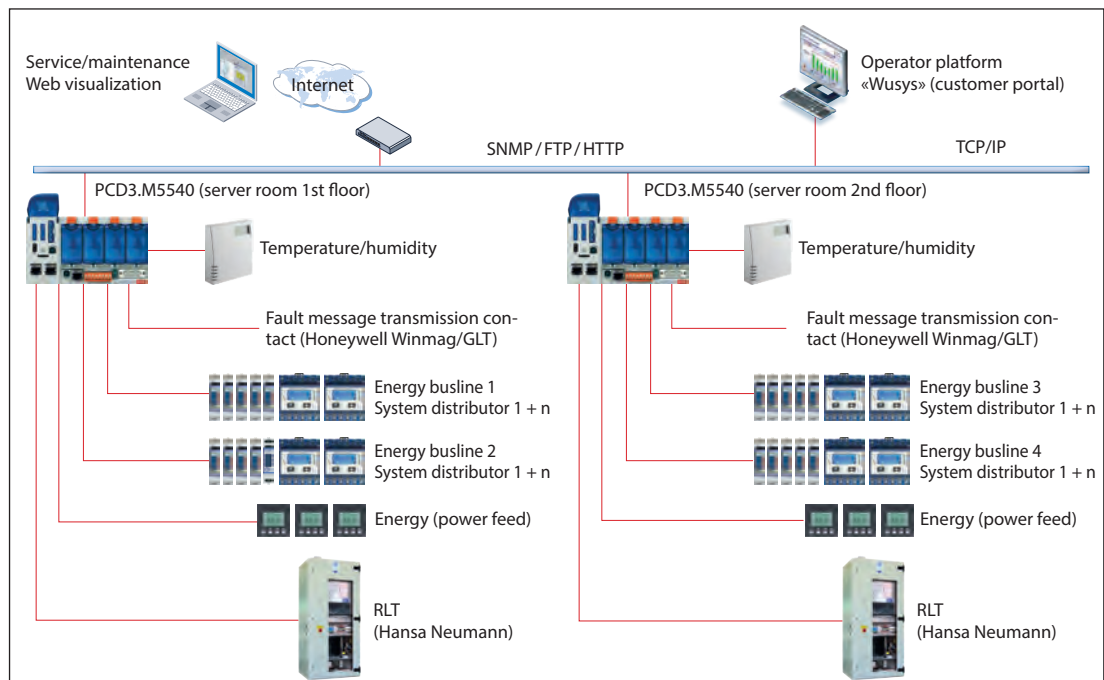
**The benefits for the operator:**

- No additional control system is required for energy management and system monitoring. Thanks to the SNMP agent in the AutomationServer, the existing operator operational platform at Wusys can be simply sent all data without any special hardware or software drivers.
- Thanks to the integrated web server, the system statuses for maintenance and servicing can also be directly visualized on the PCD3 controller. Again, no additional system is required.



▲ SNMP agent integrated into every SaiaPCD® controller

► Network topology of the infrastructure of the Wusys data processing centre in Frankfurt. Thanks to SaiaPCD®, only one system is required for energy data capture and monitoring the server rooms. The AutomationServer, together with the web server and SNMP agent, offers the open interface for the Wusys operator platform and saves costs on additional hardware and software as well as engineering services.



**Process and building automation at Biokimica in Pisa, Italy**

Biokimica is a leading manufacturer of chemicals for the leather, textile and cleaning industries. In the new head office with 14,000 m<sup>2</sup> of production and office space (3 floors, 36 offices and 190 employees), both the production process and the building automation are automated using Saia PCD® controllers.

The AutomationServer plays a key role in this project and has many uses. The overall operation and monitoring of the production process and building automation occur using the Saia PCD® web panel concept on the basis of the SBC web server and Saia PCD® web panels. All relevant process and

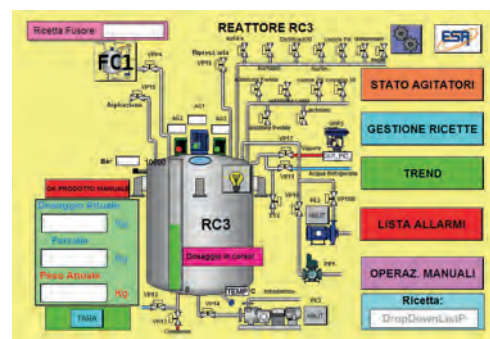


▲ Chemical reactor with web-HMI

access data is logged and stored in Excel compatible CSV files on the connectible Flash memory modules PCD3.R551M04 from where it is collected by a higher-level system and archived for traceability purposes.

**The benefits for the operator:**

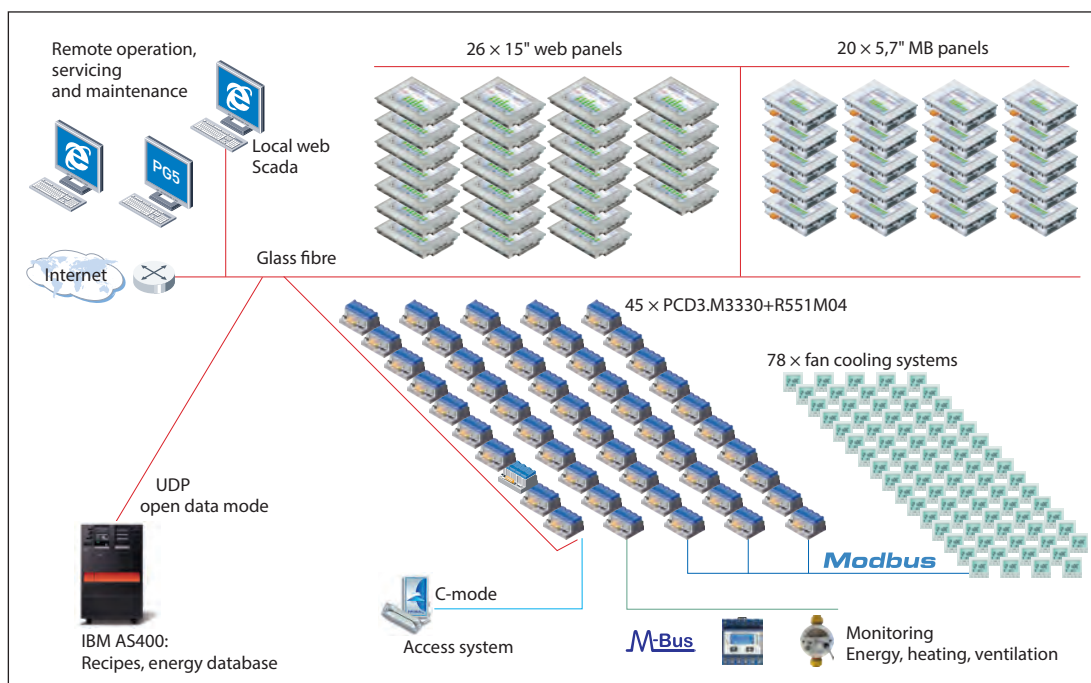
- Standardised, flexible and modularly expandable solution for process and building automation
- Simple operation and maintenance
- Saia PCD® web panel – no license fees for PC-based control systems
- Robust industrial hardware with long life cycle instead of sensitive vulnerable PC systems
- Data is locally stored in the Saia PCD® controller in an IT-compatible CSV format and can therefore be easily integrated into the higher-level system. Data is still always available locally even if the communication with the higher-level system fails.



▲ Screenshot of the web-HMI for the chemical reactor, created with Saia PG5® WebEditor 5.14

**Lean automation with the Saia PCD® AutomationServer**

The two real-life examples clearly show the advantages and major benefits offered by a controller with integrated AutomationServer. With its open web and IT standard interfaces, a Saia PCD® controller can be simply integrated into the in-house tools already available to the operators. Contrary to a dedicated controller, a Saia PCD® controller can be used for different tasks. Thanks to their modularity, Saia PCD® systems can also be simply expanded at a future date, for example to include additional interfaces. For operators, this means greater flexibility, independence and reliability, as well as less work and lower costs for system maintenance and care.



System topology of the production process and building automation at Biokimica in Pisa, Italy. The entire system was created with Saia PCD® controllers. The AutomationServer plays an important role. The web-HMI interface is used to monitor and operate the system and the building via a standard browser. All important process and access data is stored in Excel-compatible CSV files on the connectible Flash memory modules PCD3.R551M04.

# The new Saia PCD® Controller generation

## Fully compatible with the past, and ready for the future.

In 2011 Saia Burgess Controls reached an important milestone – the entire Saia PCD® controller family was renewed. 10 years ago, the basic equation of Saia PCD® = PLC worked fine, but the formula for all controllers today is Saia PCD® = PLC + (Web + IT).

Author: Urs Jäggi



USB and Ethernet as standard

The determining factor was not to start from scratch but to create a functionally compatible replacement. Existing application programs can be transferred for modification and extension with Saia PG5®. Thus, the further development of the controller range is not yet complete. In this article you will learn what happens next and where the new controllers are implemented.

### Combines up to 50 × more processing power with web and IT technology

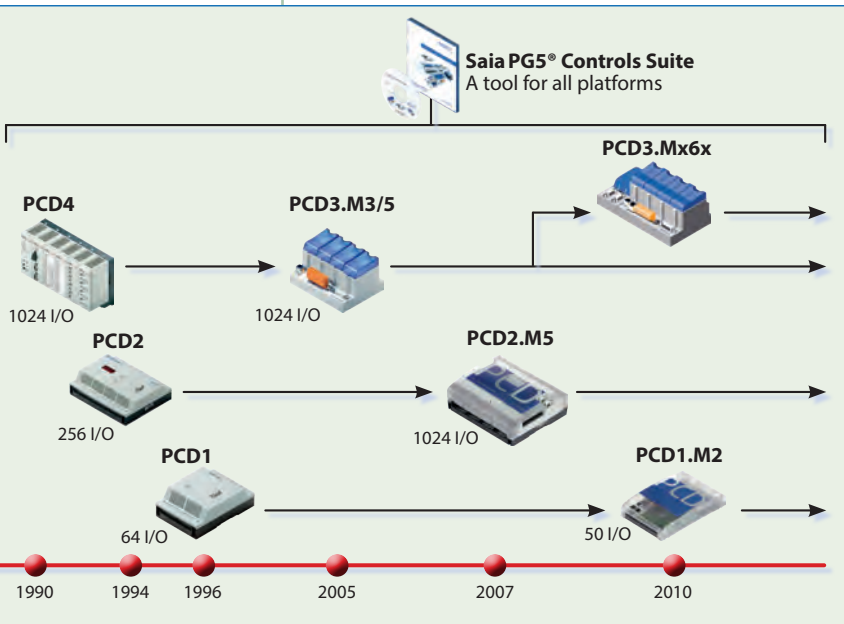
From the small PCD1 to the largest PCD3 controller, all Saia PCD® controllers are now available in modern technology and with innovative new features. With their rapid ColdFire processors, they have up to 50 × more computing power than the old Saia PCD® generation with the 68,000 processors.

With much higher performance, additional communications interfaces and built-in Web and IT functions, all Saia PCD® controllers are now at the cutting edge of technology. All controls are provided in the basic version with the Automation Server, one USB and one Ethernet interface. As long as there is space available, the Ethernet connection is a 2-port switch.

### User programs are still compatible

For the user, a generational change is much more hassle if the old and new systems are not compatible and existing applications have to be rewritten. Not so with the Saia PCD® controllers from Saia Burgess Controls, which accord with the values and culture of a real PLC company. When developing PCD-Controllers, the biggest priority is a long life cycle in order to minimize the effort and costs for users and operators.

The necessary adjustments to the new hardware platforms are made in the operating system. Thanks to the interpreter technology, the interface for programmers is compatible with all controller families for years to come. The interpreter language is constantly being extended with new features, while the existing functions continue to be supported. So existing application programs for the first Saia PCD® generation can be ported to the new Saia PCD® controllers without additional expense. The Saia PG5® software is a programming tool for all controller types and generations. Older programs may be expanded and updated with the latest version of PG5. Application programmes designed for small PCD1s can also be used on the large PCD3 CPU. The examples below prove that this isn't just marketing blurb:



▲ In 2011 we removed the old Saia PCD® Generation and replaced it with fully compatible equipment. Old applications can be transferred to the new Saia PCD® controllers and can be processed further using PG5.

In 2011 we removed the old Saia PCD® Generation and replaced them with something fully compatible. Old application programs can be transferred to the new Saia PCD® controllers and expanded and processed with PG5.

In 2005, the first PCD3 controller was introduced on the market. The upgrade of the flat series with the PCD2.M5 CPU to the new technology came in 2007. In 2011 the introduction of the new PCD1.M2 CPU and the PCD3.Mxx6x-power CPU completed the renovation of the first Saia PCD® control generation. The new Saia PCD® controllers are based on fast ColdFire processors and the latest web and IT technology.

AutomationServer, keine Option immer dabei!





**Bustaffa  
Cheese Factory  
Italy**



PCD6 controllers had to be replaced for the latest generation following water damage at a cheese factory in Italy. The requirement was to transfer the applications program and the connection to the existing control system and renovate it without loss of production. Owing to the compatibility between generations of devices, the replacement work could be carried out during operation, without stopping production, and with minimal investment costs.



▲ Pictures of the new (top) and old (bottom) panel: The new panel was fitted with PCD3 and tested without stopping production using the "old" PCD6 devices.

**The youngest Saia PCD® members of the new generation in practice:**

**PCD1.M2120 has been tested a thousand times over in the field**

The latest addition to SaiaPCD® controllers, the PCD1.M2120, sets new standards in the field of small controllers. With USB and Ethernet as a standard communication interface, the large on-board flash memory and the integrated automation server, it provides small-scale control with unprecedented functionality. In the year since its release, several thousands of them are being used by customers in a variety of projects. Owing to their compact and flat design, they are used in the following applications: in air conditioning equipment in small spaces, under difficult environmental conditions in snow cannons, in space control in a hospital, for controlling for cinema projectors, in heat pumps, for building automation in a stadium, and in the control of solar and municipal heating plants or as data managers and data loggers for energy supply.

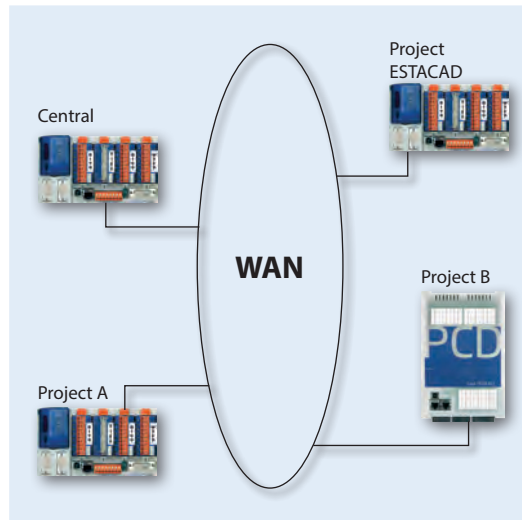
Below is information on two additional projects:

**The PCD1.M2120 as BACnet controllers in air conditioning units at Deutsche Telekom**

The high-performance communication technology at Deutsche Telekom has to be air conditioned round the clock. To ensure the high availability of public telephone networks, all the relevant operating systems and communications equipment are monitored.

**PCD1.M2120 as applied to a district heating network in Fribourg/Vaud/Neuchâtel regions (Switzerland)**

SaiaPCD® controllers record energy consumption and control and regulate primary facilities. The interfaces and various communication capabilities of the new PCD1.M2120 were the deciding factor when implementing a communications gateway. The energy data is collected with the new plug-M-Bus module and transmitted via fiber/WAN to the central counting office.



▲ Municipal heating network topology

**PCD1.M2160 with more memory**

This CPU adds another device type to the young PCD1.M2 family. This arose due to frequent requests for even more onboard flash memory. The CPU has 1MB flash memory for user programs, 1 MB of SRAM for data blocks and texts and 128MB of onboard flash memory for the data system. The fast CPU combined with the large memory and integrated automation server makes it ideal for use as a data concentrator.



▲ View of ventilation tower control panel with PCD1

SBC M-Bus Interface module



▲ PCD1.M2120 with M-Bus module

1 MByte	flash memory for user programmes
1 MByte	SRAM for DB/Text
128 MByte	Onboard Flash-memory for file system

**PCD3.Mxx6x Power-CPU**

The new power CPU extends our range of top-class PLCs. The PCD3.M5xx6x was released in mid-2011. Prior to that, over 120 new CPUs were used in the pilot phase in a variety of projects, such as building automation, where communications performance and memory are at a premium, or in machine control, where great performance has real advantages. The new CPU runs application programmes 2-3 times faster than existing CPUs. In addition, the flash memory has been doubled for the application program and a new on-board flash memory for the file system is provided as standard. Thanks to the faster processor and increased system resources, the new power CPU has enough power to process complex control and communication tasks.

Below you will find more information about a building technology project:

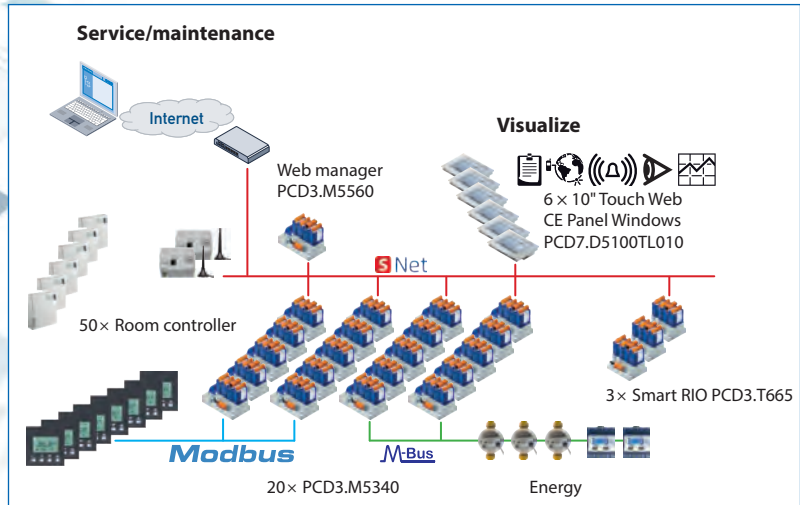
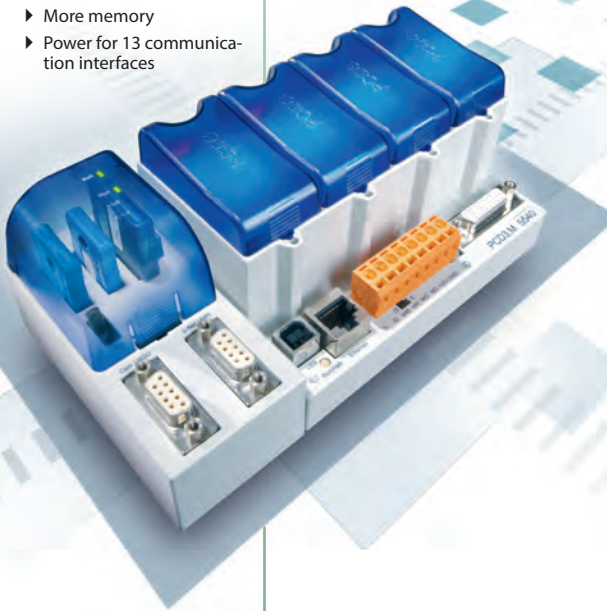
**The PCD3.M5560 power CPU in use at MarcCain textile company, Germany:**

The building automation system of MarcCain's new administration and production building in Bodelshausen is controlled with Saia PCD®. The PCD3.M5560 power CPU is used as central web management station for operation and service. In this case, high performance and extensive memory resources were the decisive factor in selecting this controller.

**PCD3.M5560**

Next innovative step in the new generation

- ▶ Triple speed
- ▶ More memory
- ▶ Power for 13 communication interfaces

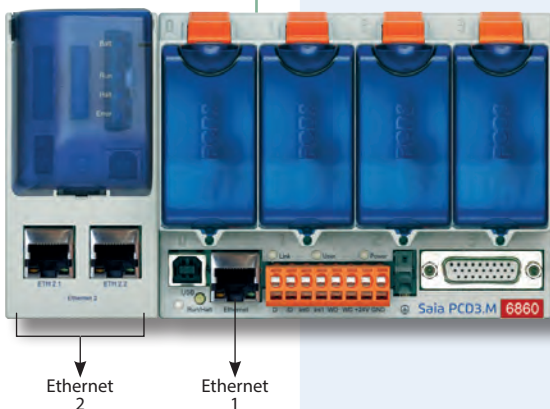


▲ Network topology building technology at MarcCain PCD3.M5560 Power-CPU with AutomationServer as the central Manager-Station for operation and service.

**Future developments at a glance  
PCD3 with 2 Ethernet interfaces**

The PCD2.M480 there is already a controller with two Ethernet interfaces. However this does not yet have a fully-fledged automation server. To take this into account, a new PCD3 controller with a second Ethernet port (with integrated 2-port switch) has now been created.

The PCD3.Mxx6x power CPU serves as the basis for the new controller type. The second interface is created with an additional co-processor module to the left of the existing extension. Thus the controller now has two completely independent Ethernet ports. It is particularly suited for use in infrastructure projects (e.g. road or railway tunnels). In that context, network security and availability is a high priority. The co-processor also provides the basis for future functional enhancements.

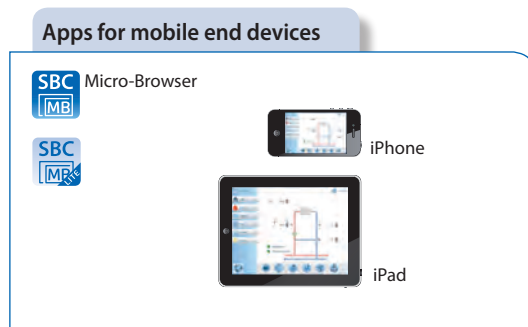
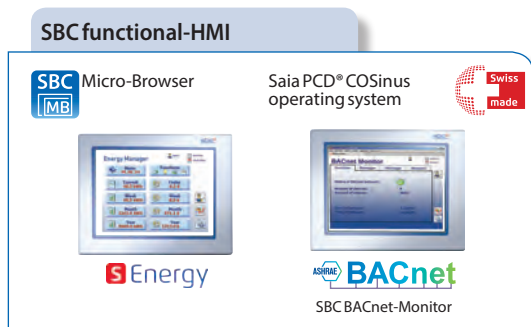
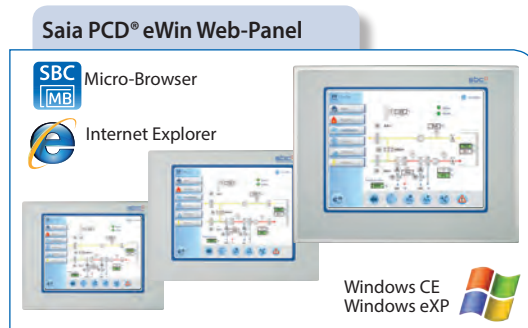
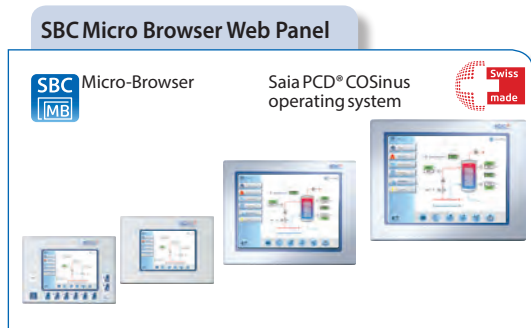


# 10 Years SBC S-Web

## A paradigm shift towards lean automation

How has the technology, application areas and product portfolio influenced the development of web-based control and visualization, and what's next? The answers lie in a proven track record of innovative lateral thinking combined with the concepts of lean philosophy.

Authors: Urs Jäggi/Thierry Rebut

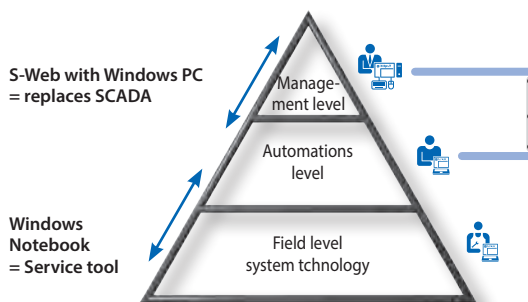


◀ Dedicated S-Web HMI devices – of course all the applications will run on any other Linux, Apple or Windows system.

### 2002: The beginning of SBC S-Web

In 2002 we were the first company in the industry to supply web technology for automation, with an HMI application server at every automation station and a standard browser as the HMI client. With the first version of Saia PG5® Web Editor it was possible to create visualization and service applications for Internet Explorer, even without JAVA.

In early years, S-Web technology replaced mainly simple SCADA and management software and served as a simple service interface. Every notebook or standard PC could use it for operating and service functions without the need for special software. Dedicated operator stations were therefore unnecessary. The «no bells and whistles» approach of the S-Web Editor was particularly suited to the remote monitoring, service and management of automation systems via telephone connections. Staff came up with a simple browser interface that was much easier to use than with overloaded,



▲ Since 2002: the first step for web technology in automation

highly stylized special software. Changes to the user interface could be made quickly and easily on site and so the «Perfect Fit» could be achieved. So it was really «lean».

► **Structural diagram of an S-Web system from 2002:** From the outset, there was also the possibility of running S-Web over RS-485. This is still used today in modern and large projects such as at Frankfurt airport to reduce the load on LANs

### ▼ Stand 2002

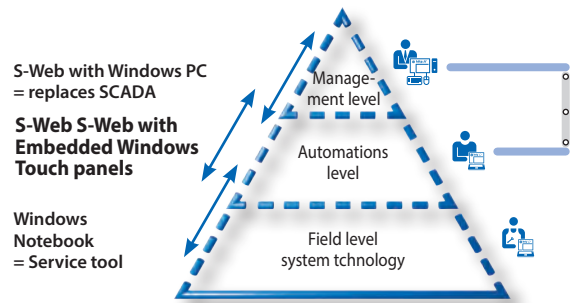




**Since 2004**

**S-Web with embedded Windows touch panels start with SBC Micro Browser**

To use the web technology with fixed devices, customers began to use standard Windows touch panels for S-Web applications. It didn't go well. The available resources and computing power were not enough for the sophisticated JAVA virtual machine in Internet Explorer or Firefox. When a Windows Touch Panel was powerful enough, the ventilation fans would break down. Another disadvantage were the operating conventions of Java or Windows. For example, the «Windows Help» associated F1 key does not match the touch screen. The solution was a web browser optimized for plant and machine operation. This was pre-installed in addition to the standard browser on the CPUs for Embedded Windows produced by Saia Burgess Controls itself from 2004.



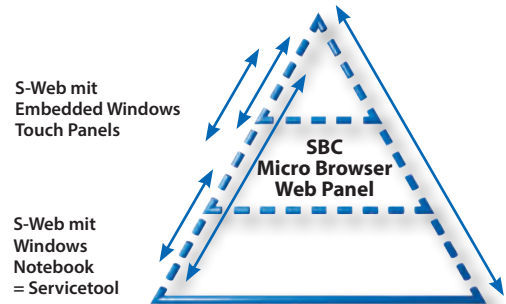
▲ Since 2004: Embedded Windows Touch Panel with SBC Micro Browsers allow for the use of the Web technology now permanently installed in industrial machinery and equipment.

This solution has worked well and was very successful. This web HMI also influenced the world of series machines.

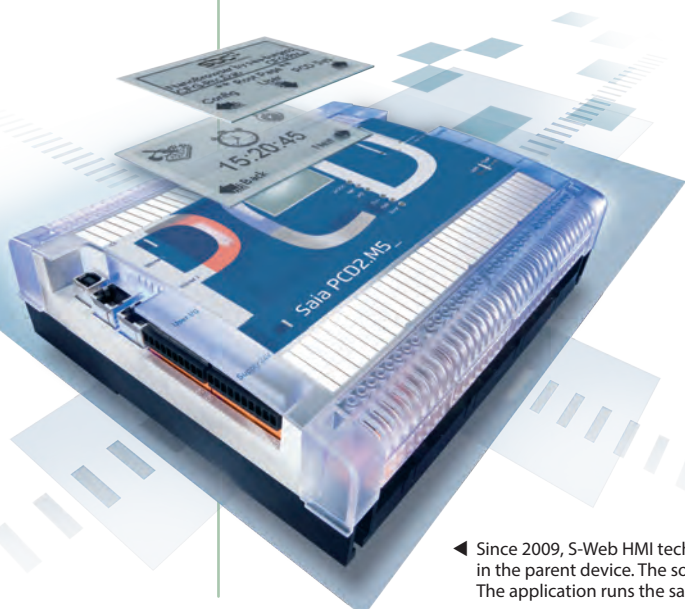
**Since 2007**

**S-Web with SBC Micro Browser web panel, based on the SBC operating system**

In addition to the high hardware requirements of Windows and Java, a number of other points needed to be considered critically. Frequent version changes and updates can lead to incompatibilities that are risky and expensive. That's not consistent with lean automation, nor does it bring peace of mind. Saia Burgess Controls developed the proven SaiaPCD®-CPUs for the new SaiaPCD® Web Panels MB on the basis of the hardware architecture and the operating system. MB stands for Micro Browser. The touch panel series SBCMicroBrowser range in size from from 3.5" to 12". The technology and thus the life cycle are completely in the hands of Saia Burgess Controls.



▲ The touch panel series SBC Micro Browser range in size from from 3.5" to 12". The technology and thus the life cycle are completely in the hands of Saia Burgess Controls.



▲ Thanks to the SBC Micro Browser technology, web technology has also become an attractive option for production machines.

◀ Since 2009, S-Web HMI technology is also available in a 1,9" format embedded in the parent device. The software tool is the same as for the large panels. The application runs the same on the PC browser as on the local display.

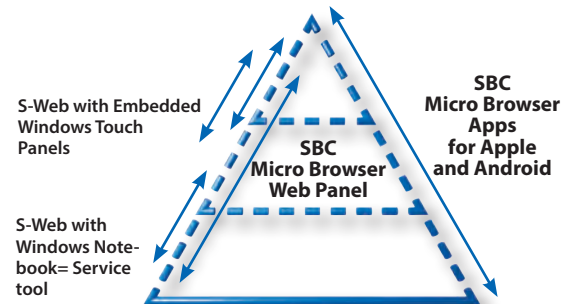
**Since 2011**

**The Saia PCD® Web Panel world «goes fully mobile» and starts with functional-HMIs**

At the Light + Building Fair in April 2010, we were the first company to offer the technology for iPad. The HMI application on the iPad impressively demonstrated the openness and communications capacity of Saia PCD® automation devices. In the meantime, tablet computers and smartphones have become ubiquitous they are in every shop and can always be found online.

Since April 2011, the SBC Micro Browser App can be downloaded from the iTunes store and is fully established as a product. The Android world will soon follow. For managers, operations supervisors, service personnel or caretakers with Saia PCD® Web Panel technology all stakeholders have the Saia PCD® automation world in their pockets, and always under control.

In addition to «going mobile», 2011 saw the successful beginnings of a brand new category of device the SBC functions-HMI. They offered everything that the Web-Panel offered, in addition had a fully documented application preinstalled: take it out of the box, plug it in and it's ready to use. Web applications run through SBC Microbrowsers on all platforms. An application can be used by different target groups simultaneously and in any location.



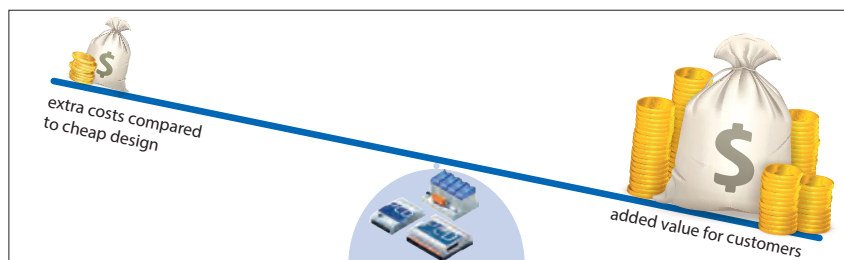
▲ Web applications run through SBC Micro Browsers on all platforms. An application can be used by different target groups simultaneously and in any location.

More on SBC Functional PCD-control: Page 28  
 Functions device type «Energy Manager»: Page 44  
 Functions device type «BACnet-Monitor»: Page 119

**Saia PCD® Web Panel**

**Consistent implementation of lean automation**

More automation with fewer qualified personnel for minimal cost those are the aims of lean automation. With Web-HMI it works really well. It was even better in this case because additional costs in the design were taken into account systematically, as the following example from the 5.7" display module technology range demonstrates:



▲ More value vs additional costs for better technology with the Web-Panels MB 5,7" VGA TFT

**Web-HMI technology is lean in its basic design**

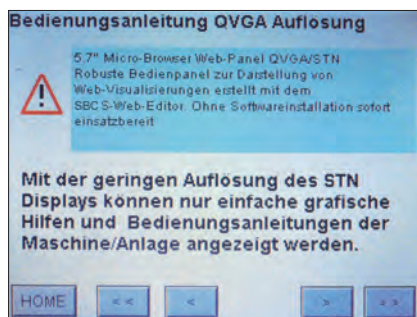
In a client-server architecture, a client (here: Touch panel) can access any connected controller remotely without additional cost. That reduces the engineering cost, so fewer HMI devices are needed in a building. What's not there costs nothing and can't go wrong! If a permanently installed industrial panel is not required, standard PCs and/or mobile devices are used. Regardless of the end device, all clients are on the same level. In case of failure, the client hardware can easily be replaced without the need for proprietary software. That means less service costs and no dependence on individual manufacturers.

Nor did it make sense to show trending curves with QVGA resolution. Service personnel and system operators would always need an additional tool for system optimization and error analysis.

5,7" VGA/TFT displays allow for graphical assistance and instruction manuals and documentation of plant and machinery.

**Features of the market standard with the 5.7" touch panel**

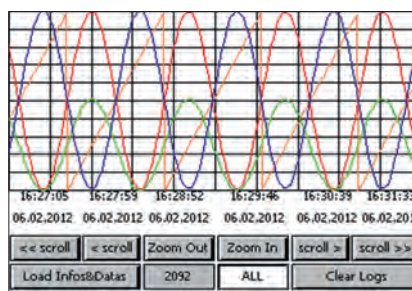
We produced the first 5.7" Saia PCD® web panels with microbrowser technology in accordance with the market standard: with color-STN LCD in ¼ VGA (QVGA) resolution (320 × 240 pixels) with CCFL Backlight. But the low resolution made it virtually impossible to display graphical assistance, a user guide or parts (machinery/ equipment) for the user on the touch screen.



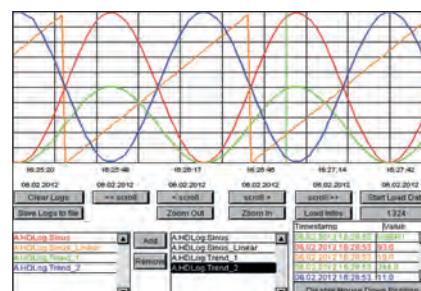
▲ QVGA: limited possibilities for text and graphics



▲ VGA: lots of space for text and beautiful graphics



▲ QVGA is standard with other manufacturers

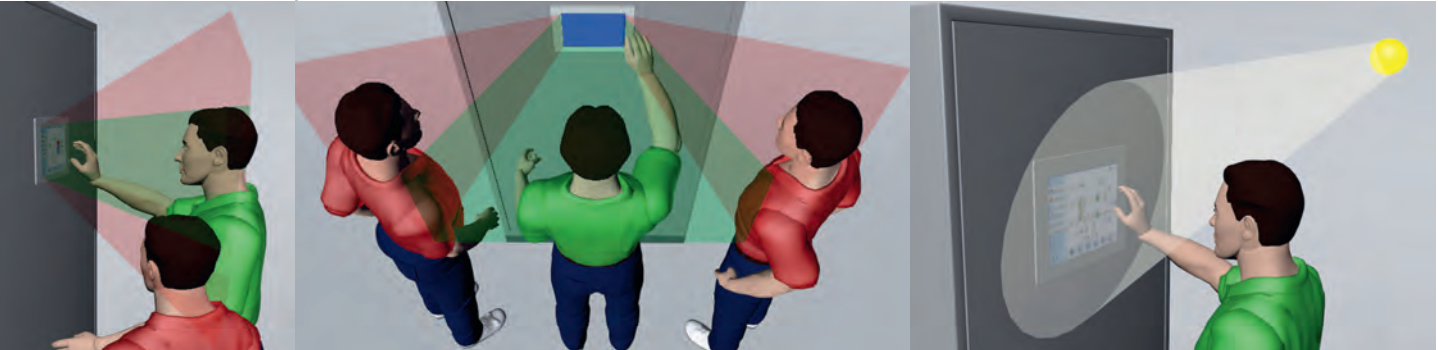


▲ VGA Standard on SBC 5,7" Touch-Panel



The STN-LCD displays can only be read directly from the front and in a directly vertical view. Bad luck for those who are much taller or shorter than the average user. It's not very easy for them to point out something to colleagues on the touch screen. In addition, the visibility for units with a CCFL back-

light in a bright environment is limited. This is usually compensated by the fact that the maximum contrast is set. This, however, reduces the lifetime of the LCD display, meaning it needs to be replaced once or twice in the life cycle of the plant



▲ Properties of STN LCDs: hard to look at from oblique angles

▲ Low visibility in ambient light



▲ system Characteristics of TFT LCDs: good readability from any angle and sharp images in bright light



▲ Expensive assembly systems are required to be able to read the panel better to compensate for the «cheap» STN LCD technology. Now it is only in the way...

### From «me-too» technology to 5.7" added value technology

What would it be worth if all these LCD related weaknesses are taken out of the 5.7" panel? If even at oblique angles and in bright ambient light, you have an eye wateringly sharp image and high resolution? If an LED backlight increases the life of the panels for years?

At Saia Burgess Controls in 2007, we were convinced that it was worth a lot, but that it shouldn't cost the customer more. The management at Saia Burgess Controls dealt personally with the top manufacturers and visited factory stores in Japan. There we found the technical solution in the form of the 5.7" TFT VGA display with LED backlight. Due to the low sales volume, the cost was very high. None of the established manufacturers wanted the extra costs associated with mass production of the 5.7" size, so progress was blocked.

That was a chance for Saia Burgess Controls because we see everything in terms of «customer value and quality».

In 2008 we added to the SBC System Catalogue the 5.7" TFT VGA-Display with LED-Backlight according to standard specifications. The price for the 5.7" devices stayed the same. The additional costs for the LCD technology were not passed on to the customer. We were rewarded with enormous growth and very satisfied customers. Meanwhile, the purchase prices for the 5.7" TFT LCD screens fell. The differences between TFT VGA and QVGA STN are now slim. The price difference between a «lean» product and a «non lean» product is 20 euro. Who wants to sacrifice the great advantages of the new technology? Who wants to have to replace a panel in a building because of a faulty LCD for the sake of another 20 euro?



## Lean concepts applied even at the time of assembly

Saia PCD® Web panels have a sophisticated mounting system, so that they can be assembled by anyone – easily and securely.

Author: Urs Jäggi



### SBC Micro Browser Web Panels

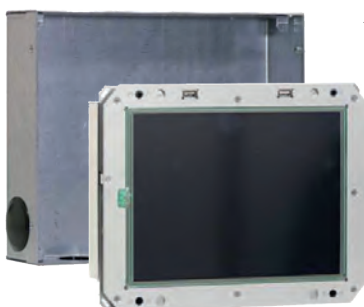
The Micro Browser web panels come pre-prepared for the installation of control panels. The cabinet door is provided with a cut-away where the panel is to be installed. It can be mounted simply and safely from behind using the supplied screws.

◀ Micro-Browser panel for panel mount

### Saia PCD® eWin-Panels

The standard version is designed for control cabinet installation. Alpha Special versions with optional accessories allow for easy in-wall mounting. Also available is a neutral front frame, which allows the user to customize the surface materials used (stone, wood, glass etc.).

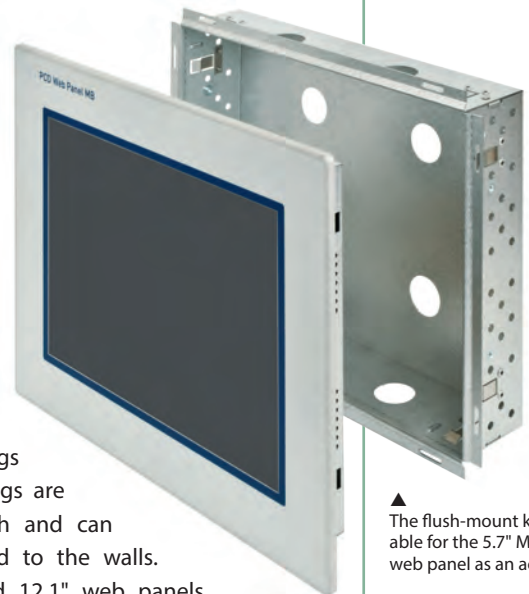
Here, too, care was taken to ensure safe and easy mounting. The casings are adjustable in depth and can be adapted to the realities on the ground.



◀ SBC eWin panel for wall mounting

### Installation kits for wall mounting are available as accessories

The web panels themselves are only available in the panel-mounting version. For flush or surface wall mounting, appropriate mounting kits are available as accessories. An identical panel for all mounting options means maximum flexibility and cost savings for everyone. This is a good example of a successful implementation of «lean» philosophy in «lean» products.

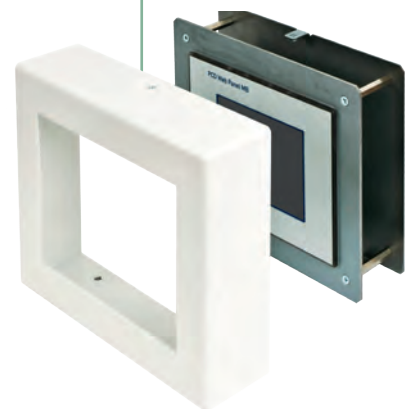


▲ The flush-mount kits are available for the 5.7" Micro-Browser web panel as an accessory

For wall mounting, robust metal casings are used. The casings are adjustable in depth and can thus be customized to the walls. With the 10.4" and 12.1" web panels, installation is very easy with an intelligent clipping system. Screws are currently used to install the 5.7" panel, but these will soon be switched over to the clipping system.



▼ The flush and surface mounting kits are available for the 5.7" Micro-Browser web panel as an accessory



## New products and perspectives.

The Saia PCD® Web Panel portfolio will be further expanded to include larger and smaller display sizes. There are plans for new forms and variants.

Author: Urs Jäggi

### New 12,1" TFT/SVGA SBC Micro Browser Panel PCD7.D412DTPF

Meantime, the 12.1" Micro Browser web panel described in Control News 12 is available as a standard item. With this panel, we are expanding our family of highend microbrowsers. So now SBC Microbrowser panels can now be used for tasks that previously needed a more expensive Windows panel, even though Windows functions were not needed.

The 12.1" Micro-Browser web panel features a high-quality TFT display with LED backlight. The laminated touch screen with precise 5-wire technology offers a resolution of 800 × 600 pixels (SVGA). As with the 10.4" panel, the 12.1" version also features an optimal ratio between the front frame and the display size. The laminated touch screen with a borderless front prevents dirt from accumulating. A multi-colored LED in the front frame displays the status of the panel. It can be controlled by the user program, so that the display status or alarm messages can be shown even when the display is off. In addition to the USB

interface, two Ethernet ports (switch) are included as standard equipment.

This is the first panel in which the new ST3 powerful CPU platform is used.

Thus, the panel has enough computing power for a fast display and operation of very large HMI pages in high SVGA resolution. In addition, the 12.1" panel offers other new useful functions and features:

- a real-time clock (RTC) with a super-capacitor can be synchronized via the SNTP protocol with network time server.
- easy configuration of IP settings with DHCP and DNS client functionality
- large flash memory for efficient management of comprehensive online and offline trending data.

The new ST3 platform is used in the further development of the smaller 5.7" and 10.4" SBC Micro Browser Web panels to give them better performance for additional functions.

### New programmable SBC Micro Browser Web Panel

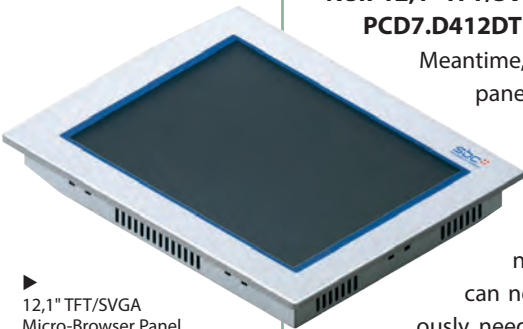
The integrated logic controller can be freely programmed using the Saia PG5® software tool to implement a simple control applications with complex HMI functions. With its integrated automation server, generous storage and multiple communication options, this panel is primarily a management station and data concentrator.

The programmable panels are also based on the new ST3-CPU platform. The powerful ColdFire processor with 240 MHz clock frequency CF 5373 allows simultaneous processing of PG5 complex control tasks and HMI functions.

The control tasks are handled with a minimum cycle time of 100 ms. As usual with a control panel, the programmable web panel features a battery-backed SRAM memory for PCD-media and a real time clock. It also includes a generous onboard flash file system for storing web pages and data.

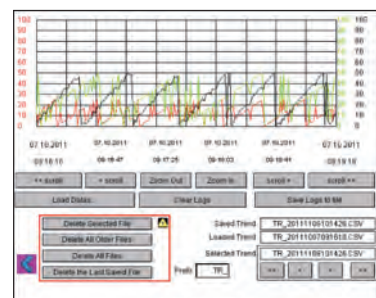
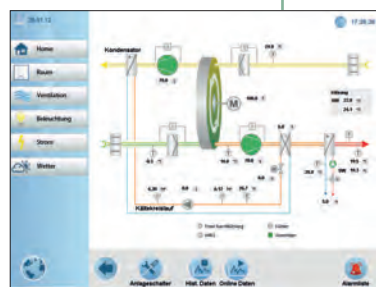
Process signals can be connected with smart RIOs via Ethernet to the logic controller. The basic equipment also includes an RS-485 interface, which is programmable in the logic controller and can be used freely. Thus, for example, Saia PCD® Energy meter with S-Bus protocol or other devices using the Modbus protocol can be connected.

The programmable Micro-Browser panel display sizes available are 5.7" (PCD7.D457VT5F), 10.4" (PCD7.D410VT5F) and 12.1" (PCD7.D412DT5F).



▶ 12,1" TFT/SVGA Micro-Browser Panel brings S-Web to the largest facilities with greater ease of use

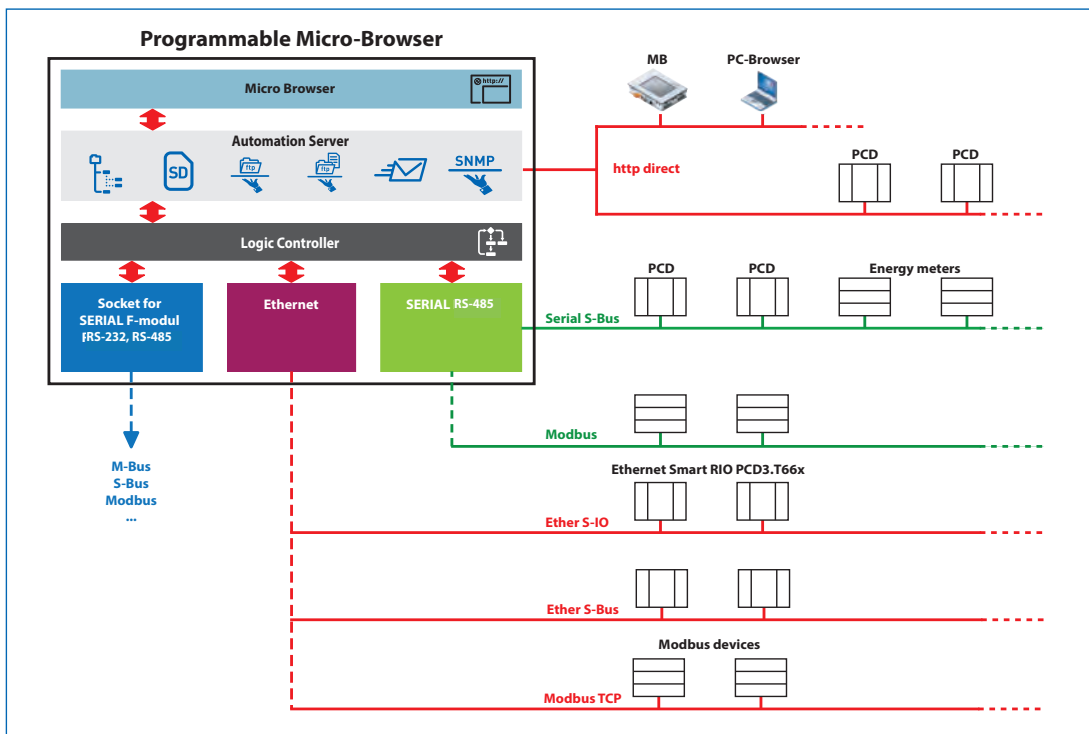
With the SVGA resolution and the performance of the ST3-CPU platform, whole HMI pages can be displayed and used on the new 12.1" Micro-Browser panel.



ID	Alarmtext	Time On	Time Off	ACK	Comment
1	Alarm1	1980 04 01 05:22:50 PM	1980 04 01 05:22:30 PM	12/20	
2	Alarm2	1980 04 01 05:22:20 PM			
3	Alarm3	1980 04 01 05:22:10 PM	1980 04 01 05:22:00 PM	12/20	
4	Alarm4	1980 04 01 05:22:00 PM			
5	Alarm5	1980 04 01 05:19:20 PM	1980 04 01 05:19:10 PM	11/17	
6	Alarm6	1980 04 01 05:19:21 PM	1980 04 01 05:19:20 PM	11/20	
7	Alarm7	1980 04 01 05:19:20 PM			
8	Alarm8	1980 04 01 05:19:22 PM	1980 04 01 05:19:21 PM	11/20	
9	Alarm9	1980 04 01 05:19:21 PM	1980 04 01 04:48:21 PM	11/20	
10	Alarm10	1980 04 01 05:19:21 PM	1980 04 01 04:48:21 PM	11/20	
11	AlarmName_11	1980 04 01 05:19:21 PM	1980 04 01 04:48:21 PM	11/20	
12	AlarmName_12	1980 04 01 05:19:21 PM	1980 04 01 04:48:21 PM	11/20	



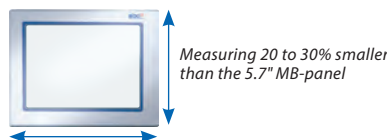
▶ Micro-Browser panel with integrated logic controller. Programmable with Saia PG5®



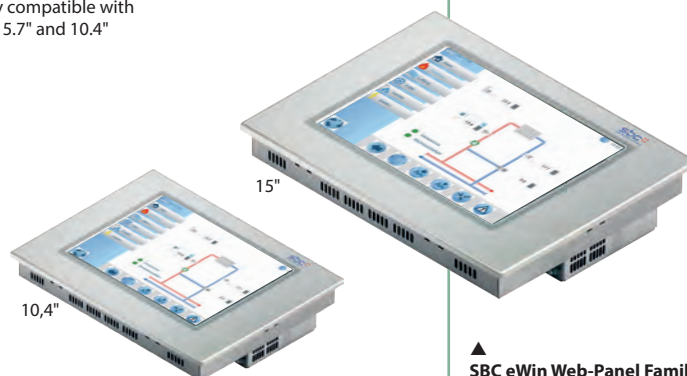
◀ The block diagram shows the many different applications of programmable Micro-Browserweb panels. With the logic controller, the additional communication interfaces, and the Micro-Browser feature, the panel is suitable for use as a management station and data concentrator.

**New small Micro-Browser touch panel**

Based on an optimized ST3 platform, we produced a smaller Micro-Browser panel for control panel assembly. The dimensions of the new panels will be reduced by 20 to 30% compared to the existing 5.7" devices. It features a brilliant TFT display with LED backlight and a VGA resolution of 480 × 640 pixels. Regarding wireless functionality, hardware and communication interfaces (Ethernet and USB), the new panel is compatible with the larger 5.7" and 10.4" VGA panel Micro-Browsers. So existing HMI projects for the 5.7" or 10.4" VGA panel can be taken and used directly on the smaller panel. Thanks to its compact dimensions, the panel can be installed in machines and installations where space is limited.



▲ New smaller TFT/VGA Micro-Browser touch panel for control cabinet installation. Functionally compatible with the existing 5.7" and 10.4" MB-panel.



▲ **SBC eWin Web-Panel Family.** Available with Windows CE 6.0 or Windows XP Embedded

**New eWin panels with Intel Atom CPU: A powerful new platform for Windows CE and embedded Windows XP**

The new panels takes the existing LX800 Windows panel into the top performance bracket. Equipped with a 1.6 GHz clocked Z 530 ATOM processor, the new platform provides a standard x86 architecture.

A multitude of functions and programs are available in Windows for this widely used standard. In addition, with various programming languages (e.g. NET or Java) it's easy to develop custom applications. The new Atom panels are available with 10" and 15" screens.

**Types available:**

**Windows CE-based Atom panels**

- PCD7.D5100TA010, 10" colour-TFT with touch-screen, SVGA (800 × 600)
- PCD7.D5150TA010, 15" colour-TFT with touch-screen, XGA (1024 × 768)

**Windows embedded XP-based Atom-Panels:**

- PCD7.D6100TA010, 10" colour-TFT with touch-screen, SVGA (800 × 600)
- PCD7.D6150TA010, 15" colour-TFT with touch-screen, XGA (1024 × 768)

The new Atom panels replace the CELERON-M panel series. The new platform offers better performance without active cooling being required. With 1 GB of RAM and an internal SSD (Solid State Disk) with 4 GB, the platform offers sufficient system resources for memory-intensive applications.





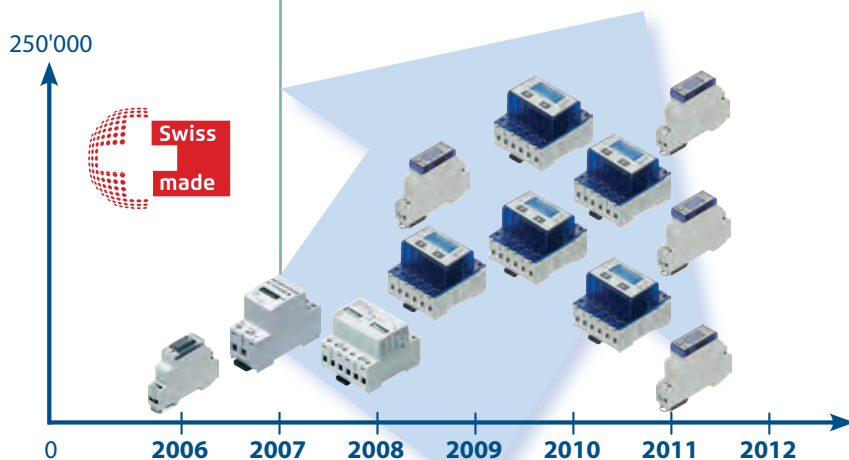
## Energy is the gold of the third millennium. We help the extraction, distribution and efficient utilization of this resource

It's a success story, thanks to quality and innovation.

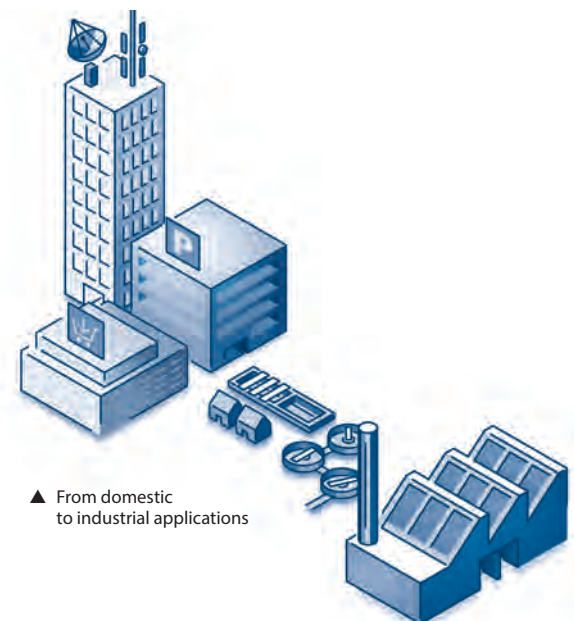
Author: Pascal Hurni

Energy-efficient operation of data centers, production and buildings is of increasing importance. The retrofitting of properties with an energy monitoring system is frequently a major challenge due to the limited space available. It is difficult to find a satisfactory solution. There are many solutions on the market for measuring energy, but they usually lack one of several key features. That includes availability in the smallest possible sizes, standardized interfaces for direct analysis of the data, and the precise measurement of energy with approval of the calculated energy measurements. These three key features are the strengths of SaiaPCD® energy meters that have been continuously developed over ten years.

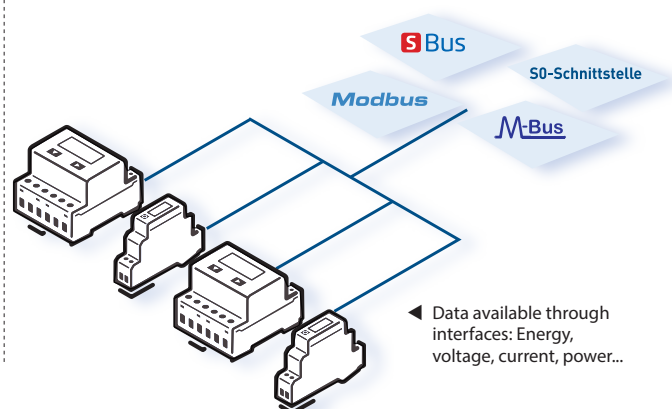
The counters impress with their robust industrial construction («Made in Switzerland») and compact size. They conform to installation standards for cabinets, so they can comfortably be fitted into the electrical distribution room. The combination of industrial quality and compact design with a large measurement range (0.25 A-6000 A) makes the SaiaPCD® electric energy meter ideal for any application. Whether it's for a small apartment or a major industrial application, there is always a suitable SaiaPCD® energy counter, even in difficult environments and tight spaces.

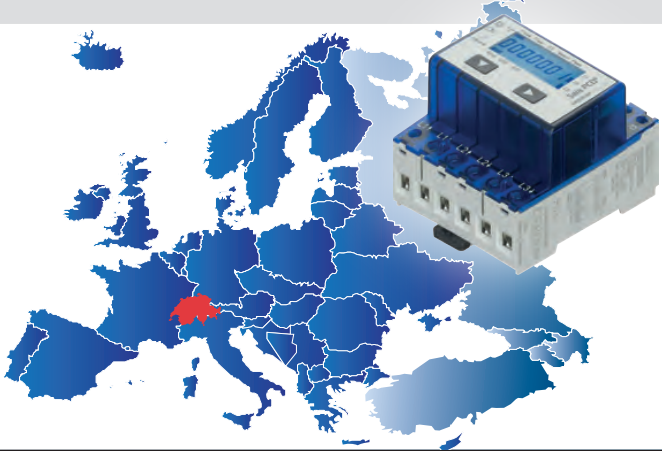


Until 2005, Saia Burgess Controls had produced electrical energy counters with electromechanical counter mechanisms in small quantities for third party clients. From 2006, the focus was on building a complete product line of our own, featuring high accuracy, maximum reliability and very small dimensions. For automation environments, a variety of communication interfaces were created so that the measured values could be read directly from the meters. This high level of innovation in recent years accounts for the strong growth of Saia PCD® energy meters and has also led to market leadership in secondary counters. Below we describe the future development and expansion of the energy counter family



All counters have a pulse output (S0 output) or, alternatively, an interface (M-Bus, Modbus or SBCS-Bus) in addition to the built-in counter mechanism. This ensures direct access to all relevant data such as energy, current, voltage, capacity (active and reactive) and active power factor ( $\cos\phi$ ).





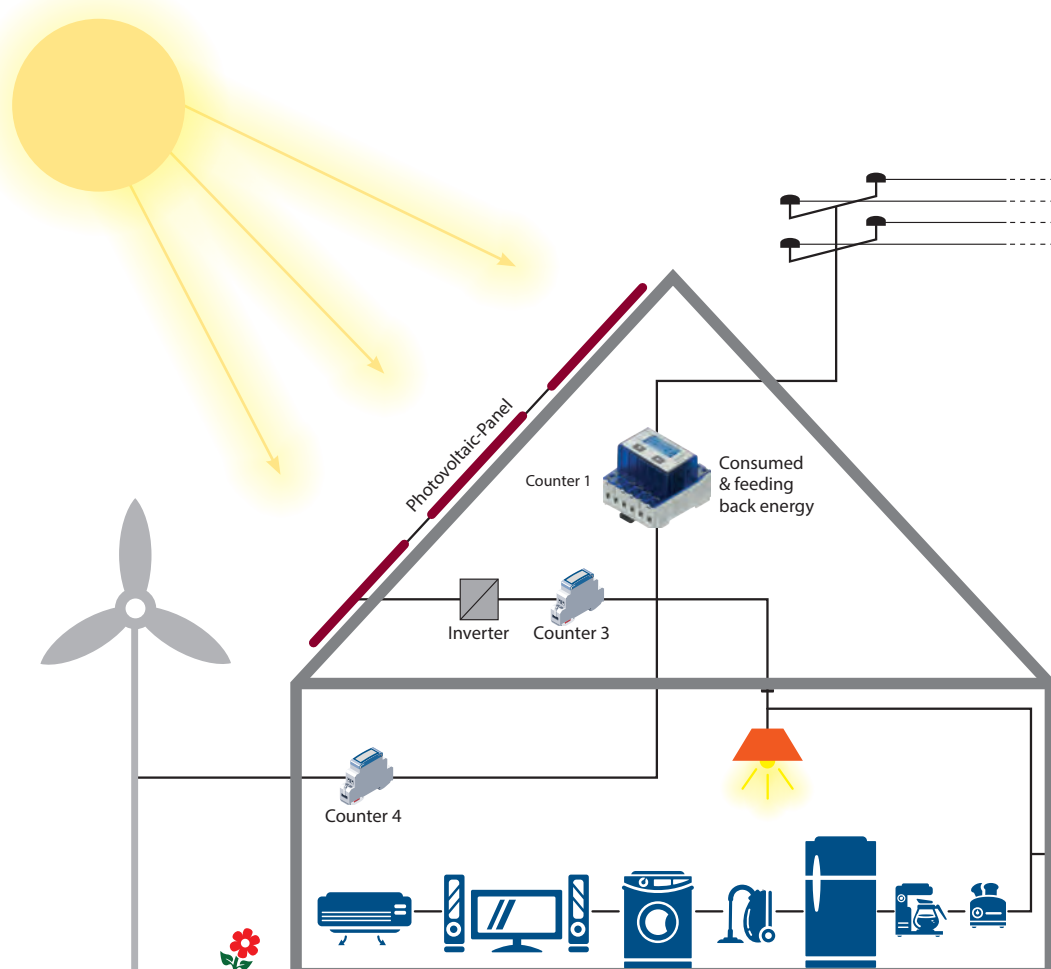
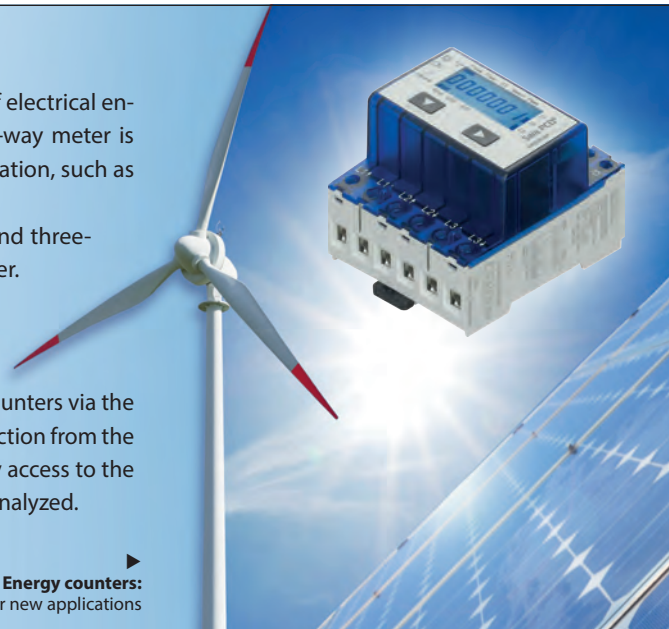
The whole family SaiaPCD® energy meter is available as a MID- approved version. MID (Measuring Instruments Directive) is the colloquial name for the 2004/22/EC European Union Directive on measuring instruments. With its MID-approved energy counters, SBC offers precision from its factory in Murten. Thus energy counters are approved for use throughout Europe without the need for additional calibration. All energy counters on [www.saia-pcd.com](http://www.saia-pcd.com)

**The new two-way energy meters**

With the new SaiaPCD® Two-Way Energy Counter family, bidirectional flow of electrical energy can be measured and counted with a single device, as. This new two-way meter is particularly at home where energy is consumed and produced in a single location, such as a photovoltaic energy facility.

The new two-way meters are direct measuring devices available in a one- and three-phase design, and in a three-phase design for a measuring current transformer. The first two-way counters will be available as S0 and S-Bus versions. After the pilot phase the M-Bus and Modbus interfaces will be integrated to ensure the full communication capability of the two-way counters. The new two-way counters can be used in the same way as previous energy counters via the bus connection for active energy monitoring and management. The bus connection from the energy counters to the SaiaPCD® devices or the S-Energy Manager create easy access to the data measured by the electricity meter, so it can be processed, displayed and analyzed.

**Saia PCD® Energy counters:**  
always ready for new applications



**A typical use for two-way energy counters**

On the roof, photovoltaic cells convert the sun's rays into electrical power, or wind drives the rotor blades of a wind-mill. Excess energy that is not consumed is normally fed into the national grid. An electric car runs on self-generated energy. If there is a demand for balancing power in the national grid, the energy stored in the electric car is used as a buffer. Its battery serves as a reservoir to compensate for fluctuations in the main supply.

# New Saia PCD® interface modules

## Communication without limits, in line with all current standards.

Use of all communication standards in all device series forever, flexibly, and securely. This is the basis for lean automation. In this context, Saia Burgess Controls has developed new interface modules and improved their integration into the engineering environment.

Author: Oliver Greune

### Lean automation

In many communications from Saia Burgess Controls, the automation pyramid is described as a key element. It conveys a graphical symbol of our own image as a provider of great freedom in communication technologies to users of Saia PCD® automation technology. Both now and in the future, users can integrate all common field-bus communication systems into the automation of infrastructure facilities. Thanks to web technology and IT the boundaries are open and transparent. The modular design of Saia PCD® automation technology also allows for the upgrading of bus system generations in the future.

The ability to integrate and future-proof should be achieved selectively. According to the «Peace of Mind» principle, to which Saia Burgess Controls subscribes, the integration of field communications can take place easily, safely, and efficiently.

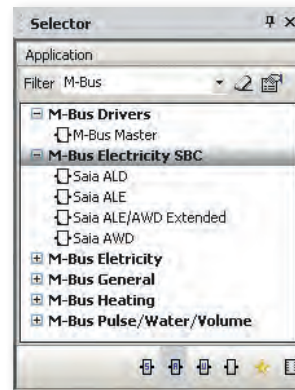
For this reason, external couplers are omitted as much as possible. In practice, these are often a source of error even during installation and commissioning. They also cause errors throughout the life cycle.

Therefore Saia Burgess Controls developed communication modules as an integral part of the Saia PCD® automation stations. Always regarding the overall solution, the necessary development projects are started, provided that the revenue generated is reasonable for the small quantity of items produced. The two communication modules for the M-Bus and DALI-coupling were finished in 2011.

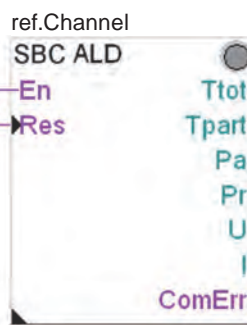
The M-Bus master modules are designed for Saia PCD® COSinus based PCD-controllers (i.e. PCD1.M2, PCD2.M5, and PCD3 ) in four versions having 20, 60, 120 and 240 slaves. Each module is equipped with two separate interfaces. The maximum number of connectable M-Bus counters can be split freely between the modules. This allows for shorter cable lengths and higher baud rates, which in turn allows for both faster data exchange, as well as safer and more

efficient operation. All SBCM-Bus master modules have an internal power supply for the M-Bus. The M-Bus master modules available as PCD2.F2700 to F2730 for the Saia PCD® COSinus and PCD1.M2 and PCD2.M5 series. Plug-in modules PCD3.F270 to F273 support PCD3 controllers and the SmartRIO PCD3.T666. They can be used on I/O slots 0 to 3 of PCD-automation stations, where the theoretical maximum number of M-Bus meters per Saia PCD® is rarely reached in practice. The range of functions and the available program memory and PLC resources means projects of any size may be undertaken. For engineering, prefabricated FBoxes for the master modules (function boxes) are available for the FUPLA environment of the Saia PG5®. This allows the application software to be implemented very easily and quickly. A communication driver module (M-Bus master) with a plain text label will connect to the following device-specific M-Bus function modules.

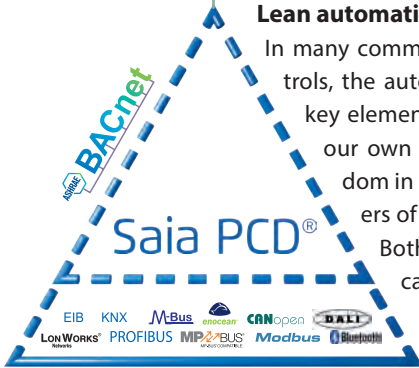
European standard (EN13757) for consumption data acquisition. The M-Bus meters can monitor and control the consumption of water, gas, electricity and



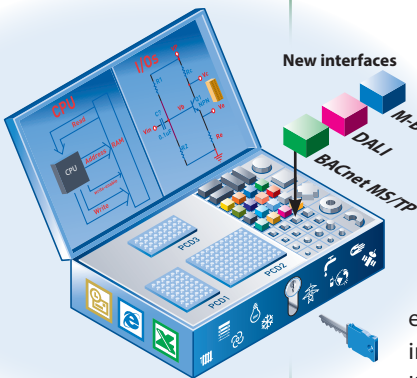
PG5 M-Bus functional components



M-Bus functional components for Saia PCD® Energy counters



The automation pyramid in the Saia PCD® System is transparent on all sides for the connection of field devices and management levels



The Saia PCD® System can be combined with hardware and software components. New additions include three communication interfaces for M-Bus, DALI and BACnet MS/TP



M-Bus Module PCD3.F270 as an integrated system component



heat. The data is transmitted serially via a polarized two-wire line.

With the M-Bus master modules, Saia Burgess Controls offers the possibility of connecting up to 240 M-Bus counters directly onto SaiaPCD® controllers. Installation without external level converter is simple, sustainable and costeffective.

**New:**

**Saia PCD® System with direct DALI integration**

DALI (Digital Addressable Lighting Interface) is a system for the convenient control of synchronized lighting appliances. The system, originally developed as lighting for theater and film, has now become an integral part of building technology for simple and complex lighting tasks.

With the new DALI-interface modules, up to 256 DALI devices can connect directly to SaiaPCD® controllers. That's a big step forward compared to the external converters popular with installers, operators and programmers. One of the development highlights of Saia Burgess Controls 2011. With demand-based management concepts and intelligent light management on the basis of SaiaPCD® automation systems, energy-optimized lighting concepts can be created.

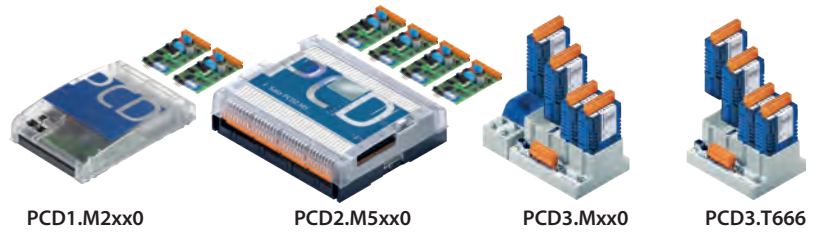
The installer will benefit from the integrated DALI bus supply voltage, which eliminates the need for additional external components, and can also be switched off. The installation is very simple.

The module is plugged into I/O slots 0–3 of a PCD1.M2, PCD2.M5, PCD3 or a smart-RIO, and the DALI bus is connected directly to it! The DALI-interface modules are available as plug-in modules for the PCD1.M2 and PCD2.M5 under the product code PCD2.F2610 for PCD3 and the Smart-RIO PCD3.T666 they are available under item number PCD3.F261.

The example shows the DALI connection with SaiaPCD® plug-in modules compared to competitive products with external power supply, wire bridges at the front, and mandatory release clamps. Neither the DALI modules nor DALI bus terminals

Options and key data with M-Bus at a glance			
up to 2× M-Bus-modules → max 480 counters	up to 4× M-Bus-modules → max 960 counters	up to 4× M-Bus-modules → max 960 counters	up to 4× M-Bus-modules → max 960 counters

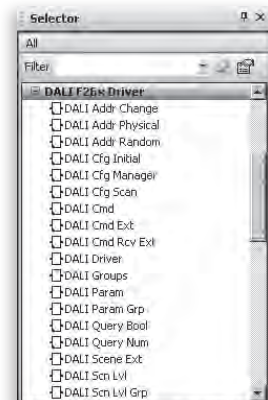
Options and key data with DALI plug-in modules at a glance			
up to 2× DALI-modules → max 128 lights	up to 4× DALI-modules → max 256 lights	up to 4× DALI-modules → max 256 lights	up to 4× DALI-modules → max 256 lights



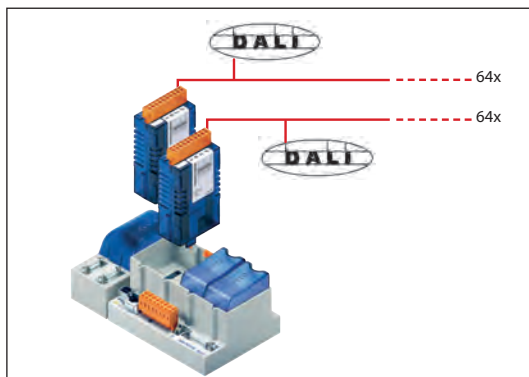
can be plugged in there. The application software can be created quickly and easily through the use of pre-function boxes (FBoxes) with the graphical FUP-LA engineering environment. The DALI communication driver block is usually used as a functional interface with all other boxes on the underlying DALI bus. Efficient FBoxes are available for addressing, and for configuring DALI lamp parameters. Command FBoxes then allow the selective switching and dimming of lights and can detect their status, such as automatic lighting control. External software tools or gateways are not required.

Saia Burgess Controls is committed to «lean automation technology» and is pursuing «Peace of Mind» for its customers. The products can be used not only in software engineering they are also ideal for assembly and service. Each plug-in module and any removable plugs have a secure ground connection on the rear wall no «ifs and buts» it's simple and secure. Other excellent, functional solutions are available from other suppliers. But the engineering is complex, assembly is error prone, and servicing can only be carried out by qualified personnel. This is the exact opposite of «lean automation technology» and results in unnecessary costs and stress over the entire life cycle.

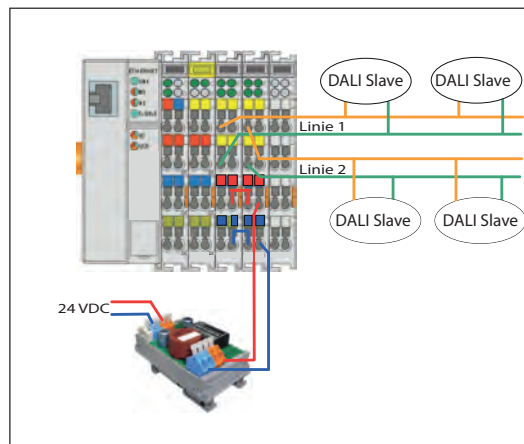
▲ Concise and clearly structured interfaces for easier planning



▲ Alpha PG5 DALI functional components for commissioning, operation and maintenance.



▲ The integration of communication interfaces in Saia PCD® Systems is easy, safe and efficient; plug connections facilitate service and maintenance.



◀ Compare it with an excerpt from an installation manual. Non-lean: Wire bridges, end termination and external power supply.

## Saia PCD® field levels Integration of diverse technologies – the prerequisite for lean automation

Lean automation requires flexible and easy integration of I/O modules in automation stations. Fieldbus systems together with sensors and actuators with analogue or binary signals are the key link to the process.

Author: Oliver Greune

### Lean automation who benefits?

Even before «lean automation» was defined as a concept, operators and owners strived for greater automation with less need for qualified personnel. Having originally served as a cost-cutting measure, lean will in the foreseeable future become the deciding factor for remaining competitive. How does this relate to field automation devices?

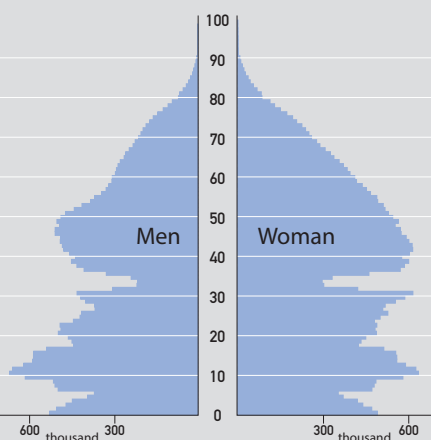
The more complex the technology of an automated system, the more qualified personnel are necessary for installation and operation. Now that there are fewer personnel available for demographic reasons, costs and operating risks are increasing. An automation system based on lean principles puts operators and users at the centre. Meeting their requirements as fully as possible is the guiding principle for the design of automation. Such a system is safe to plan, easy to install, open to improvements and can be maintained by in-house staff during servicing.

But the optimal solution is only possible if there is healthy competition among providers. The prerequisite for this is open and flexible automation systems, which can be adapted to suit the needs of the stakeholders and their environment. The «one-stop» approach, for example as part of «Totally Integrated», entails complete dependence on a single supplier. An absence of competition impedes innovation and drives costs up. Saia PCD® systems are the alternative.

Projected age distribution of the population in the Federal Republic of Germany in 1950 compared to 2050:  
In a 10-year period there is one employee for every two retirees.  
However: Lean facilities offer more automation with fewer personnel.



Age structure 1950  
Germany



Age structure 2050  
Germany



Source: Federal Statistical Office Germany

### A myriad of technologies as a prerequisite

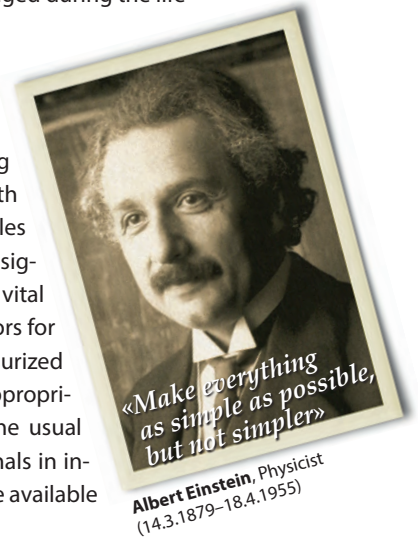
Albert Einstein's famous saying «Make everything as simple as possible but not simpler» is so universal, and it also applied to automation systems. Below we want to share a few aspects from our field, and take a look at the physical processes involved in automation systems, and the field level.

Sensors and actuators in buildings are often difficult to access. Therefore it is good if these components do not have to be changed during the life cycle.

Care and caution are needed when selecting technology. Caution means installing only components with integrated I/O modules for analogue or digital signals. This is absolutely vital for sensors and actuators for critical, liquid or pressurized substances. All the appropriate I/O modules for the usual passive and active signals in industrial automation are available for Saia PCD® systems.

Depending on the application, a compact PCD3 or modular system such as a PCD2.M5540 can be chosen, which is expandable to up to 1024 hardware data points.

Farsightedness applies to all applications in which components are used with communication interfaces. External components should only be connected using recognized fieldbus standards such as Profibus, M-Bus, BACnet, LonWorks, KNX/EIB, or at least those with a similar status, such as Modbus. In exceptional cases, vendor-specific protocols are used. The prerequisite is that the bus system must be open and have a good market reputation, such as the Belimo MP-Bus.





**▲ Diversity:**  
Conventional sensors and actuators with SBC I/O modules. Maximum freedom for servicing with minimum complexity of the overall system.



**▲ Diversity:**  
The more bus systems in the field, the greater the flexibility and functionality – but the complexity of the entire system increases disproportionately.

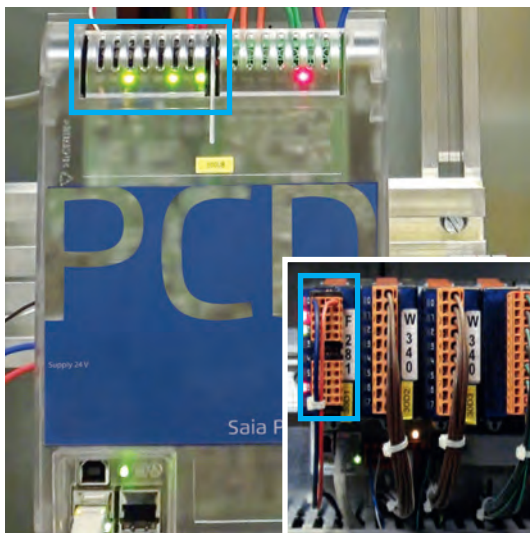


It is strongly recommended not to connect external devices from third party providers to automation stations using proprietary bus systems. For example, the SBCS-Bus is designed only for communications between SBC devices. It covers internal system functions and should not be used as an open, multi-vendor bus system. For such applications, there is a wide range of standard communication systems. Depending on the application, it is advisable to use different communications technologies and media at the field level. The profile of the different applications and the differences between users are so great that there is no ideal package solution. Planners and operators should each choose the most appropriate technology for the field level. Saia PCD® devices are designed so that different standards can be integrated into a stable and maintainable overall system. Of course, several bus systems in a Saia PCD® control can be operated in parallel.

**For full integration, it's BACnet**

There are buildings in which it makes sense to have an integrated technology from the field level to the control level. In this case, diversity gives way to a certain homogeneity. So the bus system must be chosen in a far-sighted way. The world standard BACnet protocol provides all the necessary services for standardized communication from the field device to the management system. Saia PCD® systems are so flexible that they can be adapted to almost any technology. However, if there is a choice, Saia Burgess Controls recommends BACnet. With BACnet, the management and automation levels are processed with BACnet IP and the field level with BACnet MS/TP on the basis of RS-485. RS-485 cabling is now generally used by non-specialist personnel all over the world. This has resulted in high market shares in America and Asia. These countries already have a lack of skilled workers as central Europe will have in approximately 10 years as a result of demographic change.

▼ SBCM-Bus interface module



▲ Communications module and conventional I/Os in combination. PCD1.M2120 with M-Bus and PCD3.M3330 with Belimo MP-Bus



▲ PCD3 with I/O module for conventional sensors/actuators



▶ PCD3 with output modules, including user manual



## Saia Visi.Plus

**Saia Visi.Plus helps to create management levels that span all activities and buildings. It fits in perfectly with the lean world of Saia PCD® automation systems. It is available free of charge for the optimization of a facility.**

Authors: Denys Aeberhardt / Jürg Beyeler

SCADA (Supervisory Control and Data Acquisition) is the term used to refer to higher-level control systems for the control and monitoring or technical processes. In practice, the full functionality is not always present. In many places the SCADA system is used only to display operating conditions and transmit alarms. In addition, because of the high licensing costs, often not all data points are connected, and not all modules – such as trend analysis – are used. So relevant information frequently is lost. In case of a malfunction if a value or parameter is to be analysed and evaluated subsequently, the critical data may be missing because it was considered irrelevant during planning or commissioning. Or data points were added during the optimization phase but were not fed into the control system. To remedy this, SaiaVisi.Plus – a software package for visualization and management tasks – captures all controller data and parameters in conjunction with the Saia PG5® DDC Suite automatically. This information can be visualized, recorded and made available for analysis.

### Saia Visi.Plus as part of the Saia PG5® licence

The Engineering Edition of SaiaVisi.Plus is contained in PG5. By using SaiaVisi.Plus during the commissioning and creation phase, the management level almost becomes a by-product of software development, free of charge, until the end of the optimization phase and with full functionality. If SaiaVisi.Plus to be used permanently as a run-time management system, the product is activated after acquisition of the appropriate license. All the operator displays, alarm lists and settings are then automatically transferred to the runtime system.

In many systems with SaiaPCD® devices the SBCS-Web technology based on the integrated Automation Server is used for the visualization. In such environments the SCADA system sometimes may be dispensed. But still many integrators use SaiaVisi.Plus (the Engineering Edition) during the commissioning phase to take advantage of the tools and evaluations, and use SaiaVisi.Plus to optimize the system. We recommend that you try it as well; check out the functionality of the SaiaVisi.Plus Engineering Edition free of charge during the commissioning of your next installation!

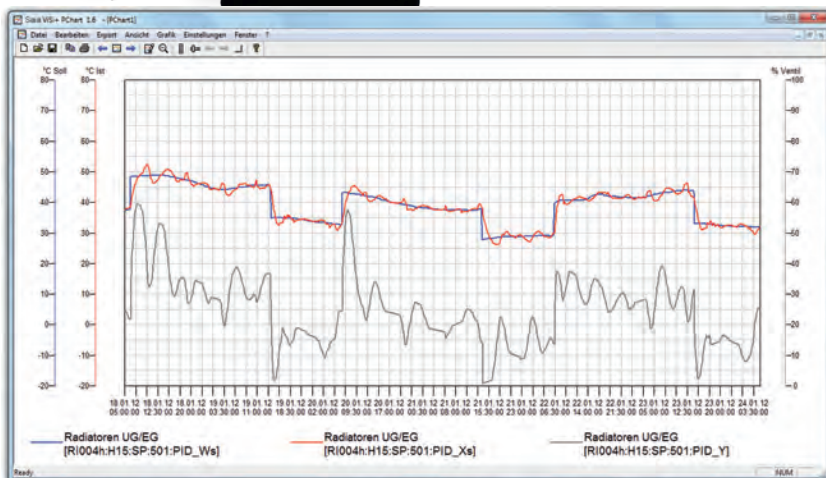
### Lean automation with Visi.Plus in practice

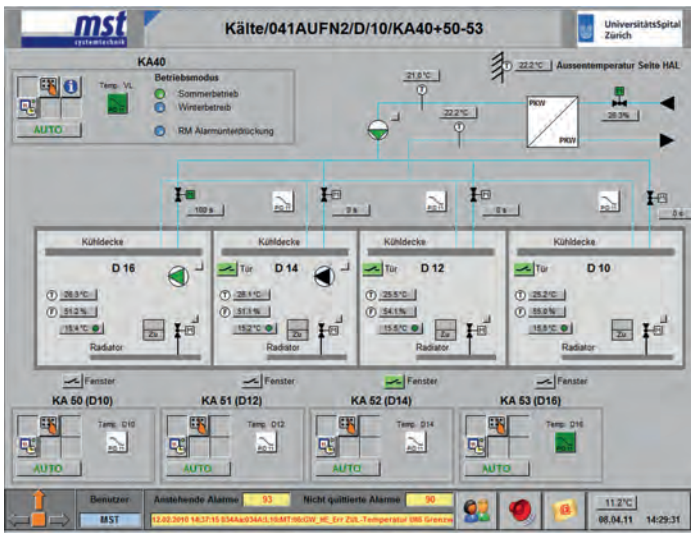
For Saia Burgess Controls, lean automation also means that several integrators are working on the same project and manage all automation stations with minimal effort. SaiaVisi.Plus and Saia PG5® DDC-Suite has been successfully implemented many times in real buildings. Sometimes projects are too large for one integrator, or the end user explicitly requests several integrators. In such cases, the project can be divided into manageable individual lots. An example of this is the University Hospital in Zürich. In the next years, the entire control system will be replaced with Saia PCD®. The individual components of the various integrators will be connected to the SaiaVisi.Plus-System. The major challenge of this project is to complete the renovation while the hospital is in operation. The facility components must not be cut off from the network, or only for a very short time. Therefore, SaiaVisi.Plus will be used with various databases. Changes can be checked in a test environment, keeping the system free from alarms or malfunctions that can arise in new facilities temporarily during implementation. The control display, menu and icons were developed in close cooperation with the operator to ensure maximum service comfort.

SaiaVisi.Plus during commissioning



Control loop testing with SaiaVisi.Plus





▲ ► Control display at the University Hospital Zurich



**Saia Visi.Plus 1.6 with Engineering Edition: Another step towards lean automation**  
**New functions and modules**

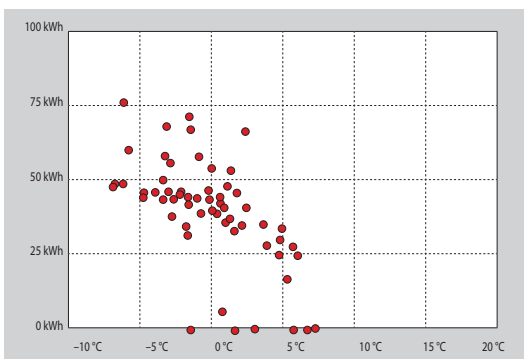
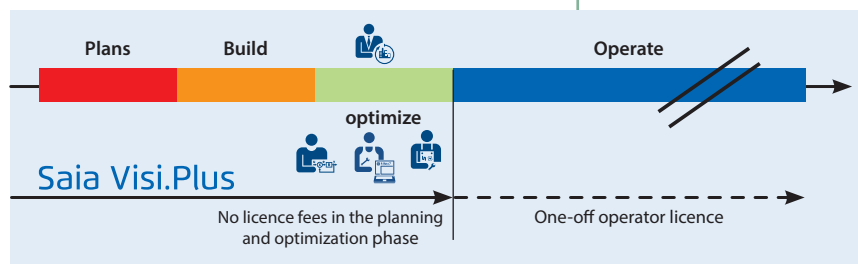
The Graphic Editor in the new version of SaiaVisi.Plus allows the use of various layers. Every view can be composed of various layers and associated with several databases. Thus complex systems such as clinics, shopping centres or railway tunnels can be split between various databases and yet retain a seamless user interface. The Web Server also uses the layering technique and can display the linked views.

New tools designed for representing data for the analysis of energy consumption are being implemented. Complex calculations can be performed using formulas in the module pCalc, so that a comprehensive analysis of the facilities is possible. This could e.g. be applied for large heating pump facilities where electrical output, warm and cold outputs and power losses are calculated.

**Engineering Edition**

With the introduction of PG5 2.0, every user gets the SaiaVisi.Plus Engineering Edition free of charge. The activation is realized via the product key for the PG5 software that is used by integrators. This makes it possible to use SaiaVisi.Plus all its functions during the commissioning and optimization phase. The runtime licence only has to be acquired if the system is transferred to the operator after commissioning for continued use. This way SaiaVisi.Plus can be installed as assistance during the optimization phase, to display trends and alerts and thereby increases the confidence of planners and end customers.

The distinguishing feature of SaiaVisi.Plus is that it is available free of charge during engineering, commissioning and optimization. A reasonable one-off licence charge is only payable if the software is used on a long-term basis.



▲ Heating consumption data dependent on the outside temperature



▲ Consumption data for the last ten years



## Saia PG5® Web Editor Version 8

### For a quick start, short learning curve and more efficiency in project production.



Image: Vaillant-Group

Within Saia PG5® Web technology, the S-Web Editor simplifies and creates web pages for visualization. Java or HTML programming knowledge is not required. In 2004 we brought out the Saia PG5® Web Editor with Version 4.01. Today, over 90% of our customers work with the Web Editor and benefit from our web technology as a recognized standard. To meet user demands, the Web Editor is constantly being developed. After seven successful years, a further step in the life cycle of the tool is planned with a completely new development launched in 2012.

Author: Urs Jäggi



▲  
The previous version was already powerful and beautiful. With Version 8 it's even easier and more efficient

#### Across the years

The base technology of the current version 5.15.02 originates from 2004. Application developers have long recognized the great benefits of the web technology and are producing complex web HMI applications. The possibilities of the current Web Editor have been exhausted. The Web Editor has constantly been updated with new functions, but its structure makes it increasingly difficult to meet the user requirements. Particularly with regard to user comfort and efficiency for the production and maintenance of complex web HMI projects limitations have been reached. It is comparable to a building that cannot be endlessly renovated and extended without changing or reinforcing the foundations. For that reason, we decided to develop the S-Web Editor on the basis of modern technology and methods.

#### And let's not forget:

- the compatibility with existing Micro-Browsers of for the web panels
- Web Editor projects 5.15 can be imported and extended in the new version

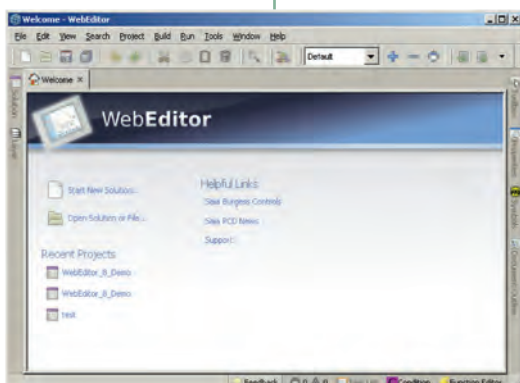
#### S-Web Editor version 8 first impressions

##### A manageable and adaptable workbench for efficient work

The workbench consists of the menu/command toolbar, the view editor and the so-called pads. Thanks to the docking window technology, the pads can be positioned, shown and hidden according the user's preferences.

#### New action and condition editor

With the new action editor, active elements such as buttons can be customized to a variety of actions. The list of actions is provided in a functions editor. Actions that have been created can be reused for other processes within the same project. In the same style in the condition editor complex conditions can be created and reused. With these important new features, the user comfort and efficiency of the S-Web Editor 8 have been decisively improved.



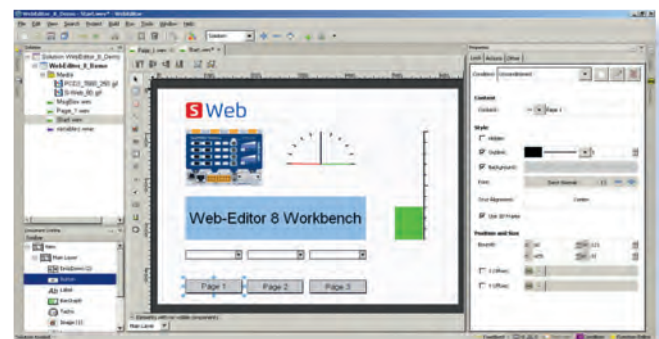
▲  
Start screen on the Web Editor 8

#### What does the new Version 8 offer?

The main aim is to reduce the development time so that the project can be created and maintained simpler. Clear structures make everything better manageable. So the external appearance must be more modern and friendly. At the same time the «building» is bigger and has sufficient reserves for further development.

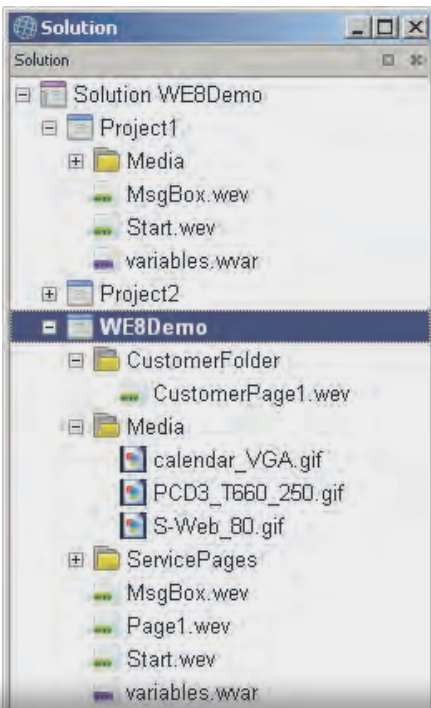
The S-Web Editor Version 8 offers more efficiency through:

- simpler and intuitive controls
- high-performance libraries for macros and project templates
- better integration in the SaiaPG5® Controls Suite, in order to produce web projects more securely and faster

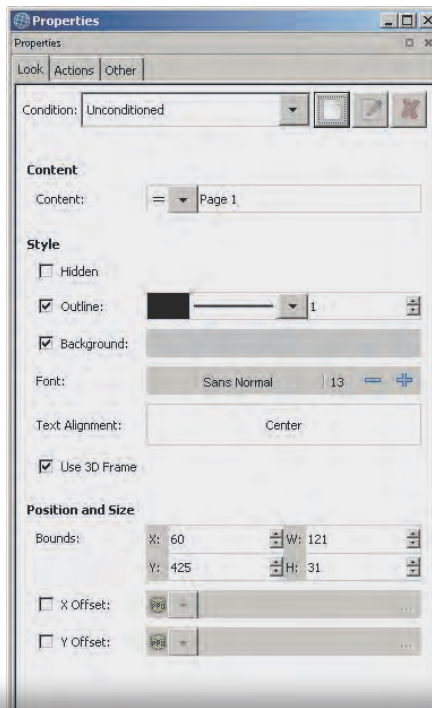


▲ Workbench of the new Version 8 can be customized by the user.



**Solution-Pad**

▲ The solution pad displays the project overview. Multiple projects can be worked on in a single solution. The various files are shown in tree structure. The user can adapt and extend the structure according to his requirements.

**Properties-Pad**

▲ In the properties pad, the features and status of the item at run time can be configured quickly and easily with just a few clicks.

**Document-Outline**

▲ The «document outline» pad document shows the structure and items of a View. The items are shown in the processing sequence, which can be easily adjusted by the user via drag and drop. In addition layers are now supported. These can be hidden, shown, or locked. This significantly simplifies the editing complex HMI pages. Items can also be selected and grouped quickly. The properties of individual items in a group can now be changed without removing the group.

**Other key features**

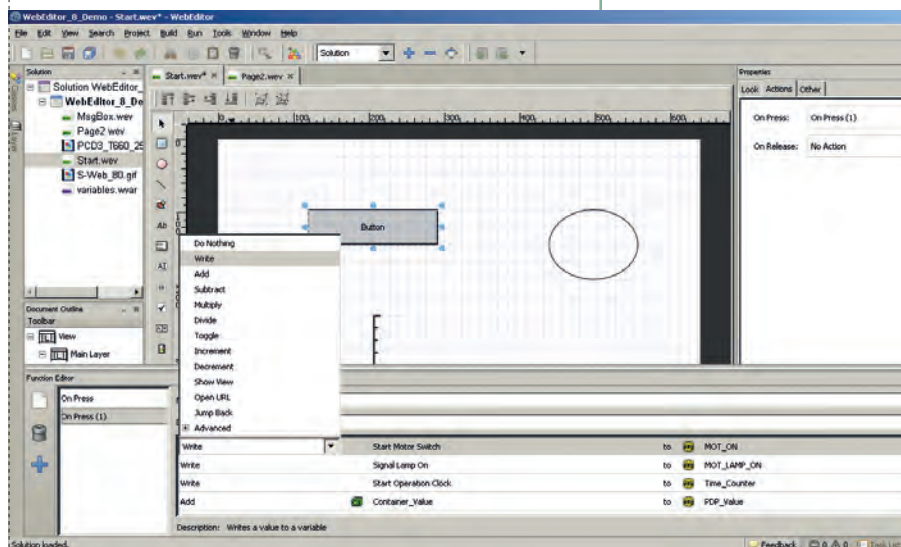
The S-Web Editor 8 is available in several languages (German, English, French). The language management for the web-HMI application has been improved. Unicode is supported and the different languages can be displayed and checked in the Editor. A range of image formats (JPG, PNG, SVG, GIF) are supported and the images can be resized in the Web Editor. The GIF-format required by the runtime is automatically generated and displayed.

There are new key elements called «CheckBox», «FileViewer», «Dropdownlists» and «Tacho». In the old version these were only available as macros. Also new are hierarchical groups, so that groups can now be nested within each other at various layers. The groups and individual items within a group can be worked on individually. The library management for macros, views, graphics, project templates etc. has been simplified and extended.

**A solid foundation for the future**

The new Version 8 is a solid foundation for future technological developments relating to our Saia PCD® web panel concept. The engineering time has been reduced considerably and allows the application developer to work with the Web HMI technology to differentiate themselves from their competitors. The development process is making good progress, and the product will be released during the third quarter of 2012.

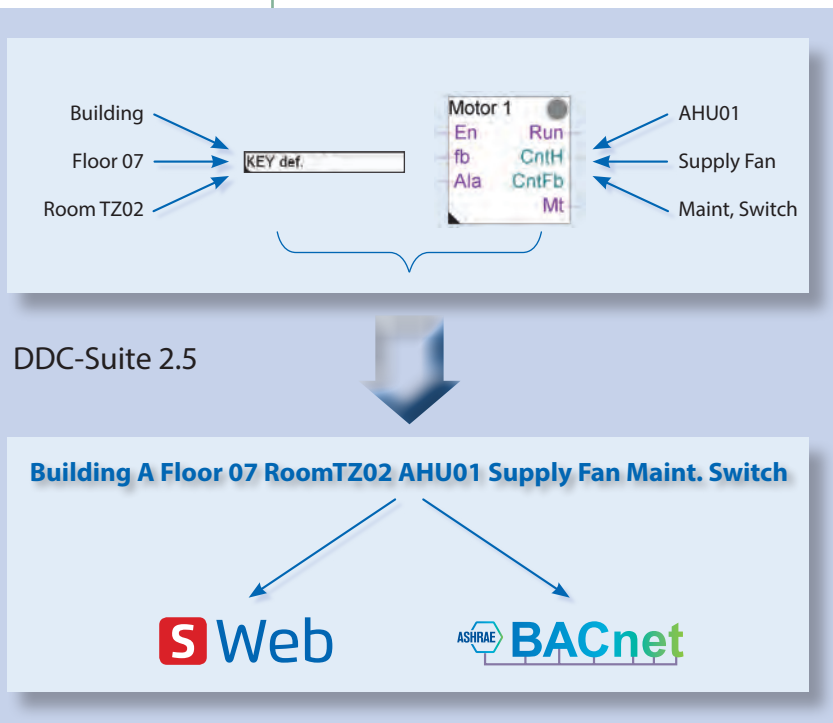
New powerful action and condition editors. With these editors multiple actions can be assigned to a button. There are many different action types to choose from (simply writing a variable, mathematical operations, view/URL jump etc.)



## Upgrade of Saia PG5® DDC Suite to Version 2.5 Improved generation of Building Identification keys

The Saia PG5® DDC Suite is an optional supplement to the Saia PG5® Controls Suite for building automation. The modular function design combined with a wide range of functional components and templates in the form of finished program parts simplifies programming considerably. Thanks to the range of possibilities, the DDC Suite 2.0 has become an important tool for system integrators in recent years. In particular the automatic generation of BACnet configuration and S-Web alarms have made a significant contribution to reducing engineering times. However, there were certain limitations on name generation. Since the majority of the names were generated using FBox names, not all building identification keys could be transferred.

Author: René Zuch



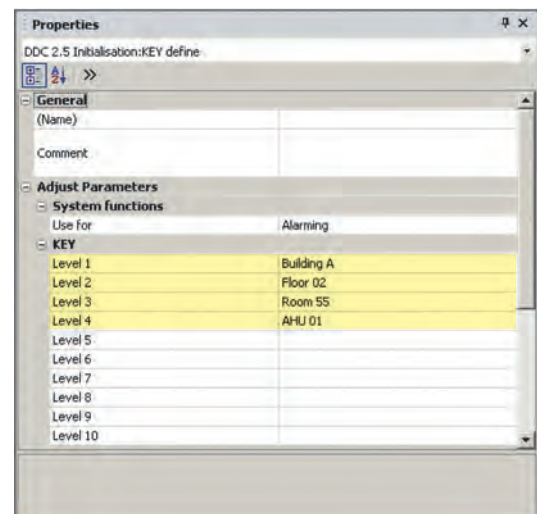
### Free generation of building ID keys

The DDC Suite 2.5 is an extension of the existing DDC Suite 2.0. It contains no functional changes or extensions and is compatible with the existing templates for SBC S-Web and SaiaVisi.Plus.

The main feature of this version is the new possibility to generate the building ID keys for the S-Web alarm texts and BACnet consistent with the requirements of the FUPLA program. All the limitations of the previous versions have been removed. The building ID key can now have up to 12 layers. The common part (layers 1 to 10) is specified by a central FBox.

Swab\_Alarming

KEY def.



▲ Central setting for different building ID layers.

▲  
**DDC-Suite 2.5**  
More flexibility  
for text information  
in BACnet and S-Web

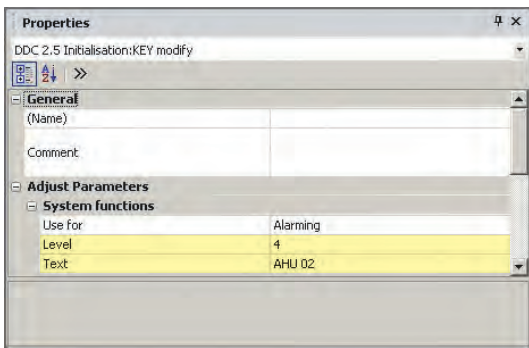
### The results of the needs of large projects

Individual building identification keys are gaining enormous significance. Clear labelling is essential for efficient service and maintenance. It saves time and costs in the daily work of maintenance personnel. Even for the major project at Frankfurt Airport Terminal A+, these building ID keys were a key component of the project. So we needed to find a new solution for name generation. For Terminal A+, new FBoxes were built to extend the existing DDC Suite 2.0. These FBoxes combined with a new feature in PG5 2.0 made it possible to enter texts directly into the FBoxes and use it directly to generate a building ID code. The lessons learned from this project can now be used by all customers running the new Saia PG5® DDC-Suite 2.5.

This FBox can be placed multiple times. Within the FBox you can select what the key should be used for. So for example different ID keys are created for S-Web Alarming, BACnet, Object Names and BACnet descriptions.

If different layers are used in certain FUPLA pages for different facilities, another FBox can simply be added.

AKS mod.

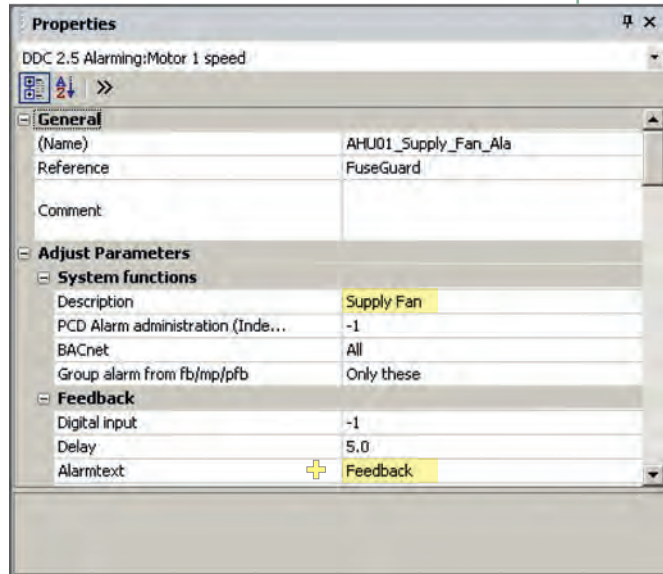


▲ Layer 4 changed from AHU 01 to AHU 02.

These FBoxes can also be installed as often as required, and the changes to building ID keys are valid until the next instance of the FBox is placed. So for every building different key names can be used.

The modifiable part of the building ID key (layers 11 or 12) comes directly from the FBoxes. This is where the modifiable part of the name is entered.

The alarm indices for SBCS-Web is generated automatically with the new «-1» setting.



▲ Individual text elements for a motor

During build, only one set of alarm names is generated in the CSV file. This can be merged to the S-Web file in one single click using the Saia PG5® integrated DDC-Suite Add-on tool.

	A	B	C	D
1	ListDefinition=1	ThisAlarmList		
2	List_1		1 Alarm_1	Building A Floor 02 Room 55 AHU 01 Ala Fuse230VAC
3	List_1		2 Alarm_2	Building A Floor 02 Room 55 AHU 01 Ala Fuse24VAC
4	List_1		3 Alarm_3	Building A Floor 02 Room 55 AHU 01 Ala Fuse24VDC
5	List_1		4 Alarm_4	Building A Floor 02 Room 55 AHU 01 Ala FusePhase
6	List_1		5 Alarm_5	Building A Floor 02 Room 55 AHU 01 Ala FuseMain Fuse
7	List_1		6 Alarm_6	Building A Floor 02 Room 55 AHU 01 Supply fanMotor maintenance
8	List_1		7 Alarm_7	Building A Floor 02 Room 55 AHU 01 Supply fanAlarm
9	List_1		8 Alarm_8	Building A Floor 02 Room 55 AHU 01 Supply fan Alarm no Feedback
10	List_1		9 Alarm_9	Building A Floor 02 Room 55 AHU 01 Supply fan Alarm Process feedback
11	List_1		10 Alarm_10	Building A Floor 02 Room 55 AHU 01 Supply fan Alarm Motor protection
12	List_1		11 Alarm_11	Building A Floor 02 Room 55 AHU 01 Supply fan Alarm Service switch
13	List_1		12 Alarm_12	Building A Floor 02 Room 55 AHU 01 Supply fan Alarm Manual intervention
14	List_1		13 Alarm_13	Building A Floor 02 Room 55 AHU 01 Exhaust fanMotor maintenance
15	List_1		14 Alarm_14	Building A Floor 02 Room 55 AHU 01 Exhaust fanAlarm
16	List_1		15 Alarm_15	Building A Floor 02 Room 55 AHU 01 Exhaust fan Alarm no Feedback
17	List_1		16 Alarm_16	Building A Floor 02 Room 55 AHU 01 Exhaust fan Alarm Process feedback
18	List_1		17 Alarm_17	Building A Floor 02 Room 55 AHU 01 Exhaust fan Alarm Motor protection
19	List_1		18 Alarm_18	Building A Floor 02 Room 55 AHU 01 Exhaust fan Alarm Service switch
20	List_1		19 Alarm_19	Building A Floor 02 Room 55 AHU 01 Exhaust fan Alarm Manual intervention
21	List_1		20 Alarm_20	Building A Floor 02 Room 55 AHU 01 SensorLimit High
22	List_1		21 Alarm_21	Building A Floor 02 Room 55 AHU 01 SensorLimit Low

▲ Automatically generated alarm list for the use in the S-Web Editor.



### BACnet Plus in FUPLA

The DDC Suite 2.5 offers many additional functions for BACnet projects too. Just as with the S-Web Alarming, here the building ID key is transferred directly to the FBoxes in the FUPLA program. You can even use two completely different building ID keys for the «BACnet Object Name» and the «BACnet Description».

All the relevant settings for this can be found directly in the FBoxes.

<b>Feedback</b>	
Digital input	-1
Delay	5.0
Alarmtext	no Feedback
<--- BACnet Object-Name --->	M01:FB
- Description	SU Motor no Feedback
- Notification-class	99
- Optional text	
<b>Process feedback</b>	
Digital input	-1
Normal input state	opened
Delay (Sec)	30.0
Alarmtext	Process feedback
<--- BACnet Object-Name --->	M01:PFB
- Description	SU Motor Process feedback
- Notification-class	99
- Optional text	

▲ Entering the «BACnet Object Names» and «Descriptions»

### A range of BACnet parameters can be selected directly in the FBoxes at a later stage.

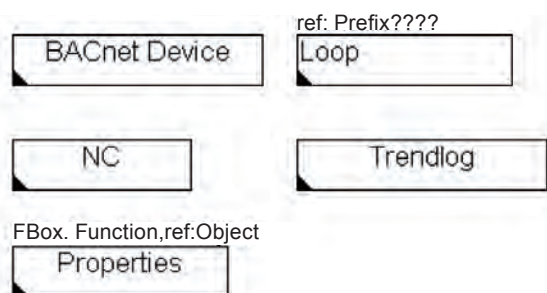
- Definition of the «Notification Class» to be used for alarming
- Settings for trend log objects
- Parameters for «Intrinsic alarming»
- Units
- COV Hysteresis
- Scaling

<--- Intrinsic Reporting --->	
- Notification-class	99
- Limit Enable	(-/-)
<b>Definitions</b>	
Unit	degrees-Celsius
COV Hysteresis	0.5
Scaling (decimal)	1

▲ BACnet parameters Setting

### The placing of additional FBoxes means specific BACnet objects can be generated directly from FUPLA:

- Notification class items with presets for the Intrinsic Reporting of referenced items
- Activate/deactivate trend log items and settings for trends
- Creating loop items for controllers
- Property FBox, to modify BACnet items



▲ additional FBoxes for BACnet

### A quick look at further developments of Saia PG5® DDC Suite

Once the Saia PG5® DDC Suite 2.5 had been created, we began to develop version 3.0. Comprehensive functional extensions and new FBoxes are planned.

### The key new features are:

- Better Integration of HDLog (Historical Data Logging)
- Energy optimized connection and disconnection of facilities
- Streamlining of the control chain
- New FBoxes for VAV systems (Variable Air Volume)
- Integrated shedding of aggregates

### Interesting projects implemented with the DDC Suite:

- ▶ Frankfurt Airport, Gate A+
- ▶ State Gallery Stuttgart
- ▶ Academic Medical Centre Amsterdam
- ▶ MarcCain production and administration buildings
- ▶ Federal administration building (B.A.F.) in Geneva
- ▶ Continental Health Insurance administration building
- ▶ Lucerne Messe
- ▶ Swimming and Ice-Skating Centre, Anney

# SBC BACnet-Monitor

## For «Peace of Mind» in planning and operation comprehensive BACnet networks

The BACnet Monitor revolutionizes the testing of a BACnet BA system at the time of acceptance and during operation. The feedback from the analysis is shown in full and can be evaluated without specialist knowledge. The installation is just as simple: unpack, plug in – ready to go!

Author: Oliver Greune



### BACnet – fair competition can only be achieved with good planning

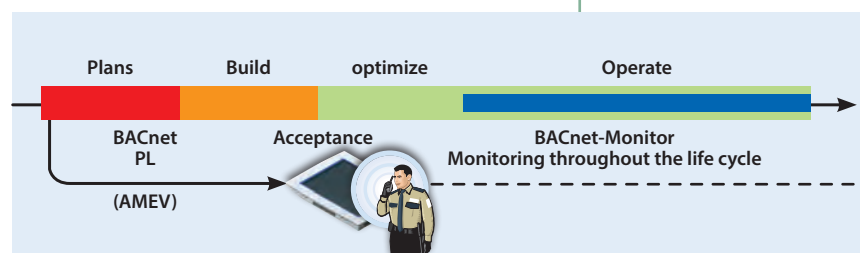
The motivation to promote BACnet as a communications protocol in building automation lies in the neutrality and resulting interoperability of data exchange between the automation stations and visualization systems of different manufacturers. In large buildings, it has been recognized that investments in «Totally Integrated» suppliers can save up to 30% if the suppliers are in genuine competition with each other. This fair competition can only work with open, standardized communication protocols and binding planning proposals. The Working Group of Mechanical and Electrical Engineering for State and Local Governments (AMEV) in Germany regularly publishes planning guidelines for public buildings. Here is an excerpt from AMEV recommendations:

«With BACnet 2007, AMEV published supplementary guidance on the application of the BACnet communication protocol (Building Automation and Control Networks). These practical recommendations have been proven in many BACnet projects and are accepted by many users as the binding planning guidelines in BACnet tenders.»

«BACnet 2007 sets out the minimum requirements for improving the interoperability of BACnet devices. The recommended minimum configuration for object types and service etc. provides a sound basis for interoperability and corresponding test scenarios in heterogeneous GA systems, and improves planning and investment security.»

«GA-planning should clarify which tools are required for commissioning tests in order to prove the BACnet functionality and for fault detection during operation (e.g. BACnet tools or protocol analyzers) and who services them. Qualified operation of the tools should enable faults (such as malfunctions) to be analysed.

The SBC BACnet-Monitor is an ideal tool for commissioning tests and continuous quality assurance during operation; it recognizes the sources of errors and presents the results in a comprehensible way.

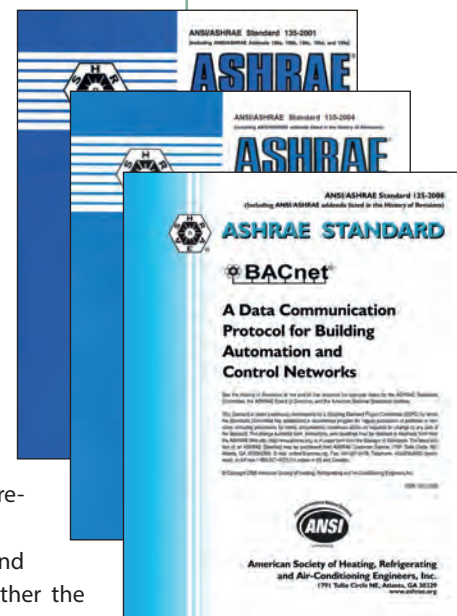


▲ Typical approach to a building project with the lean approach. The continuous improvement process during the operating phase was factored into planning. The BACnet monitor helps to recognize the realization of optimization potential in BACnet facilities.

### Why do we need transparency in BACnet facilities – where are the risks?

The neutrality of BACnet is based on standardized communication services and data objects. Theoretically, any manufacturer's BACnet device can communicate with any other BACnet device. As long as the manufacturer adheres strictly to the standard, interoperability is no longer a fiction but a reality. But to ensure that this interoperability continues down the device generations in a building, there is a need for binding engineering guidelines from planners and end clients. As long as proprietary data objects or properties are used for communication, interoperability is lost. Then the operator is bound to a single manufacturer despite the open BACnet standards. The neutral tender process as a means of reducing costs through free competition is therefore meaningless.

The SBC BACnet monitor helps end clients and planners to identify whether the installed automation system meets their specifications or not, prior to acceptance. The BACnet monitor can monitor BACnet installation even during operation, and alert the operator if a device is operating outside the specifications during maintenance or extension work on the BACnet BA system.



▲ BACnet standards from 2001 to 2008, currently 700 pages. Only products tested and certified according to BTL (BACnet Test Laboratory) can guarantee standard compliance as the basis for interoperability.

# AMEV

www.amev-online.de

▲ The publishers of planning guidelines for public buildings have determined methods for interoperable BACnet communication in order to ensure fair competition.

## Extensions of BACnet standards are not always compatible

Time poses a further risk. The BACnet standard is not static. For 20 years it has been continuously developed by the members of the BACnet Interest Groups. These include institutions such as universities, end clients with large installations, system integrators and of course device manufacturers, who have the greatest influence. Continuous innovations and requirements take the form of so-called Addenda to the BACnet standard. On a regular basis – e.g. every four years – these addenda are included in the BACnet Standard and released as a new version of BACnet Norm. But not all versions are always 100% backwards compatible.

For example, the format of the time-stamp of historical data for devices dating from 2001 to 2004 was changed. Consequently, SCADA systems based on the 2001 standard could no longer process data correctly from 2004 devices. As a result, the end clients either had to work with two SCADA systems or upgrade all the 2001 devices in the entire BACnet BA system with the 2004 version. It was expensive and frustrating. In 2010, the 2008 standard became the only valid basis for new BACnet tests. Unfortunately it is not always backwards compatible with everything either. For example, after revision 1.10, ANSI X3.4 character encoding was replaced with UTF-8. But there are no other possibilities of distinction in the text itself. This can have consequences for existing SCADA systems that process text according to ANSI X3.4 following extension of a device with UTF-8 coded text. For text without particular encoding there is no problem, but there is the threat of unforeseen consequences if the text has been written in the original language with encoding. These are just a

few examples of the many possible problems facing system integrators and end clients, even with BACnet.

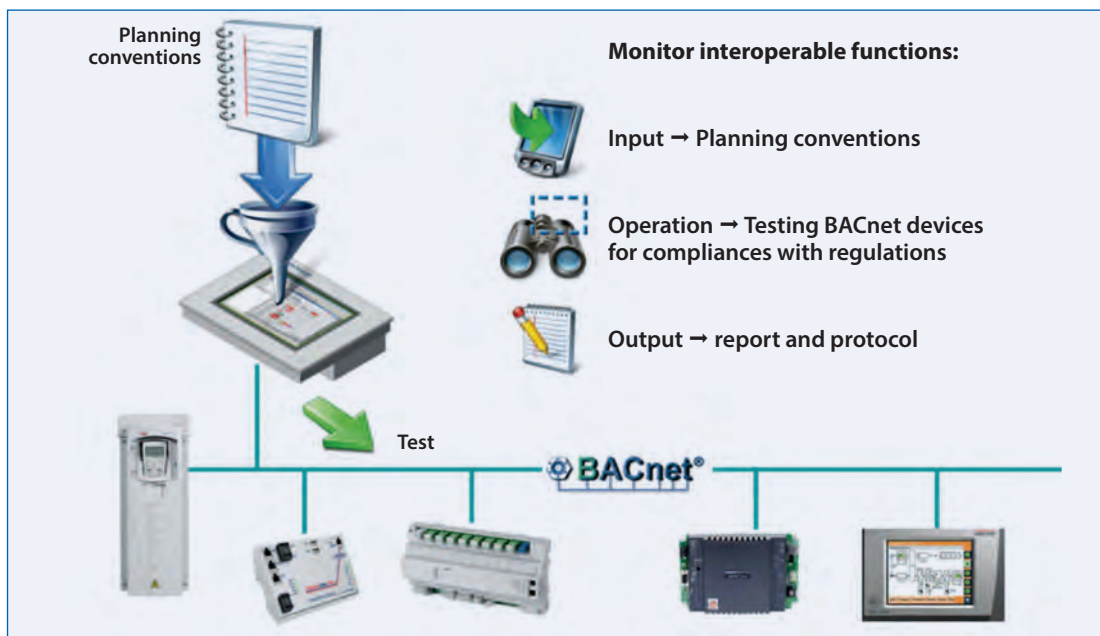
## What can be done?

Clear specifications during the planning phase are key, and adherence to them must be monitored. Planners who are unfamiliar with BACnet often have their own guidelines for BACnet configurations. A good alternative to this is to make the AMEV recommendations for BACnet binding planning specifications at the tender stage. These recommendations are really practical and have been proven in many facilities. They define the minimum features that a BACnet device must have in order to be interoperable.

## Installation of the BACnet monitor

The BACnet monitor is a tool for planners and operators for checking compliance with specifications for the configuration of BACnet devices. Individual engineering specifications in the BACnet monitor are then added in. The monitor cannot improve an existing BACnet installation; but it can give a transparent overview of all BACnet devices and anomalies. This can have a direct effect on those involved and ensure that the prescribed standards are met. In previous manual sample acceptance testing, it was left to chance whether variant devices were detected or not. The BACnet Monitor allows for fully automatic live monitoring of the entire installation. To ensure that operation is as secure as it was at the time of acceptance, the BACnet monitor checks each connected BACnet device for compliance with the rules agreed initially. Anomalies are recorded and reported to the operator.

► Principle function of the BACnet monitor: Individual planning specifications as assessment criteria for testing all BACnet devices in the BA system.





**BACnet-Monitor Visualization:**

- All BACnet devices in the BA system are automatically recognized and listed
- Visualization in tree structure
- Each recognized BACnet device can be operated without engineering
- Each BACnet property is shown, whether it is defined as BACnet Standard, proprietary or invalid

**BACnet monitor Analysis and diagnosis**

- Engineering specifications can be added in the form of an INI data on the monitor
- Up to 100 BACnet devices can be checked via the monitor for compliance with the guidelines
- Any anomalies are recorded in a data log
- The results are displayed using easily understood symbols in the device, items and property views
- Tips and warnings are displayed to the user so that problems can quickly be targeted

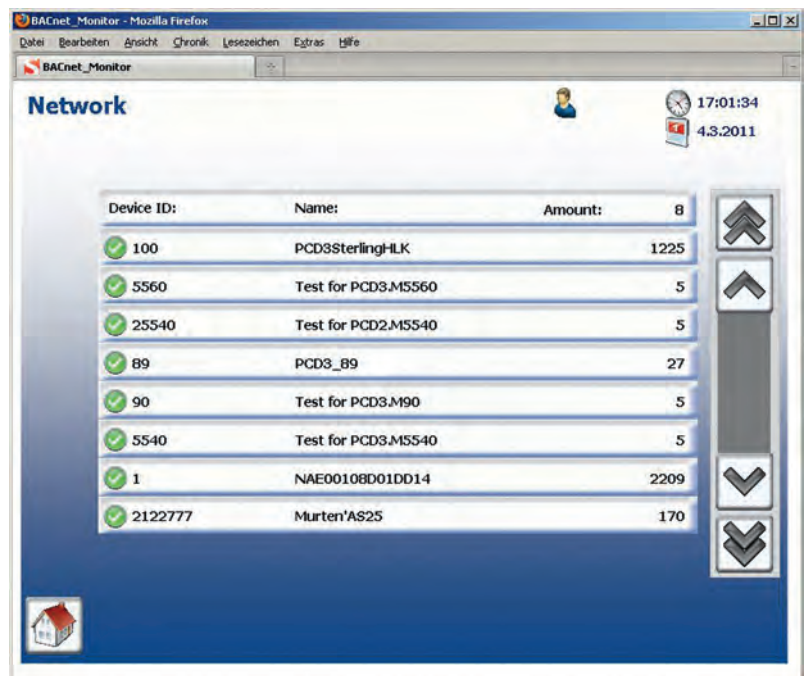
**Low investment – short learning curve**

The BACnet monitor was designed as a functional HMI. The software required for operation is preinstalled on a 12" SBC Micro-Browser panel. The greatest assets are: uncomplicated commissioning and simple maintenance. Assembly does not require any specialist knowledge. The panel can be installed as a control cupboard or as a «flush» or «surface» wall mount with the appropriate assembly kit. A 24 VDC power supply and the network cable must be plugged in. Immediately after the IP address has been acquired, the BACnet installation is displayed in full.

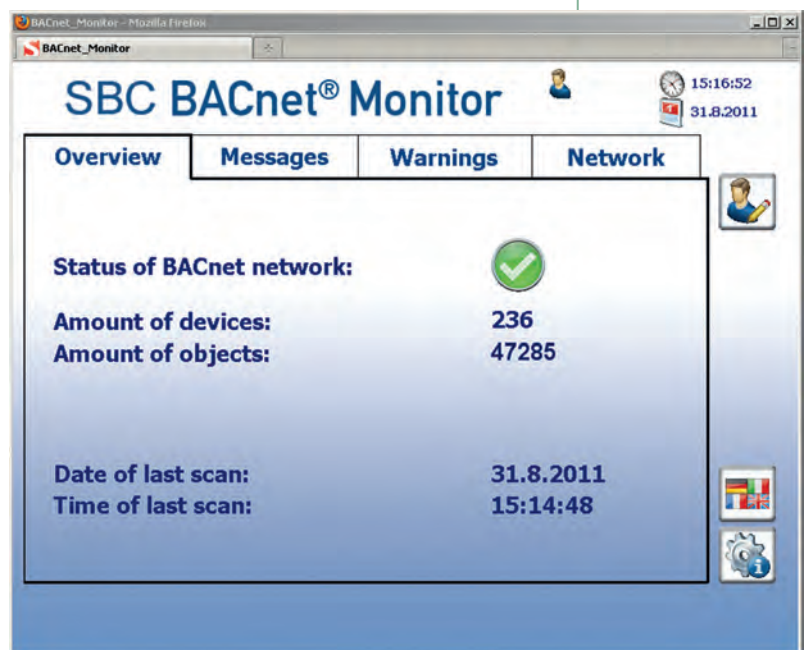
**What's new in development and marketing**

The BACnet monitor is currently being developed in the pilot phase with selected operators of large buildings and this will continue up to the production stage. General release is planned for 2012. In addition, efforts are being made to register the «BACnet monitor» function of ensuring interoperability as a separate class of BACnet device.

In this sense, the BACnet Monitor is an ideal tool for utilizing in practice the possibilities offered by BACnet in terms of manufacturer-independent interoperability and to take a step towards the smooth, secure operation of BACnet BA systems.



▲ BACnet devices are presented in a user-friendly way.  
Image: a test facility with controllers by JCI, SBC, Sauter and Siemens.



▲ BACnet devices are clearly presented in user-friendly way.  
Image: a large building with a heterogeneous structure.



◀ The BACnet monitor can be used instantly without engineering, and thanks to the intuitive user interface, no special knowledge is required by personnel.

## More energy efficiency, without loss of comfort.

Fewer qualified personnel, less CO<sub>2</sub> emissions and lower operating costs.

What does that have to do with room control?

What does lean mean in terms of room automation?

Author: Bernhard Portner

With lean room automation, buildings operations are greener and more economical. They are greener because CO<sub>2</sub> emissions are reduced owing to lower energy consumption. They are more economical because lower energy consumption means lower operating costs and simple and flexible lean automation requires fewer staff.

Two factors in building technique can influence energy consumption:

- the equipment of the building: Reducing energy demand through efficient automation and control
- operation of the building: The reduction of energy consumption, by ensuring that each individual room only uses as much energy as is required, can be achieved through the monitoring, optimization and communication of system components.

### Potential savings in energy costs

From the perspective of room automation, saving energy means avoiding waste. Cooling or heating with the window open, having lights switched on when there is plentiful daylight, and air conditioning unused rooms are examples of wasted energy. If this waste can be eliminated using a suitable room automation system, energy consumption is reduced by up to 60 per cent, without limiting the comfort or security of the rooms being used.

### Additional increase in productivity through room automation

The user is at the centre of room automation, which should ensure maximum added value and maximum comfort. Efficient single-room control gives offices, classrooms, hotel rooms and shops optimal room conditions in terms of comfort and cosiness. This can be customized for the user or for typical use. The key parameters of lighting, temperature and air quality are controlled by the room automation system.

### SBC Room control system effects

The greatest potential for saving energy is in the field of networked room automation and its parameters of use. The PCD7.L6xx and PCD7.L79xN room control families ensure optimal synergy between HVAC, lighting and shading thanks to excellent networking functions.

The multiple settings of PCD7.L79xN ensure that the optimal balance is achieved between energy saving and comfort. This ensures that energy consumption is reduced significantly, while increasing user comfort.

### Simple commissioning

The new compact PCD7.L79xN room controllers are suitable for standard applications, where the emphasis is on good value for money, for example, heating and cooling applications with combinations of radiators, floor heating and integrated cooling systems.

The room controller's integral software modules have parameters that can easily be set for the most diverse application areas by means of the automation system's integral function blocks (FBoxes). That makes changeover simple, quick and safe. Since no programming knowledge is needed, fewer qualified personnel are needed during commissioning and servicing.

### Cost-saving installation and easy replacement

The compact room controller is fitted directly onto the wall, so that no terminal box is needed. Wiring and installation is simple, saving additional installation costs. Thanks to the pluggable housing (electronics) on the base plate, the devices can be easily replaced without the need for costly and error-prone rewiring.

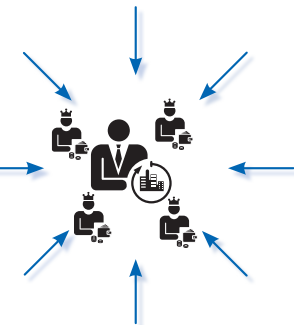
▲ Serviceability thanks to a base plate with pluggable terminal boxes

### A diverse range of applications

The application program for various types of facility are predefined in the controller and can be activated via the configuration settings.



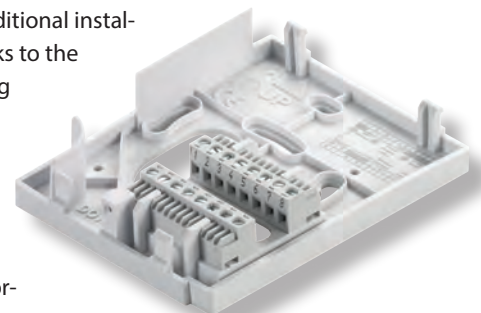
▲ Saving money by reducing waste



▲ The user is at the centre of room automation



◀ PCD7.L79xN compact room controller



**Preconfigured for delivery**

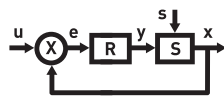
The EEPROM memory of the PCD7.L79xN comes preloaded with an application program for a typical facility that can be used «out of the box».

**Configurable application programme**

If the preloaded application does not meet the requirements of the project, the functional components (FBoxes) contained in the SaiaPG5® engineering tool can be used to configure and activate the application software for other types of facility. Seven user programmes are available for different facilities that can be activated by means of the integrator's configuration settings.

Thus the user can achieve the «Basic Fit» status.

To achieve «Good Fit», the controll parameters for the specific application can be customized and optimized.

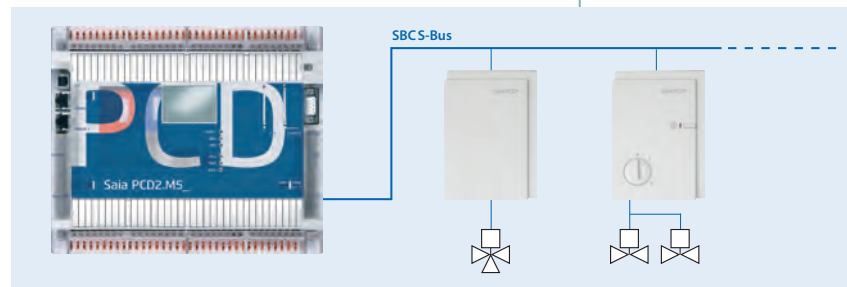


**Independent functionality even without bus connection**

Once the application program in the controller has been configured, function is guaranteed, even without connection to SaiaPCD®. All configured settings remain in place for years, even in the absence of a power supply. Control continues uninterrupted even if the connection to the SaiaPCD® automation station fails.

**Direct control of the automation station guarantees «Perfect Fit»**

If the predefined applications are not sufficient to achieve «Perfect Fit» room automation, the free outputs can be controlled in addition to independent functionality by using an upstream SaiaPCD®. It is also possible to switch off the independent functionality of the room controller completely, and to control all inputs and outputs from the central SaiaPCD®.

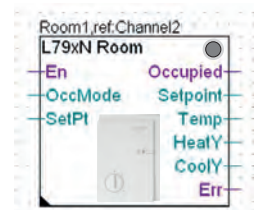


Easy networkability and comfortable engineering with PCD7.L79xN

**Efficient project implementation**

These practical function blocks (FBoxes) cut engineering time and simplify commissioning, as configuration data can be sent in a single step across the communications port to up to 127 controllers. SBCS-Bus Configuration data can be sent via the communication interface in one step to over 150 controllers

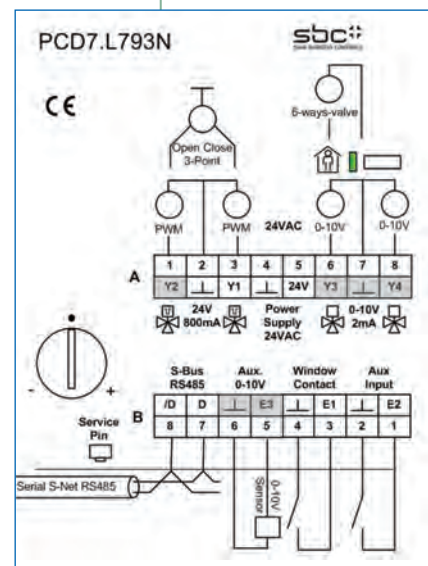
Simple and secure commissioning is ensured through automatic recognition of communication speed and intelligent bus addressing.



▲ Efficiency through FBoxes

**Overview of device types and functions**

	L790N	L791N	L792N	L793N
<b>HW</b>				
Integrated temperature sensor NTC	x	x	x	x
Presence button with LED feedback			x	x
<b>Inputs</b>				
Window contact	x	x	x	x
Digital multifunction analog (0...10 V)	x	x	x	x
<b>Outputs</b>				
Triac (PWM) 0...10 V	1	2	2	2
<b>Controllable valves</b>				
Thermal fans	x	x	x	x
0...10 V-valve				x
3-points-valve		x	x	x
6-way-valve				x
VAV-actuator				x
<b>Functions</b>				
S-Bus Slave operation	x	x	x	x
Change-Over	x	x	x	x



▲ Connection options for the PCD7.L793N



## Saia PCD® in data centre applications

Technically, you can solve everything in a data centre with Saia PCD®.  
The big hurdle is uncertainty, as the necessary knowledge is often lacking.  
With this article, we hope the fog lifts a little.

Author: Kostas Kafandaris

HVAC applications in data processing centres are often a challenge. They are full of terms such as reliability, redundancy, availability, tiering requirements, and so on. They are full of uncertainty. Some attempt to resolve technical safety issues with failsafe fieldbus. In the end you are left wondering why the facility was not accepted. Therein lies a simple but important rule.

### Classification of data processing centres

There are 4 categories of data processing centre (tier I to tier IV). Tier I is the lowest level and means nothing more than a «normal» server room in any building, while tier IV data centers must meet the highest requirements for maintenance and availability. The criteria for classification can be found in «Data Center Site Infrastructure Tier Standard: Operational Sustainability» from the Uptime Institute. This Santa Fe institute, established in 1993, has a leading role in improving «uptime» in data processing centres.

### Impact on the HVAC application

Tier classification specifies the availability of a data centre.

Classification according to the tiering concept				
	Tier I	Tier II	Tier III	Tier IV
Redundancy	N	N+1	N+1	2x (N+1)
Supply paths	1	1	1x active 1x passive	2
Maintenance during operation	no	no	yes	yes
Single point of failure	Multiple failures	Multiple failures	Multiple failures	none + fire
fault tolerance	none	none	yes	yes
Several fire compartments	not required	not required	required	required
Thermal control	220–320 W/m <sup>2</sup>	430–540 W/m <sup>2</sup>	1070–1620 W/m <sup>2</sup>	>1620 W/m <sup>2</sup>
Period under consideration	1 year	2 years	5 years	5 years
Limited operation (maintenance)	2 downtimes in 12 hours	3 downtimes in 12 hours	0	0
Downtime	1.2 failures over 4 hours	2 failures over 4 hours	2 failures over 4 hours	1 failure over 4 hours
	↓	↓	↓	↓
Annual IT down-time	28.8 h	22.0 h	1.6 h	0.6 h
Availability	99.671 %	99.749 %	99.982 %	99.991 %

This table is an excerpt from the tiering classification and is not complete. Table taken from the Uptime Institute

### ▲ Classification according to the tiering concept

Source: [http://www.bitkom.org/files/documents/BITKOM\\_Matrix\\_Ausfallzeit\\_RZ\\_V5\\_0.pdf](http://www.bitkom.org/files/documents/BITKOM_Matrix_Ausfallzeit_RZ_V5_0.pdf)  
Federal Association for Information Technology, Telecommunications and New Media

However, it does not indicate how the HVAC application must be designed and implemented. What is clear is that availabilities of between 99.671% (tier I) and 99.991% (tier 4) increase the demands on HVAC infrastructure. That's why it's important that automation stations not only comply with the PLC hardware standard IEC 61131-2, but also with extra requirements such as those for shipbuilding certification. This provides a sound basis for meeting the criteria, particularly for tiers III and IV.

### 1.3

#### Tier Standard: Topology

*Tier Standard: Topology* establishes four distinctive definitions of data center site infrastructure using the Tier Classifications (I, II, III, and IV) and the performance confirmation tests for determining compliance to the definitions. The Tier Classification System describes the site-level infrastructure topology required to sustain data center operations, not the characteristics of individual systems or subsystems.

For informational purposes, the following is a brief summary of each Tier from the *Tier Standard: Topology*.

- Tier I – Basic Capacity: Site-wide shutdowns are required for maintenance or repair work. Capacity or distribution failures will impact the site.
- Tier II – Redundant Capacity components: Site-wide shutdowns for maintenance are still required. Capacity failures may impact the site. Distribution failures will impact the site.
- Tier III – Concurrently Maintainable: **Each and every** capacity component and distribution path in a site can be removed on a planned basis for maintenance or replacement without impacting operations. The site is still exposed to a equipment failure or operator error.
- Tier IV – Fault Tolerant: An individual equipment failure or distribution path interruption will not impact operations. A Fault Tolerant site is also Concurrently Maintainable.



#### Source:

<http://uptimeinstitute.com>  
Extract from PDF: «Data Center Site Infrastructure Tier-Standard: Operational Sustainability»

The criteria for classification are complex, and cover not only requirements in terms of equipment, but also those relating to the building and its personnel. For example, tier III data processing centres must have a maintenance technician present in the data processing room 24/7. Tier II classification requires normal (manufacturer) support or on-call support five days a week during a shift. And a tier I center, coffee cups and microwaves are allowed for use by staff.

**Implementation**

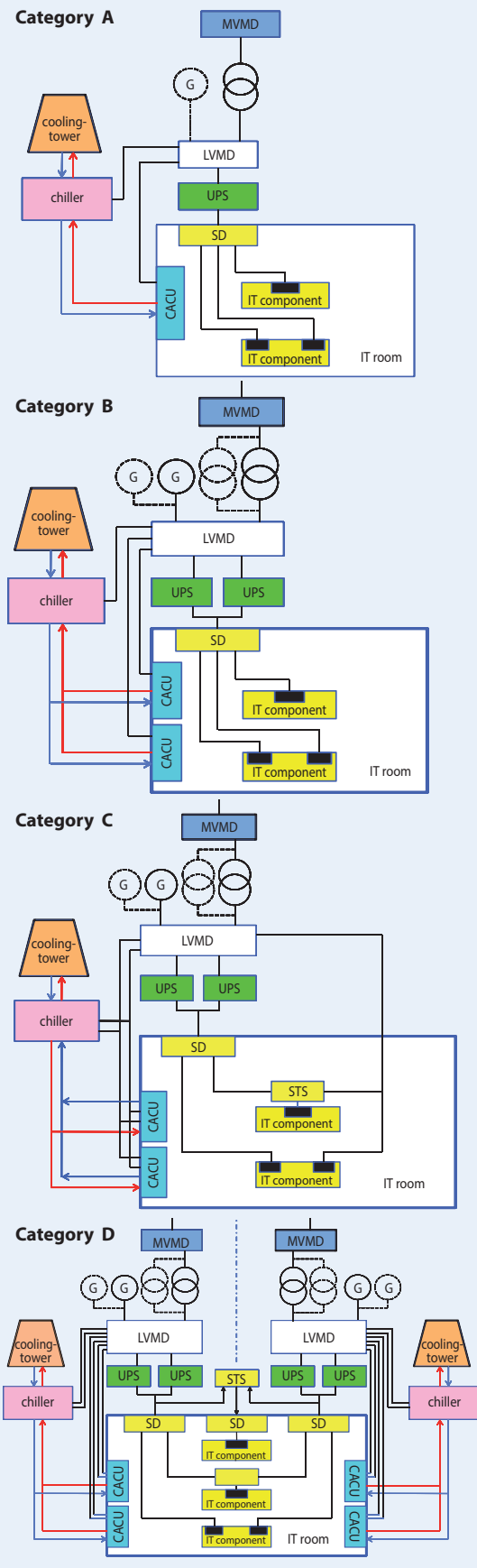
Even if the aforementioned specification and planning assistance from BITKOM (Federal Association for Information Technology, Telecommunications and New Media) with respect to redundancy, fault tolerance, etc. of the HVAC application specify no details, in practice the following applies: From Tier II, CPU (PLC) redundancy is required, and from Tier III the I/O level and the rest of the cabinet infrastructure must also be redundant. The redundancy requirement from Tier III means that two identical control panels must be installed. The SaiaPCD® of the two control panels must have the same program and must be synchronized in the exchange of data. If one control panel is out of order or undergoing maintenance, the second one takes over. This is how the data center of EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites) was planned by dc-ce RZ-consulting; it is currently being built by TOBOL Control GmbH Darmstadt. It is important that data exchange is itself redundant. This can be achieved with data exchange over Ethernet and RS-485. For tier II classification, only the CPUs need to be redundant, as it is possible to work with an I/O level. This can be achieved by coupling the I/Os to separate SaiaPCD® or a Smart-RIO-PCD3.T6xx. The free programmability and communication options ensure that the automation technology can integrate seamlessly into the IT infrastructure as far as the I/O level.

**Additional features of data centres**

According to a survey by online specialist magazine «Data Center Knowledge», Data Center Infrastructure Management is the fastest-growing area of interest of operators of «Enterprise Class» data centres (Source: <http://www.inside-it.ch/articles/26554>). The aim is to integrate the management of the IT infrastructure and buildings in order to use a data centre as efficiently as possible. In practice this means that the automation station must support a variety of interfaces, buses and protocols to communicate with all field components and assemblies, which they must also be able to process and forward FOR IT PURPOSES. Ultimately, the IT department wants to have overall transparency so that know the status of each assembly, but they want as little as possible to do with ICA. To achieve this, you have to speak their language. Only mention the SNMP protocol, which is widespread in IT management, or FTP, which allows data to be used at the management level directly as Excel-readable files. This is everything that a SaiaPCD® supports by default. The issue of energy efficiency is becoming increasingly important, even in data centers, whose power consumption is increasing steadily worldwide. Measures for energy efficiency can make a major contribution to reducing consumption and operating costs. With a SaiaPCD® or S-Energy Manager together with energy meters and communication interfaces, values can be measured, stored and forwarded very simply. Thus, irregularities or peaks can be identified and the necessary measures taken.

**Summary**

Data centres make major demands on the application in terms of uptime. But they are not from another planet. SaiaPCD® has the technology required. Reliable hardware, free programmability and support for IT protocols. SaiaPCD® offers all this as standard. Energy recording and monitoring is included. It can never offer «multiple redundant» and «failsafe» technology, because the system is affected by the external environment. You can read more about energy monitoring and optimization in data centres in the reference report on page 48.



**▲ Reliable data centres**  
 Source: [http://www.bitkom.org/files/documents/BITKOM\\_Planungshilfe\\_Betriebsicheres\\_Rechenzentrum\\_2011.pdf](http://www.bitkom.org/files/documents/BITKOM_Planungshilfe_Betriebsicheres_Rechenzentrum_2011.pdf)  
 Federal Association for Information Technology, Telecommunications and New Media

- MVMD** Medium-voltage main Distribution
- LVMD** Low-voltage main Distribution
- CACU** Circulating air cooling units
- UPS** Uninterruptible Power Supply
- STS** Static transfer switch
- SD** Subdistribution
- G** Generator

## SBC HVACSE-Training centre ICA technology: tangible and understandable

With our new training centre in Murten, we have created an environment that provides practical training in HVAC technology, room automation and energy management.

Author: René Zuch



▲ A look at the new training centre

Many of today's customary technical components have been installed directly in the new training room, so that the theoretical and practical training represents a single entity and participants encounter in their training what they are to expect in practice. The training centre is designed for three different target groups. For operators, it's about being able to service and maintain facilities. Service technicians may need to make minor changes to programs or parameters.

New employees of system integrators can learn in practice how to create applications with SBC software. Even existing SIs can still learn a lot about increasing programming efficiency.

We made our best to cover as many of different requirements. Most topics are explained with examples, and we consciously omit complicated formulas.

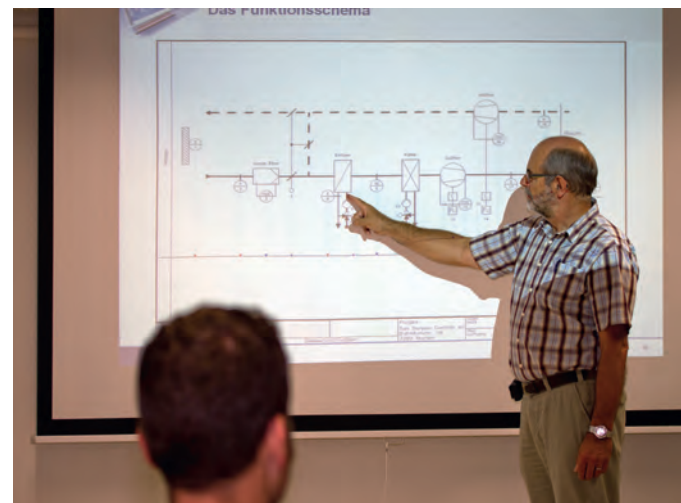
In the Training centre, the technology is tangible, which makes it easier to understand. This means that its graduates are in a position to implement their first project.

Up to 12 participants can be trained at six workstations. The following pages provide an insight into the training concept and the technology used in the training centre. Training content is delivered in modules, so that individual modules can be used depending on previous knowledge.

### HVAC technology training module

In the first instance, the technical equipment and training materials for HVAC technology were set up. Below we describe the complete training process used to instruct new employees in HVAC technology.

Training begins with an introduction to a number of theoretical principles, such as the symbols used in ICA and an understanding of control schemes and feature lists.



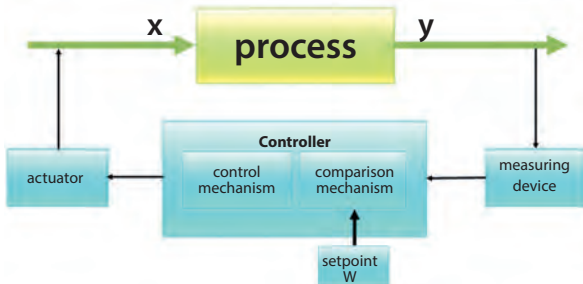
▲ A trainer explaining a control scheme



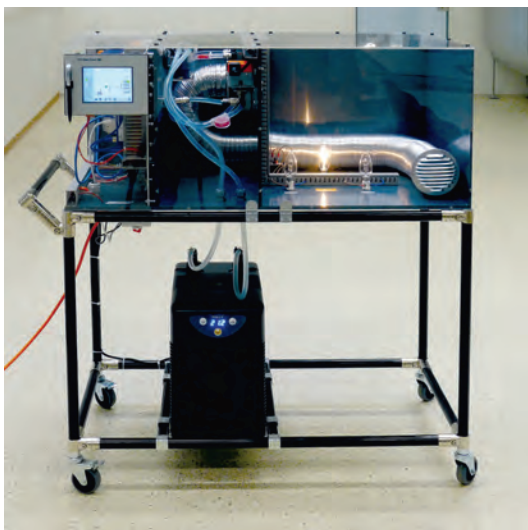
**Learning the basics playfully**

Thereafter, we train employees in the basics of control technology. The training comprises, inter alia:

- the basics of measurement and control technology
- recognition of process behaviour
- assessing process controllability
- understanding and regulating PID controllers
- correct implementation of basic control strategies



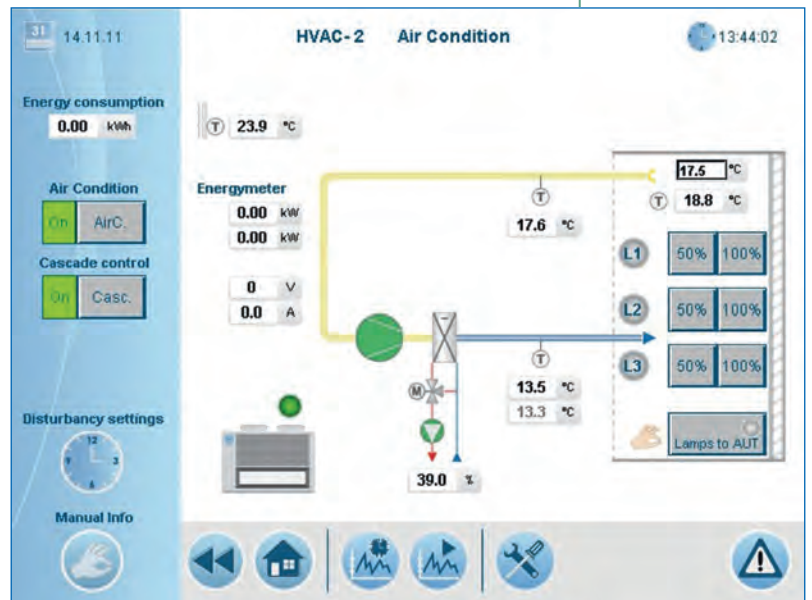
The training includes a practical component using the Mini-HVAC facility developed by SBC. Each workstation is equipped with one of these devices.



▲ One of many mini-HVAC facilities used for training purposes

The devices simulate a room with a ventilation system. They consist of a Plexiglas chamber in which the heating load is simulated by lamps. The room is conditioned using a recirculation system. The recirculation system contains heat exchanger which is supplied via a three-way valve and a cold-water pump.

The hydraulic system is visualized via built-in flow indicator, so it is easy to see how the water is mixed according to demand using the three-way valve.



▲ Saia PCD® Webpanel with the facility diagram of a mini-HVAC training module

This model provides a basic understanding of the processes to be controlled. A range of experiments are performed in groups with different control settings, and the results are analysed together. The overarching objective is to ensure that trainees can interpret historical trend data, understand processes, and determine the correct parameters for stable control. Once the training component has been completed, it's time to work with real ventilation facilities.

**Learning ICA applications with Saia PCD® in real facilities**

First of all, a number of theoretical principles are taught. These relate to the construction and operation of HVAC primary plants and include the following topics:

- the basics of ventilation technology
- the construction and components of a ventilation system and regulation/control using SBC systems
- control strategies for ventilation facilities

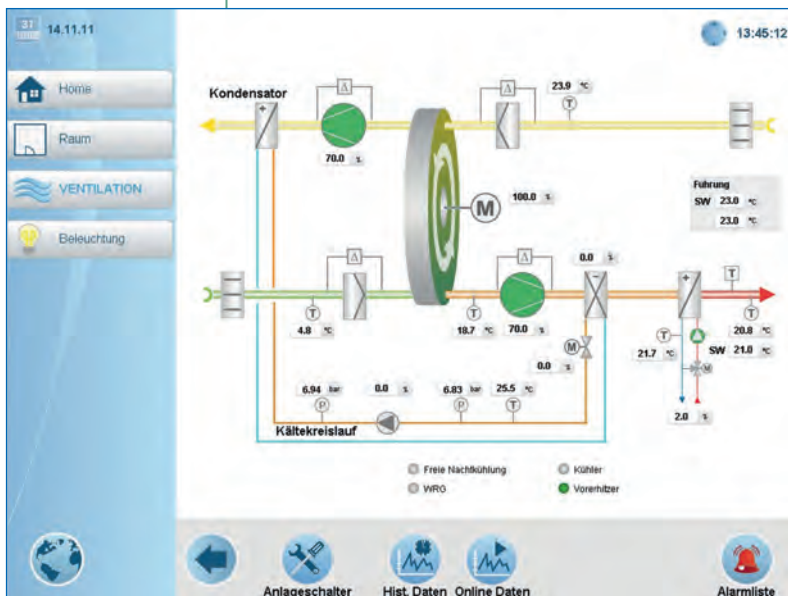
The course makes use of the centrepiece of the new training centre – our practice Air Handling Unit (AHU).

The AHU supplies the training room and two smaller side rooms. One of the side rooms is regulated by a Belimo MP Bus VAV actuator. Temperature and CO<sub>2</sub> are measured in all rooms, in order to optimize the efficiency of the unit which is driven by frequency converters.

Some of the sensors are connected using EnOcean radio technology so we can include this topic into our trainings as well.

The AHU conditions the air using a built-in cooling system, a heater and a rotary heat exchanger (see image).

The whole Air Handling Unit is controlled by a PCD3. M5560 which is installed in the local control cabinet. A 15" Intel Atom S-Web Panel equipped with an embedded Windows XP is integrated for a comfortable visualization of the process using the S-Web or SaiaVisi.Plus.



▲ Diagram of the training ventilation facility



▲ Control panel for the training ventilation facility (Certified POM Gold)

The consumed electrical energy is measured by SaiaPCD® S-Bus energy counters and the heat consumption is recorded using M-Bus heat meters.

Lighting control is realized via a SaiaPCD® connected over KNX/EIB while the current meteorological data is captured by the roof-mounted weather station and read over Modbus.

At the end of the training the participants get the possibility to program and finally do the commissioning of this Air Handling Unit with PG5. By doing so the participants are confronted with most of the technologies they will encounter in their future daily work.

The new training centre is part of the official training program from 2012. The training schedule can be found at [www.sbc-support.com](http://www.sbc-support.com).

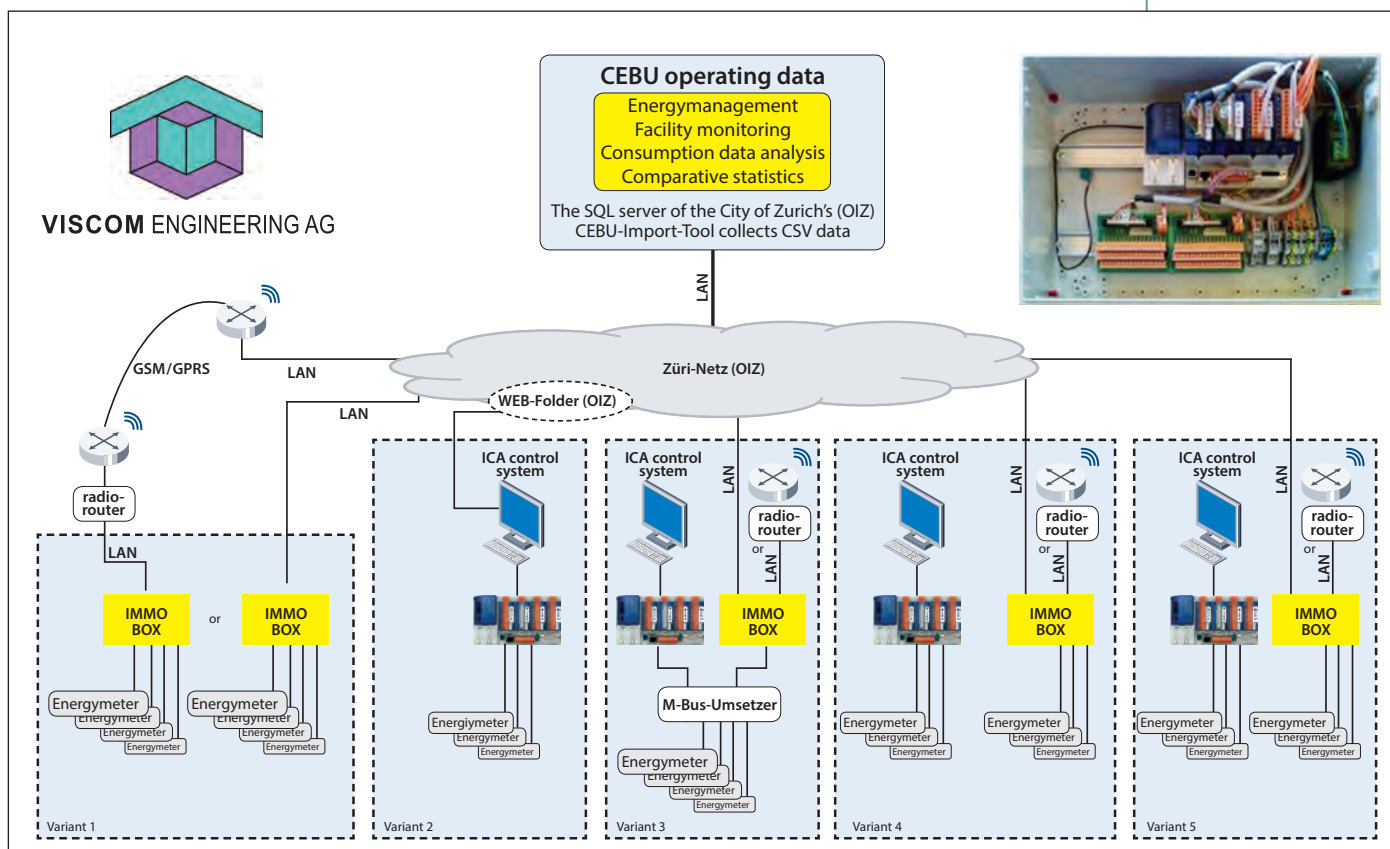


▲ The training ventilation facility

# Efficient programming methods

To create efficient projects, it is essential to reuse elements of the program systematically. Using a real example, this article shows how program components can be reused using different methods.

Author: Christian Durrer



▲ **Immo-Box:** Alternative options for sending energy meter data to the CEBU operational database

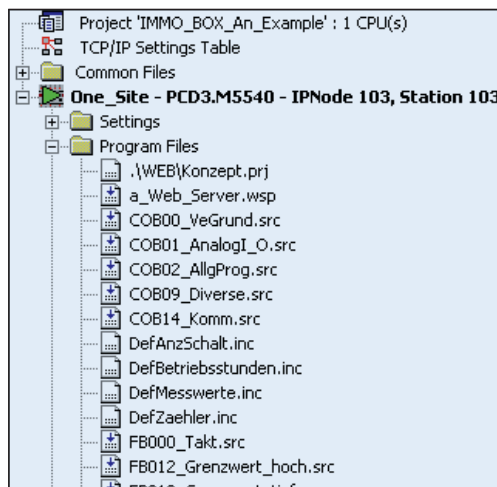
## In this context the key project is the «Immo-Box» by our client Viscom AG from page 60

This overall project collects energy data for 200 build- ings. Even this brief description is sufficient to show that the program structure must be uniform. When considering the project in detail, you quickly realise that the data collection and indeed the overall program for a location was created for a uniform system.

Care should be taken to ensure that further stations are installed over the years comply with the uniform structure of the programme. This means that the latest version of PG5 is not used, as functions were successfully tested with PG5 1.4 and released.

The following issues arise in the context of the PG5 project

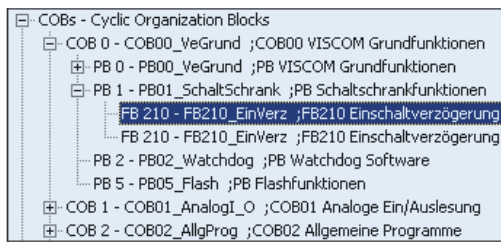
- The PG5 project contains a variety of program data



▲ Reusable modules are integrated as IL data.

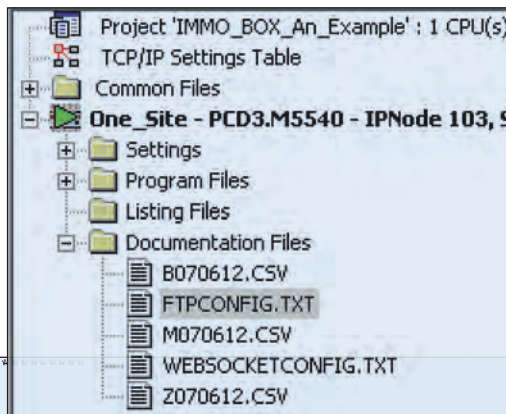


- ▶ A large volume of data are written in IL, and contain mainly FBs and PBs.



- ▲ IL blocks are programmed once and can then be called several times.

- ▶ The symbols are not generated in PG5, but imported from Excel
- ▶ Despite the frequently encountered IL data, there is also FUPLA and the S-WebEditor.
- ▶ The project is programmed in PG5 1.4.
- ▶ The «doc» folder contains the FTPCONFIG.TXT data:



```

*****
# FTP Configuration file
#
# Default values
# FTPStart=on
# FTPPort=21
# FTPMaxInstNbr=3
# FTPConnectionTimeout=0      0=No timeout, != 0 timeout of specified seconds
# FTPRemoveDefaultUser=0     Default user and password is kept
# UserName=root,rootpasswd,0,0xFF,rd_wr
#
*****
# Uncomment next line do forbid FTP connections
# FTPStart=off
#
*****
#
# Overwritten values
# FTPPort=33                  # Check if this value is NOT used by any other
# FTPMaxInstNbr=2            # Two instances max
# FTPConnectionTimeout=3600  # 1 hour timeout if no command received
# FTPRemoveDefaultUser=1    # default user is removed

userName=secretuser,secret,0x10,0xFF, rd_wr
                                # User = secretuser
                                # password = secret

group
# defined with read only access

```

- ▲ Configuration of the FTP server is saved directly in the project

- ▶ The data are written locally to a data system and read as data over the integrated FTP server.

## Company standards

There are good reasons why things look complicated at first glance. In discussions with the project leader you arrive at explanations for individual points that help to make the project as efficient as possible:

- ▶ For recurring functions, appropriate program blocks (FBs and PBs) that can be reused have been being generated for years. These blocks are generated once and tested and can be used again in all projects (similar to FBoxes). For this project, a new block was created that is suitable for cyclical writing of energy data on the Flash of the Saia PCD®.
- ▶ The structure of FBs and PBs allows the required program blocks to be processed for specific purposes using the appropriate calls.

; Änderungsdatum:	
; Änderungsindex: a	
-----	
; History:	
; Datum:	Änderungsgrund:
-----	
	COB COB00_VeGrund
; Aufruf PB VISCOM Grundfunktionen	0
-----	
	CPB PB00_VeGrund
; Aufruf PB Schaltschrankfunktionen	
-----	
	CPB PB01_SchaltSchrank
; Aufruf PB Watchdog Software	
-----	
	CPB PB02_Watchdog
; Aufruf PB Flashfunktionen	
-----	
	CPB PB05_Flash
	ECOB

- ▲ Overview of calling functions

A notable aspect of PBs and FBs is that the symbols of PG5 and an external tool can be prepared that can be imported into PG5 using the Excel import.

This procedure ensures even more efficient programming.

- ▶ If a function does not already exist, but exists in the form of Fupla FBoxes, these can be integrated easily into the existing structure. Thus, for example the M-Bus connection was created for this project with up to 80 M-Bus devices per Saia PCD® for data collection.
- ▶ For on-site operation, an S-Web Editor project is used.
- ▶ FTPCONFIG.TXT configures the FTP server of the Saia PCD®. This prevents access using the standard password «rootpasswd» and ensures that the FTP connections can «run».

This was actually possible with PG5 2.0 directly in the device configurator, but since the project began in 2008, this version of PG5 was not yet available. These issues may appear to be rather unusual at first, particularly for those accustomed to programming with the DDC Suite. But if you think that every employee in the company is familiar with this method and symbol naming, it is clear that this internal company standard unifies the structure of the projects and so reduces the adjustment period of a project. This means employees can quickly familiarize themselves with a project that they have not created themselves.

**Reusability of program components**

As is clear from the application above, it is important when creating programs to standardize recurring functions so as to prevent duplication of development and testing.

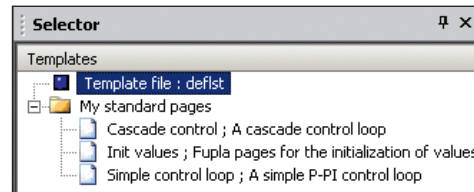
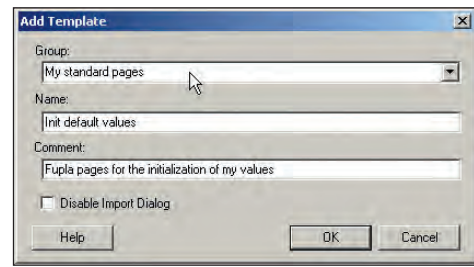
In this project, the following methods were used for the reuse of functions:

- Integration of standard functions via IL FBs and PBs
- Reuse of pre-programmed FUPLA pages by importing \*.fxp data files
- Reuse of standard functions for a project through the use of a template project
- Generation of a symbol structure using an external tool, with import of symbol definitions into PG5 using Excel-Import

As you can see, PG5 provides several ways to create functional units and reuse them in future projects. Depending on the inclination of project developers, there is no definitive «way to go» but a variety of ways in which suitable methods can be used and combined. Most recently it has become clear that an increasing number of combinations of different editors, tools and interfaces is being used. So it's even more important to be aware of the advantages and potential limitations of current thinking.

**Ready-to-use templates**

The lowest cost option for this type of method involves the use of DDC Suite template projects, that are available in a ready-to-use form on the support site [www.sbc-support.com](http://www.sbc-support.com). These can be combined as required. So the export functionality of existing FUPLA pages is a very interesting way to make program components reusable throughout the company. We are further improving the FUPLA export functionality to make it even simpler to work with the templates in FUPLA Editor.



▲ Simple creation of originalFUPLA templates

**Comparison table for the reuse of program components**

The table below shows the various methods for creating recurrent features that are unified key components. In comparison with the project discussed here, the only addition are in-house FBoxes that of course also ensure the reuse of program functions.

	Template projects	FUPLA page templates (*.fxp)	FBoxes from FUPLA pages (standard license)	FBoxes with IL preprogrammed (adv. license)	FBs and PBs programmed in IL
👍	<ul style="list-style-type: none"> <li>➤ Intuitive</li> <li>➤ All templates (incl. for example the S-WebEditor) direct in the same project</li> </ul>	<ul style="list-style-type: none"> <li>➤ Simple to create</li> <li>➤ Intuitive</li> <li>➤ Symbol names can be changed during import</li> </ul>	<ul style="list-style-type: none"> <li>➤ Library administration is the same as in Saia PG5® FBoxes</li> <li>➤ Function assistance included</li> </ul>	<ul style="list-style-type: none"> <li>➤ Library administration is the same as in Saia PG5® FBoxes</li> <li>➤ Function assistance included</li> <li>➤ Comprehensive range of functions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Functions similar to FBoxes can be created relatively easily</li> </ul>
👍	<ul style="list-style-type: none"> <li>➤ Simple to create</li> <li>➤ Template projects can be shared across the company</li> </ul>	<ul style="list-style-type: none"> <li>➤ Individual functions can easily be reused</li> </ul>	<ul style="list-style-type: none"> <li>➤ Simple to create</li> <li>➤ FBoxes can be shared and licensed across the company (FBox internal functions are not visible to outsiders)</li> </ul>	<ul style="list-style-type: none"> <li>➤ FBoxes can be shared and licensed across the company (FBox internal functions are not visible to outsiders)</li> <li>➤ The function of the FBox can be modified subsequently (incl. version management)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Can be used as a precursor for the development of a FBox</li> <li>➤ The function of the FBox can be modified subsequently</li> </ul>
🗨️	<ul style="list-style-type: none"> <li>➤ The file sizes of templates can be very large</li> </ul>	<ul style="list-style-type: none"> <li>➤ no library administration (yet) available in PG5 (in progress)</li> <li>➤ additional data (e.g. graphics) not contained in templates</li> </ul>	<ul style="list-style-type: none"> <li>➤ FBox names cannot be used</li> </ul>	<ul style="list-style-type: none"> <li>➤ Requires extensive know-how of the developer's FBox</li> <li>➤ Relatively high development and test costs per FBox</li> </ul>	<ul style="list-style-type: none"> <li>➤ Version management not automatically integrated</li> </ul>
🗨️			<ul style="list-style-type: none"> <li>➤ Function of the FBoxes cannot be modified subsequently</li> </ul>		<ul style="list-style-type: none"> <li>➤ FB parameters cannot be transferred using FUPLA</li> </ul>



## FAQ-Manager at [www.sbc-support.com](http://www.sbc-support.com)

It is used heavily but is not being used everywhere. This is a brief description of on the benefits and uses of the SBC FAQ manager.

Author: Christian Durrer

As the name «FAQ» (Frequently Asked Questions) suggests, this platform, available 24 hours a day, provides the answers to the questions most frequently asked to our support team. Our experience shows that the majority of support questions can be answered efficiently and quickly using this service. You can use the FAQ manager to search for solutions more efficiently at any time of day.

[www.sbc-support.com/faq/](http://www.sbc-support.com/faq/)

### How do I search effectively?

It's important to know how to retrieve the most relevant answer from the 1300 FAQs – a number that is growing every week. This can be achieved by skillfully limiting the folders to be searched:

1. Click on the folder for the most relevant product (here «PCD3»)
2. Enter the search term (e.g. «Firmware difference»)
3. Limit the search to «Mxxx and sub-folders» for PCD3 Products

Limiting the search to a folder in the FAQ manager

### Be informed automatically

In addition to your specific search, you can also be kept informed about the latest modifications and FAQs via the Newsletter Service. Once you have registered your email address, you will receive emails as often as you choose being informed about the latest changes of FAQs.

We recommend weekly updates, so that you receive a summary of on average 3 to 4 FAQs, each containing a direct URL link to the entry.

### A small selection of actual FAQs

- How does the «Backup user program to file system» on PCD3 and PCD2.M5 work?  
FAQ #101622

This FAQ is interesting because media content (register, counter, flags) are contained in the backup with the new Firmware 1.16.27 and later.

◀ Partial extract of FAQ 101622 regarding the backup of program on the Saia PCD®.

Content	"old" linear backup	linear backup to hidden onboard flash FW before 1.16.xx	FS backup to hidden onboard flash FW 1.16.27	new file system backup (to flash memory card or INTFLASH)
User program and memory allocation	✓	✓	✓	✓
RAM and ROM DBs (at the time of the backup)	✓	✓	✓	✓
S-Bus settings (Serial, IP address, Modem, password)	✓	✓	*)	✓
Content of media (R/T/F) e.g. first-time-inits	✗	✗	✓	✓
IP protocol settings (DHCP, FTP, HTTP etc.)	✗	✗	*)	✓
Smart RIO files (PCD3.T66x programs)	✗	✗	*)	✓



► Can I automatically be informed if the support site is updated?

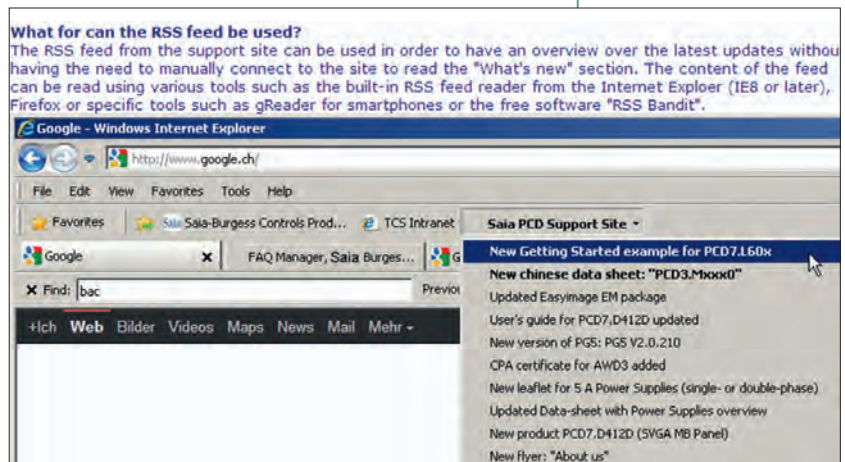
FAQ #101695

We are often asked whether it's possible to be informed automatically if the support site is updated. This is now possible using the newly set up RSS feed.

► When should I use the new «Alarming 2» feature in FUPLA and WebEditor?

FAQ #101690

This FAQ helps you decide when it's appropriate to use the new «Alarming 2» feature in S-WebEditor 5.15.02.



▲ RSS-Feed im Toolbar des Internet Explorers

**Getting Started Updates**

To make it easier to get started with programming or configuring a new product, we regularly produce sample projects with a description. These samples provide answers to frequently asked questions and reduce the familiarization time for a new technology. Below is a short list of the latest «Getting Started» samples from the «General information» → «Getting Started» section of the support website [www.sbc-support.com](http://www.sbc-support.com)

- Getting started with M-Bus modules PCD2/3.F27x(0)
- Getting started with the Smart Ethernet RIO PCD3.T665|T666
- Getting started with PCD7.L60x and PCD7.L79xN room controllers

General Information	
Certificates/Quality	▼
Document Index	▼
Getting Started	▲
▶ Introduction	
▲ Program examples	
▲ PG5 2.0	
General	
Web and HMI	
Communication	
▶ PG5 1.4	
Services	▼

◀ Getting Started Menu on [www.sbc-support.com](http://www.sbc-support.com)



## «Lean Logistics» at Saia Burgess Controls High performance and reliability in supplying our customers

The extensive conversion of our production to lean processes has spanned the past two years, with many positive results. The next step in this direction – for the benefit of our customers – is the implementation of lean principles in commercial customer service and delivery logistics.

Author: Patrick Marti



Kanban warehouse in Murten ▲

### «Lean» in customer service

Lean in logistics is the systematic elimination of processes that do not contribute to service delivery. For example, internal stock movements and transport via several different service providers and transportation companies.

We want to be the best, most secure choice for our customers, not only in terms of the technology, innovation and reliability of our products, but also in terms of availability and predictability. Thus our customers can focus their resources on the core business to promote growth and company image.

### Delivery performance and reliability

The fast, reliable delivery of small orders is of particular importance to system integrators. Two measurements show this. Delivery performance is defined as the capacity to deliver products within a specified time period, for example 48 hours. Delivery reliability is the capacity to meet the first confirmed deadline. When both things coincide, service is fast and predictable.

In the last 2 years, we have increased our direct deliveries from Murten to customers by over 50%. At the same time, we closed two warehouses and maintained a consistently good service. Orders for all our customers in Austria, Switzerland, Germany, France, Italy and the Netherlands are dispatched from our two locations in Murten (Switzerland) and Neu-Isenburg (Germany). The direct delivery service is already available to resellers in countries that focus on sales and wish to avoid local stock, as in Belgium.



Kanban card in Murten ▲

Kanban warehouse in Murten ▼



### Only a solid and reliable service can increase the confidence of our field staff and customers

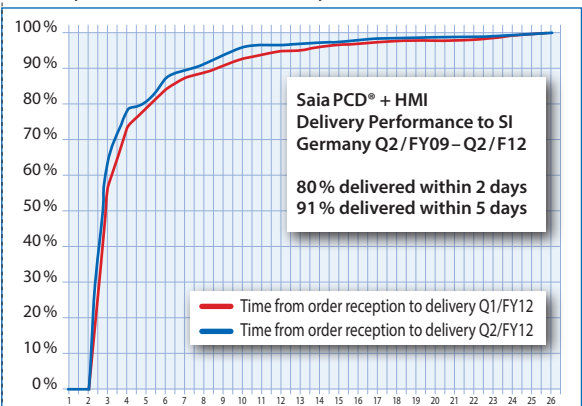
Our latest figures show a delivery reliability of 97% by the first confirmed date in key countries such as France, Germany and Switzerland. 75% of products ordered by system integrators leave our warehouse within 48

hours of receipt of order, regardless of type and quantity, and 90% of products ordered leave the warehouse within 5 days. «Lean» does not necessarily mean immediate cost reductions. We have increased the workload at our central warehouse locations and handle larger numbers of smaller and more expensive shipments from these locations. But this is more than offset commercially and financially by eliminating local handling and local stock. The key factor here is the drastic reduction in the number of steps from order receipt to customer delivery, and increased reliability of processes.

### Lean never stops

Lean requires progress to be monitored constantly. We get straight on with the next step and can offset the workload in the factory by managing end product storage in the production stage. The savings do not lie in the end products, but in benefits arising directly from the smoother production processes. Another measure is to focus on transport arrangements that ensure the best possible service, including EU customs clearance and rapid and transparent transport at the right price. See also: Lean never stops.

Delivery Performance to SI in Germany for SaiaPCD® and HMI



▲ Delivery performance in Germany: a constant level of service with the same warehouses and 25% more orders

# Annual Report of the Director of Finances and Administration

As in previous years, 2011 was a good year for our company. We have carried forward the continuous, steady growth of recent years. Our technology profile and market orientation are so strong that even in difficult years we have barely experienced a drop in sales. In all markets, we were also able to gain a market share. Author: Adrian Spicher

By expanding our local software development department, we reduced our dependence on third parties. At the same time, there has been a significant increase in our capacity to innovate. In the past two years, newly launched product innovations such as energy meters and functional web-HMIs have been very well received and will guarantee sustainable growth.

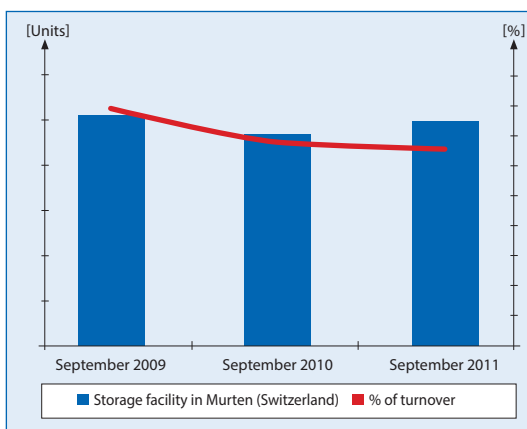
With the consistent application of such «Lean» principles as uniform production, the elimination of MUDA (waste) and the introduction of cycle times, production in Murten (Switzerland) has become leaner and more efficient. Production staff occupy a central position, not only by helping to define their methods and working environment, but also by being prepared to question their own habitual practices. As a result, it has been possible largely to offset the negative effects of the strong Swiss Franc. «Lean» does not limit itself to production, but also «infiltrates» other areas too. Additional lean projects in R&D, sales and administration will secure the future of the Murten site for years to come. With the introduction of «One Piece Flow» into production, intermediate storage has been eliminated. The capital tied up in the factory in the form of stock value has been reduced from 18% to just 14.5%. Delivery performance actually improved during this period, and production output per capita increased. Due to the proximity of R&D to production, changes or improvements can be introduced and implemented quickly.



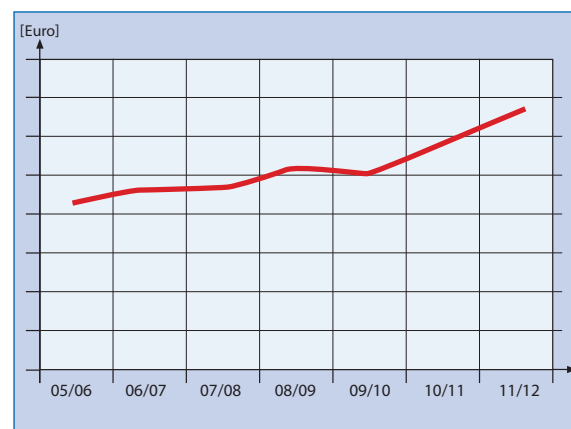
▲ Headquarters of Saia Burgess Controls, Murten/Switzerland

Good quality is ensured by targeted investments in operating resources and infrastructure, combined with well trained, responsible employees.

Saia Burgess Controls is in a strong position to achieve further growth. Our motivated and dedicated staff, comprising a good blend of youth and experience, constantly strive to achieve further sales growth. Our owner's strong financial base also helps us to invest in production equipment, personnel and infrastructure. In the next few years, Controls will have a turnover in excess of \$100 million, without having to take great risks. All stakeholders will benefit from this growth and have a part in this success, of which we are very proud.

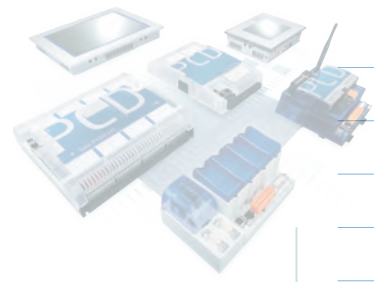


▲ Warehouse development in absolute terms and as a % of sales turnover. More efficient use of capital resources



▲ Controls Sales. We missed the major economic crisis of 2008/2009 – thanks to innovation.





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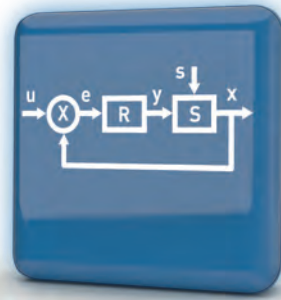
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*Subjects to change without notice.*



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SAIA BURGESS CONTROLS

# SBO Controls News 13 | The SBC Automation Yearbook