

Why do so many brewery automation

Automation is becoming the critical component within breweries large and small, so why is it that so many implementations go wrong? Whether it is the insurmountable challenges faced with a three-year old PCS7 system at Carlsberg Fredericia, or the four-year old ABB system in Warsteiner, there are common recurring themes which this article aims to highlight.

by **Mike Jamieson**
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Automation is not new, it has been around for a very long time within breweries but still automation projects continue to go wrong. History demonstrates that the lack of brewing knowledge within automation vendors and the engineers applying their technology continues to be the biggest problem – today it is compounded due to the increase in modern brewery complexity.

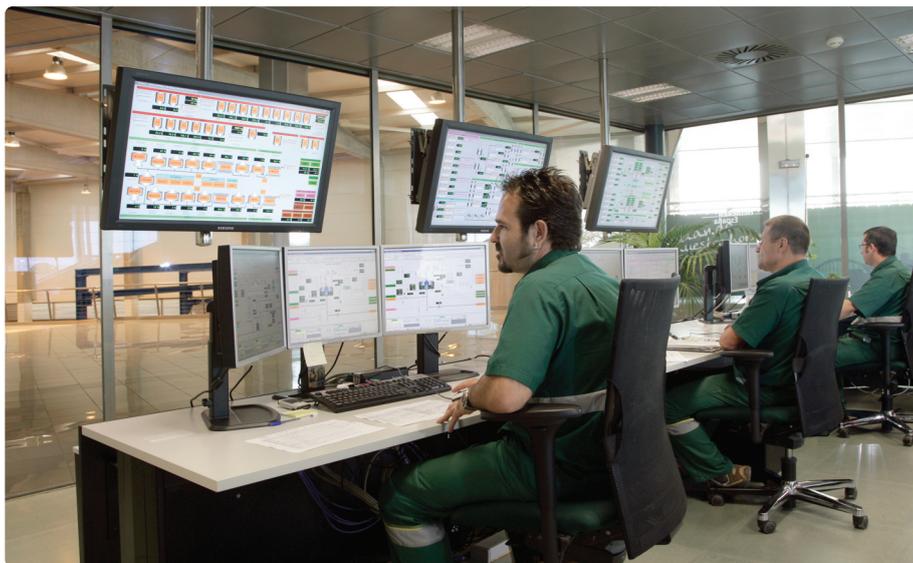
The driver behind automation often comes from capacity expansions due to brewery consolidations or growth and globalisation of brands, combined with the need for improved financial performance (reduced headcount, losses, etc).

Automation is not always easy though, especially when many brewers still believe their skills are an art that cannot be captured by automation. Good control means right first time, reproducibility and requires the elimination of the potential of human errors.

Bad night's sleep

Maybe a single brewer can, on a good day, produce beer of the best quality, but does he do the same when he has a bad night's sleep? Processing conditions can be controlled to a far greater level today (raw material variability, process parameters, etc) therefore automation should manage the process, eliminate where possible operator actions, and allow the brewer to focus on quality via 'exception based management' rather than fire-fighting.

With the process complexity in modern breweries, the capability of a vendor to convert the perceived 'art of brewing' into a comprehensive control solution is a primary challenge. Being able to codify the brewmaster's knowledge and that of his original equipment manufacturers (OEM) into lines of code which deliver a flexible, efficient, economical and automated brewery can be an enormous task. This complexity, combined



The control room in the new Heineken brewery at Seville, Spain.

with the brewers uncertainty of what an investment into automation and information systems will deliver to a brewery, often result in a willingness to spend ten times more on stainless-steel rather than on a new automation solution, even though both could deliver similar results.

Why is this? Well to be blunt, if you look across the globe, there are many examples of where automation has negatively impacted brewery performance and not just slightly. All people involved in automation within the brewing industry can name at least half a dozen 'bad automation projects' where large teams of engineers have been on site for months if not years trying to get the system to work, where often it never does and it ends up in contractual debates. Poorly implemented automation projects cause dropped brews, capacity reductions, less recipe flexibility (especially for introducing new recipes), and often complete brewery process outages. Many problems are related to automation hardware failures, but most are simply down to bad software and configuration. For example, configuring a system with the wrong unit definitions and wrong control module assignments will lead to poor/failed automation and low/zero plant flexibility.

Cost of ownership

This is not to mention the impact on cost of ownership of these systems to the brewer. The price to buy, the ongoing price to maintain and the impact on the workforce to be able to adapt to a new system (or the system adapting to them), can create an environment where the focus is no longer on making good quality beer, but rather on just making sure the system doesn't stop.

Additionally, automation can also adversely impact man, machine and product safety if

standard business rules are poorly implemented. For example, poor unit configuration when a vessel is switched into maintenance where valves can then open unexpectedly due to incorrect interlocking, which can then lead to a potentially dangerous situation.

This is why, if investing in automation and information systems you must get it right first time, as if you do, remember that 'software doesn't rust' so the benefits are there long term. There are many examples of new systems being replaced within 2-5 years of being implemented. Can a brewer really afford to spend money on automation twice?

There are also examples of where automation delivers significant operational benefit when paired seamlessly with the process. For example Heineken in Seville achieving 18,000hl/man year, a world class performance from a well defined, designed and executed process automation solution.

So why do so many projects fail? There are many reasons for this; the top five I would like to propose are as follows:

Automation hardware is 'dumb'

However many brewers base their decision on their preferred PLC or DCS platform. This hardware is not built for a brewer, it is built for any manufacturing environment, it can almost be treated as a 'commodity'. The value-add is in the intelligence that is programmed into the hardware. Unfortunately, there are no automation hardware vendors that can call themselves brewery experts – so why use this as a primary selection criterion for your new automation system? This point can also be extended to most automation software vendors, where their software platforms are also 'dumb' empty containers that contain no brewing know-how!

projects go wrong?



The new: The control room at the Tucher plant in Nuremberg.

Reliance on the wrong people

The solution programmed into the hardware is only as good as the person that does it. Will he have a brewing background? Or is he fresh out of an automotive plant, or even just fresh out of school? PLC strengths are that they can do a million things, their weakness is there is a million ways to do those things. So are you confident that the engineer programming your system can translate your process requirements into lines of code? Or do you both speak completely different languages? Will you get what you asked for? Or will you even know if you got what you asked for?

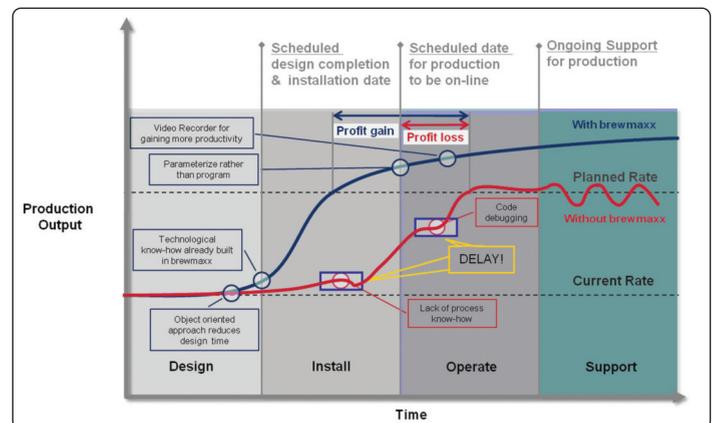
Reliance on the wrong guidance

Vendors supplying automation and information products are driven by an allegiance to standards. However these standards are generic and often do not fit to the brewer. For example, ISA 88, a standard for batch processes (like a brewhouse), if applied by the rules does not allow the brewer to do continuous transfers into his cellars when switching from one tank to another. In filtration, it forces you to treat a continuous process to behave as a batch process, reducing your cycle times and throughput capabilities. This ultimately forces an inefficient brewing process not necessarily due to 'bad-coding' but instead wrong

interpretation of business rules, processing requirements and operational practices.

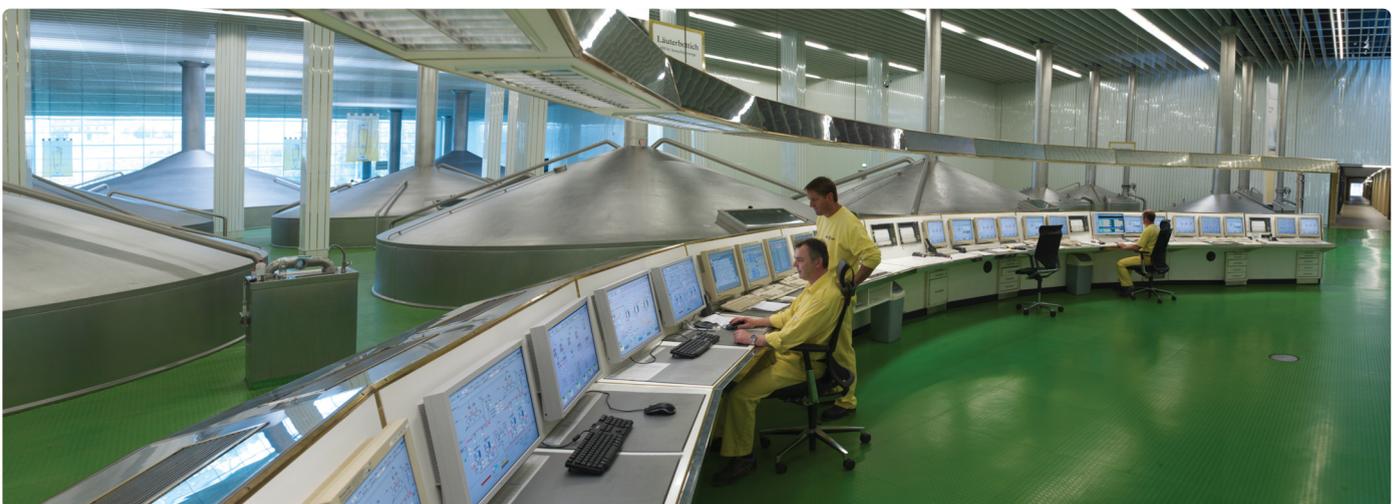
Similar things can be seen with standards related to information software used in manufacturing plants. ISA 95 declares the Manufacturing Execution Systems (MES) functions and interfaces between process control and Enterprise Resource Planning (ERP) software. The problem is that this standard has led companies to build or buy pieces of software, just to be compliant with S95, even though much of what S95 declares is not even required for the average brewer. The standards are designed to reduce complexity, but in the end, when all you want to do is make beer, and make it well, they just increase complexity, costs, and the ability to get the system running.

The important standards are the brewing specific interpretations of the above ones. For



Automation Project Lifecycle, traditional approach versus using brewmaxx.

example, what Heineken achieved with their BEAMS (Brewery Equipment Automation Modules Standards) interpretation of the S88 standard for beer processing, or in the information space, the Weihenstephan standard for Packaging Line Data Acquisition on bottling lines. However, even with the definition of good brewing automation standards being in place, it does not necessarily mean a successful automation project. If the control philosophy being applied does not have the required level of instrumentation on the brewery, then the level



The modern: The control room at the Warsteiner plant set in the Arnsharpe Forest Park about 60km east of Dortmund in Northwest Germany.

of automation will never be realised.

Codification of brewing know-how

The reason OEMs develop their own solutions is because they need to capture in the 'dumb hardware' the know-how of the process engineer who designed the process equipment. As they cannot influence the automation vendors hardware and software development plans, or afford to train their engineers for all platforms on the market, it is cheaper for them to develop their own solution. The problem is, what if you are buying from two separate OEMs, do you really want two different control systems? The OEMs solution is only good on their equipment, so what if you mix and match equipment within your brewery, or across your breweries? You end up with different standards, different solutions, different methodologies and ultimately an integration and support headache (unless you have multiple different OEM support contracts). Individual units like the mash filter may work perfectly, but what about the complete process cell (the brewhouse), will it be integrated and perform optimally? Indeed, who is responsible for ensuring the brewery operates optimally, if each OEM is only responsible for his own little area?

You only know what you know when you know it

Likewise, if you only do what you know you can do, then you never do very much. As with the above point, capturing the true requirements of the brewery for a control and information system are very complex. If you have 'dumb hardware', you rely on the person programming it, his experience and the quality of the questions he asks. If any of them are weak, he will be on site for the next 20 years debugging and modifying the system. If you take an OEM's solution, it is only optimal for that OEM's equipment, it knows nothing about other vendors process equipment, therefore you are in the same situation as before. This is where references are crucial. Being able to see how a system platform has been applied in multiple different brewing environments, consistently, whilst codifying this knowledge and experience into the solution is the only way to learn to know what you don't know and to ensure you obtain maximum benefit from any investment you make. The approach of reverse engineering an existing old system and re-writing within a modern hardware and software platform just ensures that you do the same tomorrow as you did yesterday, no matter if it was good or bad. The approach should be to leverage the additional functionality of the new system to improve the breweries performance immediately while also

creating re-usable standards that can be deployed to other locations.

In conclusion

So if you want to guarantee a bad automation project; have a 'dumb' PLC platform, being programmed by an engineer that knows nothing about brewing, using multiple pieces of different software that may be 100% compliant with every automation standard under the sun, yet never been proven in a brewery, on top of multiple different OEM pieces of equipment, using a specification based upon the documentation from the obsolete control system, then there is a high probability the project will not go well!

Contrast this with an approach which will guarantee success. Don't worry about the hardware platform, just use whichever you can get the best price and spares support for. You're a brewer, so only use solution providers that have brewmasters on the staff, along with engineers that have proven experience, to ensure the same language is spoken. Choose a platform which is built and proven for use within breweries – compliance to generic standards are almost irrelevant. Proven standards for breweries built into the core solution are key. Choose a system which is proven to work across your brewing OEMs, to ensure an element of their process know-how has been captured in the system. After all, you don't want to select a system that every time you ask for an OEM to supply it, he hits you with massive upcharges! Finally, select a system that brings new ideas, approaches and methods of working based upon experience from working closely with OEMs and other brewers, this is the key to releasing your latent capacity and maximising your ROI.

The biggest challenge, if you truly analyse the vendors servicing the brewing industry with automation and information solutions based upon the above information, is that you soon realise there isn't a lot of choice out there if you want a successful project. Perhaps this is why there have been so many failed projects across the globe. Hopefully this article stimulates a change of perception about automation and information and that if implemented by a world-class brewing integrator like ProLeiT, with a world class brewing solution like brewmaxx; you can achieve a world class brewery. ■

■ **The author**

Mike Jamieson is Vice President Sales and Marketing at ProLeiT AG. Mike acknowledges the assistance given by Joost Roldaan at Heineken Supply Chain Services where he is Manager Process Control and Utilities and Dr Martin Lutz, Head of Brewing Department at ProLeiT.

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