Applying Industry 4.0 technology to existing assets to achieve 21st century performance

BOULTING

The current landscape

Following the publication of the Made Smarter Review, Juergen Maier, CEO of Siemens UK and co-chair of The Made Smarter Commission recently commented on the slow uptake of new technology in the UK.

In an interview with Nick Peters, editorial director of The Manufacturer under the headline "The great British conundrum" Juergen said that

"…if we sit here and we wait until we get instructions, or until it's all crystal clear, we will be waiting forever. The thing to do is get involved, start experimenting, start doing, start learning from each other.." and *"..when I'm talking to my colleagues in Germany, or in the Netherlands, or even in Italy. People there are just open to having a go"*

According to the Future of British Manufacturing Initiative – "Industrial Digitalisation Frenzy is something that's causing manufacturers to:

- Focus on technology as their starting point instead of treating it as an enabler
- Think they need to start big with an all or nothing approach"

The challenge

Boulting Technology is both a manufacturer (of L.V. Assemblies) and a solution provider with long-time OT (Operational Technology) control system experience as well as particular expertise in pump systems.

In 2018 we formed an alliance with long-time IT collaboration partner NETBuilder in order to address end to end (IT/OT) digitalisation.

Since 2009 we have been successfully combining our pump system experience with our system integration capability to optimise pump systems for our clients (fig. 1), clocking up significant energy savings, with project payback typically under two years. In 2015 we were awarded Pump Centre Project of the Year for one such project.

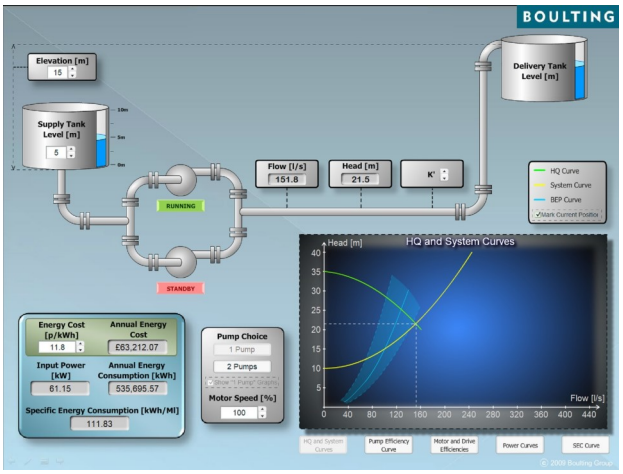

Fig. 1. PSOp software

Our challenge is to combine this domain experience with new technology to provide new value. This will enable us to address a wider range of assets in the installed base of pump systems, such as within systems where our project based approach isn't financially viable.

What we decided to do and why

For us, it is important to retain our independence. In more than 20 years of providing solutions we have always strived to demonstrate this. We look at a problem or requirement and come up with the best, most cost effective, solution we can. Sometimes our client has standardised with a particular vendor, which we comply with.

In the new world of Industry 4.0 we have maintained our close links with all the major industrial automation vendors: including Siemens, Rockwell, Schneider, Mitsubishi and IFM - they all have their own take on how they address the challenge of Industry 4.0. We are working with all of them.

We've also been keeping a close eye on newcomers. In the spirit of disruption there is significant cross-over from other technologies and/or vendors known better in the consumer, commercial or IT world, to the Industrial I4.0 space.

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While Virtual Reality and Augmented Reality are changing the possibilities for Human Machine Interfaces, new sensor technologies are challenging what is possible and how much it costs.

New sensor technology

We have reviewed sensors that use low power Bluetooth, battery power, self-power or wireless technologies and many are clip-on or stick-on. As they offer quick, simple physical installation at a low cost and support an add-on philosophy, we have currently adopted this method.

We have approached a proof of concept based on local rather than cloud processing, to simplify and shorten the time to value. Whilst this has excluded some sensor sets that work with cloud solutions, we are able to employ these in future solutions.

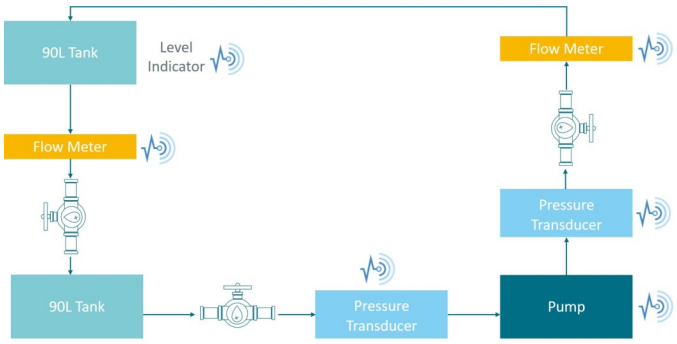
Our Roadmap and test rig

To progress the project development we sketched a roadmap showing the ideas we had such as applications, (pump monitoring being one) the proof of concept stage, Beta site, Roll-out, Additional Services, Refining, etc.

We based our initial development on the following logic:

- We have significant domain expertise with Pump Systems.
- NETBuilder, our IT alliance partners have expertise in Data Analytics.
- We recognised that scalable solutions (starting small) could aid potential uptake.
- A local network system could allay security fears in the initial stage.
- Using "Add on" instrumentation would allay concerns about compromising existing systems by adding to, or changing them.
- Getting results (and value) quickly will help with justifying further investment.

To demonstrate value pre Beta site testing we built a test rig. This enables the generation of something close to real process data. The test rig comprises of two tanks, a pump, various sensors and valves. The simplified and scaled down model is a real process enabling a proof of concept study.



Why Data Analytics ?

Data analytics with tools such as splunk®>, allows simple unification of multiple, real-time, data sources. Once in one place the data can be examined in many ways including re-useable real-time dashboards which can display high-level information (KPIs, trends, etc.), giving insight into how things are and highlight problems or enable changes to plans early. Additional functionality such as Artificial Intelligence, Machine Learning, Predictive Maintenance, are also achievable quickly and easily.

Being able to look at multiple data sources makes Data Analytics a very powerful tool. For instance, the cause of a niggling intermittent fault with a process component (more difficult to diagnose than a hard fault) might be better diagnosed and eliminated for the future by looking at the bigger picture with diverse data sources.

This could mean reviewing data from the process itself: process & equipment temperatures, flows, energy use, vibration, etc. which might themselves give some clues to the fault. However, if the root cause comes from outside the process, final diagnosis might be helped by reviewing the process data for previous occurrences against other factors, for instance: wind direction, ambient temperature, rainfall, barometric pressure, time of day, network activity and anything else that is available.

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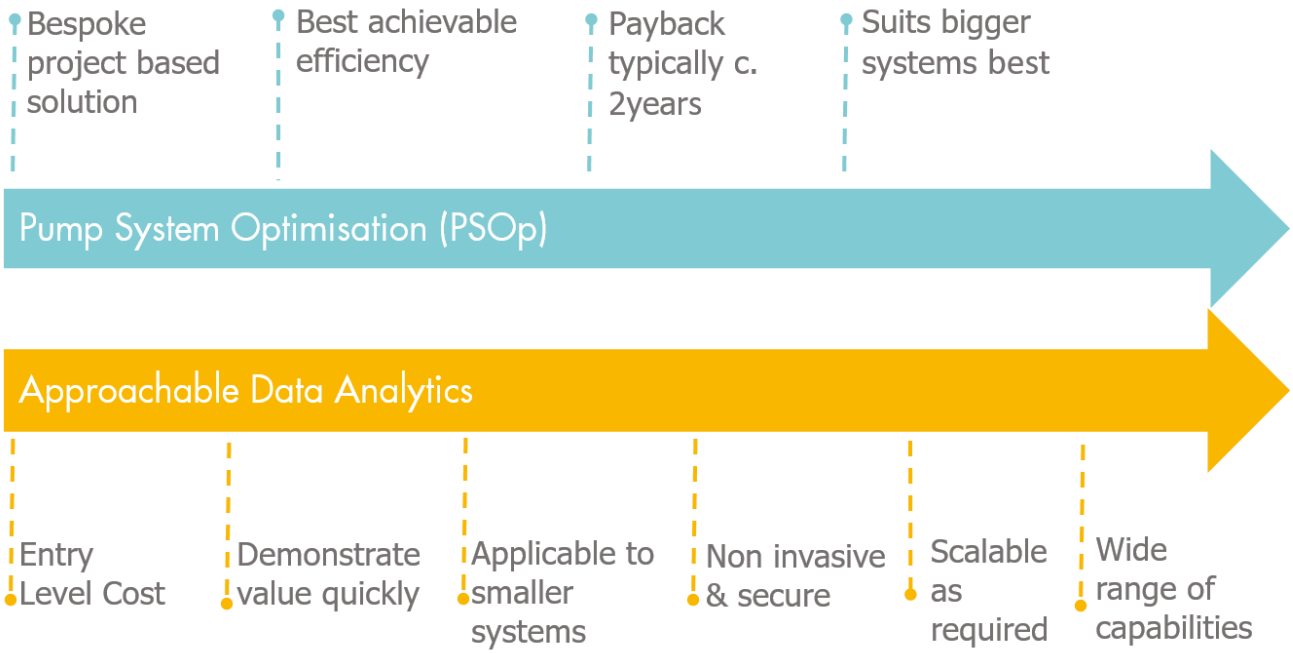
Fig.3. Process test rig



Outcome – how we've transformed the business case

The system we have developed, Approachable Data Analytics, has transformed the business case for system optimisation, condition monitoring and preventative maintenance.

Previously, typical improvement projects have been funded based on a two-year pay back. Now, as our solution has a significantly lower implementation costs, many more projects become financially viable.

The system we have put together is a small, low cost, scalable system with local processing, standalone smart instrumentation, simple connectivity and short implementation time from switch on to analysis of data.

We have been gathering data from our test rig since early May. We have already published (and will continue to) updates and results via our website:

www.boultingtechnology.co.uk/industry-4-0-insights

What next ?

We continue to progress along our roadmap, but also remain flexible. In the future, our roadmap may change based on our progress, findings or available technology.

The pace of change for technology is now very fast, and 5G will soon be with us. Great things are promised, including the possibilities for reliable real time communications for mission critical applications and large scale smart device connectivity.

Innovations such as these will almost certainly feed another step change in what is possible in the field of instrumentation, sensors and of course data analytics.

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