A more profitable reality for powder processing

When the UK division of the Hosokawa Micron Group looked to improve its productivity, the route the innovative powder processing company chose was to couple its market leading equipment and services to the world of virtual and augmented reality (VR and AR), and then to harness this to data analytics.

The result has been to transform a business that had appeared to plateau in terms of revenue and growth to one with a target operating income rarely seen in the industry.

"We looked at our digital strategy across the business both horizontally and vertically and when we were looking at the horizontal one, one of the things we wanted to know is could we use VR rather than building a wooden mock-up of our containment systems when selling to clients," said Iain Crosley, Hosokawa Micron Ltd's (HML) Managing Director. "We talked to the AMRC and they sent their people over to see us and help develop a solution."

Using VR to show the product to potential customers proved very successful. The first piece of equipment the firm sold this way turned out to be the biggest isolator they had ever built: 14 chambers using hydrogen peroxide and high temperature sterilisation. "It was also the first sterile isolator we had done," says Crosley.

Having been an early adopter of data analytics, he then wondered whether there was a way of bringing the virtual and data analytic technologies together in a way that would drive improvements in performance: in particular, process and lab efficiencies; increased plant uptime; reduced operator error; improved product quality; and faster changeover and preparation processes.

To achieve this, Crosley had to overcome a number of barriers. These included:

- **Islands of disparate data**
- **Lack of equipment condition and state visibility**
- **Lack of time due to firefighting resource limitations**
- **Lack of data analysis capability**
- **Lack of automated processes**
- **Excessive reactive and emergency work**
- **Lack of instrumentation and sensors**
- **Production demands limit operational flexibility**

To help him overcome these challenges, Crosley had an ace up his sleeve in the form of Xpert Rule. With their help, Hosokawa now has a mobile phone app that allows for the remote monitoring of the company's contract powder processing suite.

The result is an end-user interface that enables:

- **Effective monitoring of equipment and processes – alerting operators to problems before they occur with anomaly detection and predictive analytics**
- **Capture and automate best practice domain expertise of the workforce and enhance with machine learning**
- **Deployment of intelligent automation to the IoT Edge, running on the smallest embedded computers e.g. Raspberry Pi**

In addition to the mobile app, Crosley has also worked with the AMRC to develop a powder processing digital twin. Although still in its infancy, the company recently took this to the PowTech event at Nuremburg where it attracted huge interest. "It is the first digital twin in the powder processing industry," says Crosley. While not all his customers will use it, he believes this technology has tremendous potential. Many of his customers are in remote parts of the world and the twin will allow his team to more effectively identify the service and maintenance requirements of equipment in distant place. The digital twin could also be used in plant commissioning.

The big obstacle to achieving this has been the lack of knowledge inside the organisation. "We are processing engineers and the creation of a digital twin requires a lot of gaming visualisation knowledge behind it – and we don't have that," said Crosley. "So, having people who understand the technologies and who can put them together to give the best immersive experience but also get the highest functionality has been great, and that is the kind of thing we get from the AMRC."

"the first digital twin in the powder processing industry."

Iain Crosley, Hosokawa Micron Ltd's (HML) Managing Director.
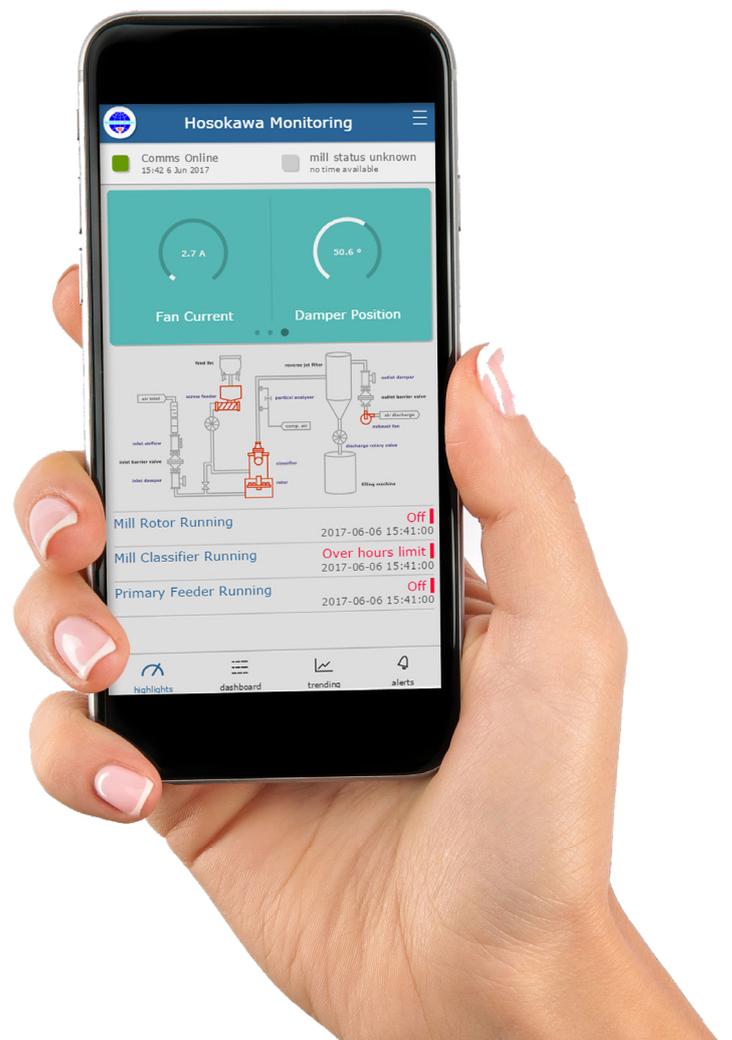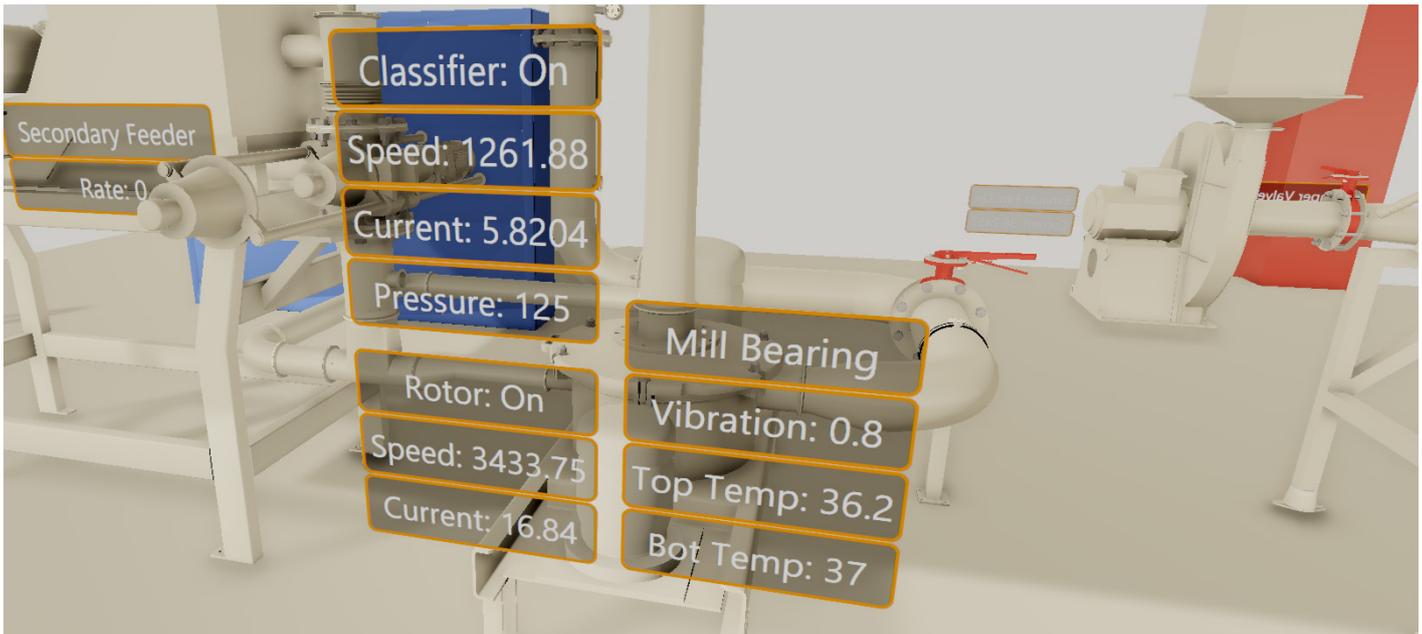
The benefits of digitalisation have been both measurable and impressive:

- Connected machines sharing data in real time to maximise efficiency across the suite

- Continual monitoring of key equipment parameters to ensure all control actions are based on actual process data and verified process models with pre-set limits

- Combined rules from data and experts to detect process or equipment problems before initiating appropriate actions, from notifications and alarms, to advice and fully closed-loop solutions

- Operational data now integrated throughout the business processes

- The deeper understanding of our processes enables leaner management of our supply chain

- Complaints due to out-of-spec material minimised: 98 per cent right first time

- Customer retention and growth: now have closer control of business/product mix to combine the higher volume, lower margin with specialised lower volume, higher margin work

The application of these smart factory initiatives has underpinned the business case for an investment of £1m in Hosokawa's contract manufacturing suite over the next three years. In addition, it has given the company confidence that its contract manufacturing revenues and margin will develop strongly over the next three to five years.

In FY2016 – three years after installing data loggers and beginning this journey – Contract Manufacturing Sales had grown by 34 per cent. The mid-term plan for 2017-2020 is confidently targeting a further 36 per cent growth. The process areas are effectively land locked, which means that any improvements have to come through operational efficiency.

The Contract Manufacturing side of the business delivers a higher gross margin than machine sales and will be a key contributor to its target operating income of eight per cent by 2020; a figure all but unheard of in the industry, where world-class operating income is six per cent.