

## Case Study: Perceptive Engineering

Innovative product development opens up new markets

### The challenge

Perceptive Engineering identified a requirement to develop a 'next generation' industrial control package, capable of monitoring and maintaining the performance of their control systems automatically. Development of a software product able to accurately monitor advanced control systems would provide the company with a distinct advantage over competitors and the opportunity to engage its existing products in several new industrial sectors.

### The University of Manchester solution

In order to develop such a package the company partner was in need of specialist expertise in control loop monitoring and turned to The University of Manchester's School of Electrical and Electronic Engineering. The partners identified that a Knowledge Transfer Partnership (KTP) scheme would provide the opportunity to develop a complete process control package and monitoring solution for industrial delivery.

KTP is a UK-wide programme to help businesses to improve their competitiveness and productivity, by harnessing some of the knowledge, technology and skills available within UK universities. Professor Barry Lennox and KTP Associate Marie O'Brien worked with Perceptive Engineering to employ complex control theory and statistical techniques to estimate the performance of a control system and the quality of the sensor measurements used within the controller. Sensor measurements can be very unreliable in certain environments and using such measurements in a control system can have serious quality and safety implications. The two-year partnership delivered:

- **New software product**, 'Data Quality Monitor' (DQM), which monitored the reliability of the sensor measurements, and if errors were detected, the sensor measurements were reconstructed using statistical inference techniques.
- **Demonstration of application** within a case study project at a wastewater treatment plant. This demonstrated that the DQM, when linked to the control system, could enable the plant to operate with greater efficiency under varying weather and pollutant conditions. Tests on a pharmaceutical process demonstrated similar improvements to plant efficiency.
- **New knowledge and capability** has been embedded within PEL, including a thorough understanding of signal monitoring and data reconstruction techniques, which enables further opportunities to be exploited.

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This KTP has surpassed our initial expectations, we are delighted that the innovations have not only been so successful, but have also been short-listed for a prestigious award.

Dave Lovett,  
Managing Director,  
Perceptive Engineering Ltd.

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Perceptive Engineering Ltd. (PEL) is a small to medium - sized Process Control and Optimisation consultancy based in Daresbury, which serves multiple sectors across the UK. It develops Advanced Process Control and Multivariate monitoring software for industrial manufacturing environments. The company optimises both continuous and batch processes, focussing on improving productivity, quality and robustness of many process manufacturing systems.

[www.perceptiveapc.com](http://www.perceptiveapc.com)

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by Transferring Knowledge

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## The benefits

Undertaking a KTP project with University of Manchester engineering experts has given PEL significant new knowledge and capabilities, including a thorough understanding of signal monitoring and data reconstruction techniques. It has also embedded skill sets within the company that will enable it to address further opportunities in this area.

- PEL has gained guidance and experience in developing the DQM solutions their industrial markets demand. As a result of the project they now have a comprehensive 'waste water treatment simulator' available to evaluate the performance of new advanced process control techniques.
- The firm has acquired a new product, which can be sold as a stand-alone system or an optional, integrated complement to its primary product range, giving it a complete software portfolio.
- A project case study at a wastewater treatment plant has demonstrated that, when linked to the control system, the DQM can enable a plant to operate more efficiently under varying weather and pollutant conditions. Interest in this technology has been very significant and an assessment by United Utilities found it reduced energy usage by 25% and CO<sub>2</sub> emissions by 200 t/year, it is now being implemented at 12 UK waste water treatment plants and discussions are underway for implementation in further applications.
- A similar case study in pharmaceuticals has also been successful, meaning PEL can now address the needs of two key industries where efficiency and sustainability improvements are urgently needed.
- As a result of the KTP, the company's annual sales turnover has increased by over £400k and the additional work generated from the project has resulted in the employment of three full time members of staff and is set to increase over the next couple of years.
- Orders taken at European conferences and exhibitions have significantly increased the value of exports, which is anticipated to rise by £200,000 a year.

The DQM tool, combined with robust control systems appropriate to each industry sector, is already making a big impact in the marketplace, and has been short-listed for UKTI Energy and the Environment Business Innovation Award.

The project has given the academic team greater insight into the problems faced by SMEs in the pharmaceutical and water industries, and helping to develop the software solution has increased their familiarity with delivering and applying industrial control and monitoring packages. The project has generated two conference publications and two journal articles, creating exposure for the team in a new application field, and Associate Marie O'Brien has secured an Application Engineering role with PEL as a result of her technical and professional development.

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This KTP has been a positive step in so many ways, not least in forging a strong link with a company like PEL. And we have all benefited hugely from the resulting research and training opportunities.

*Professor Barry Lennox,  
Lead Academic,  
School of Electrical and Electronic  
Engineering,  
The University of Manchester.*

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