

The Fourth Revolution unfolds

Could Industry 4.0 change forever the way in which manufacturers operate? By **Neil Tyler**.

Industry 4.0 – or the Industrial Internet of Things – is on the verge of radically changing the way in which manufacturers operate. The approach is expected to pave the way towards a future in which smart factories, intelligent machines and networked processes are brought together to encourage greater manufacturing productivity, flexibility and profitability.

Speaking last year at an event celebrating the Electronics Systems Community's (ESCO) first anniversary, Brian Holliday, deputy managing director of Siemens Industry UK and Ireland, said: "A focus on Industry 4.0 would provide a path to future smart factories, which would have the potential to help stabilise and grow high value manufacturing in the UK."

According to Holliday, future manufacturing is all about time-to-market, individualisation and flexibility. Factories will need to be smarter, more connected and more productive in order to compete.

Dramatic streamlining

"Industry 4.0 has the potential to dramatically streamline the conventional order-design-manufacture-supply process enabling customers to communicate requirements directly with the manufacturer's production systems, which will generate the data needed to make the product, order the necessary raw materials from suppliers, schedule manufacturing time, organise despatch of the finished products and take payment," suggests Ken Christie, director of UK EPLAN, a

specialist in the development of CAD software.

Talking about systems communicating directly and collaborating with each other is easy, Christie says. "Achieving this is difficult, especially when the systems belong to different companies, as they inevitably must if meaningful horizontal integration is to be achieved."

Smart factories will also need to be connected to their supply chain. By being better linked, companies will be able to better manage inventory levels and offer 'fleet-of-foot' flexibility.

Industry 4.0 is industry's way of applying the disruptive capabilities of the IoT and big data and this drive towards intelligent manufacturing has been driven by the falling price of microprocessors, which means that



intelligence can be built economically into any device or system.

The advent of low power processors, intelligent wireless networks and low power sensors, when combined with 'Big Data' analytics, has led to a booming interest in the Industrial IoT.

Building intelligence into more and more devices, however, means more data will be produced.

"IIOT or M2M has been around in one form or another for many years," says Gadi Lenz, chief scientist at AGT International.

specialist AGT has developed data software capable of tackling complicated problems. But he warns that, as a term, 'data analytics' is too often overloaded, with people meaning different things.

"Advanced analytics includes things like machine learning, which in turn requires more than an Excel spreadsheet or simple rules based engines to work effectively. At AGT, we have a growing number of data scientists working to tackle difficult IoT problems that require complex analytics."

weighing up the pros and cons of investing in IoT and data analytics," says Lenz. "Our responsibility is to show them how they can save or make money out of the data they are collecting. In a few years, I think most businesses will wonder why this was ever different."

The impact on UK manufacturing from embracing IIoT and data analytics was estimated by CEBR in a report published last year. This suggested Industry 4.0 could boost UK factory productivity by as much as 22% if the UK automated to the same level as Japan, which is assessed to have the highest deployment levels in the world.

While much is being made of the IIoT the networking needs of industrial devices and applications are distinct.

"In OnWorld's global survey of industrial wireless system network users, reliability and security were the two most important concerns cited. This is not surprising if you consider that a company's profitability, the quality and efficiency with which it produces goods and worker safety often rely on these networks. This is why reliability and security are essential for industrial wireless sensor networks," suggests Joy Weiss, president of Linear's Dust Networks group.

Much like the IoT, the adoption of Industry 4.0 is being held back by worries over security and concerns that too many consortia and industry bodies are vying over standards.

Despite that, Lenz believes the crucial issue is customer education. "There is certainly some push back from customers; they've heard of the IoT and kind of understand the benefits. But there is still plenty to do to encourage them to embrace it. While there are challenges, it is not technology that is holding this back; rather, it's simply explaining the benefits to business from its adoption.

"The concept of mass customisation is set to be the new industry paradigm, but it will need a new breed of manufacturing engineers, computer scientists and IT specialists to understand and implement increasingly complex tasks," he concludes.



"Many companies we deal with use sensors to manage their machinery more efficiently. They use sensors to do something in real-time, whether that is controlling a process or making changes to a production line. But when you ask them what they do with this data, beyond addressing an immediate need, they don't understand the question.

"Modern manufacturing systems generate reams of data that can tell you so much more about the manufacturing process, such as monitoring the long term health of machines or identifying those elements of the process likely to degrade first," says Ross Yu, product marketing manager with Linear Technology's Dust Networks product group. "The knowledge gained from in-service monitoring can allow customers to predictively maintain critical equipment, avoiding unwanted and expensive downtime."

According to Lenz, analytics

Complex analytics are required by manufacturers who are themselves trying to manage increasingly complex operations and who are looking to optimise production processes.

Complexity is ubiquitous, with companies having to manage movements in costs and prices, manage multiple plants and deliver products that can be made from diverse combinations of inputs.

This is where advanced analytics will have a crucial role to play providing better understanding of the effects that variations anywhere along the value chain can have on the production network as a whole.

Another major benefit for companies is better cross-unit collaboration; business decisions, which have traditionally been made in 'silos', can now be made with a clearer sense of the constraints and trade-offs involved at a corporate, rather than departmental level.

"More and more companies are

The advent of low power processors, intelligent wireless networks and low power sensors, when combined with 'Big Data' analytics, has led to a booming interest in the Industrial IoT.