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How manufacturing execution systems can improve process capacity

by Chris Parsons

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Industry 4.0 and automation & robotics have grown in importance in today's manufacturing landscape. What role do these technologies have in improving process efficiency and capacity? Chris Parsons, Critical Manufacturing, explains how manufacturing execution systems (MES) can improve process capacity.
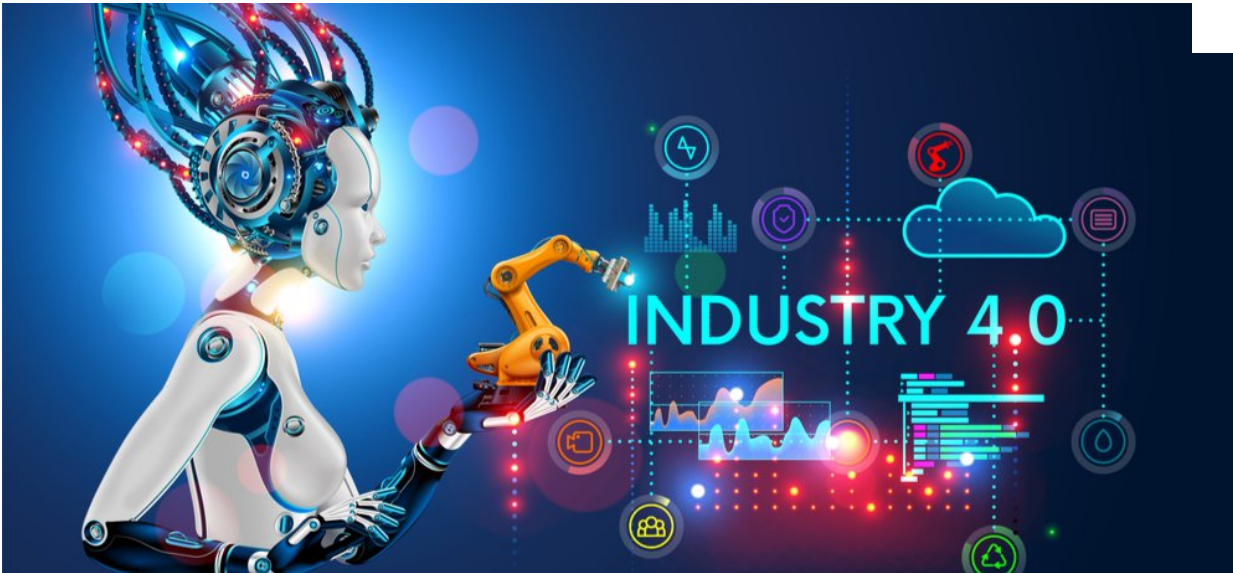
The latest, future-ready MES, based around Industry 4.0 technology, is set to help medical device manufacturers increase production efficiency, enhance quality, facilitate compliance and meet demands for medical devices.

New technologies and advances in medical care are changing the medical device market, creating opportunities for manufacturers but also presenting them with challenges. Increasingly sophisticated devices; small batch, high-mix orders, and demands for improved quality all sit alongside pricing pressures and the need for competitive edge. The Industry 4.0 (I4.0) manufacturing model offers a way for businesses to meet these demands, increase production efficiency and improve process capacity. The backbone of this model and pathway to a smart factory is a modern manufacturing execution system (MES) that can error-proof and future-proof medical device manufacturers against quality issues, regulatory pressure and constant change.

I4.0 adds intelligence to materials, products and machines. Rather than travelling linearly through a production line, waiting for any bottlenecks to clear, smart materials and products can negotiate the most efficient route to get the services they need. This minimises the impact of machine maintenance, calibration or breakdown, as the product takes an alternative, more efficient route without operator intervention.

A new breed of MES is the backbone of the I4.0 production model. It brings visibility and control across the shop floor and into the wider supply chain. To handle the distributed intelligence within a smart factory, this new MES is based on decentralised logic and can handle vast quantities of data. It also integrates wider production and logistic processes, enforcing procedures to ensure compliance with industry standards and company procedures. It can check that machinery is certified and calibrated, that operators have the correct certification, and that processes are operating within acceptable control tolerances. Any deviation can be raised in real-time and actioned. This adds to efficiency, lowers costs and helps reduce errors.

A modern MES should also measure and help improve overall equipment efficiency (OEE) and yield, reduce cycle-time and increase delivery fulfilment. It contains complete and accurate data about the entire production process and so inherently provides a complete electronic device history record (eDHR). Having this integral record will reduce the time and pain of audit processes as well as reducing the risk of regulatory violations. This can free resources that would normally be dealing with exceptions or prolonged audit processes, to concentrate on innovation both in terms of product and process enhancements – further adding to levels of efficiency and competitive advantage.

Getting personal

Having a smart shop floor whereby products find the most efficient route through production not only increases production efficiency and capacity, but also offers a way to easily produce small batch or personalised products. Traditionally such orders would need considerable manual input. Adding intelligence to the products, however, means they can navigate their way through the services they require without operator intervention. This significantly reduces production cost and shortens delivery timescales. Controlled by the automated process is also less prone to human errors and, once again, higher levels of quality, efficiency and consistency can be expected.

The power of digitalisation

The Industrial Internet of Things (IIoT) and I4.0 technologies have revolutionized the ways in which real-time data can be used to optimise production. If the MES offers a completely integrated digital twin, new possibilities are created whereby augmented reality (AR) scenarios can be used to further increase operational efficiency.

AR arms operators and technicians with a clear and comprehensive picture of everything they need to complete required tasks or resolve issues efficiently. Having this information immediately available reduces the potential for errors, particularly in setup and maintenance operations. Even the most complex tasks, such as assembly operations can be completed quickly and confidently with the guidance of native, real-time AR within the MES.

With a new era in medical device production comes the dawn of a new type of MES. These systems take plant monitoring, control, guidance and optimisation to new levels. Their intelligence and ability to analyse vast quantities of real-time data mean they can respond quickly to dynamic changes on the shop floor and help optimise the use of materials, machines and human resources to improve overall process capacity.

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