Industry 4.0 Needs an MES on Steroids

Critical Manufacturing

The Industry 4.0 (I4.0) philosophy needs the next generation of Manufacturing Execution Systems (MES) to make it a reality. These I-4.0 optimized MES can take the masses of data produced by the Smart Factory and give it context; turning it into useful, actionable intelligence for real-time operational decision making. They can be used to ensure compliance with overriding processes such as logistics, engineering, operations and quality. They can provide the foundation for Advanced Analytics and deliver cloud services for different functions within the business.

The Internet of Things (IoT) is a big part of the I4.0 model. Using the latest miniaturised electronics available; smart materials, products and machines can interact with each other in dynamic manufacturing processes that will drive production efficiencies to levels never before seen. The masses of IoT data collected from a smart factory, however, are no use without contextual information. Without knowing details such as which equipment the data refers to, settings of the equipment when the measurement was taken, details of the batch of materials being processed, etc; the data collected cannot be translated into valuable information. This is needed for real-time decision making and offline analytics based on Big Data and Machine Learning to identify problems and solutions that will further improve processing efficiency. There are many good Big Data solutions already available in the marketplace and these are continuing to evolve. An MES should not, therefore, incorporate its own Big Data or Machine Learning solution, but leverage the advantages presented by existing solutions. It thus needs to incorporate structured and unstructured data exports and provide the ability to pass results of analysis and associated decisions back to the shop-floor.

The distribution of intelligence throughout the shop floor means that the I4.0 model is inherently a decentralized one. To support this, the MES also needs to act decentralized – not physically but logically with autonomous agents, products and tools that create a shop-floor marketplace. Importantly, however, the MES must support the transition from a centralized into a decentralized shop-floor, because I4.0 is a journey and will not happen overnight.

Having distributed intelligence throughout a plant requires good connectivity. MES need to seamlessly integrate IoT devices as they are added and make them part of the shop-floor assets so they can be controlled. For example, if an IoT device is added to collect pressure data, the MES framework needs to be able to set the frequency of measurements and associate these with data collection objects.

While products or materials can communicate with shop-floor machines, compliance with wider processes such as quality, logistics and engineering still need to be applied. This vertical integration is essential through the MES to link manufacturing and engineering processes with the shop-floor.

Of course, not all the information needed for a completely efficient manufacturing plant lies within the facility. Horizontal integration of the MES can provide transparency throughout the whole supply chain. This will enable the decentralized production model to be extended to other factories, enabling them to compete to perform transformation steps on products to create a Manufacturing as a Service (MaaS) model.

MES will further need to integrate mobile solutions needed to support the I4.0 convergence of operations, information and automation mobile solutions. In the future, interaction with supervising operators will be via mobile devices with self-downloading apps specific to the piece of equipment the operator is approaching. These apps will have great usability, as we expect from the consumer apps we all use day to day, and provide the specific functions the operator needs for that piece of equipment.

Summary

I4.0 is the 4th Industrial Revolution. A highly evolved MES on steroids is needed to make this vision a reality. There are many aspects and features this next generation MES requires but, at its heart, it needs to support the decentralized logic on which I4.0 is based. These are exciting times for manufacturing plants and the benefits of the autonomous shop floor are far reaching in terms of productivity, the ability to economically create fully customized products, and the many cost savings I4.0 offers. The right MES will be central to a successful migration path to I4.0, working alongside existing systems and machinery. It will ensure the full reach of I4.0 can be achieved with MaaS models while protecting against any loss of quality by imposing the necessary wider business processes.

The advantages I4.0 has to offer means this revolution will happen. It may take time to fully realise its potential, but those that do not plan

for this more efficient manufacturing model may well put their whole business at risk in the future.

About Critical Manufacturing:
Critical Manufacturing empowers high performance operations for some of the most advanced manufacturers worldwide with innovative software technology and advanced services. Its new generation Manufacturing Execution System (MES) is an Industry 4.0 centerpiece, incorporating all necessary integration, mobile, connectivity and logical decentralization features. This deep, unified system increases performance, control and quality for complex manufacturing operations. The company is part of the Critical Group, a private group of companies founded in 1998 to provide solutions for mission and business critical information systems.

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