Factories of the future: Connected everything

-By Ashwani Mishra, ETCIO.com

Industry 4.0, smart manufacturing, the next industrial revolution – whatever you might want to call it – is more than just a flashy catchphrase. The idea of connected manufacturing or smart factory is becoming increasingly pervasive.

Factories and their machines across the globe are getting smarter as connected products and systems operate as part of a larger, more responsive and agile information infrastructure. The aim is to reap benefits and improvements in efficiency and profitability, increased innovation, and better management of safety, performance and environmental impact.

Industry 4.0 involves the heavy use of automation and data exchange in manufacturing environments, encompassing areas such as cyber-physical systems, advanced analytics, the Internet of Things (IoT), 3D printing, and cloud computing, among others.

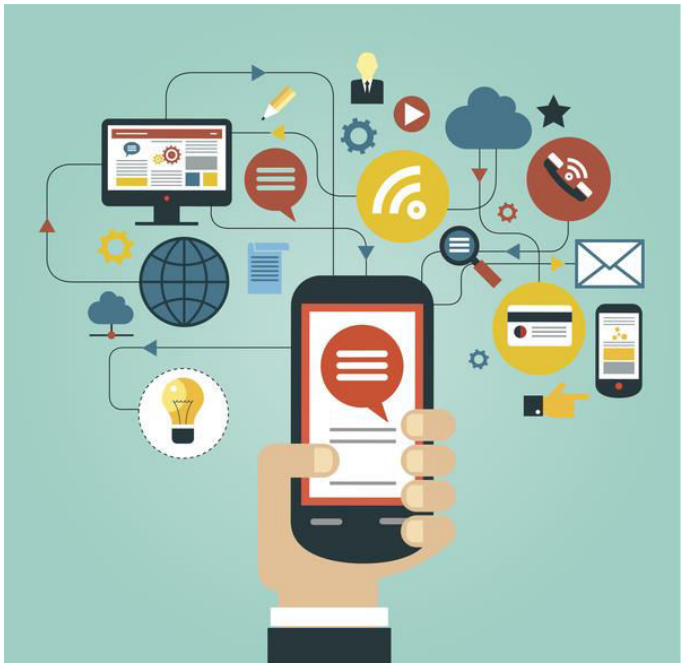
Not a utopia but reality

Reports peg the smart factory industry to touch USD 215 billion (Rs. 14.4 lakh crore approx) by 2025 and there has been no major economy in the world that is not embracing it.

Take the case of Siemens' PLC manufacturing plant in Amberg, Germany, where it has taken digitalization to the point by automating the production of its automation systems. The result is a reported 99.99885 percent *perfect* production quality rate—an impressive one given the plant produces around 12 million Simatic PLCs each year. Another example is of Bosch that achieved a 25 percent output improvement for its automatic braking system and electronic stability programme production with the introduction of smart, connected lines.

At Tesla's Gigafactory in Nevada, mobile robots called automated guided vehicles or AGVs are being used for moving items from one point to another. Besides the AGVs, the Gigafactory is also equipped with robotic arms that assist humans in making the battery packs at the plant.

And it's not just the western companies riding the smart manufacturing trend. Back home at Mahindra & Mahindra's Nashik plant, there are robots building car body frames while a similar scene plays out at the Tata Motors unit in Pune. Factory floors in the plants operated by Godrej and Welspun use the Intelligent Plant Framework that connects every machine node in a factory and understands the rate of work and efficiency. The aim of the framework is to let businesses reduce waste and organize production flows.



These examples clearly illustrate that the fusion of real and virtual worlds of production is happening now. Machines are conversing with machines; humans are capable to talk with machines and vice versa.

Our country's thrust towards "Make in India" has taken cognizance of Industry 4.0 and begun its positioning in this space. Our first smart factory — moving from automation to autonomy — where machines speak with each other, is being set up in Bengaluru at the Indian Institute of Science's Centre for Product Design and Manufacturing with a seed funding from The Boeing Company.

Getting smart and how

Smart manufacturing is all about driving digital value chains, and in the process creating more agile and market focused competencies.

One of the key building blocks towards this for organizations is to define strategic goals tailored to meet their requirements and select core competencies that they want to digitize. This will ensure that they streamline

processes between business units and across operations, such as production, logistics or customer care.
It is also crucial that leaders prepare their organizations and the support functions for a journey of change culture and management. This will require doing away with conventional wisdom, and include innovation and knowledge exchange between employees.

CIOs will need to develop a joint strategy with other C-level executives and support the discussions, for example, on more-transparent processes, quality or knowledge exchange that leverages technology as a platform.

However, as with any major shift, the journey towards Industry 4.0 has its own set of challenges.

Factors to worry in smarter delivery

While technology is a significant enabler for smart factories; skills/expertise has been rated as a key technology inhibitor for faster digital adoption. Additionally, there is a lack of experience and manpower to create and implement smart systems along with reluctance from stakeholders and investors to invest in new technologies.

Information security is another fear factor in the adoption of Industry 4.0 as new systems will be integrated and more access will be provided to such systems. With less human intervention, keeping up with the reliability of the production process can be another barrier. For successful cyber-physical communication, a high level of reliability and stability is required. In some cases, this can be difficult to accomplish and sustain. Finally, any form of automation is always considered as a direct threat to job security.

In time, manufacturers will need to iron out these issues and consider the shifts that they will require to make before embracing Industry 4.0. To succeed, business leaders will have to work actively and think out of the box to incorporate ideas and systems that may never were have been considered. They will have to question everything, right from rethinking their strategies and business models, to discovering the right investments.

The fourth industrial revolution may not have happened yet, but the march has already begun.