Educating Budding Engineers through Operational Technology for Industry

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Manufacturing has emerged as one of the high growth sectors in India. India is expected to become the fifth largest manufacturing country in the world by the end of 2020. The sector's contribution to the country's GDP stood at 16 51 per cent in 2016 Micro, Small and Medium Enterprises (contribute nearly 8% of the country's GDP, 45% of the manufacturing output and 40% of the exports. The present era is Industry 4.0, the fourth industrial revolution which is based on information technology and operational technology. To make progress in such an era, the MSMEs must be made even more efficient and ready with necessary technologies. Lean Manufacturing is a set of techniques, based on various minor to major breakthroughs that help in reducing cost and hence increase productivity.

Since many years, the number of sick MSMEs has been increasing year after year in India. Various schemes were launched and are still being launched by the Government of India to increase the competency of MSMEs. They are helping in all respects but still there is a wide scope to take the lean awareness and its benefits up to the ground level. Industry 4.0 is a new phase of the industrial revolution, in which existing factory automation is being integrated with IT networks and systems. It essentially represents the application of the latest advanced digital information technologies to industrial activities. The term Industry 4.0 derives from the belief that this is the next (i.e. fourth) major disruption in the manufacturing value chain.

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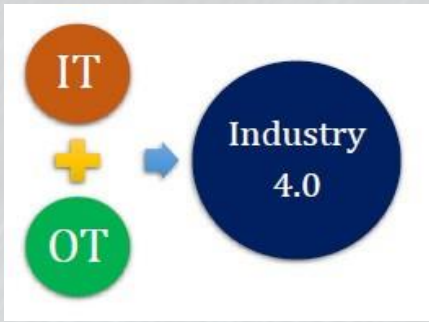
In general, there are four types of technologies that will come into play as we enter the next industrial revolution:
•Data, compute, and connectivity (including "Big Data," IoT/Machine to Machine (M2M), and Cloud)
•Analytics and Artificial Intelligence (AI) including machine learning and advanced analytics applied to large datasets.
•Human-machine interaction (UI, touch-screens, virtual reality, augmented reality)
•Digital-analog/physical conversion - the interface between the digital and physical realms; includes 3D printing and additive manufacturing, advanced 3D scanning, advanced robotics, and energy storage and harvesting (i.e. conversion of physical to electrical and back).

It's our responsibility to make the students aware of this. According to the joint report of NASSCOM and FICCI, by 2022, 37% of the Indian workforce will be engaged in different job roles and 7% of the workforce will be doing the jobs which do not even exist today.

It has been noticed that units are so engaged in the day to day management issues that they don't have time and resources to dedicate for a strategic understanding of the need and acquiring means of various techniques which would help them in enhancing their productivity and hence being competitive in the world. Lean Manufacturing is a set of techniques, which have evolved over a long period and are based on various minor to major breakthroughs that help in reducing cost and hence increase productivity.

Lean is also the major backbone of the Industry 4.0 revolution. The fourth Industrial revolution is based on 2 major technologies: Information Technology and Operational Technology. Therefore, Lean philosophy plays a major role in it. If we want our industries to get ready for this 4 th revolution, we must imbibe the culture of Lean within them. The major challenge now for the higher educational institutes is about how to make the budding engineers ready for this Industry 4.0. Also, it is equally important to get to know that along with Information Technology, Operational Technology is something where skill-based training and support needs to be provided to the budding engineers at the institute level.

The question which may arise in the mind is "Why Operational Technology? Does it have any correlation with the Industry 4.0 technologies?" The answer is "Yes", lean tools are serving as the backbone for the Industry 4.0 technologies, that too in terms of providing the necessary thought process in their development.