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## SMART MANUFACTURING – THE WAY FORWARD

**Business leaders have just started to tap the tip of the iceberg as far as the potential of smart manufacturing is concerned, and the possibilities remain immense.**

In the near future, a world will exist where machines will do your bidding. It will not just be limited to algorithms, but also take note of several other variables that influence the product. The concept of smart manufacturing is slowly making this dream a reality. Through the use of intelligent technologies, big data, and analytics, it is assisting in the reduction of inefficiencies throughout the pipeline, from idea generation to product sales. Business leaders have just started to tap the tip of the iceberg as far as the potential of smart manufacturing is concerned, and the possibilities remain immense.

In a recently concluded roundtable organised by BW Businessworld with some of India's top leaders associated with the manufacturing sector, a wide range of topics were discussed, including the adoption of smart manufacturing, priorities of smart manufacturing in the short and long run, digital enablers and technologies which can power digital transformation (DX), and the challenges involved in making a product smarter.

**Smart manufacturing is inevitable:**

Fabex Steel Structures, Co-Founder and CEO IV Ramana Raju suggested that smart manufacturing is the need of the hour and will help overcome several challenges.

Raju said, "Currently, in steel manufacturing, we buy the raw materials from Tata Steel, JSW Steel, so when the materials on the receipts ship in, there is no proper accountability for several factors, including: traceability of materials, wastage accountability, and finished goods movement, amongst others."

These are the key areas in which smart manufacturing will help provide a solution. Raju commented, "A seamless end-to-end traceability of the product should be essential. Also, IIoT (Industrial Internet of Things) can play a key role in minimising wastage, and supporting the company's bottom-line."

Raju highlighted that currently, they have been using the latest equipment and types of machinery to provide better products. The new technologies can also be used to minimise wastage, and have a positive impact on improving overall efficiency and profitability.

Autodesk, Country Head for Design, Manufacturing & Media Entertainment - India & SAARC, Parminder Singh defined smart manufacturing as the digitalisation of the complete manufacturing process in design, production, supply chain, distribution, and sale. In simple terms, it is the conversion of analogue processes into digital.

Singh highlighted the fact that the pandemic played a major role in businesses adopting smart manufacturing.

He said, "Organisations are adopting smart manufacturing as they want to increase productivity, and efficiency to prepare themselves for the future. Organisations with a strong digital backbone were able to overcome the challenges faced by the pandemic more efficiently."

Singh underlined that data can help overcome several problems. He commented, "Once you start collecting the data, it can provide insights that may not have been clear before. For instance, you can now figure out the bottlenecks that were not visible earlier."

Organisations that do not adopt smart manufacturing have a high chance of being left behind. Singh explained, "As per a study done by Deloitte, 51 per cent of their respondents applied smart manufacturing in one way or the other. The results of the study showed that the group that was working on smart manufacturing initiatives saw a 10 per cent increase in production output and almost 11 per cent more utilisation of their capacity."

**Adopting the smart manufacturing methodology:**

Mekhos Technology Services, Co-Founder & CEO, Anurag Batsal classified smart manufacturing into two different domains: one based on the product point of view, and secondly, from a machine point of view.

Batsal said, "When I talk about smart manufacturing from a product's point of view, it means that the product needs to answer some basic questions by itself: where was I made? What was used to make me? What are the parameters that you should use to process me? How do you get help when I am functioning incorrectly or not functioning at all? If the product can answer all these questions by itself, then we can conclude that the product is smart."

Batsal also highlighted smart manufacturing from the machine point of view. He mentioned, "If a machine can say the status of its operation, the overall efficiency of the equipment, recognise the fault which is coming in automatically, and maybe nudge the user to get it into troubleshooting."

"Also, everyone is getting more and more energy conscious. So, if a machine can tell what the carbon footprint, or energy consumption per product output, is, that would be great for us," he added.

**Smart manufacturing to result in better productivity:**

Jakson Group, COO-Solar Business, Anurag Garg suggested that the potential of smart manufacturing is beyond imagination. He said, "Smart manufacturing could start with your vendor being on the connectivity, to the customer service being connected. Certainly, it will take time to visualise it, but it is not a very far-fetched dream."

Garg said, "At Jakson, we have recently set up a new plant which is fully automated. We also have legacy plants which are partly automated. The first and foremost advantage of the fully automated plant is that the robotics is doing the decision-making and very few manual interventions are required, thus resulting in better productivity."

"Reduction in manpower cost, fatigue levels & zero defects are all possible due to automation, technology & smart data analytics," he added.

Garg mentioned that smart manufacturing will optimise the efficiency of both facility managers & overall operations, and with centralised remote monitoring you can measure the performance of several plants under one roof.

**The focus has now shifted from efficiency to resiliency:**

PGP Glass Ltd., CDO & CIO, Yoganand Tadepalli focused on both the pros and cons of smart manufacturing.

Tadepalli said, "The pandemic has now shifted the focus from efficiency to resiliency. A lot of companies have the best systems, but if they are not agile enough, it can be challenging. Resiliency becomes critical. Having good data and analytics helps to be more agile in the entire process of developing products."

Tadepalli pointed out the benefits of improved predictability, which is a result of smart manufacturing. He said, "With data and analytics, and in-house data scientists that we use on an everyday basis, our factories are now well connected. Not only do we have the best systems, but real-time insights are being generated every second which is improving predictability."

Tadepalli also mentioned a few flip sides to smart manufacturing, including the initial cost of implementation, the need for systems thinking, and technology risk management in lieu of systems integration.

**Priorities for smart manufacturing:**

Super Auto Forge Pvt. Ltd., Managing Director Murali Shankar S focused on a few key areas of smart manufacturing, including production management and supply chain management.

Murali shankar said, "Smart manufacturing will play a vital role in production management. We need to have a limited batch size with setup change being reduced to a minimum. How will one tune their process and resources to meet the ever-changing customer requirements? This remains a very key area concerning the production management system."

"Also, how efficiently one handles the art of supply chain management effectively is going to determine the agility of the business, and the quality of the overall process," he added.

Murali shankar mentioned that in India, one can get cheap labour, but maintaining consistent quality with the manual operations is a big challenge. He said, "If you have to do a good, quality and consistent job, then automation is a must. With the cost of resources going up, how well one manages their resources and should know which resource to use in which area. Also, reskill and up-skill is going to become an important factor in the long run."

**Understanding your business drivers is of paramount importance:**

While speaking about smart manufacturing, Parminder Singh recommended that one should understand the business drivers of their organisation. "One needs to define the areas where they can have an impact, and identify the enablers for technology that will help to achieve those business objectives."

He added, "Autodesk believes in the value of outcome-based selling because we want to understand the business drivers that our customers want to secure. This also gives the senior management a view of the KPIs, what's measurable, the ROI, and what will they get at end of the day when the project is completed."

He pointed out the importance of digital twins in smart manufacturing. He explained, "A digital twin of a product can help the team virtually analyse everything before going out and implementing it on the actual product. Autodesk has cloud services like Fusion 360, which help customers in designing sustainable products. Fusion 360 is a cloud-based CAD/CAM tool for collaborative product development."

Yokogawa Electric Corp., Vice President – Digital Innovation & Services, Naveen Kashyap said, "For me, the chief key enabler is data. IIoT sensors measure a variety of parameters. Data can now be transported effectively and securely using 5G technologies to cloud-based platforms, which provides scalable compute, storage and resources on-demand to run your analytics powered by AI."

"Digital twins can feed on data, and make simulation, asset management, and analysis a piece of cake," he added.

Kashyap went on to comment that the narrative that we use today would have seemed like science-fiction back in 2017 a couple of years ago. He pointed out, "In the next couple of years, smart manufacturing will become the norm, as solutions evolve with time. As increased adoption of sensors and subscription-based models of the cloud lower price points, the democratization of technology empowers non-experts to manage sophisticated systems thereby accelerating smart manufacturing."

**The challenges involved in making products smarter:**

Bharat Bijlee Ltd., Vice Chairman & Managing Director, Nakul Mehta commented, "The convergence of sensor technology, edge computing, cloud computing, and connectivity have made things affordable."

Mehta also posited that products for a smart manufacturing ecosystem have to take into consideration various factors. He said, "A smart manufacturing ecosystem has several challenges, including communication with other assets, data security, and providing customizable visualization so the user can see what he wants. There are a lot of information options in terms of OEE, uptime, productivity of plant, machine or operator, diagnostic alerts, etc."

"One needs to make sure that the product adds value to the consumer in a way that it integrates seamlessly into his smart ecosystem, and provides actionable condition monitoring to minimize downtime; this goes beyond just descriptive and predictive analytics. Prescriptive action can also be suggested," he added.

Mehta opined that making products smart has also benefited their manufacturers. He commented, "As manufacturers, we are able to remotely monitor what is happening, and we can predict failures or understand how the product has been installed and used in the field. A lot of learning is also fed back to the consumer about the correct selection and usage of the product and so on."

Mehta pointed out that the products should be priced in a way that makes economic sense to the customer. He said, "There are multiple models available, such as a subscription model, a pay-per-use model, outcome-based model etc. This is something which needs to be figured out on the basis of what the user wants. There is no one-size-fits-all concept which can apply here. The bottom line is that it must add value or help make the user's life easier"

The panellists included the discussion by reaching the consensus that smart manufacturing is the way forward, and businesses should embrace it in order to stay ahead in the competition.