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Manufacturing 2022: Making Machine Tools futuristic



By **OEM Update Editorial** ✉

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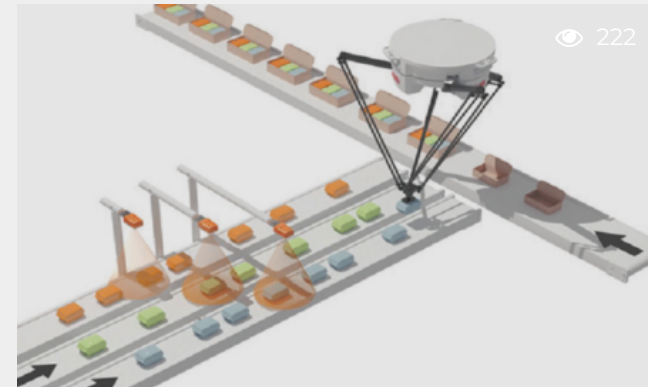
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Industry experts shared the perspective on the imminence of robots used for machining, manufacturing technology and digital manufacturing advancing towards Industry 5.0.

The Indian machine tool industry, driven by technological improvement, is constantly innovating, helping the industry grow. The future of manufacturing that took shape with industry 4.0 is advancing towards industry 5.0. The sensors attached to machine or cutting tools are providing grounds for data analysis

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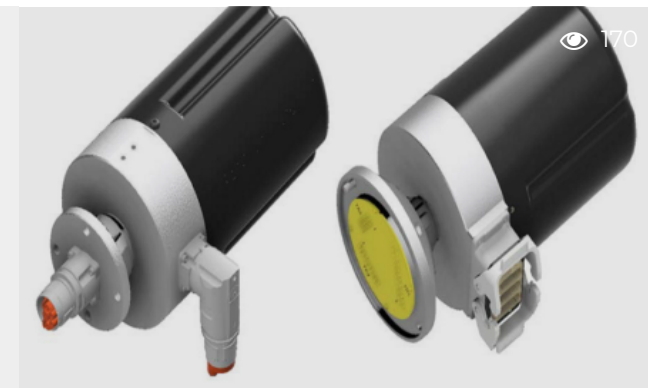
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and robotic manufacturing. The machine tools industry will focus more upon human machine interface thus optimising cost for productive manufacturing.

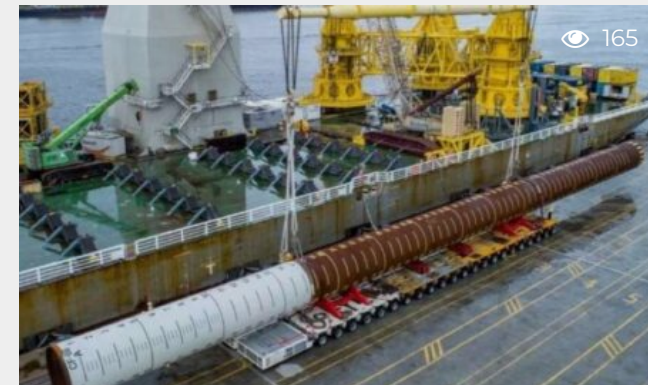
Manufacturing technology involves new-age technologies in both metal cutting and metal forming making the future of the tool industry. Digital manufacturing that focuses more on 3D and additive manufacturing is the futuristic trend. The concerns due to pandemics stand to reshape and alter the future of manufacturing, needing emphasis upon technical training and skilled manpower; creating engineers of tomorrow.

Machine tools: acceptance of robotization by Indian manufacturers

Industry 4.0 is very industry specific. And, certain industries who do not care about 4.0 or 5.0 for them; even 2.0 is more than sufficient, Mr. Vaibhav Shah, Managing Director, API Metrology. For machine tools itself, it is very industry specific, whether it's a foundry industry or an aerospace, or defence equipment or railways. It depends on the application. And as far as India is concerned, a very low cost manpower is available. Manufacturers do not really go or opt for automation just because the cost of production is



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always on their mind. When there are applications like aerospace, defence or energy or things which are more complicated, and where more access and involvement is required, it is seen the industry 4.0 or 5.0 coming in, in its own way, as people want a very high level of productivity. Many customers seek a complete solution, where robots would be used for machining, like a typical application is, drilling on an aircraft wing. This is a very typical application where robots do this in a free form manner. If the same job is required on a CNC machine, that might cost more time. Whereas a robot can be a perfect tool for that kind of application provided, it has a vision or is there a motion of that robot that is completely under control of some metrology guided system. So this is the next thing that is mostly going to emerge.

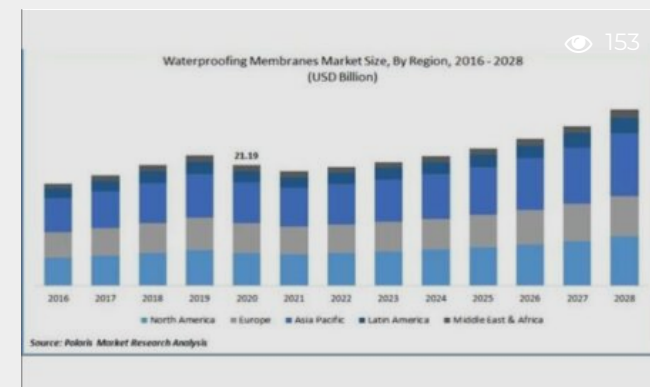
Essence of CNC getting enhanced and its impact on machine tool sector

Mr. Avinash Khare, Head-IMTMA Technology Centre, Pune feels, CNC is going to increasingly become more communicative rather than becoming a standalone controller for a standalone machine tool; it will become a powerful part of the production system. "So, it will talk to production scheduling, it will have to talk too, even ERP for that matter. So, it will have much more power



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and it will be self optimising, self learning, self evolving, and self improving”, adds Mr. Avinash.

Some of the features are increasingly going to come and some of the CAD/ CAM features may become integral parts of CNC going further. Commenting on Industry 5.0, he felt industry 5.0 has evolved for premium brand made products first of all. The American philosophy is that anything that is at premium has to come with human creativity, let it have human variability as well. But human creativity and human variability and human intellect must be powering the premium products.

Highlighting that Industry 5.0 is addressing the premium products basically, Mr. Avinash opined, “If you are having run of the mill jobs in manufacturing shops, it will really not deserve industry 5.0; it will be industry 4.0. Industry 5.0 is not an extension of industry 4.0. In fact, it is the opposite of industry 4.0. So you basically graduate to go one more step and it becomes from industry 4.0 towards industry 5.0. Industry 4.0 is all about total automation and industry 5.0 is all about human and machine interaction.”

Now, the point is to bring in the human touch through Artificial Intelligence. AI is good and AI is also bad simultaneously. If machine tools start behaving like



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human beings, will they not become as temperamental as human operators? Is the moodiness coming into a CNC machine or even in an automation system, for that matter, for robots? It is not so. Further, whereas AI has been permitted in autonomous driving for vehicles in the European Western world, it is not yet permitted in machine tools and industrial automation. Industry 5.0 is first of all restricted to premium products, class products where human creativity and human touch is important. So the question is, we have to decide what we need and what does not fit everywhere.

According to Mr. Uzair Hasim Shafiul, Industry ExpertManufacturing, R & D, ASDC, generally, what happened when you looked at the history of the industrial revolution. Definitely, all the revolution standards are interlinked with the previous one. So, industry meant third industrial revolution elements like robots, computers, PLCs, etc., and then Industry 4.0. Right now, no sufficient facilities are available for 4.0. Therefore, 5.0 is a remote possibility.

In industry 4.0 Cobots are used. So by looking at the Cobots, people are able to see the videos for industrial robots and Cobots, where the difference is a safety aspect. Mr. Uzair feels, “If you look at any kind of the OEM manufacturing process line, we are concerned, we



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always will say only one word – safety first. We cannot directly just put the cobot along with the operator and just tell the operator that we have got a new technology, and you can work along with this.”

It is plausible, most of the companies have to adapt to the industry 4.0 components, then think about 5.0. Automation is vital in helping manufacturers compensate for manpower shortage and eliminate time-consuming and error-prone processes right from the plant floor to the back office. Technologies like AI, machine learning, and smart machines can improve decision making, quality, consistency, and uptime.

India to be self reliant in terms of having its own sensors

While talking about futuristic machine tools, self reliance on sensors is very, very critical. Mr. Rajashekara H V, Advisor and Head IMTMA Design Institute highlights, for the sensors compatible with industry 4.0, number of devices are available to capture the various data from the machine tool, especially when you talk about the vibrations occurring across the entire machine, the tool vibrations that are coming across the energy measurement. If you look at the temperature rise happening for every element; it needs to be measured in terms of bringing the quality and

accuracy. Today, we have various kinds of sensors available at doorstep. It is only the question of integrating the technology – that is a sensor capturing the data. Sufficient platforms are available to capture the data and analyse the data and bring it to the top floor. Data is very essential to make ultimate decisions from the point of sensors and adopting the technology that reaches to a very decent level of understanding. Implementation may not be the challenge, only the configuration of what needs to be done at shop floor is the only decision; which Mr. Amitabh Chaturvedi, Founder and Director of InnovaPoint Infotech, also felt about – as three different baskets, those are all very essential to make a blueprint of what needs to be done at shop floor and putting everything once it is configured.

Much of the investment or much of the time is not required and data can be flown from the shop floor to the top floor without meddling the data among the people. The data which is currently flowing without the technology can be manipulated by some people; which is not really coming to the decision makers to know what exactly the problem is; or what exactly is the production data. Since the data is not flowing to the top floor, there are probably some wrong decisions taking or taking the decisions or implementation of the right

problem at the right time, at the right cost, which is going to be plugged by using all these technologies.

Are challenges in implementing Industry 4.0 similar to Industry 5.0

According to Mr. Amitabh, even in Industry 4.0 the human aspect is very important. It may change a little bit in 5.0. The human aspect will be more prominent. So, those challenges will be there. They might undergo few changes, but again any new initiative will have its own challenges. In this case, a kind of large scale standardisation is required, and with respect to status in terms of digitalization among manufacturing spaces, it is generally felt that every factory has its own process. It is important to give flexibility to everyone to have their own processes implemented. But once we have success, we see more and more references how others have done and that they have been successful. With time, we will start to draw some kind of best practises. We have many references to know what works and what does not work. So, standardisation probably means a little ahead of us right now.

Moving from Industry 4.0 to Industry 5.0

There is no right definition of 5.0, and also industry is

not matured enough to understand the need of 4.0. To get a complete picture it is needed to adapt to Industry 4.0 and go to the next level. The industry can grow to the level of 5.0 after achieving industry 4.0 level. There is no benchmark for anybody as to what extent it is required for shop floors to attain the level of a smart factory.

Each company has its own process; its own manufacturing demands and its own technology. Firstly, as an Indian manufacturing company, it is necessary to adapt and get the benefit from 4.0. Then we can look at graduating from Industry 4.0 to Industry 5.0. Only a couple of corporate companies have every facility and every technology. Let us look at the SMEs, small and medium and micro companies, whether they are graduated enough to adapt to Industry 4.0, whether they are willing to carry out that! Most of the SME companies still do not understand what Industry 4.0 for the technology per se means and what benefits they can draw out of this technology.

Before the majority of Indian companies migrate to Industry 4.0 in terms of technology and start getting the benefits out of that; there is Industry 5.0. Still it is a figure that is appearing across the manufacturing industry, and elevation from Industry 4.0 to 5.0 is an

option. It is better to completely understand the technology of 4.0, implement it in a major way even for the micro level companies, and then probably the level of Industry 5.0 can be achieved.

Conclusively, skill development will become a very arduous task as the manpower needs to be trained to use cutting-edge technologies and learn machine language. Large amounts of investments are required to fully implement Industry 5.0, whereas the manufacturing landscape is dotted with MSMEs who would not have the resources to do so; hence the adoption to Industry 5.0 a big challenge.

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