



# THE RIGHT PROCESS

PROCESS MANUFACTURERS COMBINE COMPONENT MATERIALS AND APPLY THEIR PROCESS IN SUCH A WAY THAT THOSE COMPONENT MATERIALS CAN NEVER BE RETURNED TO THEIR ORIGINAL STATE

BY BINDU GOPAL RAO



"The usage of 3D printers has evolved radically and these systems are now being increasingly used as production machines."  
— Vikas Khanvelkar



"The manufacturing industry has a perpetual requirement of building for scale. But, it becomes challenging when there is a demand to build highly customised products without generating waste or losing productivity."  
— Shekhar Rohira

1. Digital manufacturing solutions help companies streamline processes through designing ideal plant layout.



"As it lacks the self-learning capacity, the efficiency is dependent on the designer that builds it and hence machine lacks any learning capability."  
— Munira Loliwala

2. In process manufacturing, the role of CAD essentially becomes a factor of workflow and process efficiency.



2

**CAD SOFTWARE ARE REQUIRED TO DEVELOP** parametric 3D models or product designs. These CAD files form the basis for product design analysis and simulation to evaluate product performance and robustness under anticipated conditions and forces.

Parametric designs are also required to measure tolerances, and 'Design-for-Manufacturing'. CAM software are essentially required for ideal tool path generation for the CNC machines. This helps manufacturers in manufacturing machineries efficiently. PLM solutions help companies manage product design data, manage and align resources including men, machine, material, and money thus facilitating companies achieve highest efficiency in handling their design and development process right from product design to manufacturing.

#### TECH EDGE

New technologies such as digital manufacturing solutions help companies streamline manufacturing processes through designing ideal plant layout through analysing critical facets such as assembly line planning, and robotics and human ergonomics analysis to facilitate smooth coordination between humans and machines.

These technologies help companies achieve higher productivity, while also meeting working safety parameters. Vikas Khanvelkar, chairman & managing director, DesignTech Systems, says, "The usage of 3D printers has evolved radically and these systems are now be-

ing increasingly used as production machines to develop customised parts for end use applications. They turn out to be cost effective, less time consuming, and modifying the design and printing the parts is easier in 3D Printers than in the traditional approaches."

In manufacturing companies, CAD Software is used to design a new part during the design stage. Then CAM helps in developing the tools (tools are the moulds that make the actual product) that would be used in manufacturing of the actual part. Operating and controlling all these processes along with data analysis is done with the help of ERP.

Karthik Shankaran, chief innovation officer, Detroit Engineering Products adds, "In the manufacturing industry, we see CAD/CAM and ERP is being effectively integrated into a collaborative platform. With Systems Engineering, IoT Big Data and Intelligent product design being a priority for the manufacturing industry, connecting them with Business Intelligence under the ERP architecture is a critical part of digital transformation. This aggregation of information and analytics is shortening "data to information to decision making" process in the manufacturing industry."

#### INDUSTRY ADVANTAGE

Process Industry would greatly benefit from the new age manufacturing technologies. Digital Manufacturing technologies have evolved substantially and can now facilitate companies to not just design, optimise,



3

and streamline their manufacturing plant layouts, processes and resources but also integrate manufacturing with the product design functions seamlessly to better plan production processes.

"Latest technologies in manufacturing and product design and development can help companies augment product design and manufacturing efficiency by eliminating the 'wastes' to enhance the quality and quantity of productivity thus bettering the overall manufacturing performance. Issues concerning to constraints in manufacturing or feasibility of manufacturing, popularly referred to as "manufacturability concerns" or "ergonomic constraints" are very difficult and highly expensive to rectify once the plant, work flows and processes are established," adds Khanvelkar.

Digital manufacturing solutions facilitate conducting prior validation that would help companies identify such concerns at the earlier stage of planning and hence save considerable time and cost of rectification. Even the existing plant could be rendered virtually and modified to see how manufacturing efficiency can be enhanced which then can be implemented by the companies in their physical plant space, he adds.

Already CAD systems are used effectively by designers in the process manufacturing industry to coordinate and to mitigate clashes while installation. Virtual validation is useful to check and ensure future maintainability and integrity.

"Process manufacturing industry was used to collecting process data using PLC or SCADA systems and the use of IoT was not unusual. Now the process data collected along with analytics is helping carry out

WITH CAD, THE  
PROCESS OF  
INNOVATING,  
VISUALISING, AND  
SIMULATING CAN BE  
DONE AT INCEPTION  
STAGE ITSELF.



"With IoT, Big Data and intelligent product design being a priority for manufacturing, connecting them with Business Intelligence under the ERP architecture is a critical part of digital transformation."  
— Karthik Shankaran

process optimisation. With ERP now it is possible to tie the requirements, compliance with inventory, analytics and process automation. In this way, integration is a step in the right direction for the process manufacturing industry," says Shankaran.

#### PROCESS MATTERS

In process manufacturing, the role of CAD essentially becomes a factor of workflow and process efficiency. Autodesk's Product Design and Manufacturing Collection integrates professional-grade CAD, CAM and CAE technology and creates a collaborative work environment for the workforce at all points of workflow. This way, the product teams, engineers, customers, business decision makers, factory work-

3. The principle that CAD brings to the manufacturing space is to adopt a 'design first' mindset.



"Software errors and compatibility of devices are minor issues that pop up from time to time. The software is not inclusive."  
— Amit Patil

4. Cloud and online CAD software run in a local browser or through a web or mobile app.

ers and everyone involved in the process can come together to a single platform to be an integrated digital workforce.

For example, Inventor and Inventor CAM can be used together to set up and generate toolpaths for machining operations that instantly updates whenever the design is modified. Likewise, a combination of Inventor, AutoCAD, Navisworks and Factory Design Utilities, can generate 3D models of factory layouts created in AutoCAD and use them to help to detect potential collisions and perform virtual walkthroughs of the proposed design.

Shekhar Rohira, country manager, D&M & M&E (India & SAARC), Autodesk, adds, "Players in the manufacturing industry have a perpetual requirement of building for scale and being sensitive to the market needs. But, it becomes challenging when there is a demand to build highly customised products for

## BUSINESS INTELLIGENCE AND ANALYTICS WILL CONTRIBUTE TO THE UPGRADATION OF MANUFACTURING.

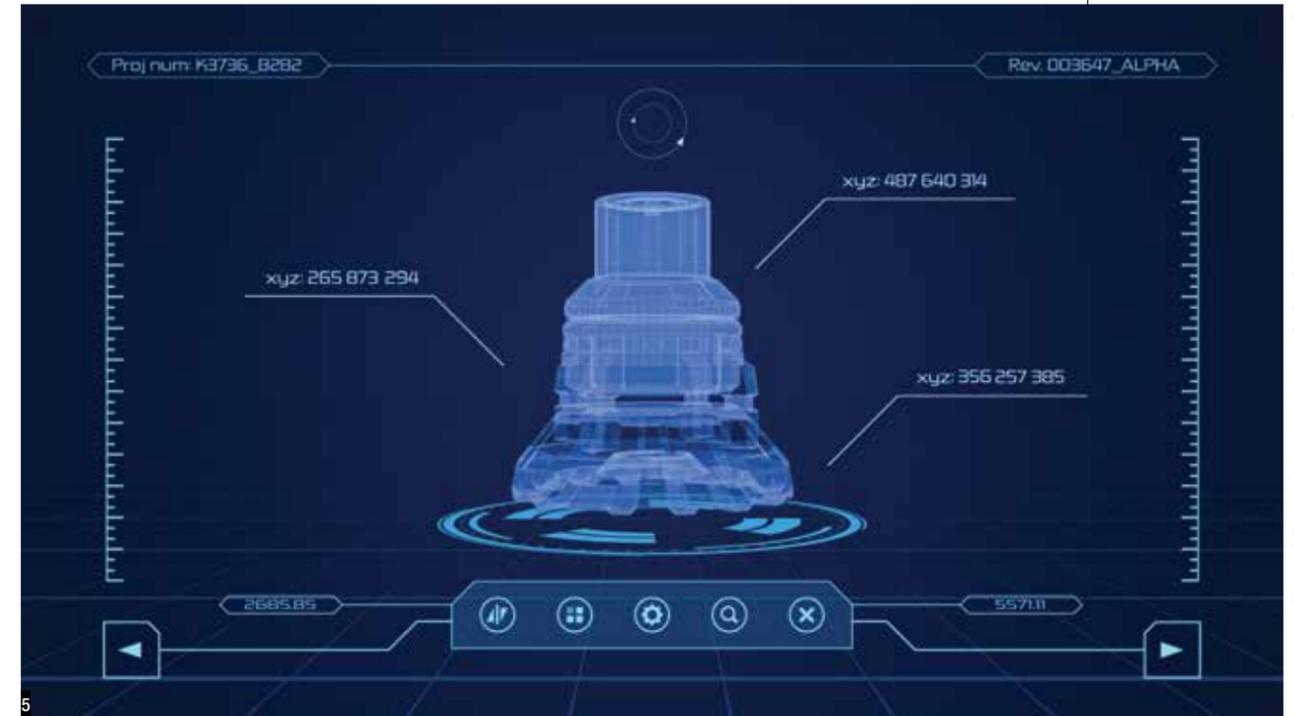
industries without generating waste or losing productivity. This is where the significance of using the right tools from the design stage itself, arises. Design thinking at the ideation stage helps manufacturers visualise the entire process from ideation to production, sitting at their desks."

With the help of CAD, the entire process of innovating, visualising, simulating and making can be done at the inception itself with minimal wastage. This way, one can arrive at a Minimum Viable Product (MVP) that is subsequently scalable. Thus, the principle that CAD brings to the manufacturing space is to adopt a 'design first' mindset whereby there is a 'digital twin' before the product becomes a reality, he adds.

### CHALLENGE FACTOR

Some of the major challenges in using CAD/ CAM in process manufacturing is lack of awareness. People are still using the old traditional method, lack trained manpower which is why companies are still reluctant to use the latest technology.

Amit Patil, design engineer, Electrica Engineers India, opines, "In CAD/CAM there are software licence issues due to lesser availability of licenses. Software errors and compatibility of devices are minor issues that pop up from time to time. The software is not inclusive. Hence, the entire product cannot be made in a single software. Specific software is needed for different components of the same product (e.g., optics in lens have to be made in optics design software). No major challenges are faced while using ERP system since the system is customised for every industry."



With the help of CAD, the entire process of innovating, visualising, simulating and making can be done at the inception itself with minimal wastage. This way, one can arrive at a Minimum Viable Product (MVP) that is subsequently scalable.

Thus, the principle that CAD brings to the manufacturing space is to adopt a 'design first' mindset whereby there is a 'digital twin' before the product becomes a reality."

Munira Loliwala, business head, EMPI, Team-Lease Services, avers, "These tools like any other system have their limitations of application, for complex mechanical system, it fails to cover the aspect of ease of serviceability. As it lacks the self-learning capacity, the efficiency is dependent on the designer that builds it and hence machine lacks any learning capability. These aspects are now covered by the research and development in the field of expert systems and research done in AI."

### CONTEMPORARY CUES

The latest trends in this technological segment are Smart Manufacturing, gearing up for Industry 4.0 backed by Industrial IoT, and propagation of advanced technologies such as Augmented and Virtual Reality.

Adoption to the latest technologies would help companies attain their goals of product design and manufacturing excellence through efficient processes and systems that augment productivity. Also generate greater Return on Investment (ROI) and enable

them achieve higher cost effectiveness. These technologies would help them remain competitive and relevant in the fast changing market space.

Rohira adds, "Cloud-based solutions are gaining popularity rapidly, considering the workflow conveniences and possibilities that it offers. Cloud and online CAD software run in a local browser or through a web or mobile app, unlike traditional CAD software installed on a local computer. They offer many of the same capabilities as traditional CAD software but are updated through a remote server and are acquired through a subscription, usually on a monthly or annual basis."

Our complete PDMC collection is available on cloud, helping users take the power of Autodesk cloud software with them wherever they go, letting them draft, edit and view CAD designs on multiple devices, he adds.

Another trend seen in the industry now is the advent of automation in the design and space. For instance, robots are moving from the production line to the construction site; 3D printing is going from prototyping to production quality; and now we have the ability to make things of increasing complexity and fidelity much easier than before. Business Intelligence and Analytics features are becoming important features of an ERP that will contribute to the upgradation of manufacturing sector, it is to the delight of a manufacturer that companies designing these software's have understood the importance of customisability and ease of use. ■

5. With the help of CAD, the entire process of innovating, visualising, simulating and making can be done at the inception itself with minimal wastage.