

AUTOMATING THE DESIGN TO MANUFACTURING LIFECYCLE

10 KEY STRATEGIES TO WIN

eBook

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BOTTOM LINE

Speeding up new product development cycles, improving product quality and increasing yield rates happen when manufacturers integrate diverse design and manufacturing systems encompassing mechanical design, electrical design, design simulation and analysis, Computer-Aided Manufacturing (CAM), inspection, work instructions and ERP systems to create a unified design-to-manufacturing platform.

CUSTOMERS ARE DRIVING MANUFACTURING'S INFLECTION POINT

A new era of manufacturing has arrived, differentiated by focus on how to deliver excellent customer experiences at scale. It's evident from plastics manufacturers who serve multiple industries to the world's largest manufacturers producing millions of products annually. What the smallest to largest manufacturers all have in common is a new intensity to excel for customers on the dimensions of customization, cost, production flexibility and quality.

Taking a closer look at the factors driving manufacturing's inflection point shows why integrated, real-time systems that provide at personalization at scale are what it's going to compete and win in manufacturing today and in the future:

- **Customers are becoming collaborators in creation more than ever before.**

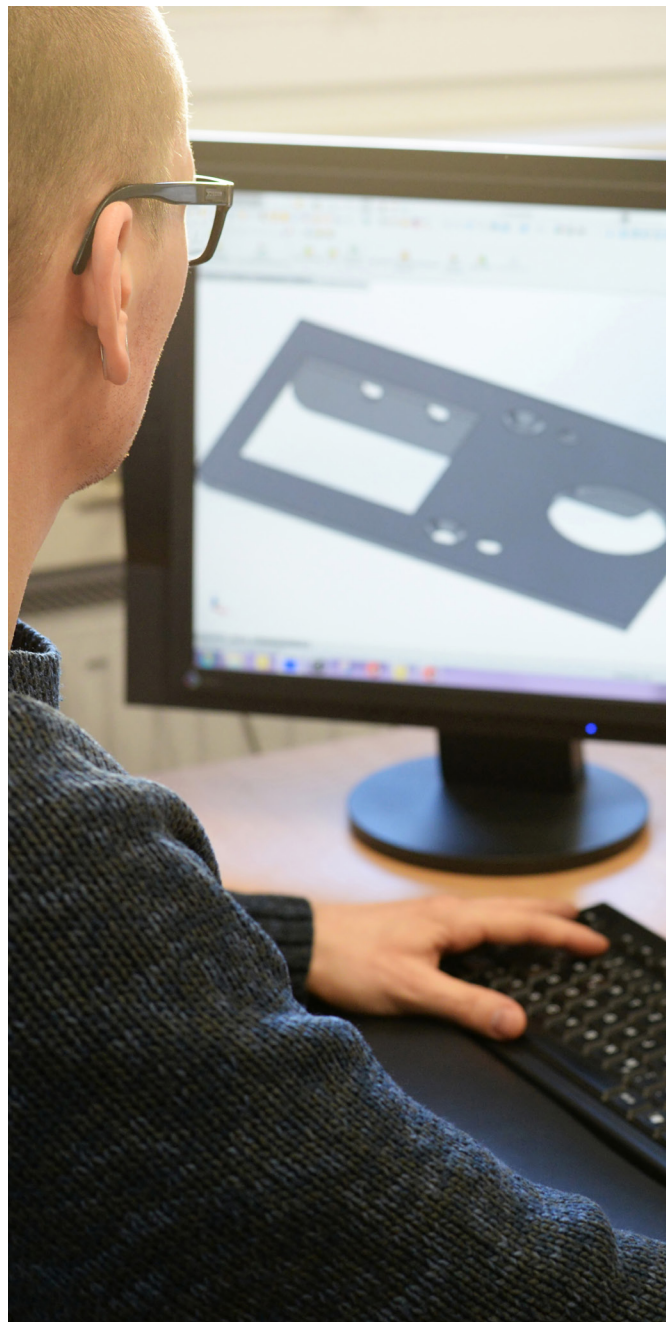
The majority of manufacturers today are integral members of supply chains, directly affected by the often rapid product change requests their customers receive from OEMs and globally recognized manufacturing brands. Existing approaches to Configure, Price, and Quote (CPQ) provide personalization at scale to a point. It's going to take a new approach to give customers more freedom to be collaborators in creation than CPQ allows for today. And that freedom starts by giving customers the opportunity to define a product model just once.

- **Customers want greater visibility in every phase of manufacturing starting with verifying their product functional specs are being interpreted accurately, product designs can scale for manufacturability, and they have a constant view of costs.**

Manufacturing's inflection point began when customers built compelling business cases that showed why verifying products' definition, manufacturing and cost need to be known before production begins. Customers' need for visibility is so great that manufacturers who have integrated their diverse design and manufacturing systems together and getting more orders and growing faster than their competitors.

- **Customers say short-notice production runs are the new normal, rewarding manufacturers who can provide them with their business and more growth.**

Knowing how to make workflows more efficient so valuable production hours on the shop floor can be freed up is a must-do to grow. The urgency manufacturer's customers have to get short-notice production runs done, often for customized products, is the fuel that is driving manufacturing's inflection point. Manufacturers who have integrated their simulation, electrical, Computer-Aided Manufacturing (CAM), inspection, work instructions and ERP systems into a design to manufacturing workflow know when they'll have short notice production runs available.



- **Customers' product designs are more configurable with a corresponding increase in materials costs, making real-time cost estimation a must-have.**

In this era of smart, connected products and the accelerating product lifecycles relied on to create them, costing tools need to provide real-time estimates in seconds. Designers and engineers need to continually check their designs against cost targets and manufacturers relying on quoting and product configuration tools are delivering 100% accuracy in their quotes. It's a proven fact from research completed at Gartner on CPQ selling strategies that the manufacturer who provides the first complete quote most often wins the deal.

- **Customer quality audits are more frequent and data-intensive, giving those companies with integrated design to manufacturing a competitive edge.**

It's becoming increasingly common for customers to ask for quality assurance test results to be included in every product shipment they receive. The more regulated the industry, the more in-depth the quality assurance reports and analysis needs to be. Aerospace and defense, energy, regional and national governments, life sciences, medical products all are asking for more in-depth quality reporting and are increasing the frequency of plant visits to complete periodic audits. Taken together, all the reporting requirements and in-plant audit visits are making an integrated manufacturing systems essential, with design to manufacturing delivering the most reliable, repeatable results.

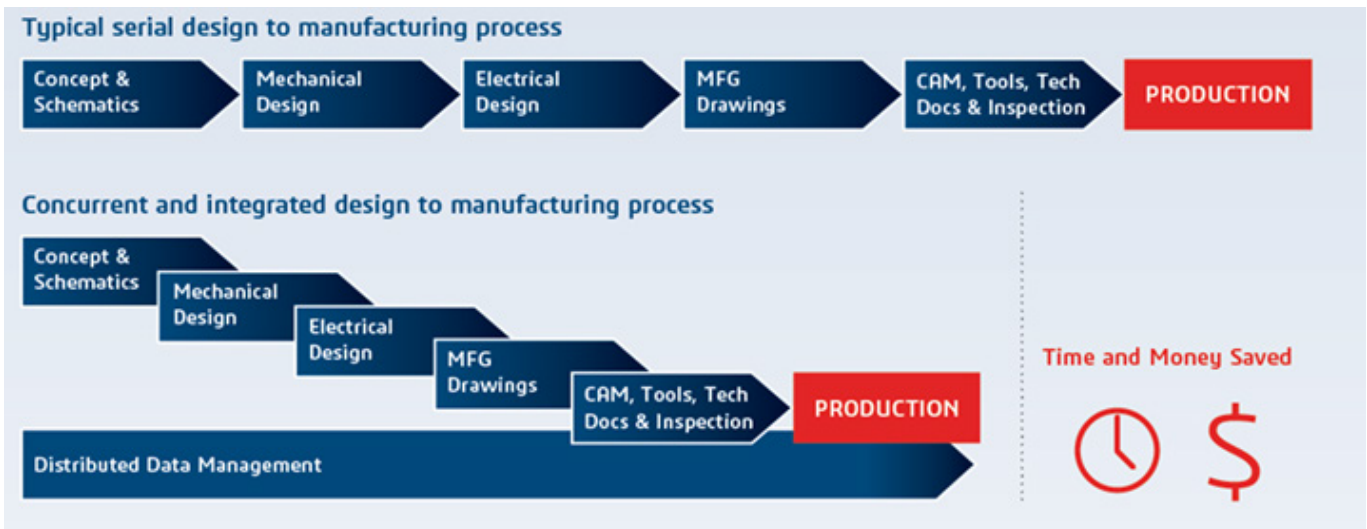
TURNING MANUFACTURING'S INFLECTION POINT INTO GROWTH

The more integrated product design, engineering, quality and production are the more likely a manufacturer is going to be able to flex and scale in response to customers' demands. Product models need only be defined once in the CAD system to serve as the multifaceted information needs of each phase of manufacturing. When simulation/FEA, Electrical, Computer-Aided Manufacturing (CAM), Inspection, work instructions and ERP systems all synchronized on a common product model, product quality improves, customer delivery dates get met and new products are delivering on time.

Taking on short notice production runs that deliver higher revenue and margins become possible. Taking a design to manufacturing approach to integrating every aspect of manufacturing makes it possible to fulfill customers' requests cost breakdown analyses by product configuration with their larger orders or audit data to meet international quality standards.

Manufacturing's inflection point is also being driven by the need to speed up new product development cycles, constantly improve product quality, and find new insights into how yield rates can be increased. The future belongs to manufacturers who seize intelligence and use it to compete and win more customers. By unifying the diverse systems of simulation/FEA, Electrical, Computer-Aided Manufacturing (CAM), Inspection, work instructions and ERP systems manufacturers are able to accelerate time-to-market for new products, meet tight customer delivery dates, and improve quality. The following graphic contrasts the typical serial approach versus a concurrent and integrated approach to the design-to-manufacturing process. The latter approach is saving manufacturers up to 25% or more production time while reducing costs.





In adopting a more concurrent and integrated design-to-manufacturing process, engineering, quality and manufacturing teams need to take more of a lifecycle-based view of each product, relying on their CAD systems' representation of product models as a single source of the product definition. When designers, engineers and manufacturing teams aren't using the same product definitions, product quality drops fast. Production machines and the teams running them don't receive accurate work instructions, and suppliers send components and materials that don't match the product design.

When there is an accurate, multifaceted definition of every product model in the CAD systems, product models can serve as the single source of a product definition, and all changes to the product at the bill of material (BOM) level can be propagated automatically through all functional areas. Concurrent design and manufacturing are possible at a significantly faster pace, since there's no need to freeze designs to include any product changes.



THE MANY BENEFITS OF HAVING A CONCURRENT DESIGN TO MANUFACTURING STRATEGY

Integrating design, engineering, quality and manufacturing systems enables teams to share design information in real-time, alleviating costly delays in projects and finding the root cause of quality problems before they cause production delays. The better the consistency and quality of collaboration and communication, the higher the probability new products will be delivered on time and at a high quality level. According to Decision Analyst surveys completed in conjunction with DELMIAworks and extensive customer interviews, the following are the key benefits to taking a design to manufacturing approach to unifying manufacturing and IT systems. The survey found that when real-time monitoring is used as the foundation for creating a design to manufacturing, time-to-market is accelerated up to 75%.

For manufacturers who adopt a concurrent design to manufacturing approach, they're able to more effectively troubleshoot product quality problems. One of the most valuable insights gained into product quality when real-time data unifies a design to manufacturing strategy is specific actions that can be taken on the shop floor to improve yield rates and reduce product scrap. Over time, the more integrated design, engineering, quality and manufacturing teams are, the greater the cost reductions they are able to achieve by reducing errors and increasing the scale and scope of their manufacturing strategies for specific products.

Another benefit is how a design to manufacturing platform enables all departments to use all data in real-time, alleviating the need for data extraction, translation or individualized analysis. When an entire organization is sharing the same system of record which is the product model, late product design changes can be made without a significant impact on the products' delivery schedule. One of the most valuable strengths of a design to manufacturing platform is its ability to propagate from design to manufacturing in real-time. Frequently customers will ask for last-minute design changes in response to their markets' changing needs or to be more competitive. Having real-time integration at the foundation of a design to manufacturing strategy enables every member of the team to immediately understand and react in real-time to what customers need.



Design To Manufacturing Increases Quality and Innovation While Cutting Costs

Manufacturers that adopt a concurrent and integrated design-to-manufacturing process—where their CAD, simulation/FEA, electrical, CAM, inspection, quality management, work instructions, ERP, and manufacturing execution system (MES) software are synchronized, with CAD systems' product definitions serving as the central product definition—can also increase their quality and innovation while cutting costs in three key ways.

Speed time-to-prototype

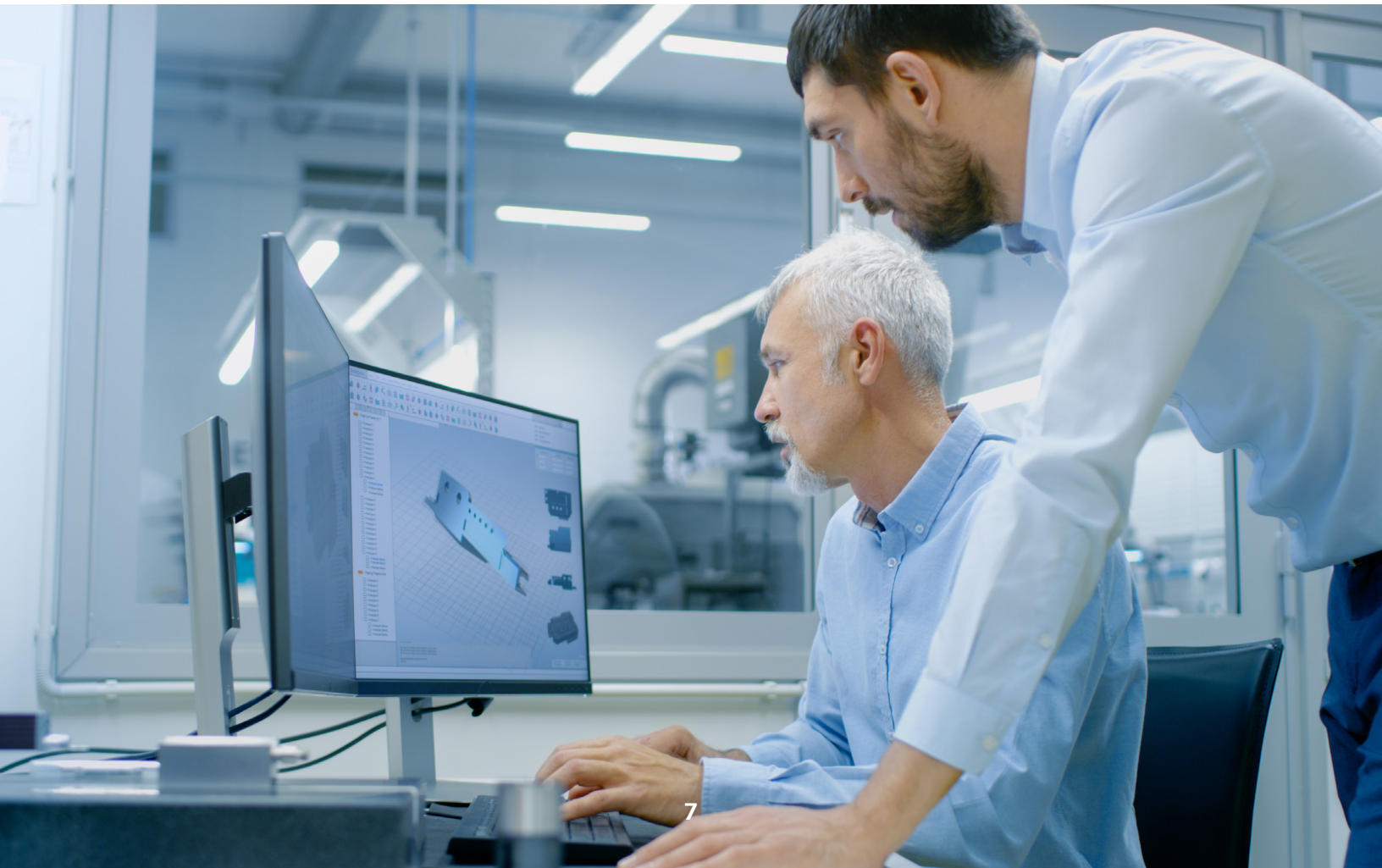
Syncing the diverse base of systems enables manufacturers to reduce the time-to-prototype exponentially while increasing product quality. When centralized product models managed in CAD systems are the main product definition engineering and manufacturing rely on, teams have the analytics, data, and information they need to take action, in the language or lexicon they speak. As a result, companies adopting this approach are seeing a proliferation of new product prototypes with fewer initial design and prototype errors while also protecting against and future production issues.

Foster collaboration

Manufacturers who adopt a design to manufacturing approach to managing the lifecycles of their products free up engineers and production teams to work interactively and solve manufacturing challenges faster. Manufacturing product engineers can use design to manufacturing environments or platforms to evaluate new product designs earlier in the product development process. And manufacturing scheduling teams can look at the impact of new models on existing shop floor workflows, as well wear and tear on new machines. This results in the ability to both increase manufacturability and reduce costs.

Pursue configure-price-quote selling

The total available market for a manufacturers' products increases the more a given manufacturer can offer customers and distributors flexibility in product designs. Taking a lifecycle-based approach where the centralized product model serves as the single product definition company-wide can free medical product manufacturers up to pursue a configure-price-quote (CPO) and product configuration strategy. This, in turn, can deliver higher gross margins by attracting customers who otherwise would not have purchased devices.



10 WAYS DESIGN TO MANUFACTURING DRIVES MORE REVENUE

Companies who excel at providing customers the freedom they want today for customizing products stand the greatest chance of dominating their markets five years from now. Design to manufacturing is the roadmap manufacturers are relying on closing the gaps between designers, engineers quality management and production teams. Presented below are ten ways Design-to-Manufacturing drives more revenue:

- 1. Eliminating disconnects between what engineering designed and what manufacturing can produce leads to more sales at higher gross margins.** Design to manufacturing closes the many gaps between engineering and manufacturing, enabling manufacturers to improve time-to-market and also create, design, product and sell more profitable customizable products. By unifying simulation/ FEA, electrical, Computer-Aided Manufacturing (CAM), inspection, work instructions and ERP systems into a single platform, manufacturers are driving higher gross margins too. Real-time integration enables all of these systems to share engineering and manufacturing data, further closing configuration gaps and driving more revenue.
- 2. Opens up new global markets by being able to personalize products at scale increasing Total Available Market (TAM) revenue size and growth.** Localizing products doesn't have to take months or years. When a design to manufacturing strategy is in place, product managers, markets, and engineers only have to change a product model once for a new national or regional market. Design to manufacturing increases the speed and scale of global expansion by simplifying product configuration management over lifecycles.
- 3. Real-time fine-tuning of new product features that specific customer segments want is now possible using design to manufacturing, accelerating sales cycles in the process.** When designers, engineering, quality and manufacturing can see how their product designs impact customer deliver dates via the design to manufacturing platform, both teams can work with product management to fine-tune product requirements in real time to unique customer needs and drive more sales.
- 4. Speeding up product development lifecycles for new customizable products that more perfectly meet customers' requirements, delivering new revenue is a major benefit of design to manufacturing.** The majority of a new product revenue ramps sharply up in the first six months following launch of a new product. By capitalizing on the unique cadences or clock speeds of every step in the production process, design to manufacturing platforms enables manufacturers to reach a new level of customer responsiveness and product quality and maximize launch revenue. By unifying these diverse systems, manufacturers are slicing through the performance paradox of product configuration, delivering excellent quality products while meeting challenging delivery dates.
- 5. Closing product configuration gaps with design to manufacturing improves customer order accuracy, fulfillment speed and product quality creating greater customer loyalty and follow-on sales.** The gaps between simulation/ FEA, electrical, Computer-Aided Manufacturing (CAM), inspection, work instructions and ERP systems cost manufacturers' valuable time that's spent solving order problems instead of excelling on each customer order. When these two systems are orchestrated on a common design to manufacturing platform, time-to-customer improves due to the unique cadences or operating speed of each system being synchronized with each other. The result is greater follow-on revenue from satisfied customers.



6. Extending the sales of best-selling products by adding new features to product models without disrupting existing production workflows is possible using a design to manufacturing strategy.

Design to manufacturing is based on a single, unified product data model stored in the CAD system that flexes changes as customers' preferences shift to new features or options. The best aspect of having a unified product data model is that the existing one being used in production can be duplicated then modified to support product line enhancements fast. Design to manufacturing extends the life of best-selling products by managing the many feature and product attributes including effectivity, product modularization, product model definition and master data models.

7. Improve the balance of revenue across configurable products to sell higher margin models while reducing margin exposure for the less profitable configurations using the insights gained from the design to manufacturing platform.

When design, engineering, quality and manufacturing all share the same data and manufacturing intelligence, it's much easier to align the entire company on designing, selling and building the most profitable configurable products. Design to manufacturing closes the gaps that make expensive pricing and profit margin mistakes happen.

8. Increase pricing accuracy and estimates by using the automated, real-time manufacturing cost estimation capacities inherent in the design to manufacturing platform.

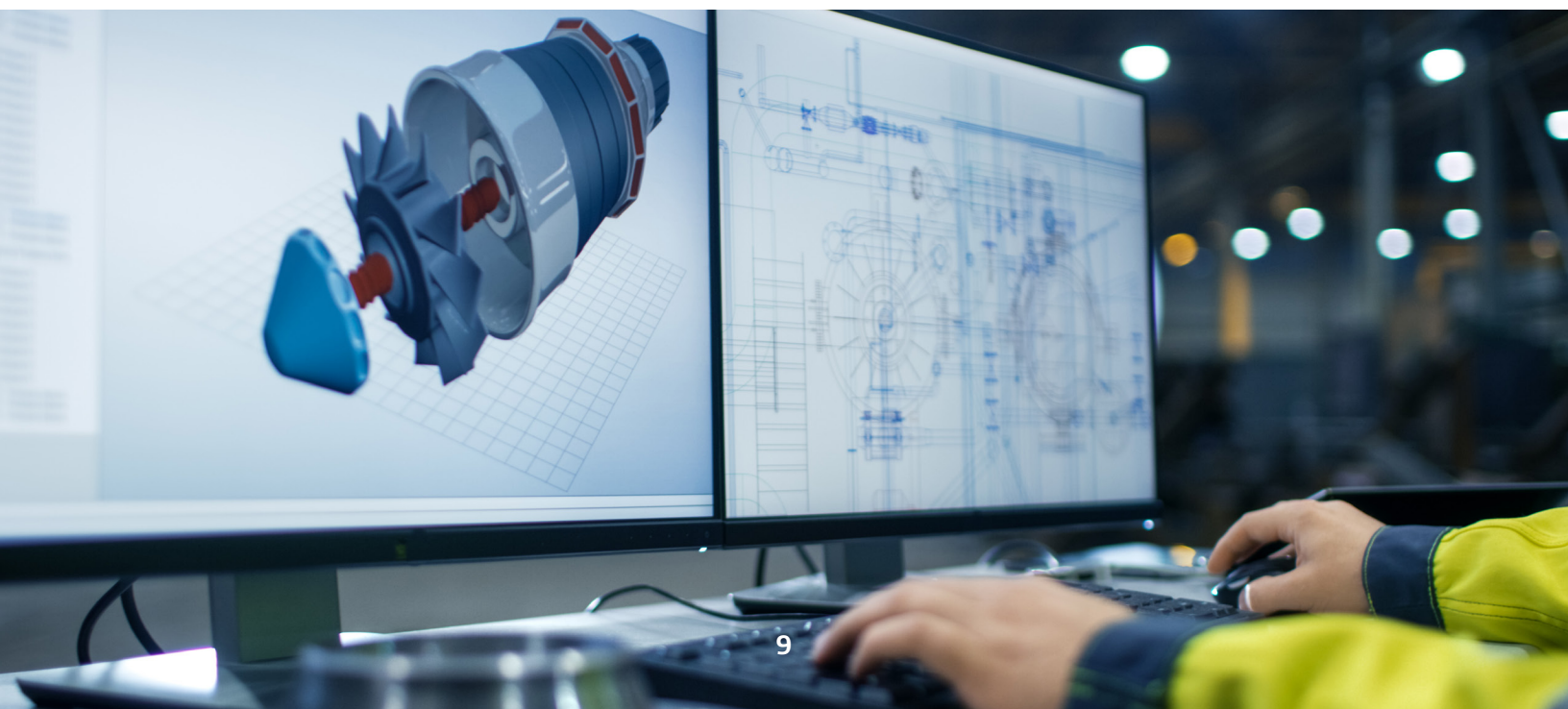
When each product's model is the system of record for essential costing and pricing data, real-time manufacturing cost estimation improves. Manufacturing has greater visibility into standard, direct, and indirect costs and can better manage production workflows to generate the highest margins possible.

9. Quoting accuracy improves by providing sales and marketing with a single definition of every product that can be sold in a make-to-stock, configure-to-order or engineer-to-order configurations leading to more sales.

Design to manufacturing enables manufacturers to move beyond the constraints that held them back from pursuing Configure, Price, Quote (CPQ) and product configuration strategies. When a single product model contains all the configuration data needed to scale from make-to-stock to engineer-to-order without requiring manually input data or additional work, the design-to-manufacturing process is significantly improved.

10. Automatically propagate product and design changes across all functional areas to accelerate new products to market while improving product quality.

Design to manufacturing speeds up new product development cycles, improves product quality, and increases yield rates. With a single product model serving as the master representation of the product, engineering, quality and production can complete tasks concurrently and further increase sales while reducing costs.



CONCLUSION

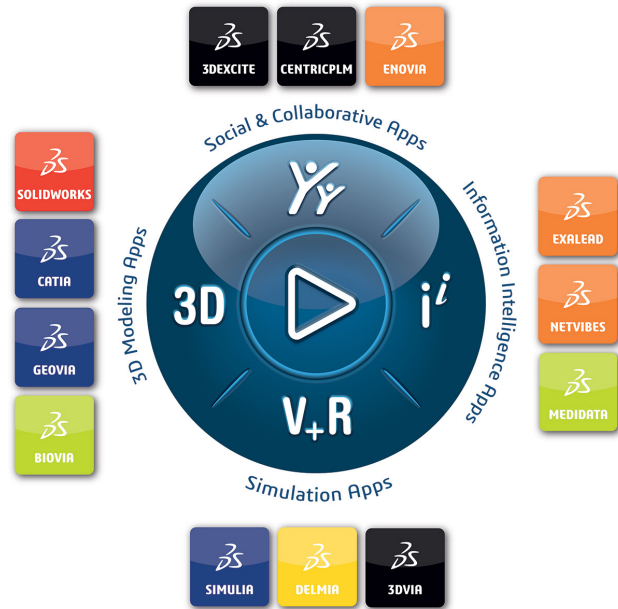
Taking a centralized product model approach that scales across the entire design to manufacturing process combined with a collaborative working environment helps to increase the levels of innovation manufacturers can achieve. A concurrent and integrated design to manufacturing process makes it possible for manufacturers to deliver products faster, at a higher overall level of quality, and at lower costs. It's time for manufacturing to adopt a more lifecycle-based approach to creating new products, one that brings together design, engineering and manufacturing interactively on a real-time collaborative platform.

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