VIEW POINT

Customization imperative: Can your operations manage unique customers?

The increasing demand for customized products and rapidly changing nature of consumer demand & preferences compel manufacturers to redefine priorities. Infosys experts discuss how the modern manufacturing ecosystem is shifting towards distributed manufacturing to enable mass customization instead of mass production.

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Since the introduction of the steam locomotive, industrial manufacturing has evolved by leaps and bounds with technological advances. The fourth wave of industrialization or Industry 4.0 is being ushered by the interconnectivity of devices and widespread digitization of manufacturing operations which enhances the performance of the enterprise across the value chain. Digital technologies and smart devices are serving as catalysts for manufacturing enterprises to unlock business opportunities across the value chain. It has been well established that the demand for bespoke products has resulted in a shift from traditional mass manufacturing to demand-driven and agile manufacturing.

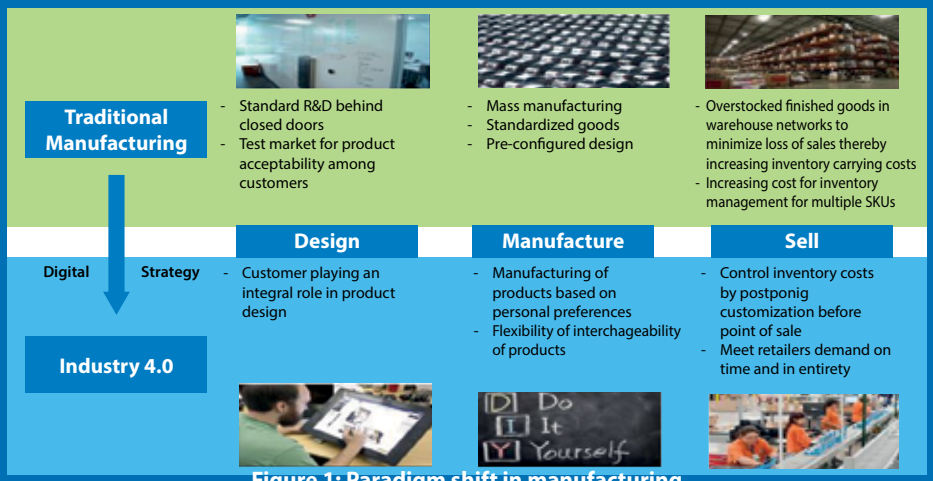


Figure 1: Paradigm shift in manufacturing

Broadly, three major shifts are reshaping manufacturing **(Figure 1)**. In the design stage, enterprises are moving from in-house R&D to co-creation with customers for product design. In the production stage, there is a shift from mass manufacturing to products based on consumer preferences. Finally, manufacturers are gravitating from high levels of finished goods inventory by delaying or moving the final finished goods closer to the point of consumption for customized / dynamic customer preferences.

Design democratization: Inclusive product design

Manufacturing is driven by changes in nature of demand and consumer needs. In such a dynamic environment, the design process needs to be agile and responsive. The influence of real-time social sentiment analysis and crowdsourcing for product design may well ensure consumer feedback is incorporated into modular design and utility of the products, eventually becoming the cornerstone of innovation in manufacturing **(Figure 2)**.

With users becoming increasingly well-informed, accelerated product replication and innovation are imperative. Consequently, product development and consumption lifecycles have contracted significantly. Speed in decoding and incorporating consumer preferences into existing and new products becomes a critical success factor for manufacturing enterprises.

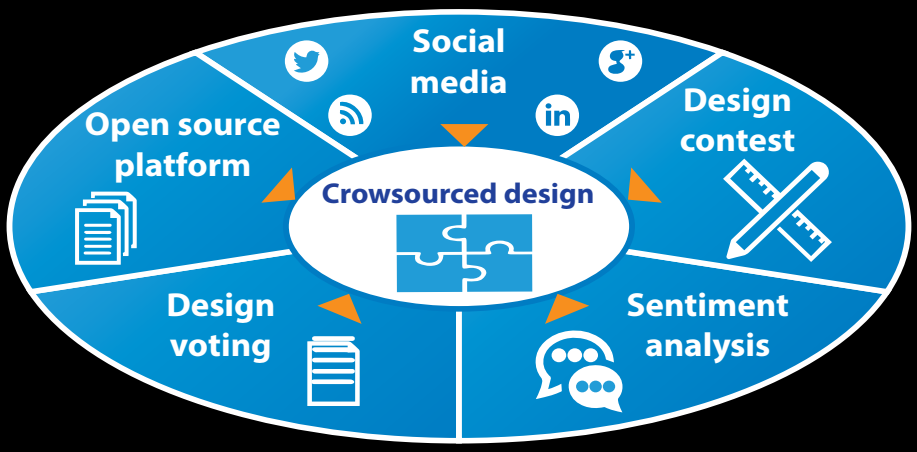
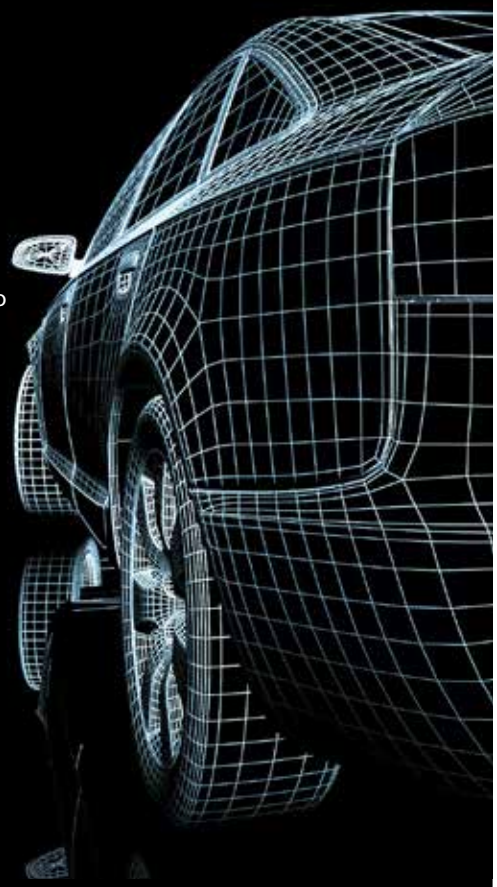


Figure 2: Design democratization



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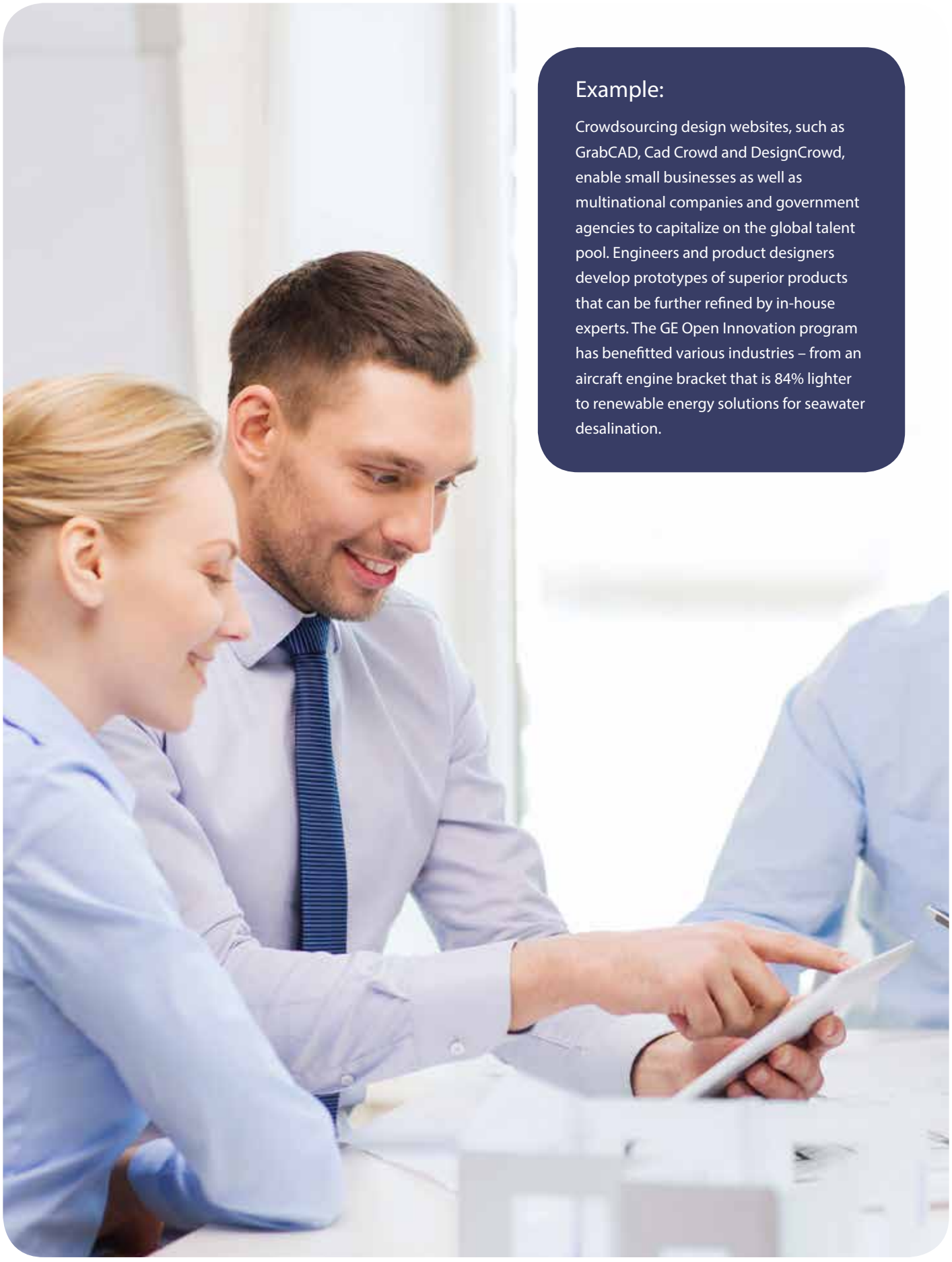

Example:

Crowdsourcing design websites, such as GrabCAD, Cad Crowd and DesignCrowd, enable small businesses as well as multinational companies and government agencies to capitalize on the global talent pool. Engineers and product designers develop prototypes of superior products that can be further refined by in-house experts. The GE Open Innovation program has benefitted various industries – from an aircraft engine bracket that is 84% lighter to renewable energy solutions for seawater desalination.

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Do-it-yourself (DIY): shifting the needle to a predominantly mass "Make to order" (MTO) model

The adoption of robotics and 3D printing have paved the way for the 'Maker Culture.' This movement has been spurred by the increasing demand for bespoke manufactured items, the efficacy of 3D printing for fabrication of prototypes and diminishing manufacturing costs. The 'market for one person' is driven by personal fabrication and design innovation. Legions of consumers seek to design and use personalized products or solutions. These discerning consumers prefer personalized rather than mass-manufactured products. While products for the masses will always be required, demand for personalized products will grow rapidly **(Figure 3)**.

Collaboration tools enable diverse levels of customization **(Figure 4)**. Do-it-Yourself (DIY) kits were traditionally confined to configurable products. However, the synergies between DIY and MTO lends itself to products and solutions across industries, for Business-to-Business (B2B) as well as Business-to-Consumer (B2C) segments. It is set to create a shift from mass manufactured Made to Stock (MTS) products to an MTO model with less reliance on a centralized mass manufacturing and semi-finished goods environment.

In the future, consumers will make metallic, larger, colorful, and high strength industrial components and finished goods from the comfort of their homes. Standardized chassis variants, panels, trims, and steering wheels can be created in a distributed manufacturing environment locally, based on local requirements, and can be printed at home or at a neighborhood facility.

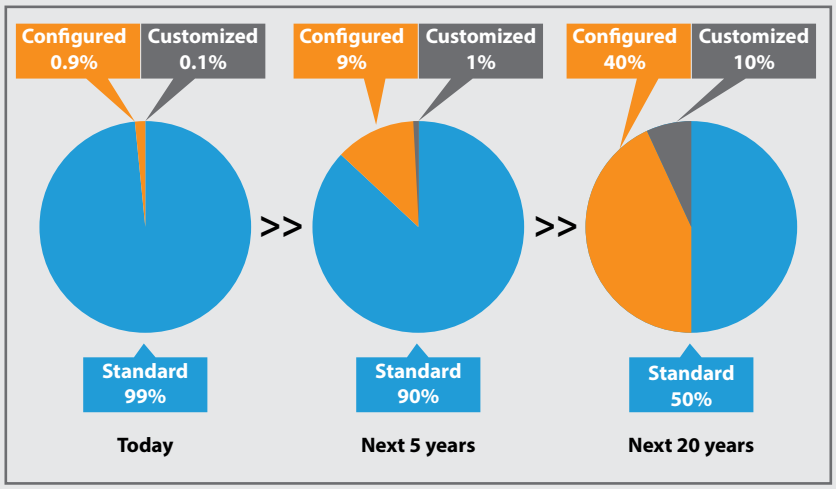


Figure 3: Shifting global demand of products and solutions

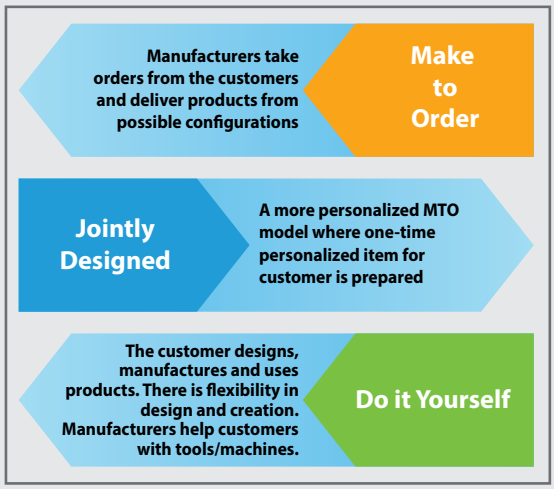
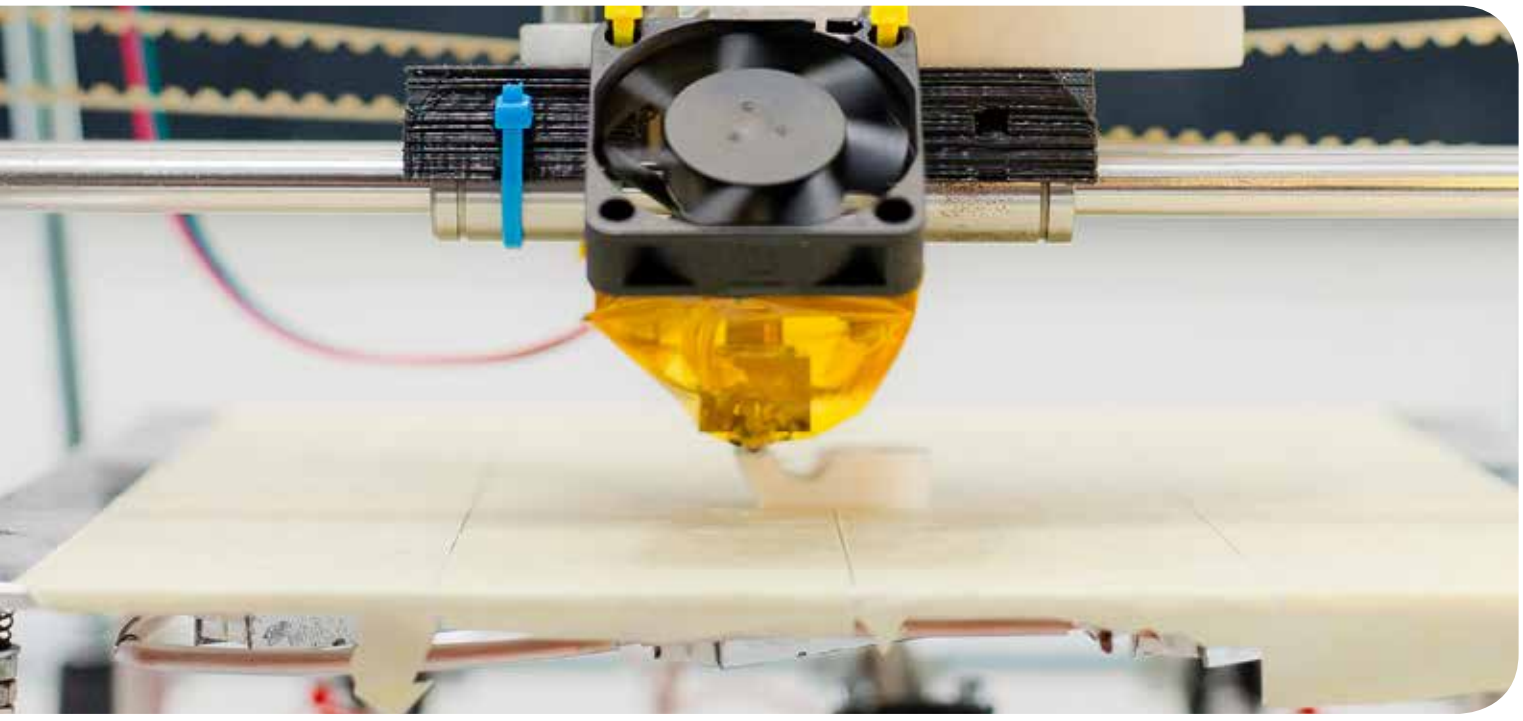


Figure 4: Stages of customization



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Example:

MakerBot Industries, a New York-based company, produces economical desktop 3D printers for additive manufacturing of prototypes and models. In addition, it offers a portfolio of designs across product categories, at a reasonable cost. The 3D models can be customized by adding logos, changing colors, or altering the size, prior to printing using local 3D printers.

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Postponement of customization: delaying the point of product differentiation to the point of consumption

For bespoke manufacturing and localization of products, manufacturing enterprises need to postpone the completion of manufacturing (as far as possible) to the point of consumption. Product configurations require to be segregated into a skeletal immutable product base upon which bespoke modular components can be bolted on (based on unique preferences or designs of consumers). Automobile manufacturers have already developed this concept and taken it to market to the extent where car chassis are mass manufactured along with body parts such as door frames, handles, grills, etc. Dashboards are manufactured separately and fitted onto the chassis depending on the car models or driving rules. This may, however, be considered nascent in anticipation of what can potentially unfold in the future when customizable products dominate the global market **(Figure 5)**.

A major challenge for manufacturers is to ensure that the quality of the final product is maintained during the postponement process. Manufacturers need to have agile manufacturing capabilities across the value chain through availability of skilled local manufacturers or via advanced technological solutions such as 3D printing to fully enable the DIY customizable products. This will ensure that the sanctity of the final product is maintained across different points of sale.

Example:

Delayed differentiation simplifies inventory management and optimizes supply chain costs in the paint industry. One of India's largest decorative and industrial paint manufacturers has adopted the postponement strategy. The company offers four emulsion brands for decorative purposes, each with more than 200 color shades. The manufacturer ships the base emulsion and color strainers to distribution centers across the country. On receipt of a customer order from a retailer, sales points blend the stainer into the base emulsion to create the ordered shade. The stock at sales points are constantly replenished by distribution centers. So every retailer offers the entire range of colors in the product catalog without maintaining excess stock.

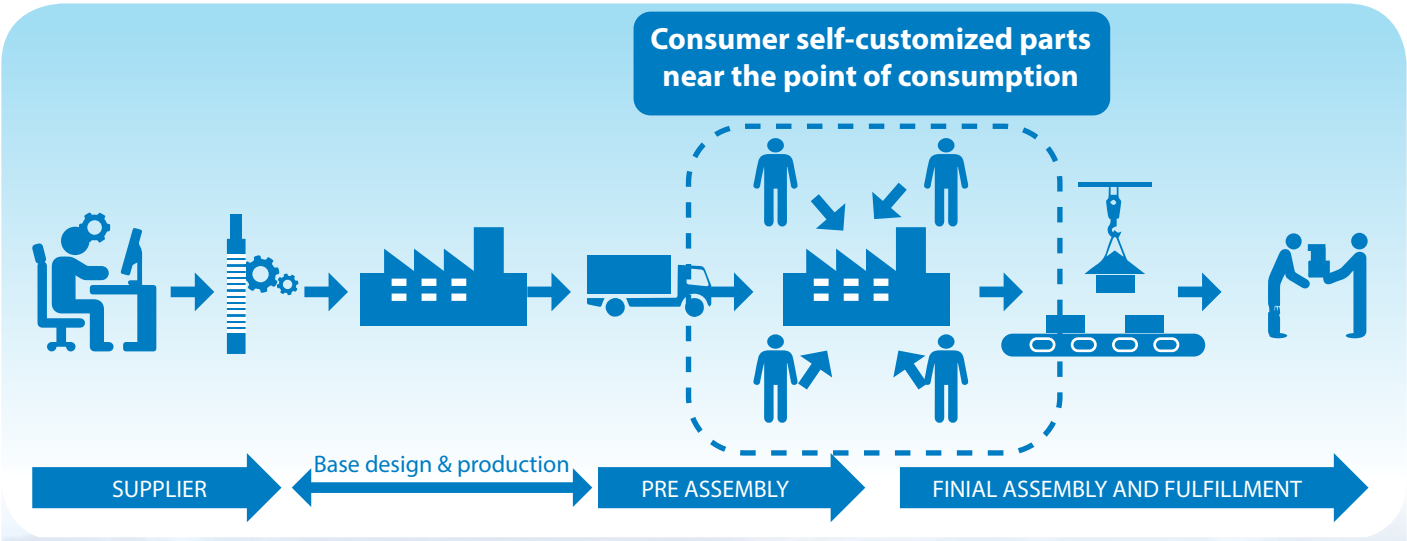
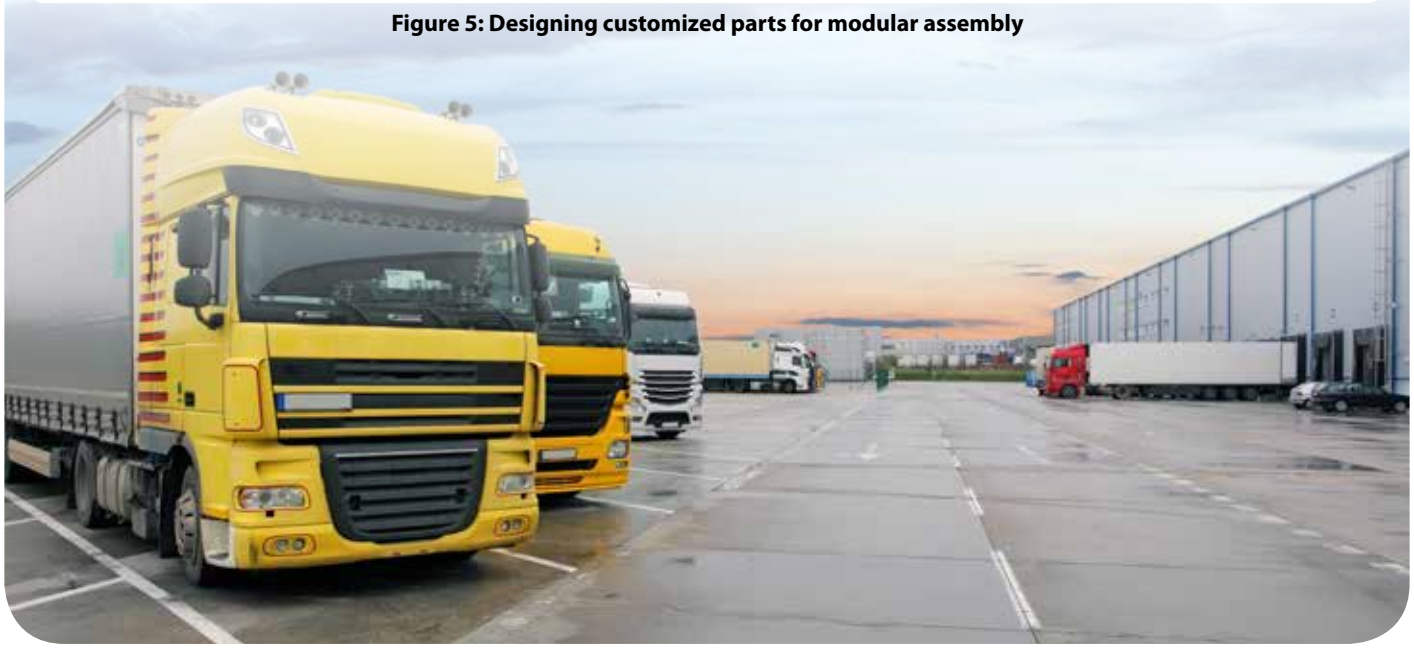


Figure 5: Designing customized parts for modular assembly



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Implications

The shifts in manufacturing blur the lines between completion of the product manufacturing process and commencement of the product fulfillment process. Increasingly, manufacturing enterprises need to make the shift from shipping finished goods from factories and adoption of traditional sales methodologies. Successful enterprises will conceptualize, design, and produce based on customer needs while ensuring inventory is streamlined and flexible to respond to demand fluctuations and micro trends.

Manufacturing enterprises need to make strategic investments in new-age technologies with an in-depth assessment of demand, supply, existing legacy investments and digital enablers. Demand sensing and analytics should be aligned with demand and volumes as well as customer preferences in demographic, geographic, seasonal, event, and cultural terms. Enterprises need to acquire capabilities in rapid prototyping and implement inclusive manufacturing methodologies such as 3D printing for reduced time-to-market. Product designs / options need to be more modular so that a wider range of products can be manufactured in compressed time frames.

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