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Engaging Customer Influence in Product Design with 3D Printing

Digital Product Ecosystem platform provides manufacturers new channels for customer engagement and monetization of product ideas

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Whether producing coffee mugs or carbide drill bits, manufacturers of consumer and industrial goods have a great opportunity to transform product development (PLM) with 3D printing, which is defined as the process of building an object layer-by-layer. This versatile digital technology innovation is already driving new manufacturing business models and accelerating product prototyping.

However, some businesses are overlooking ways to use this tool to pull customer influence directly into the product development process and to enable mass customization of products. (For more information, see Accenture's point of view, "The Disruptive Potential of 3D Printing.")[1] Customers generally have strong opinions about products but few options to communicate these ideas directly to manufacturers. In addition, as more consumers purchase 3D printers for use in schools and homes, or access them through web-enabled services, they have a new route to express these ideas or even become rudimentary product designers in their own right.

At this stage, legacy product lifecycle management systems do not easily support input from customers. Manufacturers that upgrade their approach with 3D printing and a customer interaction channel will be better prepared to produce highly personalized products at scale—an important distinction for digital enterprises as described in the Accenture Technology Vision 2015.

The Digital Product Ecosystem developed by Accenture Technology Labs integrates with 3D printing services in the cloud and allows manufacturers to deepen customer engagement through pre-production feedback loops. The ecosystem also provides a central repository for product design documentation and enables real-time communication across global teams.

This point of view examines the existing product lifecycle management process, the waves of innovation affecting product design, and how the Labs' proof of concept strengthens internal and external digital product collaboration while speeding up the manufacturing process.

Current approach to product lifecycle management

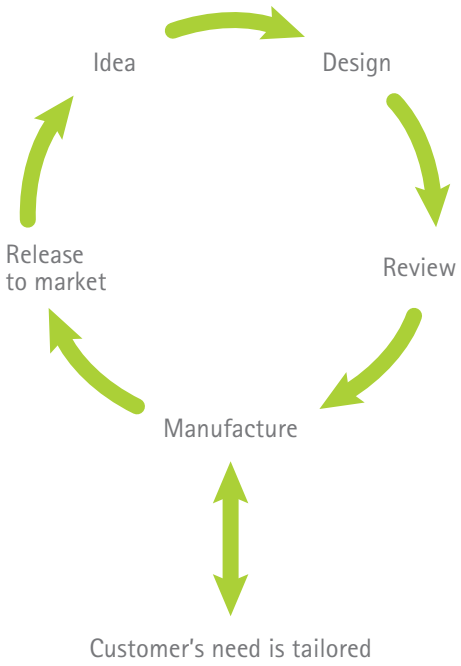
Today's legacy product development processes, which have existed for nearly 40 years, have been widely used to manage the entire span of a product—from inception, through engineering design and manufacture, to service and disposal. Although a powerful approach, the product lifecycle has not yet evolved to take advantage of new digital technologies that infuse customer opinions directly into the early stages of product design.

One of these technologies is 3D printing. Many manufacturers are using this tool for high-precision rapid prototyping and final part production using different types of materials (plastics, metals and other compounds depending on the use case). In many cases, however, 3D printing has not been fully integrated, making it necessary for product designers to switch between different systems to achieve rapid prototyping, which can lead to information discrepancies and delays.

As customers experiment with 3D printers to make their own products, traditional PLM systems also do not typically provide a channel to submit ideas for how a business can enhance an existing product. The potential to capture new and enhanced product designs from customers who are using 3D printing to make products is a vast opportunity. For example, General Electric Company launched a competition requesting a new design for a bracket and received more than 700 entries. The winning entry that met GE's strict selection criteria was from an individual in an emerging country without CAD, engineering or product design experience.[2] Manufacturers can build this concept into their product development systems by improving PLM to incorporate this new customer-opinion opportunity.

Lastly, the existing product development lifecycle process does not support postponement or ultra-postponement theories.[3] Postponement increases production accuracy and enables designers to adopt a more open design cycle, engaging with customers before production and incorporating their feedback into products to improve acceptance and increase customer loyalty (see Figure 1). Ultra-postponement delays the manufacture of a finished product until the moment a sale occurs, making it possible to print customized products like jewelry, household goods or beauty supplies to exact customer specifications. For example, Target® partnered with Shapeways, Inc. to launch a 3D-printed collection of personalized charms, rings and ornaments. Customers use a proprietary Shapeways tool that makes it easier for them to design their own products.[4]

Figure 1: Manufacturers can increase production accuracy and solidify customer loyalty though an open design cycle.



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Product design lifecycle evolving rapidly

To remain competitive, consumer and industrial goods manufacturers must expedite each and every step in the product design process.

The success of new product launches now hinges on improving collaboration within and across companies, enabling cost effective and rapid prototyping, leveraging cloud capabilities for 3D printing, and aggregating customer feedback into the product design cycle prior to mass production.

Enable better and faster communication

Global manufacturers can no longer rely on email threads, scattered design documents and legacy product lifecycle management software; they need a centralized platform on which different teams and roles can easily and quickly communicate regardless of the time zone differences. The platform ideally should provide a single source of truth, record the history of each design version and provide a product library from which to re-use ideas. As manufacturers, retailers and other companies form digital ecosystems to deliver highly customized products and services, the platform can be extended to these partners as well.

Support less costly and quicker prototyping

The traditional product design process involves many rounds of iterations, including a costly process to outsource and manufacture prototypes. Companies that reduce this iteration time can dramatically shorten the entire design cycle. 3D printing is a natural solution for producing prototypes. With a one-time investment in a 3D printer, manufacturers can quickly make some prototypes in house; if they use a 3D printing service, they can access a range of 3D printers and have prototypes shipped to any location.

An extended product design process also wastes design team productivity because members sit idle waiting for prototypes. However, with an expedited prototyping process using 3D printing, team members can validate ideas and make design changes much more quickly.

Access 3D printing in the cloud

Although the market is maturing, 3D printers are still a major expenditure, especially for companies that need several different types to produce complex components and prototypes using different materials. For companies that invest in an in-house 3D printer, one potential option is Indiegogo, Inc.-funded PrintToPeer, a start-up that offers a Raspberry Pi upgrade to wirelessly connect 3D printers to the web and mobile apps. The solution gives product designers access to the same slicing profiles and enables them to share .stl files on the web.[5]

For a more comprehensive solution, a 3D printing cloud service allows manufacturers to access a variety of 3D printers attached to a network. The service can scale new printers as they come to market or as customers' prototyping needs evolve. Sculpteo provides a 3D printing service that allows businesses and individual designers to upload design files, which the company then prints using their array of 3D printers and mails to customers.[6]

The company successfully helped AudioQuest® produce the first NightHawk headphones with complex 3D-printed parts that would have been unachievable through traditional manufacturing means.[7]

Incorporate customers' opinions into design process

Even the best design teams can inaccurately predict product demand, leading to major cost and potential brand damage. To avoid this, manufacturers need to loop in customer feedback earlier in the design cycle. Similar to how gaming companies release beta versions of video games for testing, manufacturers need a platform to share initial product concepts with loyal customers. Using the platform, the companies can ask specific product questions, collect answers and feed the valuable mass input back into the design process to finalize the product. This approach helps to guarantee the success of a new product launch.

Some companies are also applying this idea in a crowdsourcing model to encourage customers and the design community to generate entirely new product ideas. Makerbot®'s Thingiverse®, a design community for discovering, making and sharing 3D-printable items, has partnered with global companies to launch campaigns that inspire designers to make and share their creations.

Business value of Digital Product Ecosystem platform

Accenture Technology Labs has built a Digital Product Ecosystem proof of concept to address the needs of the market. Using the multi-faceted platform, consumer and industrial goods manufacturers can improve the internal digital collaboration experience, make the product conception process faster and smoother, and more easily loop in external customer opinions before mass production.

To demonstrate the business value, consider this scenario in which a large consumer appliance manufacturer develops a new attachment for its stand mixer.

Ubiquitous information center

Product designers use Digital Product Ecosystem to create the mixer attachment project. This includes uploading the initial digital design file (image, 3D model file, etc.) along with a description and 3D configuration specification. The platform provides a central location for the globally located design team to access information about the attachment piece as it moves from concept to final product (see Figure 2).

Figure 2: Developing the mixer attachment product in Digital Product Ecosystem.

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Communication channel

The design team assigns a group of internal testers to review the 3D design. Using Digital Product Ecosystem's built-in communication channel, testers and other product collaborators efficiently exchange ideas and feedback about the mixer attachment concept. The channel helps eliminate duplicate feedback and design misunderstandings, resulting in improved process reliability and agility.

3D printing technology integration

The testing team use Digital Product Ecosystem to download and print the mixer attachment prototype using a 3D printing cloud service that is seamlessly integrated into the platform, which makes the prototyping process quicker and smoother. Examining the physical part gives reviewers the most direct experience, enabling them to fully test the strengths and weaknesses of the design in order to provide more accurate feedback. As a result, designers can make improvements earlier in the process to avoid delayed time to the market and cost penalties.

Version control

The designers view the testers' feedback in Digital Product Ecosystem and modify the design as needed. Each time they make a change, the platform automatically creates a new iteration of the product and catalogues the previous version for later reference. It also provides a snapshot of each product milestone, which makes it simpler to revert design decisions. When the designers deem an iteration to be ineffective, they quickly roll back to a previous version. Halfway through the project, a new designer joins the team. The version control feature provides accurate history data to help her quickly get up to speed and understand how the design has evolved.

Channel for customer engagement and ultra-postponement

During the design process, the team uses an external channel on Digital Product Ecosystem to invite customers who understand the brand to review the mixer attachment concept or 3D printed prototype. The designers gather the customers' input on a range of criteria, such as ease of use and quality, and then incorporate it into the final product design before full manufacturing begins (see Figure 3). This feedback loop creates deeper connections with customers and generates anticipation for the new product launch. In addition, the appliance manufacturer can use this channel to validate market needs for entirely new products or to print customized products on demand.

Monetize on brand-wrapped customer designs

While reviewing customer feedback on the mixer attachment, product designers discover several potential concepts for new products related to the mixer and other appliances that the company manufacturers. This motivates a campaign to collect submissions for customer-inspired product designs, which the appliance maker shepherds through the same design cycle and eventually launches to capture additional revenue.

Figure 3: Collecting customer feedback on the mixer attachment product.

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Conclusion

Consumer and industrial goods manufacturers must make bold decisions to speed the manufacturing process and encourage early customer participation in product designs. Using a product lifecycle management platform with built-in 3D printing and ultra-postponement capabilities is a vital step to enable seamless internal team collaboration, reduce product iteration cycle times, and most importantly, engage directly with customers throughout the product design and development process.

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