Manufacturing the Future

THE NEXT ERA OF GLOBALIZATION WITH 3D PRINTING

Tyler Benster, 3D Printing Evangelist and Researcher

When it comes to manufacturing, there is no bigger story than the impact of globalization. As the world flattens and interconnects more than ever before, the global market becomes a winner-takes-all affair. The global economy rewards manufacturers that quickly adopt best practices and crushes those who linger in the ways of the past. Three key manufacturing trends build upon globalization—infrastructure productivity, responsive supply chains and product life cycle efficiency—and dictate success for manufacturers in the 21st century. Companies that adopt 3D printing in their manufacturing and embrace these trends will have an advantage over the competition.

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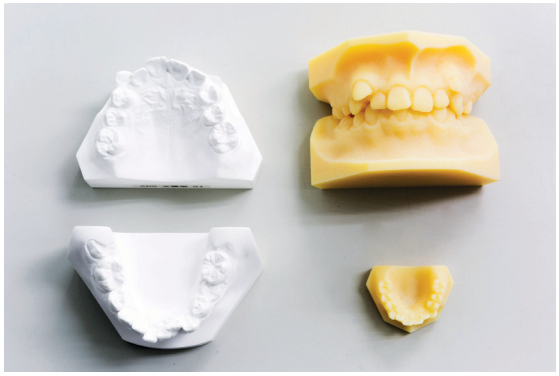
According to the Harvard Business Review, higher infrastructure productivity is essential for tackling the world's infrastructure problems. For example, streamlining the delivery process of production tools, parts and prototypes via improved transport infrastructure could save up to $400 billion a year. 3D printing brings improvement to transport productivity at minimal cost by providing a rapid digital link between remote design and local manufacturing. Logistical and infrastructure shortcomings can be overcome via in-house production in regional or local R&D facilities.

IN-HOUSE SOLUTIONS

ASO International, a leading Japanese orthodontic laboratory, has built such a ubiquitous digital manufacturing business thanks to 3D printing.



A poured gypsum model (left) and 3D printed model (right).

Pre-surgery planning and rehearsal using 3D printed models has reduced the time for complex surgeries and improved success rates.

Toru Kawakami, general manager for the company's CAD/CAM division, explained, "We can receive STL data from anywhere in the world and then create models using our Eden260V™ 3D Printer. Now we can work with an orthodontist located just a few miles away or one that is located 5,000 miles away."

In addition to reaching more customers, the company reduced costs associated with logistics and storage. "We have centralized the collection of all models from orthodontists at our Tokyo headquarters. Sending scanned 3D data instead of physical models to customers produces significant savings on transport costs, while eliminating the risk of damaged models in transit," adds Mr. Kawakami.

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Companies like ASO International can potentially expand their business everywhere. As long as there is an internet connection, a design file can be transmitted and 3D printed in a consistent fashion, thus increasing efficiency by streamlining the production process. Businesses can ultimately do most of their development work in-house, thereby minimizing the need to outsource while maintaining high quality standards.

RE-ENGINEERING RESOURCES

This digital thread also enables manufacturers to swiftly react to time-sensitive orders from buyers. Buyers increasingly demand responsive supply chains with short lead times for new orders or design changes.

Companies like Unilever have seen substantial reductions in lead times by adopting 3D printing. Stefano Cademartiri, R&D, CAP and prototyping specialist at Unilever, explains, “Having previously outsourced our thermoforming requirements for handmade wooden molds, we found that we were accumulating significant labor costs and having to contend with lengthy lead times. However, since 3D printing the injection molds ourselves, we have reduced lead times in the conceptual phase by approximately 35 percent.”

A few bleeding-edge companies have gone even further to meet short lead-time demands by turning to digital manufacturing techniques, thus enabling flexible manufacturing lines that can easily change production from one product to the next with no retooling or rearrangement required. This addresses the need for customization or any high-mix, low-volume production.

A 3D printed injection mold for a domestic-brand toilet rim block.

Collin Wilkerson, Managing Director of Western Tool & Mold, looked into 3D printing to ensure an aerospace customer could manufacture its parts on time. “We can provide fast reactions to immediate needs,” he noted. “In traditional manufacturing, you have to deal with quick spikes in the need for resources, but [with 3D Printing]

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3D printed components help streamline Western Tool & Mold's manufacturing process.

our clients can re-engineer resources to their greater benefit, resulting in a leaner manufacturing process, which includes a smaller workforce and less idle time."

EFFICIENT CUSTOMIZATION

The automotive and aerospace industries demand high degrees of responsiveness and availability. With competition growing even fiercer in the global economy, greater efficiency is required through the entire life cycle of the product. Such efficiency can be improved both in initial as well as subsequent manufacturing runs to support products through end-of-life.

Honda Access, a subsidiary of the Honda Group headquartered in Tokyo, manufactures accessories for cars and motorcycles worldwide. The company specializes in customizing accessories to local market preferences. "3D printers allow us to synchronize the development schedule with that of the vehicle itself and create the accessory parts simultaneously, improving both the quality and speed of the prototype process," commented Hiroshi Takemori, senior researcher from the product planning department.

A 3D printed fog light garnish.

The final production part.

Streamlining Future Demand

The benefits of adopting 3D printing for end-of-life goods may be even more substantial than the cost-savings from prototyping. Omer Krieger, General Manager of Stratasys Asia Pacific and Japan, commented that “Spare parts supply from the product life cycle is a growing space for us, because companies start to think about, ‘Now, how do I deliver this part 15 years from now?’”

With traditional manufacturing, a company must anticipate future demand a decade or more in advance. Then, the spare parts must be stored and distributed as demanded. Should inventory run out, a new run must be made at great expense with poor lead times. Omer explained that rather than putting the part on a shelf and waiting, with 3D printing “I can put files in my memory disk, print and deliver it in 15 years.”

These three trends represent tremendous opportunity for the bold manufacturer. Enhancing infrastructure productivity by replacing physical delivery of goods with digital transmission will enable a company to generate growth in markets previously inaccessible. Optimizing for responsiveness in manufacturing operations empowers a business to profitably produce short runs on tight time schedules. Increased flexibility in supply across the product life cycle promises to improve customer satisfaction and potentially provide higher margins in long-term contracts.

An automotive wheel concept model printed by an Objet Eden500V.

Companies that adopt 3D printing in their manufacturing will have an advantage over the competition for embracing these trends.

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