

3-D Printing: A Game- Changer for Manufacturing

Infosys® | CONSULTING



Table of Contents

A Transformative Impact Across Industries	3
Going Beyond Prototyping	4
Advances in Additive Manufacturing	5
Customer Engagement	6
Location Strategy	7

A Transformative Impact Across Industries

Additive Manufacturing into the Mainstream

In its early years, 3-D printing was defined more by what it wasn't – namely, fast or precise – than for what it was. The combination of slow production speeds and loose tolerances, combined with limitations on the materials that could be used for printing, meant that the parts produced offered little utility beyond early prototyping.

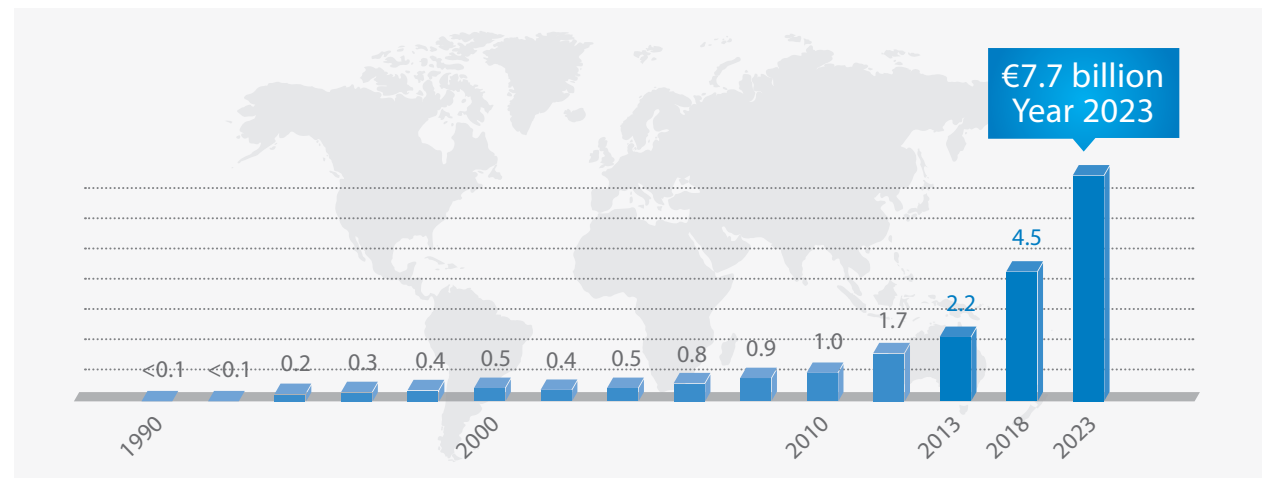
As additive manufacturing technology has advanced, these barriers have successively fallen away and 3-D printing now finds itself playing a transformative role in industries as diverse as toys to airplanes.

Attesting to the speed of this disruption, an industry CEO in the medical device space recently quipped, "The U.S. hearing aid industry converted to 100% additive manufacturing (3-D printing) in less than 500 days, and not one company that stuck to traditional manufacturing methods survived."

In this two-part series, we will first explore the changes required of manufacturers to capitalize on the massive market opportunities introduced by additive manufacturing. In part two, we'll examine how these disruptions will force firms to modify operations internally and with the broader ecosystem.

Rapid market growth

Additive manufacturing market worldwide, development and forecast (in billions of euros)



Source: Forbes

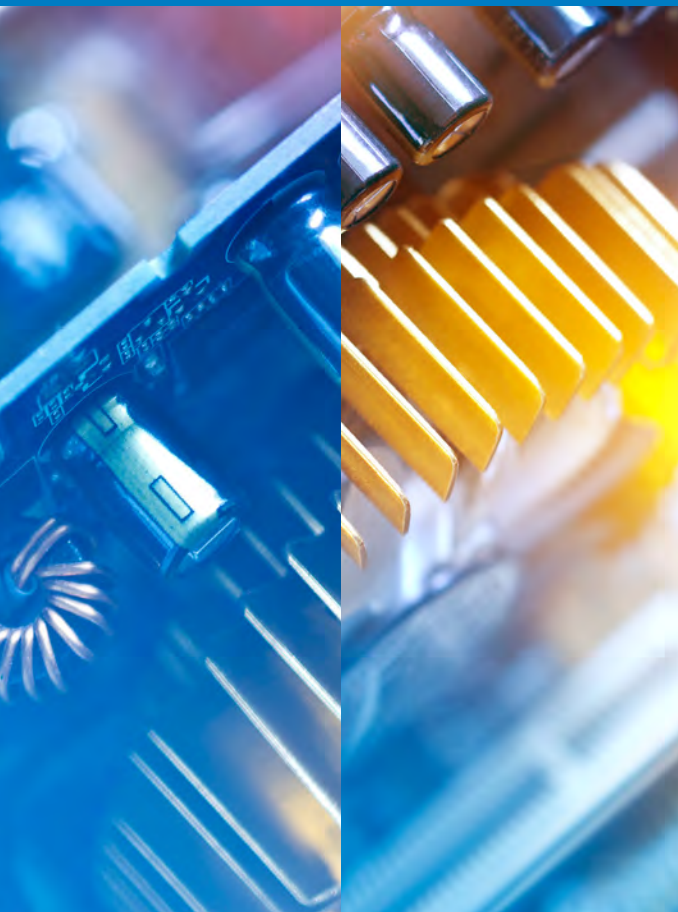
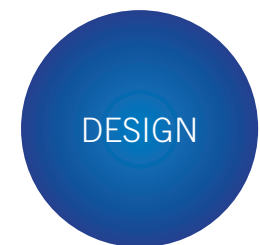
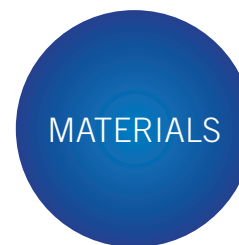
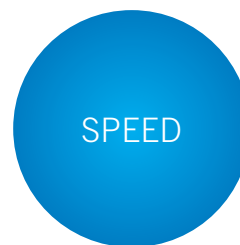
Four Key Areas Are Moving 3-D Printing Beyond Prototyping

The New Production Value Chain

Because prototyping has always been more about direction than precision, manufacturers were quick to deploy early 3-D printers to test new concepts. And because prototyping typically only requires a few units to be produced, additive manufacturing's superior responsiveness was able to successfully reduce prototype lead times from days or weeks to hours.

When firms were ready to move into actual production, they still needed to follow laborious processes to set up full-scale production lines. Consistent with historic norms, this also meant it was economically challenging to produce small, rapid batches of finished goods. This narrow role in the production value chain has rapidly changed as four dimensions advance in parallel:

- **Speed:** The time it takes to produce parts via 3-D printing is rapidly accelerating. For example, Desktop Metal, a Boston-based firm, is now taking orders for 3-D printers that will ship in mid-2018 that promise to produce metal parts "at 100 times the speed and a twentieth of the cost of current systems."
- **Materials:** The assortment of materials available to 3-D printing is expanding beyond plastics into a broad assortment of metals: stainless, gold, bronze, steel, nickel and even carbon fiber.
- **Tolerances:** In the early days, 3-D printing tolerances were quite loose. Today, however, 3-D printing is enabling dimensional tolerances beyond +/- 0.2mm, bringing additive manufacturing into the realm of higher value-add production.
- **Design:** The sophistication and, more importantly, flexibility of plans available in the market is rapidly expanding, providing the building blocks of higher-order design.




Advances in Additive Manufacturing

An Impact on Organizations in 3 Important Areas

Taken collectively, the mentioned innovations are blurring the line between prototyping and full-scale production. And because 3-D printing plays by a different set of rules, many of the boundary conditions of traditional manufacturing are being removed, presenting firms with profound choices along three strategic vectors:

- 1. Design:** Rapid changes to the source and number of designs that move beyond prototype into production.
- 2. Customer Engagement:** Expansion of the number of customer groups that are marketed and sold to.
- 3. Location:** Reshuffling of priorities driving the choice of where goods are produced.

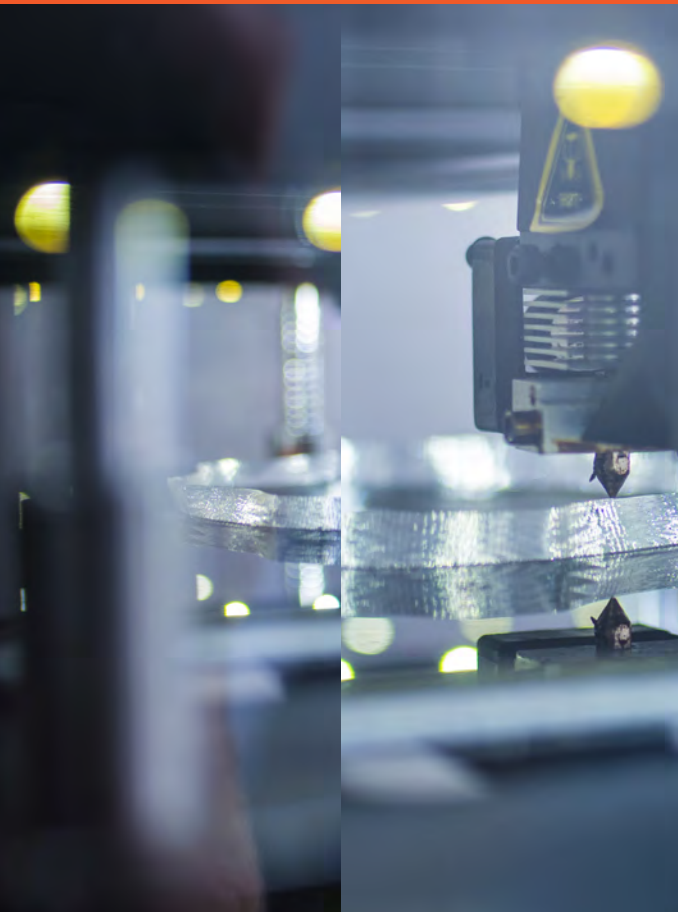
Design

The 'Add to Cart'  button that appears on Amazon's website, while appearing quite ordinary at first glance, happens to be the ultimate shape, color and size to maximize shopper purchases.

The defining quality of this button is not born from a psychometric analysis of the way this shade of orange makes people feel, but from the process used to get there. While Amazon does employ a large stable of well-credentialed designers, it was not a stroke of genius intuition that led them to this piece of clickable perfection. Instead, it was a well-honed process of rolling out a large number of prototypes and evaluating customer feedback (in their case, clicks) to see which exact permutation won.

This is a fundamentally different approach to design than the one traditionally used in manufacturing, which placed a very large premium on creating the "right" design prior to mass production. It's certainly true that manufacturing design has not been conducted in a vacuum – prototypes and user focus groups have long been leveraged – but there's a very big difference between asking a subset of curated people what design they prefer and actually releasing product variants to the market.

The dramatic removal of barriers to small-scale production will allow – and likely require – manufacturers to act more like **software companies** in the way they approach design. Instead of mass producing the design they believe is the correct one, companies will release several variants of a design and allowing customers to choose the varieties that are ultimately produced at scale. Taking it a step further, progressive firms will even offload the task of design directly to their customers, allowing them to build the products they want to buy.



Customer Engagement in the Massive Single Lot Production Era

The Customer Long Tail: A New Dimension of Market Potential

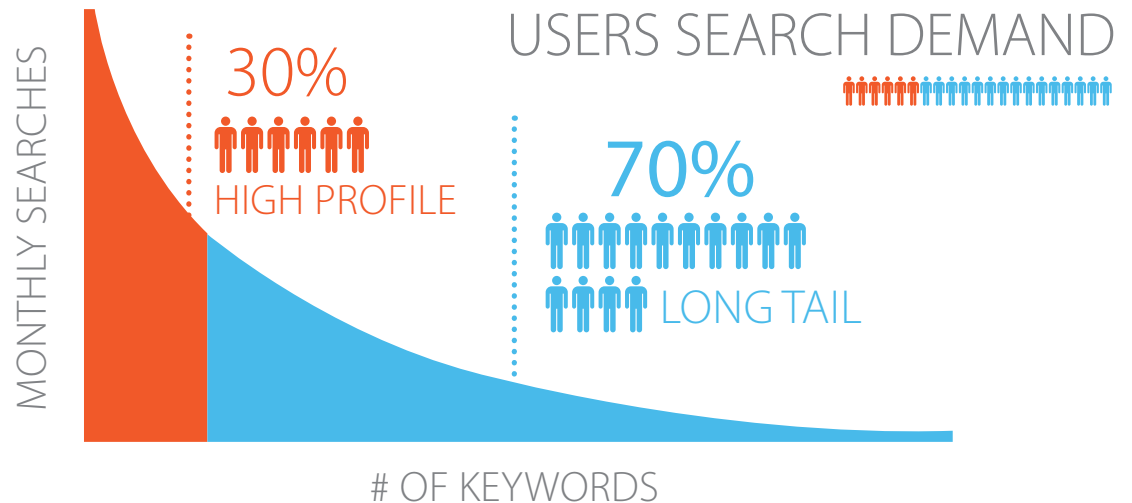
In a world where economic feasibility meant producing products at a minimum level of scale, the long tail was a domain to be prudently avoided. Because of this, companies developed marketing channels designed to reach the largest cohorts of customers. This typically translated into mainstream forms of communication: television, trade journals and conventions.

With advances in additive manufacturing, however, it is now viable to deftly shift between designs and profitably produce lots as small as one. This new “Massive Single Lot Production Era” will have profound impacts on the types of customers who can be served and the corresponding means of interaction.

One of the defining elements of the digital era is that – through user groups, blogs and message boards – people can collaborate with other like-minded individuals on increasingly arcane topics. For companies who can now produce products with similar levels of specificity, the question becomes how they reach and service these long-tail customers, something that we will explore in part two of this series.



The Customer Long Tail Presents Massive Market Potential



Source: <https://www.npmjs.com/package/long-tail>

Proximity to Customers Becomes a Key Driver

Over the past few decades, manufacturing has been engaged in an existential, political struggle around the location where products were produced. On one side were employees and politicians who wanted to keep jobs close to where demand for products historically existed and where manufacturing was originally done (e.g., Europe and the US). On the other side was the stark economic reality that price matters, and that labor was a more important input to production costs than transportation – math that made production offshoring a necessity for many companies.

In a world of massive single lot production driven by additive manufacturing, however, the defining economic inputs to the manufacturing process are materials, electricity and software. And because these all cost roughly the same amount regardless of the country they're located in, decisions around where to produce items becomes more about proximity to customers and corresponding shipping times.



A New Way of Engaging with the External World

A Customer Focused Approach

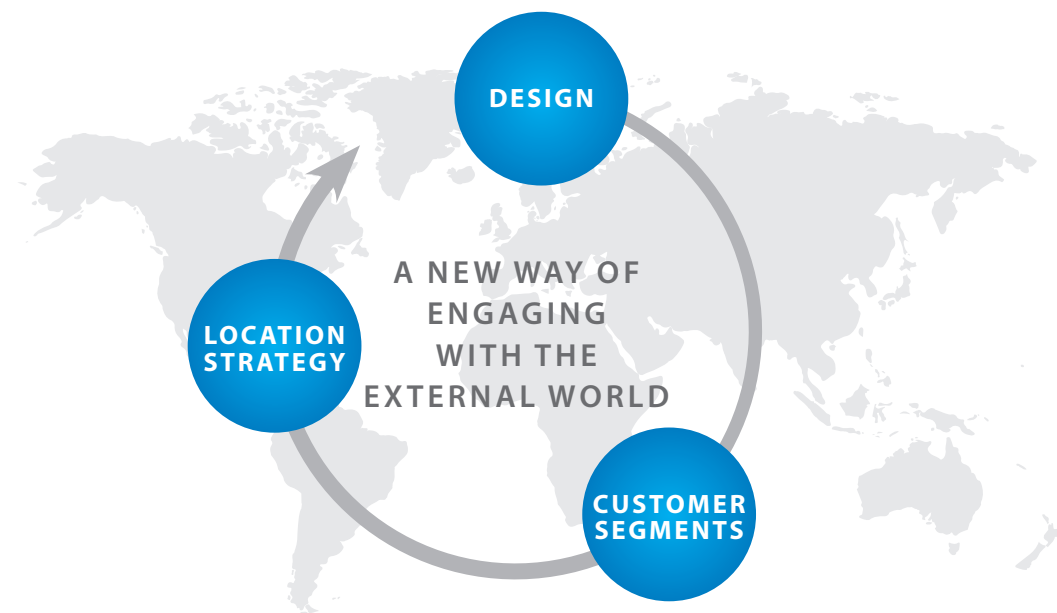
This cocktail of changes related to design, target customers and location strategy is forcing manufacturers to fundamentally reconsider how to engage with the market.

Design morphs from a primarily internal process with orchestrated, isolated customer engagement to a highly collaborative dialogue that shifts a meaningful amount of power to end customers.

Customer segments grow exponentially, shifting from a focus on what unites large groups to what differentiates one individual from another.

And location strategy moves away from a labor arbitrage to a responsive, distributed network where proximity to customers and completely different cost drivers – such as electricity – once again become relevant (this last fact has a feeling of coming full circle – remember 150 years ago when manufacturers located themselves along rivers to access cheap, available power?)

In our next ebook, we will explore the changes companies should be making today to internal operations to accommodate these changes and explore strategies to create a flexible foundation to grow from.



About Infosys Consulting

We are a global advisor enabling organizations to reimagine their future and create sustainable value leveraging disruptive technologies. And as part of technology leader Infosys, we have access to a global network and delivery capability of 200,000 professionals that help our consultants implement at scale. To see our ideas in action, please visit [InfosysConsultingInsights.com](https://www.infosysconsulting.com).

About the authors



Roberto Busin

Partner & Manufacturing Segment Head, Europe

Roberto_Busin@infosysconsulting.com

Roberto leads the organization's Europe manufacturing segment and manages its Switzerland country operations. He is an expert on transforming companies in the areas of supply chain, operations and digital, and has extensive experience setting up global delivery centers with multi-national teams around the globe. Roberto works with business leaders across some of the biggest brands in Europe, and is bringing new ways of approaching artificial intelligence enablers to organizations.

Roberto has an advanced degree in engineering from the Swiss Federal Institute of Technology and is fluent in 4 languages. You can connect with him and follow his insights on LinkedIn.



Shanton Wilcox

Partner & Manufacturing Segment Head, North America

shanton.wilcox@infosys.com

Shanton focuses on applying advanced operations capabilities to manufacturing and service organizations to integrate and streamline value chain operations. He has a record of outstanding success with a deep set of experiences across several industries, including aerospace and defense, automotive, high tech and consumer goods. Shanton has held leadership roles at Deloitte, Ernst & Young and Capgemini Consulting where he was the North American lead for digital manufacturing. He has been published in leading trade journals such as SupplyChainBrain, Logistics Management and CSCMP's Supply Chain Quarterly. He is also the lead contributor on the annual State of Logistics Outsourcing study that Infosys Consulting produces.

For more information, contact Consulting@infosys.com

Infosys® | **CONSULTING**

© 2018 Infosys Limited, Bangalore, India. All Rights Reserved. Infosys believes the information in this document is accurate as of its publication date; such information is subject to change without notice. Infosys acknowledges the proprietary rights of other companies to the trademarks, product names and such other intellectual property rights mentioned in this document. Except as expressly permitted, neither this documentation nor any part of it may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, printing, photocopying, recording or otherwise, without the prior permission of Infosys Limited and/ or any named intellectual property rights holders under this document.

Stay Connected    