3D PRINTING – THE NEW AGE ALTERNATIVE FOR MRO SUPPLIES?

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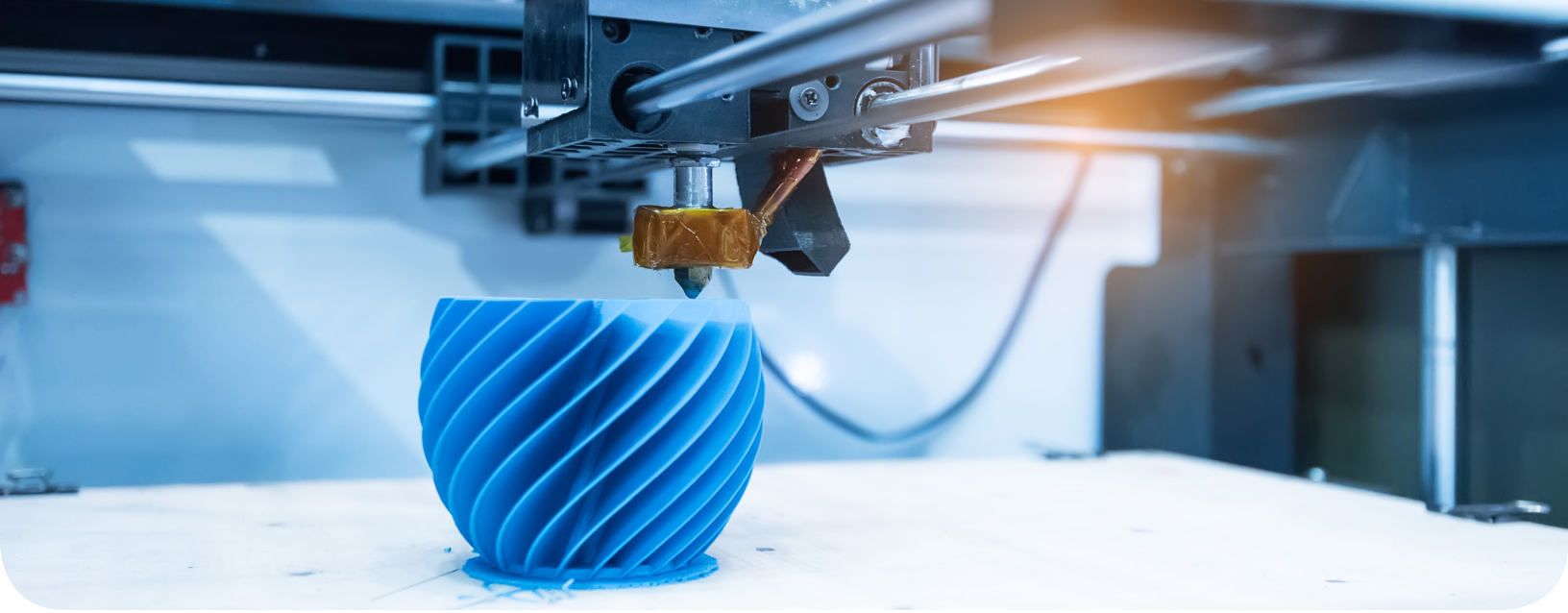


The Giant Leap for Manufacturing?

3D printing or additive manufacturing has been used across industries, primarily at the prototyping stage. This technology has now witnessed exponential growth, supported by its ability to develop complex designs at significantly lower cost as compared to the conventional manufacturing methods. Over the years, additive manufacturing has evolved from being a prototyping concept to a viable model for manufacturing low-volume customized parts, including Maintenance, Repair and Operations (MRO) supplies.

According to estimates, 3D printing currently represents less than 0.05% of the global manufacturing market, with parts production being one of the major end uses followed by prototyping. The market is expected to exceed USD 20 billion by 2020, driven primarily by increased adoption across the manufacturing space, coupled with increased affordability of 3D printers.

Additive manufacturing is expected to offset the existing challenges faced by the MRO Supply Chain including fragmented supply base, large number of Stock Keeping Units (SKU's) and parts-obsolescence, among others.

Traditional MRO Supply Chain: The Challenges

Majority of the spare parts manufactured by the Original Equipment Manufacturers (OEMs) have different levels of complexity and are often an assembly of multiple parts. Availability of the critical spare parts supersedes the cost, as avoiding any production downtime is of paramount concern to the client.

Some of the key challenges associated with MRO supplies are as follows:

Large Number of Intermediaries and Fragmented Supply base: The MRO supply chain generally includes large number of intermediaries including manufacturers, distributors and logistics service providers. The fragmented nature of the supply base for parts complicates the entire procurement process. This often leads to longer lead times in obtaining critical components and thereby results in the practice of maintaining higher levels of inventories. This in turn results in a higher inventory-holding cost.

Part Obsolescence and Stock-outs: The MRO supply chain is characterized by large volumes of parts, with each having unique end-use and features. Large product groups with high demand variations often results in unpredictability of MRO supplies requirement, creating difficulties in budgeting. This also makes it difficult for the end user to keep track of the parts and increases the probability of part-obsolescence and stock-outs.

3D Printing in the Supply Chain: The Smart New Alternative

As 3D printing becomes more accessible globally, clients across industries have begun to adopt additive manufacturing to bring in innovation and efficiency in the prototyping process. This is being extended towards manufacturing of MRO spare parts and components. Manufacturers are also exploring different areas where the 3D printed parts can be deployed.

This is also providing an alternative to companies to make-on-demand rather than buy-to-stock. The make-on-demand concept coupled with the mobility offered by the 3D printers is expected to enable insourcing of MRO supplies.

Large companies like Airbus, GE and Ford have made considerable investments in this technology and have adopted additive manufacturing in their production strategy, enabling them to reduce cost and lead times in the overall production cycles.

3D Printing Models - Some Interesting Use-Cases

In-house Model: This model involves installing 3D printers at the production facility. Parts are produced using designs supplied by the OEMs or developed in-house by the production team. This model is relevant where sourcing of components involves higher lead times or when the parts in consideration are obsolete. This model is also applicable when the parts are of higher value or when the product designs are proprietary in nature.

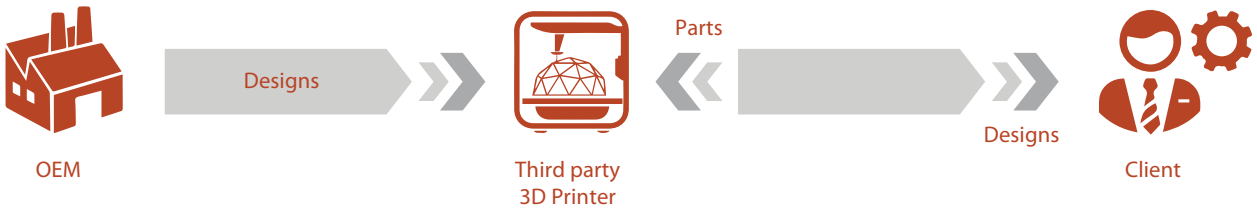
Case Study: ATR, an aircraft manufacturer used 3D printing to manufacture some of the cabin interior plastic parts. The plastic parts in question had become obsolete since the related manufacturing procedure was abandoned. The parts manufactured using 3D printing have passed the necessary flammability test and are expected to replace the existing parts shortly[1].

[1] MRO-Network:
http://www.mro-network.com/emerging-technology/how-will-3-d-printing-rearrange-aerospace-spare-parts-business

Outsourced Model: In this model, 3D designs are sent to a third party 3D printing service provider. This model is opted by clients for customized parts, when the client lacks the relevant expertise to print the part.

This model can also be adopted by OEMs who have adopted a decentralized model of product delivery. i.e. the production is spread out and nearer to the client location. The designs are sent to the 3D printing service provider, who in-turn print and deliver the parts to the client's location.

Case Study: MAHLE, an automotive parts manufacturer wanted to consolidate a fixture from three separate components to a single part. They understood that this was not possible using traditional manufacturing methods. To bridge the expertise and equipment gap they engaged Stratasys Direct Manufacturing, a third party 3D printing service provider, that supported them from design through production. 3D printing enabled MAHLE to develop a redesigned and consolidated fixture on short notice. This also resulted in significant cost saving for MAHLE[2].



[2] Stratasys Direct manufacturing:
https://www.stratasysdirect.com/resources/case%20studies/3d%20printing%20automotive%20fixtures%20mahle

Limitations Faced in the Adoption of 3D Printing:

Proprietary Designs: A large part of the spare parts used by the industries is proprietary and are usually supplied by the OEMs. The OEMs are likely to have concerns on yielding control of part production to the consumers as the quality of the printed parts might have consequences on the equipment warranty.

Operating Loads: A good proportion of the spare parts used in different equipment are precision engineered and are used in high operating loads. Parts manufactured using 3D printing might have quality issues and the same needs to be tested before the printed parts can become operational.

Mass Production: 3D printing is expected to find it extremely challenging to replace the traditional large scale production of standard parts. However, the scenario is expected to change with the increase in the affordability of the 3D printers.

What Lies Beyond the Bend in the Road for Procurement?

Additive manufacturing is expected to challenge the practice of maintaining high volumes of inventory in order to prevent any production downtime. This technology is expected to offset the existing challenges faced by the MRO supply chain including longer lead times, part obsolescence and lower volume requirement. However, limitations including the proprietary nature of the spare part designs is expected to limit the adoption of the technology across the MRO space. In addition, for higher volume requirement, traditional manufacturing is expected to continue as a preferred sourcing model in the near future.

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