Case Study

ADDITIVE MANUFACTURING APPLICATION WITHIN INDUSTRY 4.0 - Labman Automation

Keywords: *Additive Manufacturing, 3D printing, Industry 4.0*

Background to Case Study

Additive Manufacturing (AM), also called 3D printing (3DP), is a general term for a set of technologies that can build three-dimensional objects from a digital file by adding material layer after layer. It is a vital component and enabler of Industry 4.0. that allows SMEs to improve cost-efficiency of low-volume production, to decentralize production, to offer smart services, etc. Also, AM facilitates mass customization, agile collaboration and virtual inventory. Some characteristics of AM are particularly beneficial for SMEs granting them the ability to grow within Industry 4.0.

This case study presents a SME that leverages AM in order to improve its design and manufacturing processes as well as to better cater for customers' needs.

Introduction to the Case Study and it's growth within Industry 4.0.

The application of AM supports the growth of the SME under study (Labman Automation) by allowing it to develop its products faster, cheaper and with lower risks. Also, AM make possible an increased flexibility that allows the company to perform design changes during the production process without significant loss in terms of money or time. As these design changes are usually required by the customers, the flexibility helps increasing customer satisfaction.

The design freedom offered by 3D printing allows Labman Automation to create complex shapes, lighter parts and to consolidate parts into singular structures. This enables the designers to better solve specific problems and even to come up with solutions impossible by traditional techniques.

In addition, Labman is able to produce competitive tailor-made equipment and unique functional parts thanks to AM's ability to improve cost-efficiency of low-volume production.

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The Case Study and Industry 4.0 Elements: A Pictorial Overview

The advantages of AM leveraged by Labman Automation are depicted below.

Design freedom

- Production of complex parts

Flexibility

- Quick adaptation to changes
- Better customer support

Customization

- Less expensive bespoke products

Quick prototyping

- Fast and cost-effective product development
- Quick verification of design ideas

Faster production

- Quick manufacturing of functional parts

Labman Automation is using two different approaches for taking advantage of AM capabilities: in-house 3D printers and outsourcing. The picture below shows the outsourcing process.

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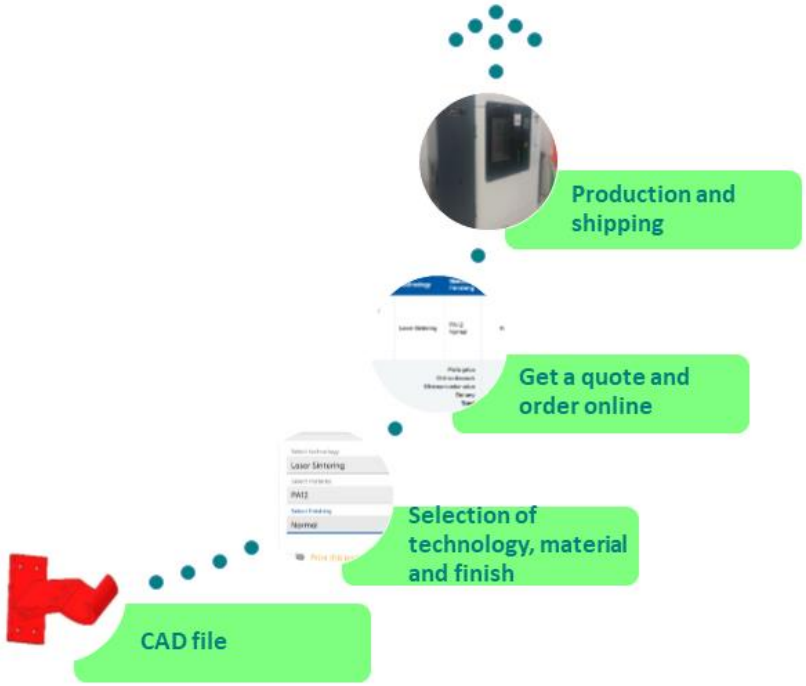

The AM outsourcing process. Image source: Ludor Engineering

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The Element Explored within Industry 4.0 Application.

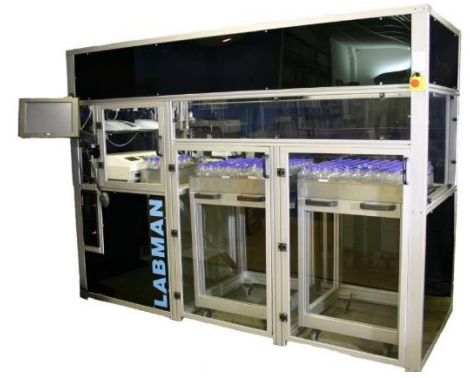

Image source: Labman Automation

Image source: Materialise

Labman Automation (www.labmanautomation.com/) is an UK medium sized enterprise founded in 1979 that manufactures custom laboratory automation and robotics. The company adopted 3D printing, going from never using 3DP to having 3D printed parts in almost every single system it builds, in just 3 years. It uses 3DP for prototyping and for fabrication of functional parts. The company owns several 3D printers (two Markforged Onyx FDM 3D printers, one Markforged Onyx Pro FDM (+ continuous fibre inlay) 3D printer and one Formlabs Form SLA 3D printer).
The SME also outsources 3DP production through a 3D Printing Service Bureau (https://www.materialise.com/en/manufacturing/materialise-onsite). The outsourcing process involves the preparation of CAD files and selection of 3DP technology, material and finish by Labman's designers, in order to obtain an instant quote and be able to order online. Next, the parts are produced and shipped by the service bureau in a few days.

The 3DP technology adoption helped Labman to quickly realise a number of important benefits.
Very often, Labman's equipment have to include parts with peculiar shapes, which are both expensive and time-consuming if made by traditional techniques. However, these can be 3D printed quicker and cheaper.

Many times, the requirements are changed during the project for various reasons. 3D printing gives an increased flexibility in these situations as the designs can be quickly adapted and the new parts produced immediately.

Application Target Audience	*The results of the case-study are intended for use by SMEs and entrepreneur subjects.*
Resources Used:	*https://www.materialise.com/en/cases/3d-printing-at-labman-automation* *https://www.linkedin.com/company/labman-automation-ltd/about/* *https://www.labmanautomation.com/* *https://commons.wikimedia.org/wiki/File:Labman_Logo.jpg*

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Further Reading:	1. *The role of additive manufacturing in the era of Industry 4.0,* Procedia Manufacturing 11 (2017) 545 – 554 2. *What is Additive Manufacturing?, GE Additive, https://www.ge.com/additive/additive-manufacturing* 3. *Additive manufacturing, explained, Rebecca Linke, Massachusetts Institute of Technology, https://phys.org/news/2017-12-additive.html*

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