



CREAT3D CASE STUDY

MAHLE POWERTRAIN BENEFIT FROM 77% COST SAVING WITH 3D PRINTING

Benefits of incorporating a Markforged
Mark Two 3D printer into a
manufacturing facility.



Powertrain

COMPANY	MAHLE Powertrain Ltd
INDUSTRY	Automotive
KEY ACTIVITY	Manufacturer cylinder heads and blocks for automotive client
FOCUS	Development partner for the automotive and engine industry
LOCATION	Manufacturing Plant, Wellingborough
RESULTS	<ul style="list-style-type: none">• 77% annual cost saving• Longer lasting, bespoke fit parts• Downtime reduced from 4 days to 6 hours

PROFILE

MAHLE Powertrain is the manufacturing services division of MAHLE GmbH. Based in Northamptonshire, MAHLE Powertrain specialise in Integrated Powertrain Solutions for the automotive and engine industries, working with some of the leading global OEMs including Audi, JCB and Jaguar Land Rover. With a substantial manufacturing plant employing over 180 personnel, the teams at MAHLE are involved in machining, assembly and quality control as part of the engine manufacturing process.

EXISTING OUTSOURCING PROCESS

MAHLE outsource a high volume of fixture components, wear parts and covers at the manufacturing plant. Most outsourced parts are machined in Delrin, Nylon and occasionally PEEK which offer good strength and durability, essential qualities for the parts.

Whilst this set-up is well established, it also brings with it a number of inefficiencies in time, resources, functionality and costs, as well as a heavy reliance on external partners and longer turnaround time from concept to end result.



Figure 1: 3D printed



DEPLOYING 3D PRINTER TECHNOLOGY

THE 3D PRINTER: Markforged Mark Two

The key requirement for MAHLE was the ability to produce strong, durable parts. Using a Nylon base material, and the ability to add reinforcing fibres, the Mark Two fulfilled the brief.

Having understood the benefits of 3D printing, and highlighting the potential improvement areas to MAHLE, Gavin Ellis, Production Engineer, worked with CREAT3D, Independent 3D Printer Specialists, to bring the Markforged 3D printer in-house and use the technology to revolutionise their production of wear parts.

MAHLE saw that using a 3D printer provided the ability to manufacture a wide range of plastic components enabling time and cost savings. The

manufacturing times for the parts themselves have been shortened, and as external purchasing is no longer required, the time associated with raising purchase orders, waiting for approval and supplier processing has been removed. MAHLE are also reaping cost savings in the overall price of the part versus externally produced inventory that needed to be manufactured, shipped and then stored.



Figure 2: OEM design Gauge Cover



Figure 3: New 3D printed Gauge Cover



“

“MAHLE have realised yearly savings in the tens of thousands of pounds”

COST SAVINGS & A BETTER FIT

One huge benefit of incorporating 3D printing has been in cost reduction. Since using the Mark Two, MAHLE have replaced Delrin and Nylon parts with parts 3D printed in Onyx. PEEK parts have been replaced with Onyx, together with reinforcing fibres of Fibreglass or Kevlar.

The consequence? From the cost analysis of the annual spend associated with externally produced Delrin parts, MAHLE have realised yearly savings in the tens of thousands of pounds, equating to an average saving of 77% per part produced.

Furthermore, by designing and 3D printing the parts, the team are able to print 3 or 4 design iterations for testing on the shop floor, to ensure optimum fit and performance.

When a replacement part on the production line is required, it is now designed and 3D printed in-house, rather than being subjected to external purchasing and delivery timescales. In addition, by managing the process internally, MAHLE have greater control and can be far more responsive. Overall, the production line suffers less downtime, with a reduced risk of internal rejects and customer delays.

SHORTER DOWNTIMES

MAHLE has also seen reduced downtimes. A spacer was needed for a gearbox in a production CNC machine. The broken part was re-designed and 3D printed in Onyx with Kevlar. Within 6 hours a replacement spacer was in location and the machine was back in operation. Previously, this would have taken 3-4 days before getting back online.

Gavin Ellis explains

“Everyone who has seen the 3D prints has immediately seen the benefits. We also have a continuous improvement system here, with many suggestions focused on workplace organisation, so colleagues can see how the speed of turnaround using 3D printing is the main benefit here. We also see a knock-on effect with colleagues who require prototype parts”.

Using 3D printing has enabled MAHLE to become a leaner, more streamlined operation with innovation in designing bespoke fit parts, saving time and money, and producing printed parts that last longer than their previously purchased alternatives, increasing efficiencies.



SACRIFICIAL PARTS & TOOLS

One key improvement for MAHLE has been in wear part production. By using the Mark Two to produce sacrificial parts and tools, MAHLE's internal processes and workplace organisation have improved dramatically.

For example, MAHLE have 3D printed a new Inspection Gauge Cover. Previously this new cover was a standard fit, supplied part. The 3D printed model is now a bespoke fit to protect expensive, retrofitted Bluetooth modules, to electronically communicate gauge readings.

Modifications to existing tools have also been made, such as the Brush Setting Tool for MAHLE's robotic deburring machine. The tool, now re-designed, can sit in an alternative location to the previous model. This new position prevents the part from being excessively affected by wear and tear. The outcome? The machine has not had to be re-programmed for 6 months, versus a previous monthly requirement. The bespoke tool is also quicker to set, meaning a tool change has been reduced from 2 minutes to around 30 seconds.

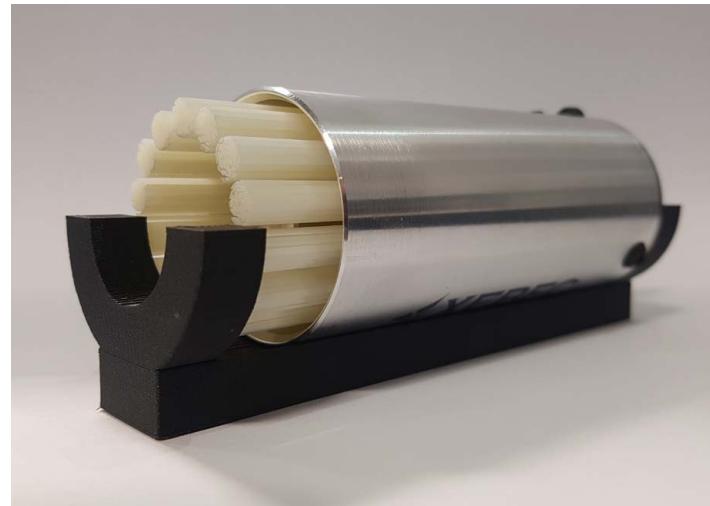


Figure 4: Brush Setting Tool with 3D printed adaptation

Using the Markforged 3D printer has allowed for substantial process improvements making a leaner production, enabling changes which previously would not have been justified to externally produce a part for these gains.

About CREAT3D

CREAT3D Ltd

Additive Manufacturing Solutions Provider

CREAT3D offer additive manufacturing end-to-end solutions including: business consultation, independent buying advice, provision of 3D printers and related equipment, tailored training packages, ongoing technical support, servicing and maintenance, repair & business continuity programmes.

Unit 5 East Reading Retail Centre,
Shepherds Hill, Reading, Berkshire RG6 1FE

T: 0800 689 1011 | E: info@creat3d.co.uk

W: creat3d.solutions

LinkedIn: /company/creat3d-ltd

Twitter: /CREAT3Dprinters

About MAHLE Powertrain

MAHLE Powertrain

For more information on MAHLE Powertrain's products, please contact:

W: www.mahle-powertrain.com