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ADDITIVE MANUFACTURING SOLUTIONS PROVIDER

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CASE STUDY

Deployment of additive manufacturing in force & torque measurement equipment with Mecmesin Ltd

BESPOKE 3D PRINTED SOLUTIONS IN MANUFACTURING

Gaining a competitive advantage in the force & torque measurement industry

Mecmesin
FORCE & TORQUE TEST SOLUTIONS

COMPANY	Mecmesin Ltd
INDUSTRY	Manufacturing
KEY ACTIVITY	Manufacturer of Force and Torque Measurement Equipment for Quality Control
CHALLENGE	To reduce costs & create bespoke solutions
SOLUTION	Deploying a range of 3D Printers (SLA, Composite & FFF technologies)
RESULTS	• Freedom with design for bespoke solutions • Up to 96% lower costs, which feed to the end customer • Up to 98.8% shorter lead times, from weeks to days

PROFILE

Mecmesin, established in 1977, specialise in the design and manufacture of force and torque testing solutions producing affordable and easy-to-use products that enable small and large businesses alike to undertake quality control checks on their products without compromising on precision.

Companies in a diverse range of sectors from aerospace, automotive, construction and cosmetics to electronics, medical & pharma and packaging use Mecmesin products within their control process to evaluate the strength of raw materials, components and finished products, enabling them to maximise productivity, identify defects, reduce waste, and ensure compliance with industry test standards.

Mecmesin has international reach with subsidiary companies in France, Germany, the USA, China and Thailand as well as a strong distribution network that now operates in more than 50 countries.

The company's HQ based in Slinfold, West Sussex has been the innovation hub for incorporating and deploying additive manufacturing technology into its processes. The aim? To reduce costs – internal cost of product development and manufacturing and the cost to the end customer.

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EQUIPMENT

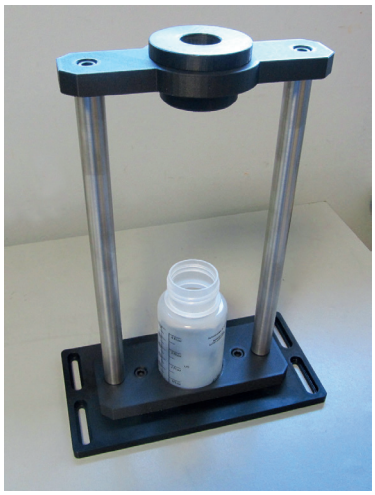
1x Markforged Mark Two Composite 3D Printer
1x Formlabs Form 2 SLA 3D Printer
2x Tiertime UP Box ABS Specialist 3D Printers

THE CHALLENGE

In addition to their standard product range, Mecmesin design bespoke products and accessories for specific customer applications. With a large number of clients spanning a wide breadth of industries, Mecmesin needed to find a way to produce products with exacting requirements, whilst keeping product development, manufacturing and end customer costs as low as possible.

They purchased their first ABS specialist 3D printer, a Tiertime UP Box, in 2015 to meet the requirements of a specific client project, the cost of which was paid back immediately through the output. Since then, Mecmesin have continued to add to their 3D print farm year on year with a variety of specialist equipment: a further UP Box to assist with increasing capacity, a Formlabs Form 2 SLA 3D printer for the production of functional and detailed parts, and their most recent addition, the Markforged Mark Two Composite 3D printer for functional, high-strength applications. This suite of 3D printers provides Mecmesin with a wide variety of functionality, capability and opportunity.

> “Each printer has led to another printer”
> explains Brian Howes,
> Mechanical Design Engineer



Syringe Plunger Force Tester.
Parts 3D printed in Onyx with Carbon Fibre reinforcement and ABS

Flip Cap Test Bottle Holder 3D printed in ABS

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"One of the biggest gains is having freedom of design, allowing more imagination without the risk."

THE SOLUTION

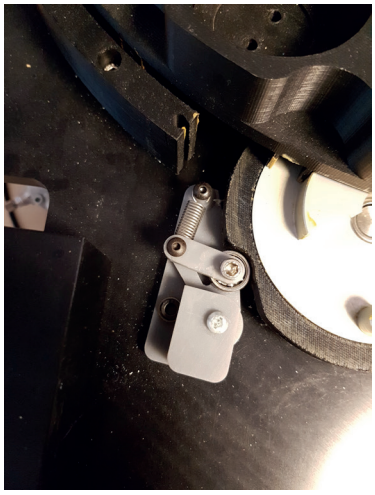
Mecmesin have been building their suite of 3D printers for the past three years and now run a range of additive manufacturing technologies including Fused Filament Fabrication (FFF technology), Stereolithography (SLA technology) and Composite Fibre Fabrication (CFF technology), all housed within their Systems and Development departments.

To date the equipment has been used in a wide variety of applications including small batch manufacturing, end components such as grippers and test holders, client bespoke part prototyping and development, tooling in manufacturing and production of stock parts.

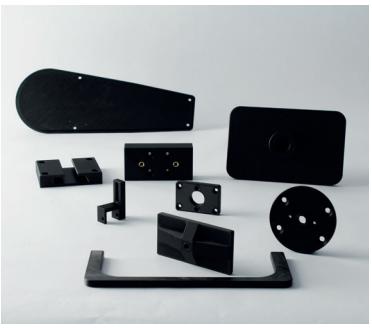
Mecmesin incorporate their 3D printers into all aspects of their business, from pre-sales demonstrations and samples, through to client consultation, bespoke product development and then reduction in costs in manufacturing, whether it be component parts or associated tooling.

Adjustments have had to been made to Mecmesin's internal processes; designing for 3D printing has been one big change – allowing greater freedom with design by not being tied down to traditional concepts and limitations, and creating better fit and more bespoke products. The Engineering Team have also had to get their head around the scheduling of print jobs to maximise output across all the machines, which in turn has helped make them even more efficient whilst providing more time to iterate or fix mistakes.

Mecmesin have also been able to complete new business for international clients, that would not have been possible without the use of their 3D printers. An American client was looking for a bespoke Camera Focus Ring Torque Fixture and it was essential to confirm dimensions prior to development which required an accurate prototype. To machine this part would have cost thousands, which would have made the job unjustifiable. However, Mecmesin were able to generate the desired prototype for just £15 in material costs, winning the business.



Combined 3D printed parts in the Automated Bottle Cap Tester: Actuator Trigger printed on the Form 2 (SLA). Bottle Jig printed in ABS



Additive Manufacturing Technologies enabling design freedom: range of bespoke 3D printed parts in Onyx on Markforged 3D printer

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96% COST SAVINGS & 98.8% LEAD TIME REDUCTION

THE RESULT

Outsourcing parts, whether for product development or manufacturing is expensive, consumes time and resource and leaves little control over long lead-times. As Mecmesin's work is incredibly bespoke to its clients' requirements, it is important they maintain control over processes, costs and resource.

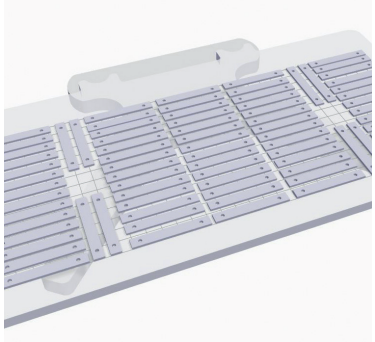
"3D printing is transforming what we're doing and how we're thinking. The team can afford to make mistakes with the 3D printer, but mistakes are harder to resolve when fabrication is outsourced. Every time there's a free period on the printer, stock parts are printed."

With the introduction of the latest Markforged additive manufacturing equipment, Mecmesin set a savings target of £1,000 per month to prove to their Purchasing Department that the value of adding the machine, would be paid back within a year. To date they are able to save on average £2,000 per month, and that's excluding any savings made by 3D printing parts for stock.

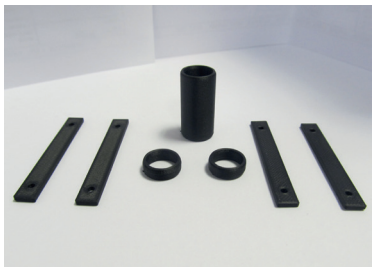
"We had initially purchased the Markforged printer with our bespoke fixturing in mind as most pieces are one-off runs which are always an expensive manufacture. After just a few weeks we realised the wider functionality of the machine and started to run low volume standard stock parts" explains Emily Swinburne, Mechanical Design Engineer.

This change to using the machines for producing stock parts has seen one of the biggest lead time and price reductions for Mecmesin. For example, Mecmesin's Spacer Tubes used on a pulley assembly were previously purchased in batches of 60 units, on a 14-week lead time, costing £210 per batch. This process has now been superseded by using the Markforged Mark Two whereby Mecmesin can fit all 60 units on a single build plate, printing in just 21 hours at a cost of £57, generating a saving of 73% and a reduction in lead time of a huge 98.9%. Off the back of this success, Mecmesin are also branching out to other production parts, such as the Bellow Nutplate which is used in Mecmesin's smaller testing stands. The part is now printed in Onyx and sees a huge cost reduction of 96% from £2.98 to £0.11 per plate, with a lead time reduction of 98.5%, from 5 weeks to a 12-hour print time.

Lead times from design, to having that same part in front of you, are drastically reducing. To outsource a custom Top Cross-Head would typically cost £300, on a 3-week lead time from ordering. The same part is now 3D printed on the Markforged Mark Two in Onyx in just 2 days, at a cost of £125. For this single part alone, Mecmesin see a 90.4% reduction in lead time and a 58% in cost savings.



Batching the Bellow Nutplates: 78 per build. Print time < 12 hours. Time saving 98.5%. Cost saving 96% to £0.11 per unit



Replacing stock parts: 3D printed Spacer Tubes & Nutplates in Onyx on the Mark Two

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NEWER WAYS OF OPERATING

Traditional materials have been substituted with 3D printing materials and are generating a wealth of benefits:

APPLICATION	TRADITIONAL MATERIALS	SUBSTITUTED 3D PRINTING MATERIALS	BENEFIT OF 3D PRINTING
Automated Bottle Closure Tester 	Machined aluminium, spark eroded steel	Onyx (Nylon with micro Carbon Fibre) ABS Tough Resin	• Shorter production lead time from 5 to 2 weeks • Reduction in costs that are transferrable to client e.g. 3D printed base at a cost of £100 versus machined aluminium at over £1,000 • Improved design opportunity for increased functionality • More client flexibility with additional bottle inserts = greater functionality of tool • Ability to personalise facia without incurring extrusion moulding costs • Ability to achieve fine detail in component parts in a lower cost material and process

Using 3D printers has now become second nature to Mecmesin, with full integration into their processes, they see additive manufacturing as part of their fabrication solution.

"CREAT3D have been great, always responsive and they let us pick their brains! They also suggest new appropriate technologies for us. It was CREAT3D, who printed off a couple of free prototypes on the Markforged so we could have it in our hands and understand the benefits of adding this technology"

Since incorporating 3D printers, at a total capital investment of approx. £22,000 for the range of machines, Mecmesin has already produced more than 60 bespoke applications for clients and seen repeat and ongoing savings in costs, time and resource. They will continue to invest in the technology and adjust its processes to benefit from incorporating more freedom of design, development and manufacture via 3D printing.

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.

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