



Solving Design and Manufacturing Problems with 3D Printing

THE CHALLENGE

Ensuring that products are robustly designed for manufacture, in short turn-around times.

THE SOLUTION

Multiple Markforged desktop 3D printers, including the Mark Two fully composite 3D printer, and two additional Onyx Series printers for increased production capacity. Based on new services that Kove were able to offer through Additive Manufacturing, all printers were running flat out 24/7 for 9 months.

THE RESULTS

"We can quickly solve our clients' design or manufacturing problems with a workable solution. By using Additive Manufacturing, we are able to produce high tolerance pieces, fast"

Rachel Mackintosh, Project Engineer at Kove

- Return on investment on the initial equipment, in less than 3 months, adding 2nd and 3rd machines within 9 months
- Clients receive 3D printed solutions to their design and manufacturing problems, within days
- Competitive advantage through the ability and agility to respond quickly to client's requirements
- New revenue streams through offering 3D printed end-use components at lower cost, with enhanced functionality and reduced weight

ABOUT KOVEDESIGN

KoveDesign is a full service, high technology engineering design consultancy, established in 2011. The Kove Team has advanced engineering specialists across the automotive, motorsports, aerospace and healthcare sectors, totalling over 30 years collective service.

KoveDesign provides design and engineering services, including end-to-end product creation. Alongside Kove's work for racing teams and sports car manufacturers, the consultancy also work with a wide range of clients including General Electric, the NHS, Rivian (Electric Vehicles) and Formula E.

As Kove's services are heavily focused in both design and manufacture, Kove understand the value that Additive Manufacturing brings, and have invested in multiple Markforged 3D printers to deliver robust, strong, quality parts quickly to their clients.

The 3D printers form part of the total manufacturing and design capabilities at Kove, alongside CNC machining, composite and fabrication shops.





THE CHALLENGE

Quite often, a product can be designed for function, but not designed for manufacture.

This is not the case at KoveDesign. One of Kove's key differentiators is designing with manufacturing methods in mind.

"Designing a functional part with the intention of it being manufactured is core to the work we do for our clients. Where suitable, we incorporate Additive Manufacturing into the project as much as possible because of the benefits it brings. From the first stages of design, right the way through to considerations in production, it is beneficial to not only shorten time lines, but generate cost savings and ensure we can meet our clients (often very short!) turn around requirements"

Explains Rachel Mackintosh, Product Engineer

THE SOLUTION

Working in close consultation with CREAT3D, KoveDesign invested £20,000 in their first Markforged Composite 3D Printer, with a full installation, training and support package. The printer was integrated quickly into the design workflow, right from initial briefing stage, and used predominately for rapid prototyping, design iteration and functional testing.

In quick succession (at 3 and 9 months), based on the fast return on investment that Kove saw from the first 3D printer, came additional investment in two further

machines from the Markforged Onyx desktop series (2x Onyx One 3D printers). These machines were needed to provide extra production capacity, as the applications had deepened into end-use parts and components, not just prototyping.

Based on new services that Kove were able to offer through Additive, all printers were running flat out 24/7 for over 9 months.

Single Technology, Multiple Value Generating Applications

The first applications for the Markforged 3D printer were design-led, with prototyping and product testing the main focus points. However, very soon after integrating the technology, Kove realised further potentials of the equipment, and now a farm of Markforged Additive equipment is used for multiple applications, generating new revenue streams for Kove, as well as cost and time savings for their clients:

Today's uses of Additive Manufacturing at KoveDesign include:

- Proving and testing prototypes
- Proving new design with product iteration
- Rapid prototyping for clients to test products
- Validating prototypes without the expensive step of machining or tooling
- Producing low volume, supply-ready components

THE RESULTS

Clients Now Request 3D Printed Parts

A further positive change that this high use of Additive Manufacturing has seen, is that clients are now requesting 3D printed parts, or request that their design incorporates 3D printing. Clients are changing drawings to reflect the requirements for Onyx (the Markforged Nylon based material), and they are adapting designs to be 3D printed. Rachel adds: *"The most consistently supplied parts in particular within our Automotive clients are now 3D printed"*.

Fast Turnaround Times with Enhanced Part Performance

Using 3D printing has enabled fast turnaround for Kove's clients. Rachel Mackintosh, Project Engineer, explains *"We can quickly solve our clients design or manufacturing problems with a workable solution. By using Additive Manufacturing, we are able to produce high tolerance pieces, fast."*

Furthermore, the technology lends itself to more complex designs, single parts instead of assemblies and enhanced functionality *"Two of the best features of the Markforged 3D printers is the excellent surface finish that the material (Onyx – Nylon with micro Carbon Fibres) produces, which is essential for our clients, as well as the ability to encapsulate inserts during the print process. It's a very powerful tool"* highlights Peter Kent, Composites Director at Kove.

Elemental Throttle Pedal

Peter Kent, Composites Director at Kove explains the reasons and benefits of 3D printing this end-use component.

"The throttle pedal we have produced for the Elemental car by using the 3D printer has a number of benefits. It is lighter - about a third of the weight of the previous pedal - which was made of aluminium.

A further benefit is the speed and part count. We have removed processes and simplified production by making the component into a single part. This therefore removes the risk, making part production easier and simpler. We have taken the complexity out of the part and encapsulated the nut, removing the need to tap in a thread.

What is exciting about the part is that you can encapsulate the nut. By stopping the printer during the production of the throttle pedal, the nut can be placed in position and the printer restarted in less than a minute. This can be all be done at the same time as creating a part which is as stiff as the previous part."



Original v 3D printed throttle pedal

Elemental Throttle Pedal

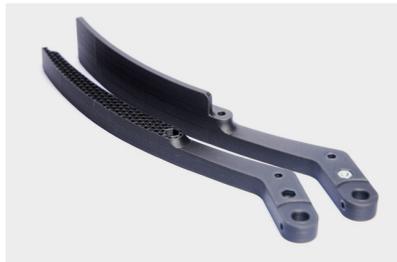
Traditional fabrication

Material: Laser cut, weld and anodise, Aluminium
Lead time: 2 days +
Cost: Approx. £100

3D Printed Elemental Throttle Pedal

3D Printed

Production method: 3D Printed in Onyx (Nylon with micro Carbon Fibre). Nut embedded into pedal during printing process
Lead time: 8 hours. Lead time saving 83%
Cost: Approx. £100. Similar cost to traditional form



Visually similar, the 3D printed version of the part was printed in a single piece

Additive Delivers Kove their Competitive Advantage

Additive Manufacturing is now deeply embedded in KoveDesign's capabilities and this is what creates their leading service, agility and design capabilities, standing Kove out from other engineering consultancies.

Speed to respond to client design and manufacturing issues, providing a functional design that can be produced, at low cost and quickly, sees Additive Manufacturing continuing to expand as a service and capability at Kove.

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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