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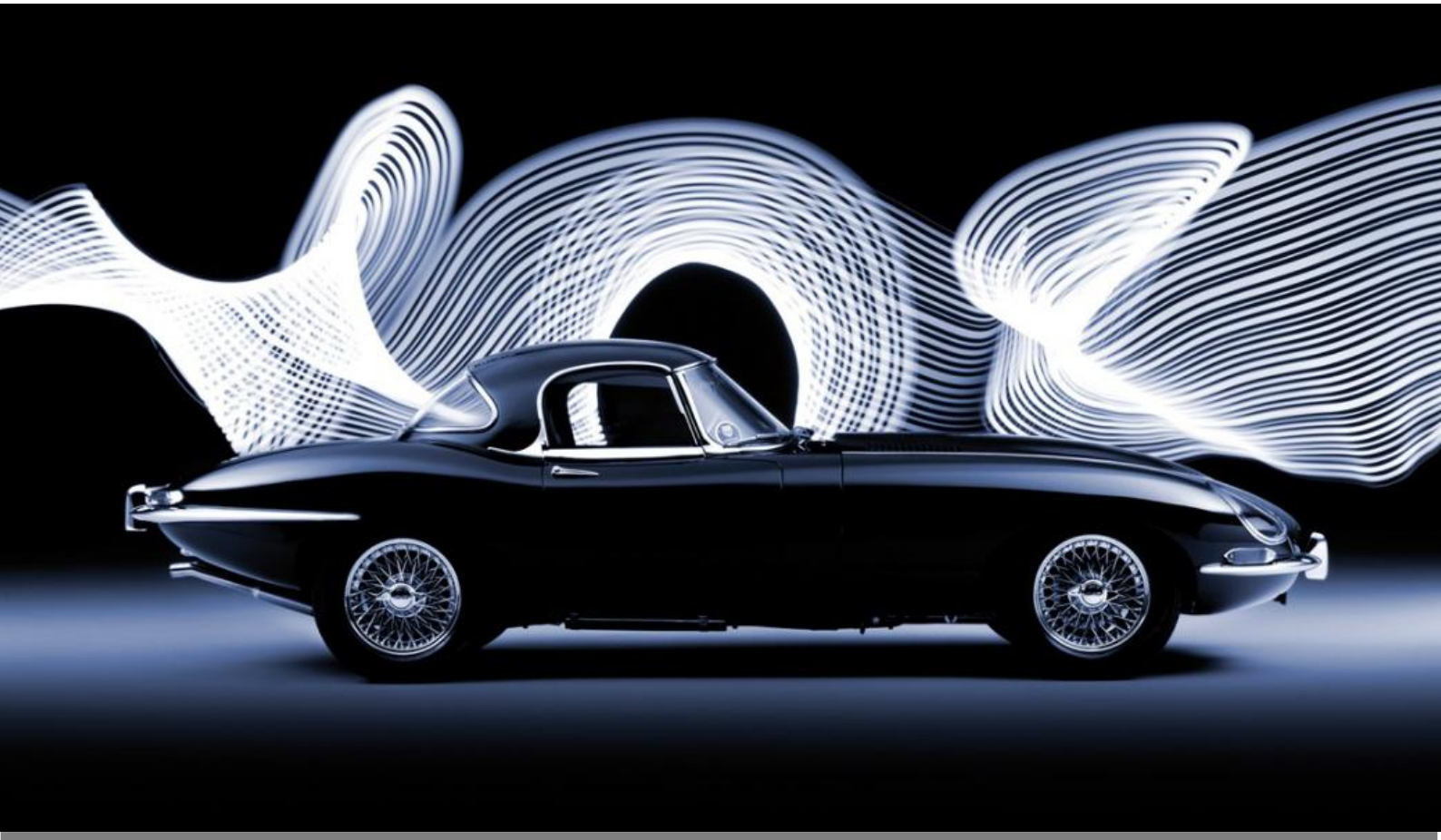
S·N·G BARRATT



Case Study

SNG Barratt Limited

If you are one of the many millions of people who think the Jaguar E-type is simply the best looking car ever produced then find a quiet five minutes to learn a little about how these iconic cars (and many other models of Jaguar) are kept on the road by the skilled team of Engineers at SNG Barratt.

Based in Bridgnorth, Shropshire and led by CEO Julian Barratt, this worldwide supplier of all things Jaguar pride themselves on remanufacturing parts that have long since been unavailable. From humble beginnings based in a garage the business now has representation in the UK, US, France, Germany and Holland.

Even though the majority of the parts SNG supply were designed and manufactured before anyone had ever heard of 'additive manufacturing' this hasn't stopped the engineering team embracing modern technology to recreate authentic, sensibly priced 'old fashioned' parts and design new ones too.

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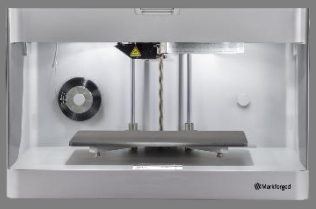
'Complex metal parts'

'Onsite Metal Sintering'



'Production ready parts as strong as Aluminium'

It's a Global Market

How do you keep the world's Jaguars purring

Supplying the world with 1000's of parts for classic Jaguar cars is no mean feat, especially when many of them are no longer available from the manufacturer. It can be expensive too, with money tied up in hard tooling or slow moving stock.

This was certainly the case for SNG Barratt in the early days, who initially re-purposed parts from donor cars or made a few key parts themselves. They eventually purchased a local automotive parts business and over time the manufacturing of fabricated parts was introduced, and the company grew again by adding small press work along with cutting/forming operations.

One constant consideration is 'part volumes' which in an aftermarket business will never be as high as those of the OEM. The engineering team often found that the original manufacturing method used for making 1000's off was simply not viable to make 10 off. When this was the case the team chose to investigate how modern day technology could help them.

Nowadays SNG are using their engineering knowledge to design and manufacture their own range of parts too. These not only replace but also improve upon the OEM parts. One of these, an electronic ignition system, is a top seller worldwide, which improves both vehicle reliability and performance. An item like this would surely have been fitted to the vehicles if it had existed back in the day, so it's a testament to the team's lateral thinking and constant quest to not only supply but also improve along the way.

Engineering Strategy

Additive provides a major advantage

As early adopters of additive manufacturing SNG Barratt have long since known the benefits the technology offers. Indeed 'additive' in one form or another has been part of the engineering strategy for a number of years now.

Whilst the team embrace many types of additive manufacturing their choice of technology is governed by the part itself. Sometimes end use parts will be made using Multi Jet Fusion (MJF) and others are made using Stereolithography (SLA). The metal end use parts & internal engineering support parts are made with their Markforged Fused Filament Fabrication (FFF) machines.

As CEO Julian Barratt points out *"SNG Barratt are an engineering company, so it's important that we have a clear and concise engineering strategy that covers all technology. The decision to include additive manufacturing in this was an obvious one".*

Metal Printing in SNG

How is it being used?

Markforged metal printing has been used by SNG for 3 years and it provides a varied range of solutions within the business. In this case they use a Markforged Metal X, however it's worth pointing out that the Markforged FX10 can also print metal too.

There are now 12 end use parts being made, which is about 20% of the machine's workload, examples of these are door catches and handbrake components. Another 70% of the machine's time is spent on 'production support', making tooling inserts, jigs and fixtures and prototypes for verification purposes, before SNG commit to hard tooling.

The remaining 10% of printing time is available for sub-contract work outside of the SNG Group, and there is a steady stream of customers using the machine.

The capacity of the Sinter 2 outstrips the metal printer, so for companies with Sinter 1 (and now users of FX10 with the metal print head) it's possible to contract SNG to perform a sinter run on your behalf. The belief is that a hybrid model where people print their own parts and SNG sinter them will co-exist happily with their own work.

'Press Tool'

End Use Metal Parts

Bottle Jack Body

The design team at SNG were tasked with remanufacturing of an OEM spec bottle jack for the E-type market as the product had been no longer available for many years. The product was costed for viability using the original (traditional) casting process, but proved expensive because of the high initial investment required. This was particularly amplified because of the low part volumes.

In search of an alternative, the team scanned an original jack body - a technique they often turn to with curvaceous surfaces that are hard to measure. Then they ran a part through the Eiger software to provide a cost comparison on the Metal-X. This proved a cost-effective solution, so two initial parts were manufactured and tested in an assembly.

Part #1 was the jack body, which was painted in the original Jaguar colour and part #2 was the cap nut that was polished to a mirror finish. Other parts in the assembly, such as the triple lift thread and locking pin were machined as per the originals.

As both parts were produced using an FFF metal technique they were printed with a triangle infill, which made them light, but 'old school'. Engineers (rightly or wrongly) associate weight with strength, so the big question was 'will it be strong enough'? The team needed to find an answer to this before jacking up a £100,000+ car!

'3D printed bottle jack'

'OEM tool kit'

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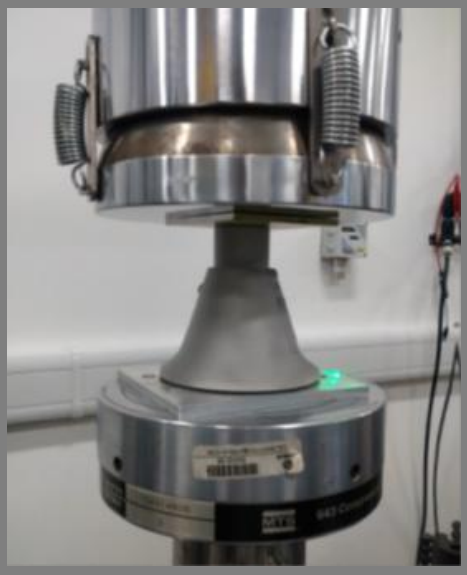

'Under Compression'

'The outcome of the testing'

GREATER THAN 9.5 TONS

'Additive wins again'

Will it be strong enough?

It's probably the most popular question asked!

To ensure the product would be up to specification the team at SNG sent the jack body to an accredited testing house and asked for a written report back on how it performed under compression testing.

To make sure the part had a fair comparison the same testing was performed on an original cast jack body too. Both parts were positioned between 2 aluminium plates and then between the compression plates and placed under the following load conditions:

- Instant load to 15kN
- Ramp up to 20kN over 1 minute
- Hold at 20kN for 30 minutes
- Increase from 20kN to 95kN over 75 seconds

A conversion of 95kN compression via Google shows us that the final pressure was just over 9.5 metric tons!

Cast Jack Body

Fail ⊗

The cast jack stand withstood the initial 3 phases of testing with no perceivable indications of failure (a Testing Engineer was present for the duration of the test). During the final phase of the test an audible cracking noise was heard at around 1900s and 66.5 kN. This was followed by catastrophic failure of the part, are per the image.

Additive Jack Body

REPORT AVAILABLE

Pass ✓

The additive jack withstood the entire test with no indications of failure and is now a saleable item from the website.

Internal Production Support

Engineering Supporting Production

As most engineers are aware the true cost of a run of production parts is in 'tooling up'. Spread across 1000's of piece parts this often only makes a few pence difference to their price, but when spread across 10 or 20 piece parts it can make a huge difference.

So when a run of parts was required for a Jaguar XF sub frame the decision was made to make the press tools as hybrid metal and polymer. The metal chosen was Markforged H13 tool steel and the polymer was Markforged's award winning 'super polymer', Onyx.

A laser cut blank was placed in to the press and the completed press tool formed the rib down the centre, after that additional brackets were formed using a second Onyx tool and once fixing points were added they were finally welded in to place. A smart low-cost solution for a limited run of parts.

In an interesting combination SNG has also been printing fixtures to bend brackets for assembly with end use stainless steel printed parts! The image on the right shows a Jaguar E-type luggage handle which is a very rare item indeed. The handle itself is printed in stainless steel on the Metal X and polished to a high-quality finish, whilst the stainless-steel laser cut blank was formed using an Onyx press tool!

Other production support items now include assembly fixtures, welding fixture and prototypes for form and fit verification.

Onyx & Metal Press Tool

Luggage Stop Arm

ROI at a glance

Casting Tools

A cost avoidance of up to £10,000 per tool

Minimum Order Quantities

Suppliers wanted MoQ of 50 pieces for some parts that only sell 5 per annum, this frees up cash that would otherwise be tied up in stock!

Polished Stainless v Chrome

Polished stainless parts now replace original chromed parts - 5x LESS

- No machined brass component
- No copper plating process
- No chroming process

If you would like to get in touch with SNG Barratt or Mark3D UK the details are below.

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