

Case Study



See where additive manufacturing fits in a subtractive world at Guhring UK's 'Factory of the Future'

The Guhring Group is a world class manufacturer of precision cutting tools and allied tooling for the engineering & manufacturing industries. With over 8000 employees worldwide and a product range of 1620 products (in 44,000 sizes) they are renowned for being leaders in their field.

Guhring Limited is based in Birmingham, UK, and they employ a team of field technical support engineers, in-house design staff and application engineers who focus on delivering a continuous stream of the very latest in cutting tool technology. Their 'special' tools are designed, developed and manufactured in-house to customers specifications, as quickly as possible.

Challenge

To develop new concepts in industry leading cutting technology and reduce lead times: Developing new cutting solutions for some of the world's largest businesses is a demanding job.

As Alan Pearce the PCD Production Supervisor at Guhring UK points out "modern industry is relentlessly working to ever shorter lead times and as we are one of the main partners in their production process, we have to do the same. Therefore anything we can do to shorten the design, development and manufacture of special tools is of benefit to everyone".

Alan goes on to say "We are always looking to reduce the lead times associated with special tooling and we've made good progress over the years. We set ourselves a challenge to outperform our competitors in this area, whilst also trying to reduce the overall cost of the development cycle – which is not a simple task by any means. Guhring are always looking to improve and 3D printing gave us an opportunity to do so".

"Our specials team meets regularly, and the wealth of tooling knowledge is evident, but what we were missing was the ability to check the form and fit of the tools quickly. Often when you see something as a CAD concept you can pick up any issues quickly, but we were still finding problems further down the line when we began making the tools, which is expensive. 3D printing prototypes has really helped."

"These issues range from making sure the coolant channels are positioned correctly, through to validating that we can actually machine the geometry needed – some of these tools are very complex and have multiple parts. To get it wrong once we've started cutting metal is much more costly than we're comfortable with."

"The other thing we wanted to achieve was to support the field sales team with concept tools in days, so they could take them and explain to our customers what we were thinking. Having tried it we've had some great results and by involving customers early on we get better products!"

Solution

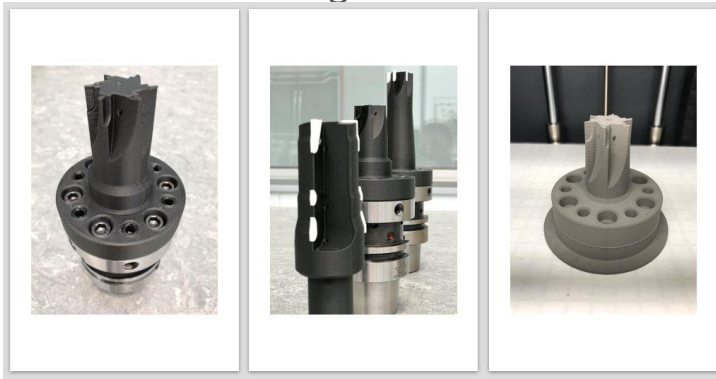
Markforged 3D Printers via Mark3D: Guhring has installed a Markforged Mark Two composite printer and a Metal X 3D printer in their technical academy. The wash station and sintering oven are in another part of the facility near to the existing coating plant and other finishing equipment.

Guhring print initial prototypes using the Mark Two composite printer, meaning an engineer can have a prototype in their hands very quickly. This allows the team to discuss the proposed concept at the earliest opportunity and validates their thinking is correct. Printed with standard settings these prints use a small amount of material and it now only costs a few £'s to check form and fit.

Once a tool has been accepted as a viable solution the design can be verified by printing it in metal. The cutting tips are brazed in to place and it's then attached to a standard holder, so the team can check coolant flow and perform usability trials on the machines located nearby. Moving forwards all new special tools will be verified by using some sort of 3D printing.

“As the person responsible for many of the special tools we design and manufacture here I find the ability to verify my designs quickly a real bonus. When you also factor in that we can now print a second prototype in metal and use it for initial cutting tests it's a huge advantage for us

Alan Pearce – PCD Production Supervisor, Guhring UK Limited”



Who's doing the 3D Printing?

Eventually the whole team at Guhring will have access to the printers, but for now it's Alan and his apprentices who have been trained. Guhring are a forward-thinking company and have bought in to modern apprenticeships whole heartedly. The fact that 3D printing is now on the curriculum also adds to the appeal of working for Guhring, making it easier to attract new staff in all areas.

Young engineers think differently and have been exposed to additive techniques throughout school and college, so they are immediately interested when Guhring explain what they are trying to achieve with their project.

Support for Production

As you walk around the Guhring facility you soon become aware that the Markforged printers are being used for other things too. Additive parts that support the production facility are appearing in every area.

Guhring have been hard at work making many of the items that are worn, broken or impossible to replace. In one example they have made some levers for an old, but very useful, grinding machine that can't be sourced any more. Other examples can be seen in use daily, such as laser marking fixtures, parts for machine guarding, work holding devices and loading fixtures.

When you rely on production machines and your facility runs throughout the night downtime is costly – one of the added benefits Guhring have found is that it's possible to use either of the printers for plant maintenance. 3D printed parts are being used to repair machines and keep them running and many have been left in situ long term.

Alan explains further "The ability to print something on demand is a real bonus, we spend a few minutes discussing the issue, create a solid model and then load it in to Eiger to choose our print settings. After hitting the 'print' button we walk off and get on with the next most pressing thing. We've taken a big step forward in reducing plant down time"!

"As part of our industry 4.0 initiative we deliver live machine statistics from the shop floor via our 'Visual Factories' software, we have KPI's around keeping our machine tools optimised, so the printers help us hit these targets".

What's next for Guhring?

Having a factory of the future isn't something that Guhring take for granted, they don't sit on their laurels and they are always working on the next new thing.

If you sit down with the management team, they will openly admit they've only just scratched the surface of what they'd like to achieve. Many of them have visions of making ultra-special tools with geometry (such as coolant channels) that can only be 3D printed.

Tool tip life is directly linked to cooling and the ability to print geometry that delivers coolant (through a custom designed aperture in the tool) directly to the cutting area is a major benefit. Other areas such as swarf evacuation are being experimented with too.

'Special' tools are only ever low volume at best, so Guhring have begun cutting trials with printed tools and are exposing them to the various off-centre loads that are traditionally associated with their industry. The dream is to be able to print specials on demand – watch this space!

AT A GLANCE

- ✓ Instant form and fit
- ✓ Lower manufacturing costs
- ✓ Customer samples can be produced quickly
- ✓ New tooling concepts are much easier to verify
- ✓ The printers are being used to support the production facility

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I've really enjoyed working with Mark3D on this project, they have been with me every step of the way. In many areas we're pioneering what we're doing, and it has been good to know we're supported properly.

This project has given me a great sense of achievement. I now look at engineering challenges differently and think – how would I print that!

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Alan Pearce,
Guhring UK Limited