

# 3D printing meets the aviation and aerospace industry: Nadcap certification

The company, toolcraft, from Georgensgmünd in Germany's Middle Franconia, manufactures high-end precision parts, components, and assemblies for different high-tech industries. The family company considers itself a pioneer for new, innovative production technologies such as additive manufacturing and customized turnkey robot solutions. Together with partners from industry as well as research institutes and universities, toolcraft aims to develop complete solutions that lead their field. A crucial area is the aviation and aerospace industry, for which the company regularly undergoes certification processes.



## toolcraft AG

[www.toolcraft.de](http://www.toolcraft.de)

toolcraft is a trailblazer in pioneering technologies such as 3D printing in metal and the construction of individual turnkey robot solutions. Here, the company provides the entire process chain in-house – from the idea and production, right up to the qualified part in the areas of CNC machining, 3D printing in metal, as well as injection molding, electrical discharge machining, and mold making. Customers include market leaders from the fields of semiconductor technology, aviation and aerospace, medical technology, the optics industry, specialist mechanical engineering, as well as motorsport and automotive technology. The medium-sized family company based in Georgensgmünd and Spalt, Germany, was founded in 1989 by Bernd Krebs.

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### NUMBER OF EMPLOYEES

380

### INDUSTRY

Manufacture of precision components along with automation solutions

### SALES

EUR 51.0 million

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### APPLICATIONS

- 3D printing in metal (Laser Metal Fusion, Laser Metal Deposition)
- laser marking

### TRUMPF PRODUCTS

- TruPrint 1000 Green Edition
- TruPrint 3000
- TruPrint 5000
- TruLaser Cell 3000
- TruMark Station 7000

## Challenges

In order to be allowed to manufacture components for the aviation and aerospace industry, manufacturing companies have to undergo comprehensive certification for their entire production environments. At the center of this is Nadcap (National Aerospace and Defense Contractors Accreditation Program), a unique association of companies from the aviation and aerospace industry. Together, they aim to ensure a uniformly high level of quality within the sector and to implement special production processes in as cost-efficient a manner as possible. toolcraft was one of the first European companies that decided to go through the difficult Nadcap certification for 3D printing with metals, in order to give themselves an edge against their competitors in the industry. Successful certification involves documenting and ensuring transparency over the numerous process steps which take place before, during, and after the LMF process with the 3D printer. Complete verification of the powder used is just as much part of this process as inspecting the component quality through optical and tactile measurement and non-destructive surface testing. Special attention is also paid to the LMF process. In addition to monitoring of oxygen levels and air humidity in the process chamber, it must, for example, be verifiable that the laser power and shape of the laser beam within the TruPrint 3000 3D printer used are coordinated in such a way that every part produced in it is exposed in precisely the same way.



"From the start of the certification process, TRUMPF enthusiastically supported us in finding solutions for the Nadcap question catalogue. The fact that zero errors were found during the audit, I believe, tells its own story about our successful partnership."

**CHRISTOPH HAUCK**

CHIEF TECHNOLOGY AND SALES OFFICER,  
TOOLCRAFT

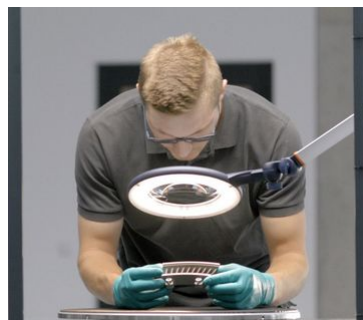


Solutions Preparation is everything - that is especially true for Nadcap certification. Before the actual audit, TRUMPF proactively supported toolcraft with ideas, solutions and suggestions so they could provide evidence of quality assurance for the entire process chain – before, during and after the build job. To do so, the TRUMPF staff studied the Nadcap question catalogue intensively and developed testing procedures such as path accuracy analysis and laser power measurement. Of course, the actual machine is part of the audit. toolcraft could fully rely on TRUMPF as a laser and mechanical engineering specialist. Thanks to plenty of expertise and decades of experience in laser technology, TRUMPF guarantees the highest level of quality and process stability even for the actual laser source and all its individual components.

Implementation Among other things, toolcraft has an in-house laboratory with extensive equipment for checking the powder and component quality. For example, oxygen and nitrogen can be analyzed in the powder or in the solid melted matter. Powder management is a pivotal element for Nadcap. Moreover, the company uses its own tensile testing facility and has installed fatigue strength systems. A further key to success for certification is the overall TRUMPF concept. Servicing and maintenance of the machines by TRUMPF's Technical Service is also an important criterion, as are the intelligent monitoring solutions which professionally analyze and monitor the LMF process. Furthermore, the exchangeable cylinder

principle of TruPrint machines facilitates a smooth parts flow. toolcraft manufactures each and every material on their own machine, installed in the newly built hall, optimally customized to the requirements of additive manufacturing. They use a separate room with a corresponding unpacking and sieving station for powder and parts handling. The intensive preparation paid off: toolcraft passed the Nadcap certification – with zero errors.

Outlook toolcraft now belongs to a select group of companies which are the first to be able to produce 3D-printed parts for the aerospace sector to the highest standards. Contact with customers from the sector shows that Nadcap gives toolcraft the clear competitive advantage compared to other potential suppliers. Both TRUMPF and toolcraft have learned a great deal thanks to the close and collaborative cooperation during the testing procedure, equipping both companies for the next challenge in the best possible way.



#### Find out more about TRUMPF products



#### TruPrint 3000

The TruPrint 3000 is a universal medium-format machine with industrial part and powder management, designed for flexible series production of complex, metal components using 3D printing.



[Zum Produkt](#)



#### TruPrint monitoring

Increase the efficiency of your production with the intelligent monitoring solutions from TRUMPF. Monitor and analyze your LMF process in the TruPrint machines simply and reliably.



[Zum Produkt](#)



### TruLaser Cell 3000

With the compact, high-precision 5-axis TruLaser Cell 3000 laser machine, you can process small to medium-sized components using laser metal deposition (LMD). Whether for coating, generating or repairing – the TruLaser Cell 3000 can be used in a variety of applications in the LMD field.



[Zum Produkt](#) 



### TruMark Station 7000

With its large interior dimensions, the TruMark Station 7000 marking system offers a great amount of space for almost any application. It makes no difference whether you want to mark individual large or heavy components with laser precision or particularly large numbers of small parts arranged next to each other.



[Zum Produkt](#) 

