

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

MBFZ toolcraft GmbH

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 moulding, electrical discharge machining and mould making. Customers include market leaders from the fields of semi-conductor 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 und Spalt, Germany, was founded in 1989 by Bernd Krebs.



NUMBER OF EMPLOYEES

403



INDUSTRY

Manufacture of precision components along with automation solutions



TURNOVER

EUR 39.5 million

APPLICATIONS

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

TRUMPF PRODUCTS

- TruPrint 3000 TruLaser Cell
3000 TruMark Station 7000

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

Challenges In order to be allowed to manufacture components for the aviation and aerospace industry, the entire production environment of manufacturing companies has to

undergo comprehensive certification. At the centre 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 a competitive 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. I believe that the zero errors found during the audit say everything there is to say about our successful partnership."

Christoph Hauck
Managing Director of toolcraft

Solutions

Preparation is key – especially when it comes to the Nadcap certification. TRUMPF proactively supported toolcraft before the audit "with ideas, solutions and suggestions", in order to furnish the quality assurance proof throughout the entire process – before, during and after the build job. For this, TRUMPF employees examined the Nadcap question catalogue intensively, and developed testing procedures such as the path precision analysis or laser power measurement. The actual machine is of course part of the audit. Here toolcraft was able to completely rely on TRUMPF as the laser and mechanical engineering specialist. As a result of their extensive expertise and decades of experience in laser technology, TRUMPF also guarantees the utmost quality and process stability for the actual beam source and all of its individual components.

Implementation

toolcraft has, amongst other things, its own laboratory with extensive equipment to verify the quality of the powder and components. Oxygen and nitrogen in the powder or the solid welded body can be analysed, for example. Powder management is a central element for Nadcap. The company also uses its own tensile testing facility and has installed fatigue strength facilities. Another factor to the success of the certification was TRUMPF's overall concept. Here, the maintenance and upkeep of the machines by TRUMPF's Technical Service department is just as important as the intelligent monitoring solutions which analyse and monitor the LMF process in a professional manner. The exchangeable cylinder principle of the TruPrint machines also enables a smooth flow of parts. In the newly built halls that are

perfectly equipped for additive manufacturing, for each material, toolcraft manufactures on a specific machine, and uses a separate room for the powder and parts handling with unpacking – including a sieving station. The comprehensive preparations paid off: toolcraft passed the Nadcap certification – with zero errors.

Outlook

toolcraft is now part of a select circle of companies that are the first to be able to produce 3D printed parts to the highest standards. When dealing with customers in the industry, Nadcap is a clear competitive advantage for toolcraft compared to other potential suppliers. Both TRUMPF and toolcraft learnt a great deal during the close, partner-based collaboration for the verification process, meaning they are both perfectly equipped for the next challenge.

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. In conjunction with the industrial parts and powder management, the machine is perfectly suited for use in job shops.

[To the product](#)

TruPrint monitoring

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

[To the product](#)

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.

[To the product](#)

TruMark Station 7000

With its generous inside dimensions, the TruMark Station 7000 laser marking system provides plenty of space for almost any application. It doesn't matter if you want to mark single large or heavy components with laser precision, or a large number of small parts in a series.

[To the product](#)

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