

3D metal printing meets Industry 4.0

toolcraft industrialises production with NX from Siemens

Georgensgmünd (Germany), 09/17: 3D printing and Industry 4.0 are the buzzwords currently defining the economy. Although additive manufacturing for plastics has already produced the first affordable printers for the home, when it comes to metal, the technology is and remains in the hands of innovative industrial companies. toolcraft has been manufacturing 3D-printed precision components in metal since 2011 and will soon be moving into its newly-built laser melting centre in Georgensgmünd. The medium-sized company has also already implemented Industry 4.0 for its CNC machining. Now, 3D printing and Industry 4.0 are to be combined with the help of NX™ software, a leading integrated solution for computer-aided design, manufacturing and engineering (CAD/CAM/CAE), from Siemens.

Continuous improvement for 3D metal printing

3D printing has now evolved past the initial hype. There is no longer a blind belief that 3D printing will make everything possible. Instead, innovative companies have steadily been working to improve the technology. Metal laser melting is used to produce complex and efficient lightweight and internal structures that are of particular interest in the aerospace and energy sectors, as well as for medical technology and motor sports. Machine manufacturers are also increasing investment in automation to make the processing and the finishing of parts even more effective. Hybrid machining centres, where additive manufacturing and subtractive manufacturing are combined, are becoming more prevalent as well. toolcraft chose the NX software suite from Siemens to optimise the additive manufacturing process from the design stage through to manufacturing and finishing. Previously, various software systems were in use throughout this process. This meant that the data and manufacturing process was sometimes protracted and difficult to monitor.

NX from Siemens - an integrated solution for CAD, CAE and CAM

NX from Siemens PLM Software is an integrated software suite for product development and part production. It comes with integrated CAD, CAE and CAM modules to manufacture high-quality products quickly and efficiently. NX provides powerful solutions for product development, 3D modelling and documentation, multi-discipline simulation for structural, motion, thermal, flow and multi-physics applications and complete part manufacturing solutions for tooling, machining and quality inspection. The software also easily integrates with Siemens' Teamcenter® software, the world's most widely used digital lifecycle management software. No other software on the market offers such an ideal basis for manufacturing high-end precision parts and components. For toolcraft, working with Siemens was the obvious choice.

Maximising effectiveness and efficiency

Siemens' NX software provides a continuous process from design and simulation to production and finishing, with feedback loops between the individual process steps. It also delivers limitless design freedom for innovative and complex parts. Special features for topology optimisation and lattice

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structures are of particular interest in additive manufacturing and are integrated into NX as well. NX allows a designer to check the design guidelines of a part, ensuring the feasibility of components at an early stage. This includes checking wall thicknesses, finding areas where support structures are necessary, and validating the ability to remove powder from internal cavities. Advanced analytics and simulation of the build process can also be used to guarantee that parts will be manufactured successfully.

Once the design has been finalized, NX includes facilities for setting up the build tray, creating support structures, and generating instructions for metal powder bed printers, such as those used at toolcraft. Finally, after parts have been printed by laser melting, NX provides facilities for finishing the part using traditional CAM instructions for subtractive machining tools.

"Using NX does not just mean we can increase our competitiveness - it also speeds up the production process. That in turn delivers shorter innovation cycles and allows us to produce more complex parts. For our customers that means greater transparency, higher-quality products and greater effectiveness and efficiency", explains Christoph Hauck, Managing Director of toolcraft.

Always at the cutting edge of the technology

Urban August, Senior Vice President and Managing Director, Germany, explains the current position: "The conclusion from our experience over a large range of projects for customers, as well as from independent studies, is very clear: additive manufacturing and Industry 4.0 have huge potential for synergies. Complete digitisation of product design accelerates the use of additive production processes, because 3D printing can be done straight from fully described digital product models. Our customers can also join the current megatrend and implement a greater number of product variants and customised products in single-piece and small-series production runs."

To advance the industrialisation of additive manufacturing even further, Siemens and toolcraft have signed a cooperation agreement. toolcraft works across the entire process chain from design, production and finishing to quality inspection and non-destructive testing according to NADCAP standards all under one roof. toolcraft is decided to the use of NX software for 3D printing in metal, but is also utilizing NX and NX CAM in the field of engineering and AV/NC programming. In the words of Christoph Hauck, "This keeps us right at the cutting edge."

Contact Details

MBFZ toolcraft GmbH

Handelsstraße 1

91166 Georgensgmünd

Germany

Tel: +49 (0) 91 72 / 69 56 - 0

E-Mail: toolcraft@toolcraft.de

Internet: www.toolcraft.de

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For further information:

Frau Tina Hartmann-H'Lawatscheck

E-Mail: tinahartmann@toolcraft.de

About toolcraft

toolcraft is a pioneer of forward-looking technologies, such as 3D metal printing and the construction of customised turnkey robotics solutions. The company tests and develops innovative engineering processes until they are ready to be used on production lines. As a provider of comprehensive solutions, toolcraft covers the entire process chain, from the initial idea to manufacturing, quality assurance and testing in the areas of CNC machining, 3D metal printing, injection moulding, spark erosion (EDM) and mould making. Its clients include market leaders in the semiconductors, aerospace, medical technology, optical, special machinery manufacturing, motor sports and automotive industries. Building close working relationships with collaborative partners as well as universities, other institutions of higher education and research centres is an important part of its corporate philosophy. The medium-sized family-owned company, located in Georgensgmünd and Spalt, was founded by Bernd Krebs in 1989.

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