

Getting the Hang of 3D Printing: Checking the Valve Torque

Source: 3S Antriebe GmbH



900 Nm firmly anchored by an additively manufactured handle: the 3S AIG XS for valve maintenance and repair

Challenge

Reliable and economically transparent small-series production of handles for a specialized tool

Solution

Manufacturing of casing with a handle made from PA 2200, a PA 12 material, using the industrial 3D printer EOS P 770

Results

20 % weight savings using plastic instead of metal

Production costs reduced by more than 1/4, guaranteeing a stable total price for the product

Final assembly time reduced by 40 minutes

Functional integration, reducing the number of components from 9 to 1

Simplified supply chain, from 4 suppliers down to 1

Hasenauer & Hesser Are Manufacturing Additively for 3S Antriebe

Some tools go unnoticed by the vast majority of us, despite playing such an important role in our lives. One example are the valve exercisers by 3S Antriebe GmbH – they ensure that water can be reliably supplied to hundreds of thousands of households. In their latest design iteration, the company replaced the expensive-to-manufacture metal handle with a plastic one. To produce the new part, their supplier Hasenauer & Hesser GmbH used the EOS P 770 industrial 3D printer.

Challenge

According to the German Federal Cartel Office, there were over 6,000 water suppliers nationwide in 2016. Water suppliers are responsible for ensuring that the precious resource of running water – often taken for granted by people and businesses – does not run out. On average, each German citizen consumes over 120 liters of water per day. Network maintenance work is therefore very high priority – it's difficult to overstate just how important it is to keep the network's crucial buried valves in proper working order. If a valve can't be closed, a broken pipe might cause floods that affect several entire streets.

To keep this precious water under control, the valves need to be maintained, just like any other type of pipeline, including gas and district heating supply systems. Especially

with older valves, a great deal of force may be required if they become stiff. "When that happens, several employees need to work together to apply a massive amount of force to open and close the valve a few times so that it loosens up," explains Daniel Bohle, who works as a design engineer for the Berlin-based company 3S Antriebe. But not to worry – valve exercisers and various accessories can be used to significantly reduce the proportion of heavy physical work.

Thus, 3S Antriebe developed a valve exerciser that can be used anywhere in the world. The 3S AIG XS can apply up to 900 Nm of force to a valve. Thanks to a clever system of levers, the machine can be operated to produce up to 250 Nm by just a single person. But this powerhouse tool was not well-suited for mass pro-

Short Profile

Hasenauer & Hesser GmbH is active in the three business areas of engineering and engineering services, production and sales of specialized valves, and additive manufacturing; in the latter, the company has more than ten years of experience.

3S Antriebe GmbH develops and manufactures actuator solutions for valves in underground supply networks.

More information
www.hasenauer-hesser.de
www.3s-antriebe.de

From 9 to 1: the functionally integrated handle of the 3S AIG XS is now manufactured 40 minutes more quickly – at consistently high quality, without post-processing, and at transparent cost.

(Source: 3S Antriebe GmbH)



"When it comes to additive manufacturing, I'm a complete convert. The component has exactly the shape that I want. And it comes with full price transparency and a simple supply chain with just a single contact person. Our experience is one of progress."

Daniel Bohle, Design Engineer, 3S Antriebe GmbH

duction. 3S Antriebe faced a number of common challenges: quality fluctuations requiring expensive follow-up work and pricing difficulties, leading to a lack of transparency in price-setting. The assembly was also relatively complex, requiring various techniques and materials.

Solution

In light of these challenges, switching to additive manufacturing was the obvious choice for the 3S AIG XS – it is cost-efficient and flexible even for small batch sizes. The casing itself was already being manufactured in this way due to its high complexity. But then Daniel Bohle turned his focus to the handle of the valve exerciser: "Before, we made this component from metal, which required multiple partners. We had a series production line, but you can hardly describe it as mass production, when you have millions of pieces. Additive manufacturing allowed us to operate more independently with a single point of contact," explains the design engineer.

Their new single partner is Hasenauer & Hesser. Hans-Jörg Hesser, one of the company's managers, revealed a few more details about the contract: "Our customer needed a component that was precise and cost-effective to manufacture with short and reliable delivery times, despite relatively small batch sizes. Functional integration played a less significant role but still remained a factor. With the proven EOS P 770, we have exactly the right manufacturing system for the job." To manufacture the handle, Hasenauer & Hesser – now the one

and only central point of contact for 3S Antriebe – selected PA 12 (PA 2200). This extremely stable and durable polymer is very light and therefore achieves weight savings when combined with a 3D-optimized design.

The production process itself was performed by Hasenauer & Hesser in the usual way: CAD data form the basis, then the SLS system by EOS builds the grip according to the additive layering process. The functional integration mentioned above allowed the switch to be placed in an ergonomically favorable position directly under the handle. But the most decisive advantage of the chosen solution was, that the number of parts and therefore the supply chain complexity could be reduced while retaining maximum flexibility. Other factors, such as quality and reliability as a partner for customers in Germany and abroad, were also important to 3S Antriebe.

Results

The objectives were all met and surpassed: the handle, newly redesigned

by Daniel Bohle, is now manufactured in a single "print" – reducing the number of parts from nine to just one. Previously, the company needed to work with four different suppliers, but now they exclusively deal with Hasenauer & Hesser. "It just simplifies everything, from accounting to negotiations to storage," says Bohle. "We now have one contact person for everything, which reduces the effort enormously. And of course quality levels have also benefited. They are more consistent now that manual work has been completely eliminated."

Additive manufacturing eliminates the need for deburring, cutting, gluing, and adjusting. Similarly, thanks to functional integration, there is no longer any need to cut threads – which could even be printed at the same time if necessary. The reduction in assembly time of around 40 minutes per part is great news for Bohle and his colleagues, but this is by no means the only advantage. For him, the most important benefit is the reliable, predictable, and shorter delivery times: "A few days instead of many weeks – that's what makes a difference, especially for our customers."

Another factor is a cleaner production process for employees, given that the sanding and lamination steps have been eliminated. Cost-efficiency has multiple dimensions for Bohle: "The price itself isn't the only thing that matters, but also how it's calculated. With 3D printing, everything is transparent and can be calculated based on volume. Personally, I'm happy about any new parts that I can make from plastic."

"For companies like 3S Antriebe GmbH, we have exactly the right answers for their questions and challenges. We can deliver high-quality results quickly and reliably. Additive manufacturing is also cost-efficient even for small batch sizes."

Hans-Jörg Hesser, Managing Director for Hasenauer & Hesser GmbH

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