Consistent production quality worldwide

At the medical location in Tuttlingen, southern Germany, Aesculap AG, the surgical division of the medical technology company B. Braun, manufactures surgical and medical technology products. Marc Laufer is Vice President of Engineering at the site: “We manufacture three different product groups here: surgical instruments and implants for the orthopaedic sector.” The third plant produces sterile containers in which surgical instruments are stored and reprocessed, as well as motor systems for battery-powered machines used in operating theaters. The variety of products that Marc Laufer and his colleagues have to handle on a daily basis is therefore just as large. And this is the case not only in Tuttlingen, but in all locations worldwide - including the Chinese plant in Suzhou. Charlie Zhu is responsible for laser applications in the “China Instrument Plant” production area: “We produce one million surgical instruments here every year. Bone punches and more than 600 different standard instruments such as forceps, scissors and sterile containers.”

Aesculap AG

www.aesculap.de

“We protect and improve the health of people all over the world” - this is the vision of B. Braun, one of the world's leading medical technology companies. Since 1976, Aesculap AG has been part of the B. Braun Group and offers solutions for core surgical and interventional processes, including surgical instruments, sterile container systems, orthopaedic joint replacements and products for interventional vascular therapy, neurosurgery and spinal surgery. The company currently employs around 3,500 people at its headquarters in Tuttlingen and also manufactures in China, France and Malaysia.

INDUSTRY	NUMBER OF EMPLOYEES	SITE
Medical technology	Approx. 12,400 (Aesculap division worldwide)	Tuttlingen (Headquarters)

TRUMPF PRODUCTS

- TruMark 7050 in TruMark Station 7000
- TruMicro Mark 2030 in TruMark Station 7000
- TruDisk 2000 in TruLaser Station 7000

APPLICATIONS

- Laser marking
- Laser cleaning
- Laser welding
- Laser cutting

Challenges

Felix Schmidt is Head of Systems & Security and Production Digitalization at Aesculap in Tuttlingen, where he is responsible for a large number of applications. “We have a high level of vertical integration. We weld, clean, bend, punch and cut the sheet metal parts for our products.” One of the main applications is laser marking. “Our global marking database contains around 30,000 items. The spectrum

is broad, spanning a wide range of product groups, but also because of the different materials used." In the field of surgical instruments, this includes various steel alloys, while aluminum is used for sterile containers and titanium or plastics for implants. "But then there are also a lot of niche products with coatings made from special materials." Marc Laufer adds: "We currently have 18,000 finished and 29,000 semi-finished products. The lot sizes for finished products range from 1 to 1,800 units. The average lot size is 40 units. The process therefore needs to be fast and the changeover from one job to the next must be simple." In Tuttlingen, 15 TruMark and ten TruMicro Mark lasers are used for marking.

At the Chinese plant, the enormous volume of one million products in the surgical instruments sector is also divided into small batches of ten to 200 units. There is a total of four marking lasers and a laser welding system for this. Alex Xu is the production manager at the plant. He says: "High-quality and reliable laser systems are essential for us. This is the only way we can manufacture quickly and with consistently high quality."

"Thanks to microstructuring, we can apply more robust and durable marking with the TruMicro Mark lasers."

FELIX SCHMIDT

HEAD OF SYSTEMS & SECURITY, PRODUCTION DIGITALIZATION AT AESCULAP AG IN TUTTLINGEN

Solutions

One for all is the principle when it comes to validating processes for the Aesculap plants worldwide. The Tuttlingen team does the groundwork and then transfers the processes and parameters to the other locations. Marc Laufer explains: "We are taking the technological lead here, developing the processes further and rolling them out internationally." Aesculap has been relying on lasers and machine tools from TRUMPF for 30 years to ensure that everything works consistently worldwide. "Getting all systems from a single source is a decisive advantage for us. It is the only way we can work to the same standards in all our plants."

Another major project is currently in the pipeline with the laser specialists from Ditzingen: in the next few years, all marking lasers are to be successively replaced by the ultrashort pulse lasers from the TruMicro Mark series. The advantages of the technology are obvious to Felix Schmidt: "Thanks to microstructuring, we can apply more robust and durable marking. This is because, unlike engraving, there is no oxide film that slowly dissolves over the washing cycles." Additionally, less combustion residue is produced during the production process. This eliminates the need for additional manual cleaning afterwards. Schmidt says: "The ultrashort pulse lasers allow us to work even more efficiently. And they offer constant laser power."

Implementation

Marc Laufer and Felix Schmidt started with a test system for ultrashort pulse lasers in Tuttlingen in 2020.

They then tested the processes under production conditions for six months and devised the standards. Laufer adds: "The biggest challenge was to reconcile the various requirements. So, on one hand, requirements for a special product that we produce in small quantities and rarely, and on the other, requirements for products that we often need in large quantities. And this all has to work on one machine, regardless of which plant it is located in worldwide."

The software connection was also challenging: Aesculap works with its own UDI administration system, which is used for all order processing. Together with TRUMPF, the team developed a connector that makes integration into the TruTops Mark interface possible. The TRUMPF VisionLine software uses Aesculap to position the markings. In future, it will also help to improve the qualification of data matrix codes. "Before now, the inspection was carried out using an external scanner in a downstream process step," explains Marc Laufer. "In future, we want to integrate this step directly into the marking process in order to increase manufacturing speed."

And the work has paid off, as Felix Schmidt reports: "We have created a machine standard and can make these parameters available to our other plants." Several TruMark Station 7000s with TruMicro Mark 2030 lasers are already in use. One of them has been in China since January. There, Alex Xu is impressed by the stability of the laser output: "There have always been fluctuations with systems from other manufacturers, but this has not been an issue with the new ultrashort pulse lasers so far." The Chinese team was also able to put the new laser into operation very quickly: Installed in January, it has already been running in series production since February.

Forecast

Until now, many production steps at Aesculap have been carried out manually, but Marc Laufer and Felix Schmidt in Tuttlingen are now focusing on automation. "With our large variety of products and the changing series sizes, you have to carefully think about where automation makes sense," Laufer points out. "And it's no good just automating the marking process, you also have to adapt the upstream and downstream production steps." But the team is getting to grips with this: a cobot is already equipping a TruMark Station 7000, on which a TruMicro Mark laser then marks saw blades.

Both are convinced that TRUMPF is the right partner for any future developments. Schmidt: "The technology is impressive and TRUMPF is support has a high level of availability. No matter where in the world, we always get help very quickly in the respective country in the event of a malfunction."

Find out more about our products

TruMicro Mark 2030

The TruMicro Mark 2030 offers maximum process reliability and precision with its ultrashort pulses. With its multi-stage power regulation and pulse energy monitoring for each individual pulse, it works with the highest degree of precision and also meets the high requirements of medical technology - for example for UDI-compliant markings, which it applies quickly and reliably using black marking.

Zum Produkt

TruMark 7050

The TruMark 7050 is a real all-rounder. Whether for welding, engraving, structuring or cleaning, the powerful laser always delivers top performance. With an average power of 200 W and a peak power of more than 10 kW, it achieves the highest processing speeds and short cycle times. It is easy to integrate and operate.

Zum Produkt

TruMark Station 7000

As a complete solution with marking laser and software, the TruMark Station 7000 offers decisive advantages: It is immediately ready for use, meets all safety standards and offers superior precision as well as adaptability to different workpieces. Integrated software makes operation and maintenance easier - ideal for medical technology.

Zum Produkt

TruDisk 2000

The TruDisk 2000 high-power solid-state laser is the powerful partner for welding, cutting and surface processing tasks. The integrated, active laser power control ensures 100% consistent performance and reproducible results. Thanks to its special resonator design, the TruDisk 2000 is extremely robust against back-reflections and also processes highly reflective materials.

Zum Produkt

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