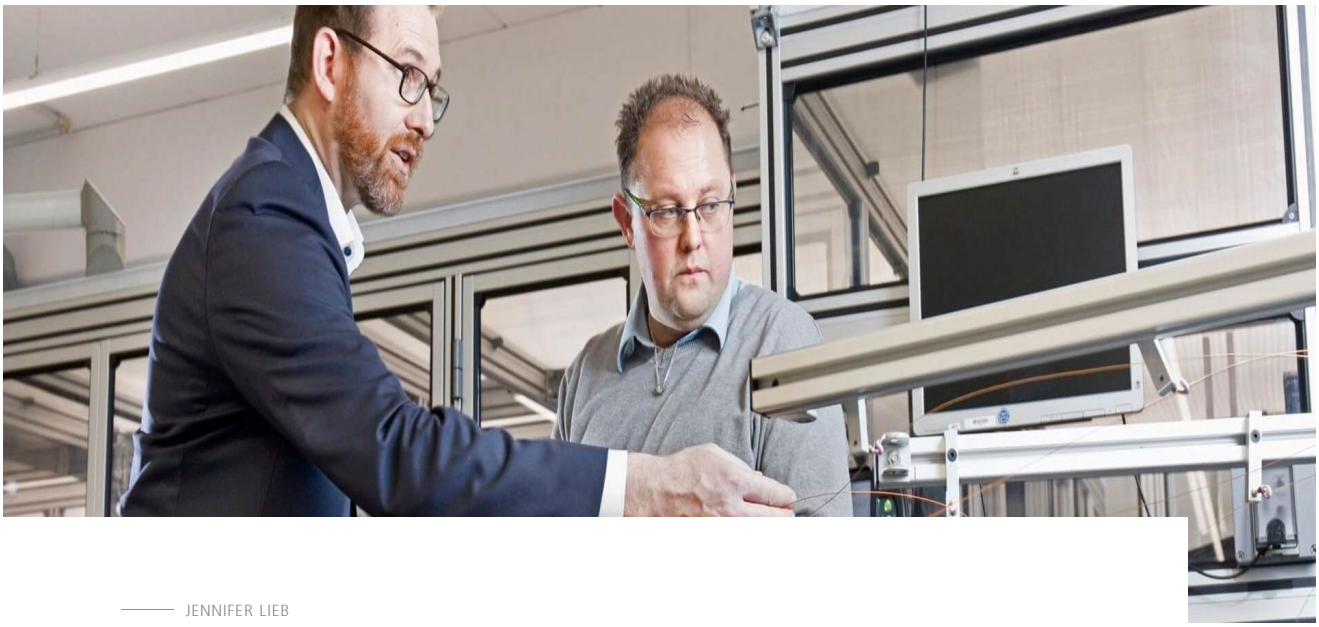


JENNIFER LIEB

For the direct wire: TRUMPF laser removes insulating varnish

Magnet-Schultz manufactures electromagnetic actuators, sensors and valves. The company manufactures the copper wire coils for its components itself. The insulating varnish on the wire interferes with contacting. A laser beam now simply removes it.

When newborns need mechanical ventilation, it is important that the oxygen is delivered to their sensitive lungs at a precisely controlled pressure. Gas volume control valves must therefore work accurately and reliably. It works like this: An electromagnetic actuator - very simply a metal pin that is attracted by an electromagnetic field - moves. This opens and closes the valve. Electromagnetic actuators are always used where electrical signals have to be converted into mechanical movements.

The family-run company from Memmingen is currently managed by the fourth generation and has been developing electromagnetic actuators and sensors for applications from the deep sea to outer space since 1912. Magnet-Schultz serves various branches of industry, including the automotive and aerospace sectors as well as medical technology, hydraulics, pneumatics and electromechanics.

Magnet-Schultz originally only used the TRUMPF marking lasers to mark its components.

A TruMark Station 5000 was used.

The labeling of components with matrix codes is used for internal traceability of process steps.

Ready for contacting

Copper wire coils are at the heart of Magnet-Schultz products. In Memmingen and on a former Bundeswehr site in Memmingerberg, the manufacturer produces millions of coils every year, which are used for hydraulic or pneumatic valves, for example, to regulate oil flows or air flows. But why does the coil wire need to be cleaned - or rather stripped of paint?

There is an insulating varnish on the copper wire of the coil. Without this, the coil cannot function as an electromagnet because the wound wire would behave like a solid copper block without insulation. However, it does interfere in one place: the contact, also known as the winding pin. That's why the paint has to be removed from the wire. Bernd Pfadler works in process engineering at Magnet-Schultz and explains: "We remove the enamel on the copper wire of the winding pin because this is where we make electrical contact with the coil."

The laser increases our productivity and has no wear and tear.

Bernd Pfadler, process engineer at Magnet-Schultz

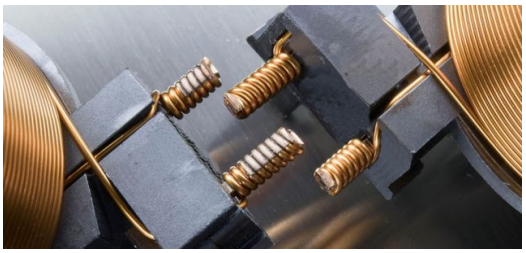
From the blade to the laser

First, Magnet-Schultz mechanically removes the enamel with three knives rotating around the copper wire. The problem with this is that it is complicated to adjust the knives and the blades wear out over time. This causes the quality to fluctuate and the wire sometimes becomes unintentionally thinner. "The copper wires have different diameters, between 0.5 and 0.6 millimeters. We had to set the knives differently for each wire, which was time-consuming and cost us cycle time," notes Pfadler. "The knives also caused a lot of dirt."

The process engineers at Magnet-Schultz are therefore considering how the paint can be removed differently. And finally come across their marking lasers from TRUMPF. Some of these have been in the factory hall for over two decades and mark all types of plastic and metal. Pfadler remembers the start of the project: "We took a first shot with our lasers and saw whether we could use them to remove the enamel from the copper wire."

Bernd Pfadler checks the paint removal under the microscope.

The TruMark 5010 laser first removed the insulating varnish from the copper wire. The coil was then contacted.



Left: the winding pins after removal of the insulating varnish, right: the copper wire before laser cleaning.

Stripping in step with production

When this worked, Magnet-Schultz turned to TRUMPF. Laser cleaning is to be integrated into one of the existing special machines. In just a few steps, the machine prepares the coil for further processing - fully automatically. The laser must therefore reach the cycle time of the machine. TRUMPF tests which TruMark Series 5000 laser is the right one for stripping in various trials after receiving the request. "The winding pins are a small area to clean and the cycle time of our machine is not that long," says Pfadler.

The choice finally falls on a compact laser - the TruMark 5010. Until now, Magnet-Schultz has used laser technology to weld and mark - now also for stripping components. "The laser increases our productivity and has no wear and tear," says Pfadler. This not only eliminates the paint, but also the additional work required from production staff.

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