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More than an extended workbench

Contract honing at Nagel

"Stick to what you know." This saying also applies for honing, as the quality of this finishing work is critical for the end result. This is where manufacturers such as NAGEL enter the fray, with honing activities for customers using internally developed machinery and tools.

Of course, NAGEL Maschinen-und Werkzeugfabrik GmbH, from Nürtingen, prefers selling its products. But, sometimes the purchase of a honing machine is out of the question. That's when Dipl.-Ing. (UAS) Markus Weber, the contract honing division manager at the Metzingen plant, and his team jump into action. The reasons for this differ. "We are often asked to help with insufficient or excessive quantities or very complicated components," he says. "The orders themselves come from a variety of industries."

Precision down to the μm level

The work often involves large lots for which Nagel has to use highly automated production processes. The team from Metzingen frequently also takes over the washing of the parts and the statistical process control (SPC). However, the company also manufactures smaller lots and single parts for customers that do not necessarily come from the automotive industry. The range is diverse: from engine blocks through to conrods, hydraulic



cylinders and small control casings, all of which require absolute precision. The diversity in the non-automotive sector is just as high: one day it might be a four-tonne press table, the next, tiny punching sleeves with an external diameter of 8 mm and an internal diameter of 2.3 mm.

The components honed in Metzingen are characterised by a high level of dimensional and contour accuracy as well as optimised surfaces. "We effectively hone everything for everyone," smiles Markus Weber. "We recently even machined glass cylinders." Currently in Metzingen, ten employees

operate 13 honing machines in single-shift operation. The department can, however, switch to rotating shifts if this is necessitated by the order volume. The department in Metzingen essentially operates like an external job shop with more machinery than employees to cover a range of different component requirements.

Machining using internally developed production technology

There is a key difference to a job shop, however, which works with external production technology: NAGEL uses internally developed and manufactured machinery and tools. "As a result, we have a better understanding and mastery of honing processes than other companies," explains the department manager. "In addition, all of the honing technology, including the spare parts, are always available in-house." This is a particular benefit with the constantly changing orders, such as from medical technology, the glass industry or press manufacture.

Besides the high demand for quality and precision, some of these industries are united by another common denominator: they hone parts for which the component related measurement results must be documented for every single workpiece. "For example, this is an obligation that we need to meet for the engine blocks and compressors," says Markus Weber. "The components have their own serial number,



which we generally record by scanning the barcode." This involves a 100 percent inspection, which allows the dimensional accuracy of every component to be tracked. Besides the inline process monitoring during the process, NAGEL also operates a high-tech quality assurance area using Zeiss and Mahr metrology as well as other tools.

How do you hone glass cylinders?

An order from the glass industry particularly roused the specialist's interest, as it went beyond the otherwise standard contract machining activities. Weber's team had to machine dosing cylinders, which were susceptible to breakage if, for example, they happened to be clamped incorrectly. In addition, the glass also had to be completely transparent after honing. "We developed the necessary process, including the handling, ourselves, manufactured the devices and moved through the stages of the test production of prototypes and pilot production until everything was ready for series production," recalls Markus Weber. "The customer then received a customised honing machine, including the honing process." It was an extremely delicate matter, as the dosing cylinder contained a ceramic piston, which can operate without a seal thanks to the exceptional honing precision down to the μm .

This example shows that Nagel's subcontracting department is more than a typical extended workbench; it is a resourceful problem solver. For instance, the automotive industry likes to get Nagel involved in an early phase of product development to assess feasibility among other things. The company received a special order from a renowned sports car maker, according to Markus Weber "we are the only company in Europe who were willing to



take on the task." He adds: "We are effectively involved in the development of new conrods from the very beginning of the process and we also develop the honing processes. There is a good chance that our main plant in Nürtingen will develop a new machine concept to fit a process, which subsequently enters series production worldwide."

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