PRESS RELEASE

Date: 01.01.2019

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Changing Mobility

Electric motors and other elements of electric vehicles are components to which vehicle manufacturers and their suppliers have been devoting considerable attention for some time now. Designing new parts and manufacturing them in a way that is suitable for series production often present a challenge, and the tight tolerances require call for specialist expertise. In 2017, MAPAL worked with machine tool manufacturer HELLER to overcome just such a challenge and to get manufacturing processes for a newly designed stator housing ready for series production.

New Challenges, New Solutions

In 2017, German machine tool manufacturer HELLER received an enquiry to design and offer the complete machining process for a newly designed stator housing, including machinery, tools, process, fixtures and all corresponding data. The end customer set a tight deadline for the work. The requirements on the component were highly demanding, and the tolerances very tight. “This special stator housing was a completely new part to everyone involved, including our customer,” recall Dietmar Stehle and Tobias Schur, who are responsible for fixtures and tools and for tool design, respectively, in this area at HELLER.

In teamwork to series production

Already during the preparation of the quotation, HELLER involved MAPAL as the tool supplier. “When it came to implementing this project, Dietmar Stehle and Tobias Schur came to us very early on,” says Norbert Meier, responsible member of the sales force at MAPAL. With new parts in particular, making sure that all parts fit together well is of paramount importance, according to Stehle. Together, HELLER and MAPAL designed the complete process for the machining of the new component. One advantage was, having worked together for decades, the two companies were able to tackle the task as a well-coordinated team. They

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investigated the tool design that MAPAL had proposed and examined the process. "Working together, we found the ideal tool design for machining," says Norbert Meier. They did so under enormous time pressure; as Stehle recalls, "For this job, we had to deliver the first prototypes very quickly indeed." This was in spite of the fact that they were still putting the finishing touches on the casting process for the part.

Stator bore as the greatest challenge

Machining the main bore for the stator housing – the stator bore – proved to be the greatest challenge of the entire manufacturing process. The process-reliable and cost-effective finish-machining of deep bores with large diameters is one of MAPAL's key competitive differentiators. The tool manufacturer with strong ties to the automotive industry gained this expertise through decades of experience in fields such as machining gear housings. "We took our expertise and applied it to the requirements for the stator housing," explains Meier.

For the collaborative project, MAPAL opted for lightweight and yet extremely robust tools in welded design that are ideally suited for the machining of the thin-walled housing. Despite the long projection length and the large diameter of more than 250 mm, the tool is highly accurate.

Light weight thanks to tubular design

For tools with "welded designs", a tubular design is used for the tool body. These tools only have half the weight of a conventional boring bar. The carriers for the blades and the guide pads are welded on and support each other by means of connection ribs. This minimises the risk of chattering. It also ensures support during interrupted cuts. The resistance to bending is excellent thanks to the tubular design and the stabilising ribs.

"We split the machining of the main bore into three operations – pre-machining, semi-finishing and fine machining," explains Norbert Meier. In the final stage, the

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main bore is machined to µm accuracy, using the fine boring tool in welded design. "The PCD-tipped blades are finely adjustable to achieve maximum accuracy," says Meier. Guide pads support the tool in the bore.

Successful implementation in series production

As for the stator bore, the machine and the tool manufacturers' experts found appropriate solutions for all other machining operations. "Together, we demonstrated not only that completely machining the workpiece within the specified tolerances worked well, but also that the solution we found allows reliable manufacturing within the cycle times required," says Dietmar Stehle with satisfaction. Apart from proving that the complete machining of the workpiece could be done within the specified tolerances, the partners were able to demonstrate that their joint solution enables process-capable manufacturing within the predefined cycle times.

Both HELLER and MAPAL gained sustainable know-how during the joint project, resulting in entirely new tool solutions, including self-aligning tools, allowing to achieve the required positional tolerances resulting from the necessary flip-over machining of the component. As a result, both companies succeeded in designing the perfect production process in the first expansion stage. Today, the customer manufactures a 5-digit production volume of the stator housing.

About HELLER

HELLER, established in Nürtingen in 1894, develops and produces machine tools and manufacturing systems for machining and employs 2,580 people. Its products include four- and five-axis machining centres, turning/milling centres, machinery for crankshaft and camshaft machining and flexible manufacturing systems, as well as a range of modular services.

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Captions:

In order to produce the main bore of the stator housing with µm accuracy, it is machined with a fine boring tool from MAPAL. Bild: HELLER

Those responsible at HELLER, right to left Tobias Schur and Dietmar Stehle, together with MAPAL employee Norbert Meier, picked the optimum tools. Bild: HELLER

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Runs reliably in series production – the combination of the HELLER machining centre with tools from MAPAL. Bild: HELLER

The tool concept is impressive, among other things, thanks to its low weight and the finely adjustable PCD cutting edges

If published, please send a voucher copy
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