

It's all about the surface

Superfinishing is growing; contract manufacturing orders are in demand.

Whether to reduce friction losses or improve hygiene – the surface quality of components is in the spotlight more than ever. As a result, superfinishing technologies have grown in significance. Nagel Maschinen- und Werkzeugfabrik GmbH in Nürtingen has responded to this trend by increasing capacities for process development and contract manufacturing in the area of superfinishing.

The growing demand for high-quality surface finishes has far-reaching consequences for many metal processing companies: their process chain becomes longer due to the re-quired superfinishing. Existing capacities no longer suffice, but expansion is associated with costs. In such a situation, contract manufacturing has become a viable alternative. More and more are going down this route, as confirmed by specialists: "Contract manu-facturing in the area of superfinishing has been growing for years now for us," explains Marcel Bosch, Process Development Superfinishing at Nagel Maschinen- und Werkzeug-fabrik in Nürtingen. "That is why we have expanded our capacities in process development as well as our machinery. We are equipped for all applications, from the smallest rolling elements all the way through to large crankshafts for utility



vehicle. We are also always open to new materials and workpieces as well as any quantity desired." Contract manufacturing at Nagel can have a lot size of just one (such as prototypes and samples) or involve complete series with several thousand items. If needed, two-shift operation is possible.

The Automotive area application has always been the most heavily represented at Nagel. However,

the superfinishing specialists are also discovering that sectors such as the bearing industry, the aerospace sector and medical technology are growing. In medical technology, the main focus is surfaces for implants. Here, a complete lack of grooves is crucial so that germs have no way of establishing themselves. In vehicle technology, the demand is for a minimisation of CO₂ emissions, which requires tribological – friction-optimised –

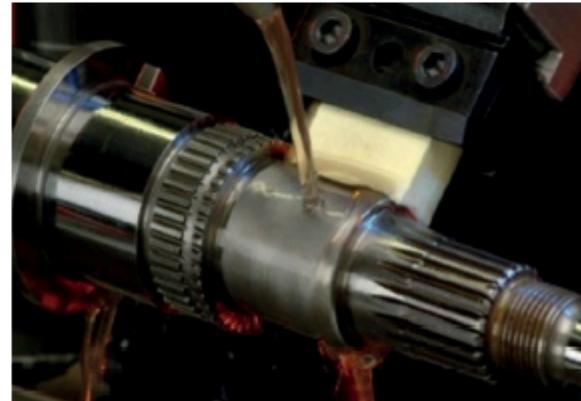
surfaces for the cylinder linings, which are honed, but also for all bearings for crankshafts, camshafts and gear shafts. The magnitude of achievable emission reductions may be minute, but small amounts add up over the entire vehicle. So, if the objective is to reduce friction losses as far as is technologically possible, superfinishing becomes a key technology. Grinding as an upstream process cannot possibly contribute to this objective any further.

"The quality and design of surfaces for bearings is frequently a question of manufacturing philosophy," says Marcel Bosch. "Some manufacturers tend to produce reflecting surfaces, such as in medical technology, while others produce defined microstructures." Back-ground: microstructures support the possible formation of a lubrication film. In order to reduce friction or wear and tear when running in a bearing, the process of plateau finishing, for example, gains significance. During this process, the peaks of a rough profile are burnished to plateaus. If the peaks remained, they would be stripped relatively quickly during operation and the result would be the typical wear and tear associated with running in. This is a problem in the

went of frequent start-stop cycles. In particular, Plateau finishing basically pre-empts the process of running in. Plateau structures are the perfect example of tribological surfaces.

Diligent process development is required so that the result is right in the end. "We don't simply supply machines and tools; we also develop the processes," underlines Marcel Bosch. Rz values of around 0.5µm must be realised. The task becomes even more chal-lenging if certain requirements with regard to dimensional accuracy are added to the mix. One example are spherical bearings. Nagel has a proven solution for this: the cFlex band finishing tool.

Bosch concludes: "We do not yet know what kind of challenges the future of superfinishing holds. But we do know that the demand for high-quality surfaces, tailored to their function, is growing continuously. All we can do is organise ourselves as flexibly as possible." The superfinishing expert brings up another interesting aspect in this context: in-house stra-ti-fication. Having the



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