

Uncompromising HSS filtering

With fine filter technology StingR has developed a pneumatic-hydraulic backflushing process for Lehmann-UMT that offers users a number of advantages. For Gesau tools, one advantage stands out above all others : mastering a particularly challenging filtration process during the grinding of gear cutting tools.



Cooling lubricants are a crucial component in the machining process , often making it possible to complete a machining task in the first place. Therefore, cooling lubricant preparation is an indispensable part of the process, as the required purity and flow rate of the cooling lubricant must be maintained. The purity of the cooling lubricant, in turn, significantly influences process stability, as well as the machining result and the wear of the cooling lubricant components.



Selecting and implementing the appropriate technology, however, requires a precise analysis of the machining process and its requirements. Gesau -Werkzeuge Fabrikations- und Service GmbH has consistently pursued this approach. The tool specialist from Glauchau- Gesau has completed the final stage of a metamorphosis in coolant preparation that has been underway for years, in partnership with Lehmann-UMT.

Manufacture and refurbish special tools

The necessity of this path is directly evident in the tool specialist's range of services. Founded in 1980 as a workshop for regrinding cutting tools, the company focused on metalworking tools from the 1990s onwards, evolving from a small workshop into an industrial service provider. Today, Kerstin Milenkov, daughter of the company founder, and Ulf Köhler are the owners of the 35-person company.



The production facility in Glauchau- Gesau focuses on rotating, monolithic shank tools, primarily made of carbide and HSS, but also cermet or CBN. Milling and drilling tools are therefore just as much a part of the portfolio as semi-finished products and precision parts. 'We specialize, among other things, in delicate tools with high aspect ratios ,' reports Köhler. Gesau -Werkzeuge also manufactures custom-made tools from CBN and cermet. The company's second service area is tool grinding.

"In this segment, we specialize in gear cutting tools with geometrically defined cutting edges and repair all tools that operate on the tooth flank," says the managing director. For example, hob cutters are ground to AAA quality in all dimensions and designs. Besides accuracy, another challenge in resharpening is the size of the tools. "Our largest broaching tools are 3 meters long and weigh up to 500 kg."

Challenge: Corundum chip abrasion

Lehmann-UMT's filter technology is also located here, in the reconditioning of gear cutting tools. Why? Because it's a particularly delicate process: The HSS tools sometimes have to be ground with dressable wheels, which generates a high proportion of abrasive material. Together with this corundum, the HSS abrasion, which, unlike carbide, is a long-chipping material, forms a tough mass that places high demands on the filter technology. 'That's why we went looking for a supplier whose filter technology could handle these types of abrasion and contamination,' says Köhler.



Up to that point, coolant processing at Gesau Tools had already undergone several stages of transformation. Years earlier, the company had invested in a centrifuge system. However, this centralized system limited them to a single type of coolant and provided only a limited range of technological applications. The process was reliable, but it lacked flexibility. Therefore, starting in 2015, the tool specialist began decentralizing again. A second circuit with a gap filter system was commissioned, which now filtered the coolant from the carbide grinding process. 'We promptly made a significant leap forward in this area: in terms of quality, throughput, and process reliability,' reports Production Manager Frank Enderlein.



The problem with the corundum-HSS mixture remained. 'Here we have four CNC machines that use dressable grinding wheels. We wanted another cell, a third circuit, to handle this abrasion,' explained Köhler. 'Today, we've reached the end of our transformation and are using three coolant circuits: the large system with centrifuge technology, which handles the mixed operation; the candle gap filter system, designed for hard metal machining; and the StingR system from Lehmann-UMT for the critical corundum-HSS sludge.'

Multi-stage filter technology

The fine filtration system from Pöhl, which Gesau -Werkzeuge uses today, can be equipped with a magnetic separator, compact filter, scraper discharge system, lamella separator, and a 5-stage filtration system. This ensures a high degree of flexibility, enabling applications in machine tool, mechanical engineering, and environmental plant construction, as well as in the chemical industry and water treatment.

At Gesau Tools, the StingR process begins with a lifting station that collects the fluid from the four machines and pumps it to the filter system. 'The first filter stage includes a magnetic separator that

removes all magnetic substances and also binds some non-magnetic substances in the filter cake,' explains Marcus Ludwig from Lehmann-UMT's sales department. 'The magnetic separator uses a counter-rotating pressure roller, which ensures a dry filter cake and that the oil remains in the process.'

After the magnetic separator, the fluid flows over a baffle plate into a two-cubic-meter intermediate tank. Angled baffles here serve to calm the fluid and prevent foaming, causing the particles to settle at the bottom of the tank. The bottom is scraped by a chain conveyor that discharges into the same drum as the magnetic separator. From the intermediate tank, the fluid is then pumped into several filter domes. 'The process used here employs filter cartridges that are periodically flushed from the inside out by a pressure surge from a fluid column. This patented process—unlike the competition—doesn't draw any fluid from the clean tank for backflushing. This is because up to 60 liters of fluid can quickly accumulate there, which would then be unavailable for supplying the machines,' explains Ludwig. In the StingR system, the cleaned medium then flows into an approximately 2-cubic-meter clean tank, from which a pump supplies the four grinding machines. The re-cleaned medium is finally discharged via a belt filter, which is timed according to fill level or time.

Individual, flexible, adaptable

fine filtration system was commissioned at the turn of the year 2019/2020. As project manager, Ludwig served as the contact person and liaison between the two companies from the initial inquiry. 'At Gesau, the limited space presented a significant challenge, requiring three or four consultations,' he explains. Today, the system operates largely unmanned. A service technician visits the site twice a year to ensure machine availability. In addition to on-site maintenance, the machine is also equipped for remote maintenance, allowing a technician to quickly connect to the system and resolve any issues. 'We guarantee that the machine is virtually 100 percent available,' Ludwig summarizes.



StingR is designed for a throughput of 500 l/min with an oil viscosity of approximately 15 cSt. It incorporates two different types of filter cartridges. The first filters down to a nominal 15 µm, the second to 3 to 5 µm. 'This gives us complete control over grinding HSS with dressable wheels,' emphasizes Köhler. Carryover losses are minimal, and the grinding result is improved. 'Because we filter through multiple stages, the user can precisely meet their specific requirements,' Ludwig points out. 'If they want to run, for example, 70% HSS and 30% carbide, that's no problem for the StingR.' Köhler confirms this advantage: 'Firstly, it handles the challenging medium reliably, but secondly, it offers exceptional flexibility.'

Furthermore, we can now individually select cooling lubricants that might be a better fit for our processes for our three machines.'



Finally, Ludwig brings up a crucial point regarding flexibility: "If a manufacturing process changes in such a way that a second or third machine is required, we can expand the filter system accordingly." He adds that it is also possible to combine the StingR with other filtration methods to increase their purity levels. "For example, if a user has a large tank, we can increase the existing filtration level via a bypass." In addition to the multi-stage filter technology of the StingR system and its adaptability to the respective process, this gives the user additional degrees of freedom to react to process changes or new requirements. This could be particularly interesting for Gesau tools in terms of throughput in the future: "We want to further expand the repair of gear cutting tools in the long term," Köhler notes. This would, of course, be a modification, but not a metamorphosis.



The StingR technology

The StingR is a sophisticated filtration system for maintaining technological equilibrium. The patented process can be used with oil, emulsions, or aqueous solutions in the machining of HSS, hard metals, and even mixed materials. The filtration system is equally suitable for grinding, honing, lapping, and electrical discharge machining (EDM). Filtration levels down to one micrometer are achieved. The StingR impresses with long filter element lifespans, high system availability, and low energy costs. The system combines short amortization periods for the investment with high flow rates in a compact design.