

Grinding with High Cooling Lubricant Intelligence



Optimal processing results require a high-quality cooling lubricant system, which MÄGERLE has formulated jointly with KNOLL for the MFP 30.

For the new, compact 5-axle MFP 30 grinding center, MÄGERLE and its partner KNOLL devised a cooling lubricant system that stands out thanks to its needs-based design and intelligent iDevice interface. The data consistency between machine, filter system, pumps, and cooler allows great flexibility with regard to process optimization. The user also profits from the reduced number of components, high reliability, and energy efficiency, not to mention its small space requirement.

The Swiss grinding machine manufacturer MÄGERLE of Fehraltorf belongs to the UNITED GRINDING Group and is a technology leader for high-performance customized grinding systems for performing flat and profile grinding tasks. The machines in the MFP 50 and MFP 51 series occupy a central position in the company's product range; aerospace companies use these systems for profile grinding of their turbine parts for the hot gas phase. Martin Preisig, Technology Director at MÄGERLE, explains: "We are well-equipped for this task with these machines and CD (Continuous Dressing) grinding. Our 5- and 6-axle grinding centers, which in addition to flat and profile grinding operations can also mill, drill, and measure, are the trend right now."

The basis for this international success is the MÄGERLE modular system, which makes it easy to create custom solutions. In addition to the company's own modules, it also includes the cooling lubricant systems that have been provided primarily by KNOLL Maschinenbau for more than 40 years. MÄGERLE can configure the appropriate cooling lubricant system for each machine from a modular toolbox. It consists of various vacuum and hydrostatic filters, pumps, and coolers.

New 5-axle profile grinding center for smaller parts

For the new development of the more compact MÄGERLE MFP 30, which is recommended for the processing of smaller turbine parts such as guide and rotor blades and heat shields without CD grinding, both partners have blazed a somewhat different path with regard to cooling lubricant supply. "We placed special value on optimizing the space requirement, energy consumption, and costs through the deployment of state-of-the-art technology," explains Martin Preisig, who is responsible for machine development in the

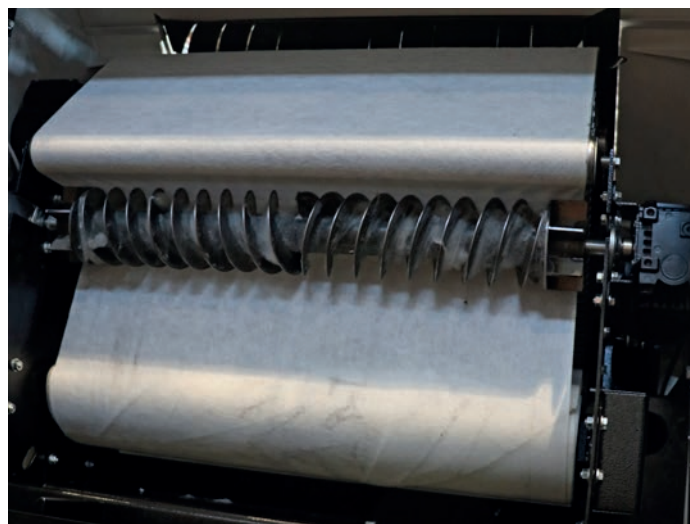
This is how the KNOLL HL hydrostatic filter works:

Contaminated liquid flows through the inlet box into the filter and then runs through the filter fleece into the filter chamber. From there, the cleaned fluid flows into the filtered fluid tank.

The vacuum pump creates a vacuum in the filter chamber. The high pressure differential across the surface of the filter creates a thick filter cake (concentrate) on the filter fleece, which itself serves as a filter medium and traps the smallest of dirt particles.

As the filter cake increases in size, the volumetric flow through the filter surface decreases and the level of contaminated fluid rises. At a defined level, the belt drive switches on and conveys the carrier belt together with the filter fleece a small distance forward. This allows clean filter fleece to reach the filter surface, the volumetric flow increases and the level of contaminated fluid is reduced again.

Once it has emerged from the contaminated fluid, the filter fleece runs over the drying section. The air flow absorbs most of the moisture from the fleece and dirt before they reach the sludge container.



An essential component of the cooling lubricant supply is the KNOLL HL 450/2000 hydrostatic filter, which combines filter fleece and simple vacuum technology and ensures low residual moisture in the fleece and dirt discharge.



Thanks to the dry dirt discharge, disposal costs are low.



The MÄGERLE MFP 30 5-axe grinding center wins people over with its small space requirement, great reliability, process flexibility, and data transparency.

Mechanics/Design, PLC software, and electrical construction area.

This also affects the system for supplying and cleaning the coolant. It is designed to address the user's needs and in a standardized, space-saving manner so that it fits perfectly with the MFP 30. Essentially, it consists of a KNOLL HL 450/2000 hydrostatic filter with vacuum pump (2 to 22 bar), an optional additional pump for increasing pressure by another 20 bar for high-pressure applications, a compact filtered fluid tank, and an additional cooling unit. Andreas Steinhart, who is responsible for Sales at KNOLL, notes that the hydrostatic filter (see the box to learn how it works) that can be used for both oils and emulsions represents an optimal solution for the MFP 30. "The HL combines hydrostatic filtration with filter fleece and simple vacuum technology that ensures low remaining moisture in the fleece and dirt discharge. The results are reduced disposal costs and minimal cooling lubricant loss."

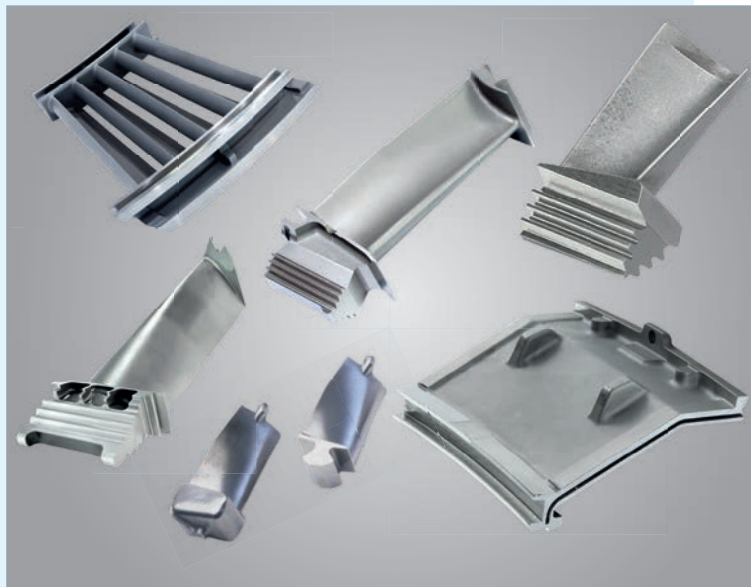
Furthermore, the company has succeeded in reducing the number of pumps as compared to the systems for the larger MFP 50/51 models. This means that for the process requirements for grinding, disc cleaning, dressing, bed flushing, and external cooling of processing tools, only a single

frequency-controlled pump is required. If high-pressure supply is required for internally-cooled tools, as an option a second pump is available, which is then switched inline with the first one. Since with frequency regulation, the first pump makes available pressures between 2 and 22 bar and the second pump provides an additional 20 bar via fixed speed, pressures between 22 and 42 bar can be called up at the high-pressure output. "The frequency regulation of the supply and vacuum pumps enables energy-efficient operation of the cooling lubricant system," adds Andreas Steinhart.

Continuous data flow thanks to iDevice

The intelligent interface between machine and cooling lubricant system and its intelligent control plays a central role here. Andreas Steinhart explains: "Previously, the focus in filter systems was on the mechanics, so that frequently a conventional interface connection to the machine was sufficient. With increasing controllability and installed sensors (e.g. IO-Link), the requirements of the interface increased and thus also the possibilities for the user. With iDevice based on Profinet, we can now achieve a continuous data flow from the machine to the filter system to the cooler. This means that the customer can access the parameters and functions of the coolant system from the CNC program and adjust them."

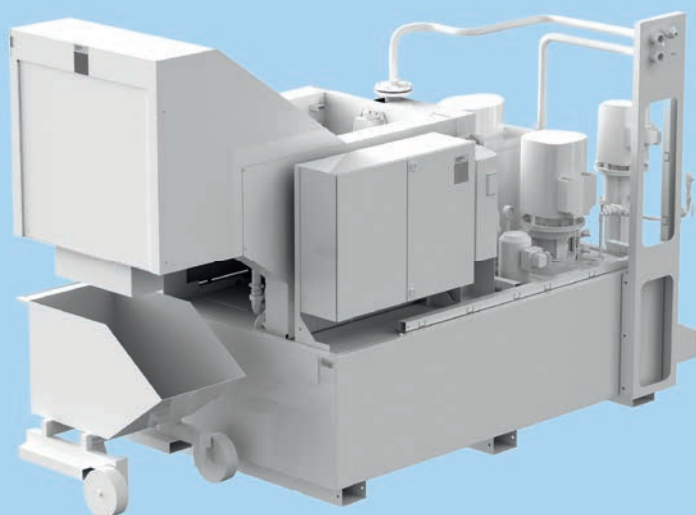
The result is improved process control thanks to programmable cooling lubricant functions instead of manual interventions, which makes it possible to reproduce the process. Martin Preisig knows how to appreciate this: "The question of whether the cooling lubricant system regulates by delivery rate or pressure is therefore answered. Now we have the opportunity to select the best regulation method depending on the program."



The compact MÄGERLE MFP 30 5-axle grinding center is perfect for such components.

The easy regulation and control of cooling lubricant volume and pressure also results in greater process flexibility. The flexible influencing of the temperature of the cooling lubricant also makes a contribution here. For the attached cooler can also be networked so that it can exchange data with the other components. Depending on the process, the regulation precision can also be adjusted. Martin Preisig provides an example "Depending on the processing requirement, we can specify the bandwidth of the cooler hysteresis by up to plus/minus 0.1 K." The cooling lubricant temperature can also be adjusted depending on the room temperature or kept constant.

Thanks to the data exchange between the machine and cooling lubricant system, the number of sensors can also be reduced. Andreas Steinhart explains: "We don't need an individual pressure or flow sensor if we can access those



The cooling lubricant system provided by KNOLL was adjusted as needed to the MFP 30.

KNOLLREPORT

AT MÄGERLE AG IN FEHRALTORF/SWITZERLAND



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KNOLL
.It works

of the MÄGERLE – and vice-versa. This reduces the number of sensors we have to install, which reduces costs and increases reliability."

The people in charge at MÄGERLE believe this cooling lubricant concept is the best one and see great potential for applying it to other machines as well. For example, Technical Director Martin Preisig is thinking about vertical round grinding machines, which are also part of the company's



Modular construction: a console with high-pressure pump can be retrofitted at any time.

product line: "This concept can be taken over nearly 1:1 here. We have already taken over the iDevice interface for all MÄGERLE type series." And he adds praise for his partners: "It is important to us that KNOLL should not only deliver ready-made solutions, but also be in a position to develop such need-based systems jointly with us. That's why we have been working together for so long already."



Martin Preisig (right), Technology Director at MÄGERLE, agrees with KNOLL employee Andreas Steinhart: "With state-of-the-art interface technology, we have succeeded in reducing the number of cooling lubricant system components. Furthermore, the cooling lubricant system can be controlled so flexibly and according to needs that the user can optimize his processes easily."



KNOLL Maschinenbau GmbH

KNOLL Maschinenbau ranks among the leading suppliers of systems for conveying and filtering chips and coolant in the metal machining industry. Highly-flexible transport systems complete the KNOLL product portfolio. Thanks to its comprehensive product range, the company is able to implement complete systems and system solutions incorporating central or localised functions. Since 1970 the name KNOLL has been associated with innovation, progress and growth.

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Mägerle AG Maschinenfabrik

Precision, quality, and flexibility are the first priority for the products of Mägerle AG Maschinenfabrik. As a provider of high-performance grinding systems for handling flat and profile grinding tasks, this company established in 1929 specializes in customized solutions. The high processing precision of specifically tailored special machines secures the customer's competitive capability. As part of the UNITED GRINDING Group, MÄGERLE is a strong member of this leading global producer of grinding machines. Around the world, MÄGERLE's customers can access a wide network of experienced service and application technicians.

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