KNOLLREPORT

User report of
KNOLL Maschinenbau GmbH

AT EMUGE-FRANKEN, LAUF

Cooling lubricant cleaning in XXL

In hard machining, Emuge employs a central grinding oil cleaning approach with KNOLL MicroPur® filters

The Emuge plant in Lauf has expanded its production capacities. Among areas affected is carbide metalworking, which has been assigned a new hall and additional machines. During this phase, those responsible also converted the grinding oil cleaning system: Instead of having individual filtering equipment at each machine, a central system from KNOLL Maschinenbau with a maximum capacity of approx. 7000 l/min ensures an especially pure oil quality. Core elements are the back-flushable Micro Pur® superfine filters.

Anyone who works with precision tools will be familiar with the name EMUGE-FRANKEN. Others, however, may not know that "Emuge" and "Franken" are brand names, each trading under companies of the same name: EMUGE-Werk Richard Glimpel GmbH & Co. KG and FRANKEN GmbH & Co. KG. Some years ago, the two tool manufacturers merged to form a joint venture as a tool system provider for thread tapping, testing, clamping and milling technology. EMUGE-FRANKEN offers the customer a complete range - from the spindle to the customer-specific workpiece clamping system. A good 60 percent of sales is made up of thread tapping products manufactured in the Emuge plant in Lauf – so successfully that production capacities reached their limits in the boom year of 2008. So those responsible decided to expand capacities in the form of a new building – work began in 2010. For two years now, the new halls and rooms have been filled step-by-step, since Emuge relocated during on-going manufacture.

At the start of 2014, hard machining was next up. The machines for grinding metal carbide taps and thread millers, as well as various indexing plates will move into the new building before autumn. Their tasks are wide and varied: They accomplish the full spectrum of blank production, from round grinding with a high metal removal rate to precision gear grinding where high surface quality is key.

To consistently produce the known top quality of Emuge tools, the company has invested not only in the new building and machinery, but also in the latest cooling lubricant (CL) technology. As Project Supervisor Norbert Herbst explains: "Until now, we have supplied the machines we use for metal carbide grinding with grinding oil individually and cleaned this oil on site using centrifuges or metal edge filters. In our opinion, there was room for improvement with this concept." Drawing on positive experiences from the central filter and treatment plants that Emuge had used for

To ensure the high quality of the grinding oil, Emuge decided to invest in a central system for cooling lubricant cleaning from the filtration specialist KNOLL Maschinenbau, Bad Saulgau. This system contains MicroPur® superfine filter elements.

The cemented carbide tap and thread millers benefit from the new central grinding oil cleaning system via KNOLL MicroPur® filters. The image shows the solid carbide BGF-Z3 thread miller.

years in HSS machining, the plan was to install a central system in the new hall.

Benefits of a central cooling lubricant preparation function

As Norbert Herbst substantiates: "The decision in favor of central cooling lubricant cleaning was made for various reasons. Due to the elimination of system components within the hall and removal of the swarf/oil mixture through overhead pipes, we have more space for machines, which we can position closer together and more flexibly." Also, the maintenance of such systems is easier to manager than with a decentralized solution. Furthermore, the production workshop stays cleaner, and the temperature of the grinding oil and hence also of all the machines can be kept very constant. His other arguments include the lower sound level and less severe heat build-up inside the hall thanks to the fewer pumps, which together contribute to a more pleasant working climate. The energy costs are also less, since one central pump is more economical than numerous individual pumps.

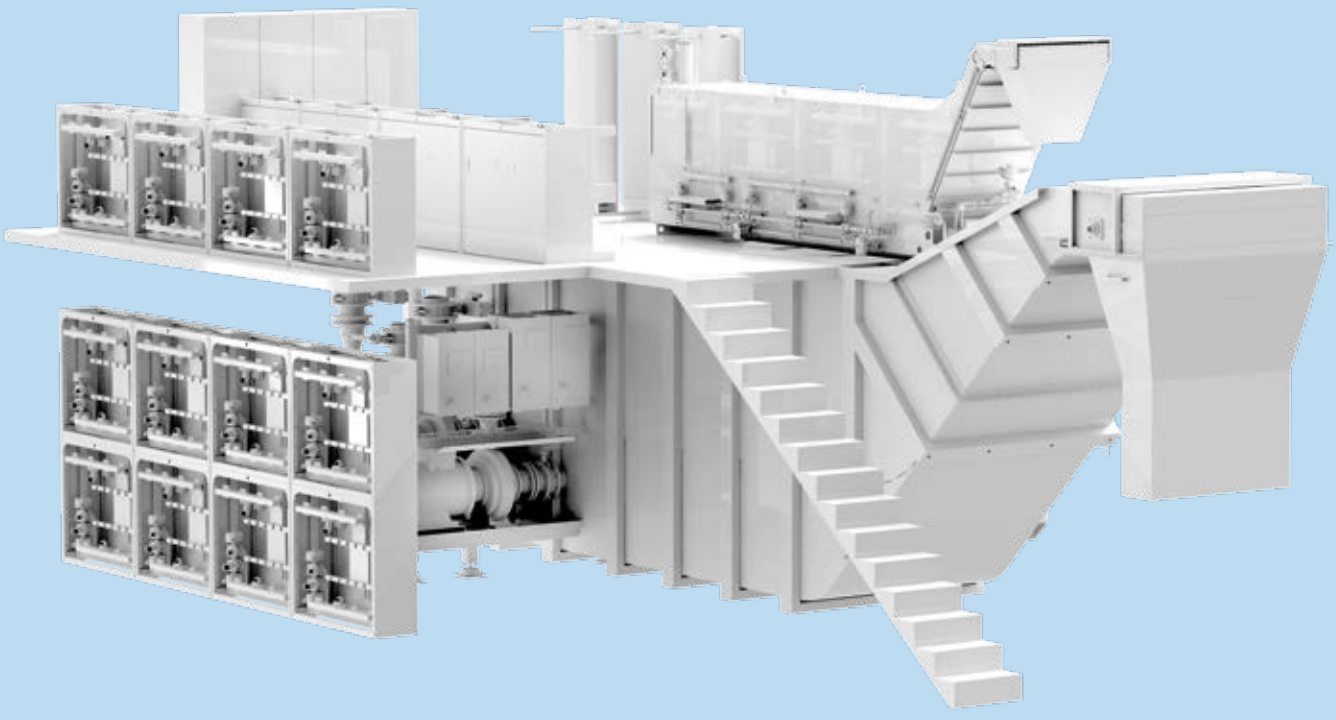
The main criterion for the new cooling lubricant system, however, was filtration. In order to guarantee the high grinding quality – especially when it comes to precision machining, a nominal filter fineness of 3 to 5 µm should be guaranteed. "With centrifuges, increasingly large swarf is able to slip through", argues Norbert Herbst, and this leaves behind traces on the surface of the workpiece." Moreover, the filter media generation and metal carbide swarf separation should be largely automated processes.

XXL filtering equipment achieves up to 7,000 l/min

Having tested various systems, those responsible at Emuge

KNOLL's MicroPur® sets standards:

- Effective backflushing with clean coolant thanks to separate pump; guarantees long life span of the filter cartridges
- Very short backflushing times ‹ 4 s without air, there fore great energy efficiency without filter interruption
- Display of the differential pressure on each filter and control panel; thus direct localization of damaged filter cartridges
- Differential pressure for regeneration can be set on each individual filter housing;this guarantees optimal filter quality
- Filter cartridges in tandem arrangement; thus less space required
- Drip-free filter change ‹ 1 min; less maintenance and cleaning work required



decided on a central system from KNOLL Maschinenbau. This system is based on MicroPur® superfine filter technology – no stranger to Norbert Herbst: "For some time now, we have used a small KNOLL-MicroPur® 120F system for individually supplying a grinding machine on site. It delivers outstanding results, in terms of both filter quality and temperature stability. In addition, we know KNOLL as an expert in filtration and micro-filtration – a company that is also able to demonstrate relevant experience in the construction of central systems."

The magnitude of MicroPur® systems ordered from Emuge falls into a particular category. As KNOLL Project Manager Joachim Gruß explains: "This is the largest cooling lubricant cleaning system we have ever installed in the tool grinding facility. At its maximum expansion stage, it offers a capacity of up to 7,000 l/min. Systems of similar proportions are known only from other areas of metalworking."

In the first expansion stage, the system comprises twelve MicroPur® 480F modules, each of which can filter a maximum of 480 l/min. Therefore, it is able to manage up to 40 machines. To create more upwards scope, all hydraulic, electric and software-related provisions that will allow the simple addition of three further modules have already been made. Even the largest system element in terms of space, the 2000 SR desludger, is rated for this purpose with its 50,000 liter unfiltered fluid tank.

MicroPur® – the heart of the system

From this tank, the dirty cutting oil is pumped to the most important central system components, the MicroPur® 480F superfine filters. These components are designed for cleaning grinding oils from metal carbide and HSS grinding, honing and lap-machining processes. Instead of filter consumables such as cellulose, they contain back-flushable filter cartridges.

A MicroPur® 480F filter module accommodates up to four housings, each of which are fitted with two such filter cartridges. These can be backflushed with clean coolant, without the filter process being interrupted. An individual flushing pump increases the backflushing effectiveness, which is evident from the longer life span of the filter cartridges and lower maintenance costs.

A special cooling circuit control function guarantees the required constant temperature. As a result, the tough requirements for temperature stability can be fully satisfied, even with large system capacity differences. As Norbert Herbst adds: "In a manner of speaking, this cooling circuit control is also responsible for energy efficiency. As it also saves an additional pump."

The filtered fluid tank is relatively small, since the cooling lubricant is supposed to be pumped back to the machine as quickly as possible. The process and filter pumps employed for this purpose conform to the new efficiency class IE3 and are frequency-regulated. Thereby guaranteeing a demand-controlled, energy-efficient supply to the machines.

Another component of the central system is the automatic concentrator AK 100, which treats the grinding sludge in such a manner that the metal carbide swarf can be removed for recycling with very little residual moisture.

Partnerships

Installation work on the system began at the end of February, commissioning was completed in early May. Since then, the various grind-

The additional automatic concentrator ensures the recovery of the valuable metal carbide chips from the backflush product of the MicroPur® filter. With this filter, the KNOLL system achieves a very low oil carry-over.

The metal carbide swarf is discharged via a scraper belt conveyor to a disposal drum, where they sediment under their own weight. The residual oil above is aspirated and returned to the circuit.

The required constant temperature is guaranteed by three plate heat exchangers, each with a capacity of 135 kW (image background).

The process and filter pumps employed for this purpose conform to the new efficiency class IE3.

All important pumps are equipped with a frequency inverter, thereby contributing to energy-efficient system operation.

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(left) Clearly arranged control center: the three filter lines are controlled from here. The oil is permanently monitored here too.

(right) The system as a whole, including all mass flows, temperatures etc., are visualized on the monitor positioned on the control cabinet.
Emuge Project Manager Norbert Herbst refers to the user-friendly open loop control and visualization function.

ing machines have been gradually brought on line, and the metal carbide machining facility will have been completely relocated by September/October. Norbert Herbst praised the project as a whole: "The support from the Design department and the KNOLL project management team was outstanding. The installation engineers were highly skilled, and so the setup and commissioning procedures encountered no problems at all.". The experience we have had with the new central cooling lubricant system has also been extremely positive, as Norbert Herbst emphasis: "The oil analyses confirm the grinding oil purity we demand, and the temperature control system also functions perfectly."

KNOLL Maschinenbau GmbH

KNOLL Maschinenbau ranks among the leading suppliers of systems for conveying and filtering chips and coolant in the metal machining industry. Its displacement pumps are also used in the chemicals and foodstuffs industries. 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.

System provider of tool technology

EMUGE-FRANKEN is a joint venture company that has been in the business of thread tapping, testing, clamping and milling technology for over 90 years. The joint venture is a merger between two independent companies – Emuge in Lauf and Franken in Rückersdorf. Over 1,170 employees (950 in Lauf and 220 in Rückersdorf), plus a further 450 worldwide look after the range of services, comprising some 40,000 stock precision tools and numerous customer-specific products. Customers come from the automotive, power station and aviation industries, as well as plant and machinery construction. Some 50% of products are exported to the rest of the world.

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