

AT HITECH, SELZACH

The Best Prerequisite for Precision



HiTeCH specializes in grinding filigree profiles with very high form precision. These are mostly customer-specific special tools, which are required in small and medium-sized quantities.

KNOLL's central superfine filter system supplies the CNC grinding machines of the precision grinder HiTeCH AG with pure cooling lubricant

Highly-qualified, motivated employees and state-of-the-art machinery are the basic requirements for reliable precision processing at HiTeCH AG. The new central system provided by KNOLL Maschinenbau makes a big contribution to HiTeCH's precision; it supplies all the CNC grinding machines with superfine filtered cooling lubricant at a constant temperature with constant pressure.

Production-technical requirements in the machine building and electrical industries, in aerospace, and in medical technology are increasing constantly. Components are becoming more compact, yet at the same time the demands for precision keep rising. Larger operations in particular are concentrating more and more on their core competencies, which provides smaller specialized companies with the opportunity to establish themselves in niche areas. An example is HiTeCH AG in Selzach, Switzerland, which has concentrated exclusively on precision grinding. Its specialties are filigree rotation-symmetrical and non-round shape geometries with tolerances in the μm range.

Managing Director Roger Tresch explains: "Our primary business is cores for injection molding tools in the mold construction sector, as well as cutting and punching elements for machine tools. In order to ensure long-term precision for the series manufacture of end products, the forming components in the process must be capable of achieving the greatest precision." Roger Tresch provides an example: "With such a nozzle needle, the diameter has a $2 \mu\text{m}$ tolerance across a length of 80 mm." "The length dimension of plane surfaces must frequently be adhered to within $5 \mu\text{m}$ or one-hundredth. In addition, there are high requirements that must be fulfilled for the surfaces generated. For a shut-off needle, roughnesses up to $R_z = 0.8 \mu\text{m}$ can be required. In-house, at customer request, mold cores are created so that after the grinding process they are ready for installation, dimensionally stable, polished to the allowance. The grinding process ends with the goal of being able to start the polishing process with as fine a surface as possible. This reduces polishing times and the profile geometries are obtained better."

Infected by the "precision virus"

HiTeCH currently employs eleven people who are all infected by the "precision technology virus," explains Roger

Economical Superfine Cleaning

The MicroPur® filter from KNOLL Maschinenbau of Bad Saulgau is designed for the superfine cleaning of grinding oils from metal carbide and HSS grinding, honing, and lapping processing. It achieves filter finenesses smaller than 3 µm, something that makes itself noticeable in precision processing through especially high surface qualities and long grinding disk service life. Thanks to its special design, the modular MicroPur® does without filter consumables, which makes a significant contribution to its great economy. Instead, it contains back-flushable filter elements such as the ones familiar from other areas of oil filtration. With

the KNOLL MicroPur®, these filter elements can be flushed back individually with clean coolant without interrupting the filter process. An individual flushing pump increases the backflushing effectiveness, which is evident from the longer life span of the filter cartridges and lower maintenance costs. Various methods from manual to fully automatic are available to recover the sometimes valuable residue produced by backflushing. The MicroPur® can be scaled at will from a simple entry-level model with 60 l/m volumetric flow to a central system. Thanks to its modular design that takes up a minimum of space, high-performance systems can be installed even in tight spaces.

Tresch with a grin. "We regard it as an exciting challenge to produce such high-precision tools with sophisticated grinding processes so that they are reproducible, economical, and especially reliable."

Tresch identifies his employees as the most important success factor. In addition to their excellent professional qualification, they also demonstrate a readiness to react to changing order volumes with flexible working hours. This creates valuable flexibility, which the Managing Director knows how to appreciate: "When we succeed in making complex tools available to customers in a very short time, we are able to occupy an economic niche in addition to the technical one."

A second success factor is the state-of-the-art CNC machine park, which is organized in various areas. In one area, primarily slim, hard metal tools are produced. Another area

is devoted exclusively to the production of highly-precise mold cores, and the third production area handles the grinding of elliptical and polygonal non-round geometries. Another strength of HiTeCH AG is the manufacture of flat ejectors with precise corner radii.



With highly precise measurement devices such as the tactile contour measuring device QPT ConturoMatic T1, the parts are put to the acid test and subjected to a final check before delivery.



HiTeCH has a state-of-the-art machine park. Thanks to its slim structure and qualified, motivated employees, the company has a competitive advantage when it comes to flexibility and delivery deadlines.

with cooling lubricant by a central system. Roger Tresch explains: "For precision processing, cooling lubricant supply is an essential factor. What's important is the right oil, which must always be available in very pure quality and at a constant temperature with constant pressure. Only then is it possible to manufacture µm-precise dimensions reliably."

In order to optimize this factor, at the end of 2012, HiTeCH decided to invest in a new central system that is equipped with pre- and superfine filtration as well as a tempering unit. The company selected the filtration specialist KNOLL Maschinenbau of Bad Saulgau as the supplier. Roger Tresch argues: "We got several bids. However, since we wanted to get everything from the engineering to the components from a single source and we also wanted a company with proven experience as our complete supplier, we selected KNOLL once again." The previous system, which was installed in 2004, also came from Bad Saulgau. Designed for just three machines with the KNOLL VL vacuum filter as its core element, this system had been pushed to the limits of its performance. Joachim Gruß, the KNOLL employee in charge, explains: "Only the performance of our VL filter is to thank that twice the number of machines could be supplied with purified medium. Here, however, it was necessary to make compromises with respect to pressure, purity, and temperature. The new system delivers significantly better values, it is optimally designed for the machine park, and it can be expanded."

Cooling lubricant supply, an important precision factor

The features of the CNC grinding machines complement and overlap one another ideally, so that HiTeCH can manage a wide variety of different orders. All grinding machines are supplied

Custom-tailored central cooling lubricant system

In summer 2013, in a time frame of just 2 weeks, the new central system was installed in the basement below the production hall. It consists essentially of two KNOLL KFE 600 compact filters for chip pre-separation and a MicroPur® 600 F superfine filter. On the latter there is an AK 20 automatic concentrator as an automatic sludge filter, from which the fine grinding chips fall into a disposal container with a remaining moisture of less than 20 percent. The purified oil is conveyed from the MicroPur® filter into a 7000 li-

ter clean oil tank, where a 100 kW plate heat exchanger ensures the ever-constant temperature of 21 degrees Celsius. From there, a 30 kW frequency-controlled pump supplies the connected machines with purified medium – entirely on demand. The system currently manages a maximum volumetric flow of 420 l/min (expandable to max. 520 l/min) and achieves a nominal filter fineness of 3 - 5 µm.

Joachim Gruß points out KNOLL's special strengths: "Not only can we supply everything from a single source, we produce nearly everything ourselves in-house. Our product portfolio ranges from chip conveyors to various filter systems and superfine filters to a multitude of pumps. We also have excellent spare parts availability and quick, strong service."

Demand-oriented and energy-efficient

The modular design of the system composed of standard components such as the compact filters and the MicroPur® combined with special containers as dirty and clean tanks especially suited the local circumstances. For the basement room in which the system had to be installed is tight and has a ceiling height of just 2.30 m – much too low for a ceiling crane. In addition, it had to be possible to lower the system elements into the room through a ceiling hatch and assemble them there. Thanks to forward-looking engineering, however, this was no problem and it was possible to

install the complete system within the required two weeks. Joachim Gruß explains: "We designed the system so that a later expansion of the machine park is possible without a lot of effort. This means that the system's con-

tainer capacity can be increased and additional filter elements can be installed in the MicroPur®."

All pumps in the KNOLL system are frequency-controlled so that the grinding machines are always supplied effectively as needed. Roger Tresch names several reasons for this: "When making investments, we also place great value on improving environmental protection. Furthermore, with a central system it is especially important that there is always constant pressure on the machine network and that each machine is supplied with the quantity of oil it needs. When switching off the coolant oil on one machine, this may not have any effects on the adjacent machines."

For this reason, the reference pressure is not measured on the pump in the basement at HiTeCH, but rather up above on the machines. This way the pump can react faster and pressure fluctuations in the system can be avoided.



HiTeCH Managing Director Roger Tresch (left) consults with Joachim Gruß (right), the responsible KNOLL employee, and Urs Reutimann, General Representative for Switzerland.

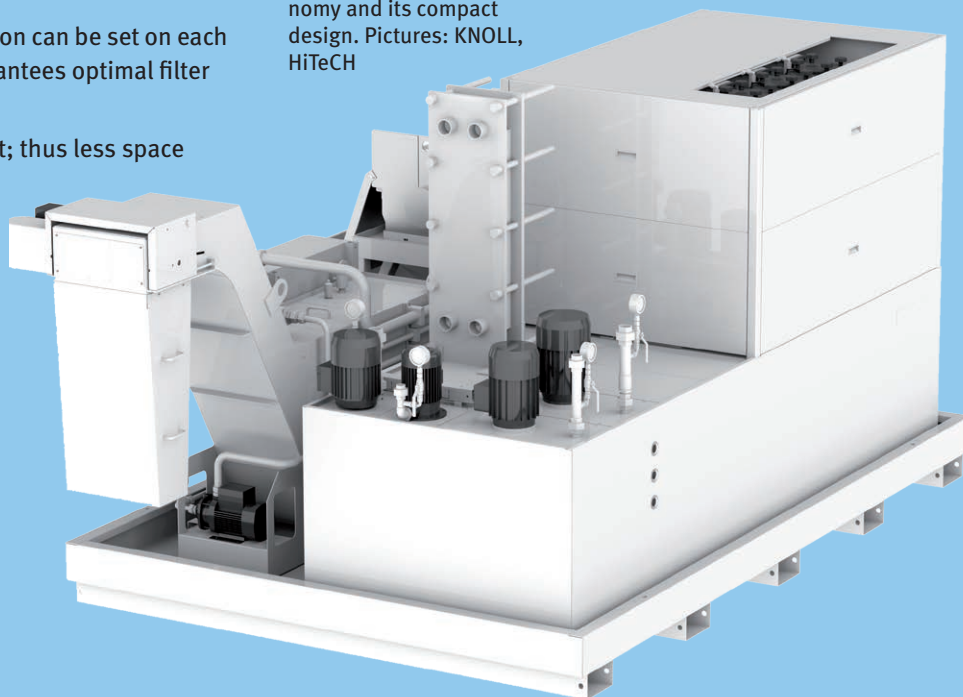
KNOLL's MicroPur® sets standards:

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

The new central cooling lubricant system is in the basement under the production hall. It consists essentially of two KNOLL KFE 600 compact filters for chip pre-separation and a MicroPur® 600 F superfine filter.



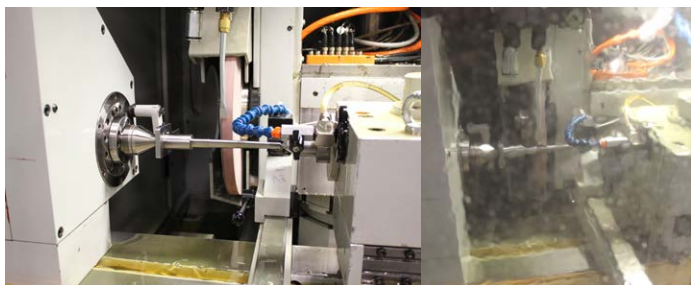
The strengths of the MicroPur® superfine filter include great economy and its compact design. Pictures: KNOLL, HiTeCH



Green light for optimal cooling lubricant supply – in order to keep an eye on the condition of the central system without a lot of running around, an additional control panel was installed in the production hall.

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The special HiTeCH expertise is based on many years' experience in the processing of round and non-round grinding. The modern CNC grinding machines are perfectly designed for the production of highly-precise special parts for machine tool and mold construction.

Greater precision and longer service life

Roger Tresch and his team are very satisfied with the introduction of the new system. In addition, the precision grinders have used the conversion as an opportunity to check the selection of grinding oil at the same time. For thanks to the constantly-changing parts of different materials – steel, metal carbide, but also brass – an optimal compromise must be found with the cooling lubricant. "This is what we have achieved with a completely synthetic oil geared toward CBN grinding," asserts the Managing Director. "At least with the new central system together with the new cooling lubricant, we have improved our production significantly. We have to correct fewer dimensions and we achieve better surfaces without doing anything more. Thanks to the purer oil, we can use the grinding disks approximately 20 percent longer before we have to replace them. Overall, the entire grinding process simply works better." In comparison to before, there is higher pressure available and the oil temperature is always the same, which allows the machine operators to optimize the process. This means that they can move at a higher feed rate and nevertheless reliably discharge the heat. Roger Tresch sums things up: "We achieved great precision even before, but now we are faster and we obtain the required dimensions and surfaces with significantly less effort."

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.

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Grinding with the highest precision

HiTeCH AG headquartered in Selzach, Switzerland was established in 2002 and has dedicated itself to the grinding of highly-precise components. Roger Tresch was named the Managing Director of HiTeCH AG in 2009. Today, HiTeCH employs eleven people and specializes in the production of customer-specific special parts for rigging, cutting and punching, as well as mold construction for the machine building and vehicle industries, the electrical and aviation industries, medical technology, and the wood processing industry. Slim mold cores, pipette cores, nozzles, and shut-off needles, as well as flat ejectors with corner radii are among the company's offerings. There are various CNC grinding machines available for their manufacture; these have been adapted with individual components to the specific requirements for the highly-precise production of slim special parts.

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