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 µm tolerance across a length of 80 mm.” “The length dimension of plane surfaces must frequently be adhered to within 5 µm 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 Rz = 0.8 µm 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 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 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 with cooling lubricant by a central system. 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."

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 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 container 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.

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

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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.
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."

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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