


AT AUGUST STEINMEYER IN ALBSTADT



August Steinmeyer in Albstadt specializes in the development and manufacturing of small and large, but always highly precise ball screws.

Improved grinding process thanks to high oil quality

Steinmeyer is investing in a central cooling lubricant system with 5 µm filter fineness and constant oil temperature for thread grinding

As the European market leader in the manufacturing of ball screws, Steinmeyer in Albstadt is intent on always staying a technological step ahead of the competition. The latest progress: with a new high-end central plant planned and delivered by KNOLL, all thread grinding machines are supplied with fine-filtered, constantly tempered oil. The result: even more precise threads and high-quality surfaces.

Each day, August Steinmeyer GmbH & Co. KG in Albstadt makes 600 to 800 ball screws with diameters from 3 to 160 mm – in roll-bent, spun or ground versions. 70% of these go to machine tool construction. But leading companies in other industries also appreciate the quality and precision of Steinmeyer products, which they use for a wide variety of positioning and feed tasks.

Whether a standard or special application – with ball screws, the concern is the play-free, dynamic conversion of rotational to linear motion. The result is stringent requirements for precision and surface quality, as Timo Schäfer, Deputy Production Manager, explains: "Even now, our threaded spindles must adhere to tolerances up to 2 µm – depending on diameter and length. The surfaces fulfill Sz values (according

to ISO 2517) between < 1.5 µm. And the requirements are increasing constantly."

To maintain its role as a technology leader and do business economically, in recent years, Steinmeyer has imposed a new structure on its production processes. According to the keyword "segmentation," the company has changed from its previous workshop production to assembly line production. For exterior thread grinding, the consequence was the move of precision grinding machines into a completely air-conditioned hall, where they were divided into two opposing lines: one series of machines for standard products and another for special products.

Timo Schäfer, the internal main project manager for this conversion, explains: "The segmentation was a lot of work on the one hand, for no machine remained where it was and production always had to be maintained. On the other hand, we created possibilities to further improve ourselves from the point of view of technology." As an example, he names the cooling lubricant supply for exterior thread grinding, which Steinmeyer took to the highest quality level with a new oil central plant planned and delivered by KNOLL Maschinenbau.



Planned and delivered by KNOLL: the new cooling lubricant central plant at Steinmeyer, which with a filter capacity of 2000 l/min for up to 23 grinding machines can supply the most finely cleaned cooling

The most important system details

- Filter capacity 2000 l/min
- Superfine filtration (particle size < 5 µm)
- Residual dirt content: < 10 mg/l
- Dirt pre-separation via endless belt filter
- Backflushable filter element
- Frequency-controlled filter pumps
- Frequency-controlled system pumps for constant oil pressure
- Oil cooling via plate heat exchanger and external cold water set
- Constant oil temperature ± 0.5 K
- System visualization on the control panel
- Interface to building control technology
- Advising, planning, project management, assembly, startup, process support from KNOLL

Central cooling lubricant supply is set

In the previous location for exterior thread grinding, Steinmeyer had long since installed central oil cleaning and supply. However, it was essentially an individual supply, which with more than 20 machines, resulted in significant added work for maintenance and less consistency in the oil quality, argues industrial master Jiri Prislín, Segment Manager for Miniature & Aerospace Ball Screws. He remembers: "Originally we had cellulose-based float filtration, to which we added KNOLL vacuum belt filters in 2004. Three VL filters installed in the bypass helped us to increase the delivery rate and improve the oil quality."

When the production managers converted the central plant completely to the vacuum filtration principle in 2013, they once again selected KNOLL as their partner. "We were able to integrate our existing VL filters and then achieved a much more constant filtration quality of less than 20 µm," explains Jiri Prislín.

However, due to the new location for external thread grinding, it was necessary to invest in a new central oil plant. Therefore, Timo Schäfer and his colleagues took the opportunity to exploit possibilities for an additional quality increase. Thus, they set ambitious specifications for the new cooling lubricant system: 5 µm filter fineness, a residual dirt content less than 10 mg/l, and an oil temperature that may fluctuate by a maximum of +/-0.5 K. The system should be designed and made redundant for 2000 l/min delivery rate. Timo Schäfer explains: "During the decision-making process, we compared various filter processes and suppliers; in the end, we wanted to select the most suitable solution. Once again, it came from KNOLL Maschinenbau."

MicroPur® superfine filter ensures the greatest oil purity

Essentially, the new central plant is based on the modularly structured almost infinitely scalable MicroPur® superfine filter. Systems with 2000 l/min flow volume are therefore no problem. Since the MicroPur® was originally designed for hard metal grinding, for thread grinding of the usual high-alloy hardened steel at Steinmeyer, it must be used together with a KNOLL KF-E compact filter with endless filter belt. It handles the task of chip pre-separation, removing coarse dirt and chips and thus making superfine filtration easier, so that filter finenesses of less than 5 µm can be achieved. Ralf Spöcker, who is the KNOLL Area Sales Manager responsible for Steinmeyer, points out other positive properties of the MicroPur®: "Thanks to its special construction, it works without filter consumables, which contributes to its great economy. The filters are backflushed by and by while the whole system is running. The system does not even have to be stopped for a filter change. Therefore, constant filter performance is



Filter pumps provide need-based, energy-saving filtration. Similarly, frequency-controlled system pumps guarantee a constant oil pressure of 5 bar.



Steinmeyer installed a KNOLL pressure boosting station on all grinding machines in order to be able to flush the grinding disks free with a special nozzle and 20 bar.

guaranteed, which ensures great process reliability for grinding."

In the new Steinmeyer system, a plate heat exchanger handles oil cooling, together with an externally installed cold water set with free cooling function. This means that starting at 12 °C, the heat is emitted without additional electrical energy, which in turn reduces operating costs. "With these components and our control technology, we can keep the oil temperature at the desired 23 °C ± 0.5 K," adds Alexander Dreher, Project Manager at KNOLL.

Another component of the central oil plant is a sludge press. KNOLL integrated the existing press into the new filter system. It ensures that a majority of the oil is recovered and creates newly dry steel briquets. For Timo Schäfer, who as a technical management expert always keeps an eye on costs, this is an important addition: "The recovered oil is cleaned in the system and all of it is then available to us again. Otherwise, we would have to refill a significant quantity of new oil, which would cost a lot of money."

Expertise in large central plants

Only three months passed from the initial inquiry to the actual order, a period in which Steinmeyer and KNOLL worked together to check various designs and create custom specifications for the system. Four months later, the set-up began in an area of 10 x 5.5 m. The result fits perfectly, as the Steinmeyer



Dirt pre-separation via the KNOLL KF-E endless belt filter: there is optimal filter cake formation here.

project team confirms. Timo Schäfer talks about an exemplary partnership with KNOLL: "Based on our past experiences, we expected nothing less. KNOLL resolved all difficulties that occur during such an installation to our complete satisfaction. It's really a strength of this company that it can address such individual requirements."

In December 2018, Steinmeyer began to move its highly precise grinding systems – this was done over the course of six months in order to keep production running. Accordingly, the machines were connected one by one to the new central oil plant, which required constant control due to the changing delivery volume required. A system for remote maintenance, which KNOLL generally installs for central plants, made this adjustment work easier, as Alexander Dreher explains: "This way, our technicians in Bad Saulgau could access the system, analyze values, and adjust things as necessary so that the optimal delivery performance was always available." On-site, the system is visualized on a control panel. The employees can query all data there and make settings. In addition, an interface to the company's internal building control technology was implemented, so that data synchronization and access to the system are possible there too.

Meanwhile, all 15 grinding machines have been connected. Thanks to the maximum delivery rate of 2000 l/min, Steinmeyer has created a buffer of approx. 50% for future development. Thus, for example, the filter fineness of less than 5 µm has



An integrated sludge press handles the recovery of residual oil. The subsequent disposal of the compressed briquets is much easier and cheaper than the disposal of wet, voluminous grinding sludge.

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already been confirmed several times by various laboratory analyses. Chipping specialist Prislin is convinced, "this way, we can further improve the grinding process with regard to surface quality, precision, and process stability. The task is now to optimize the grinding process."



One of August Steinmeyer's core competencies is external thread grinding.



Successful teamwork: Timo Schäfer and Jiri Prislin (2nd and 3rd from L) of Steinmeyer and Ralf Spöcker (L) and Alexander Dreher (R) of KNOLL.



KNOLL Maschinenbau GmbH

KNOLL is the leading provider of conveyor systems, filtration units and pumps for metalworking. These transport and separate chips and cooling lubricants. The comprehensive product range offers systems for decentralised or centralised applications. Its Automation division deals with solutions for demanding assembly and logistics tasks. These include stationary transport systems with chain and roller conveyors. With the integration of handling units (robots, cobots) and transport robots (AGV), flexible systems are created from a single source.

Steinmeyer – specialist for all types of ball screws

August Steinmeyer GmbH & Co. KG is an experienced partner for the development, production, and use of highly precise ball screws. With approximately 470 employees, in addition to standard products, this Albstadt company produces custom solutions for a wide variety of industries and uses – worldwide. The company belongs to the Steinmeyer Group, which employs more than 670 people. In addition to the drive technology competence center in Albstadt, Steinmeyer Mechatronik GmbH in Dresden is involved in positioning technology and Feinmess Suhl GmbH in Suhl in precision measurement technology.

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