KNOLLREPORT

User report of
KNOLL Maschinenbau GmbH

AT SHW BRAKE SYSTEMS IN NEUHAUSEN OB ECK

Superfine filtration and foam-free

How a special cooling lubricant and its central filtration contribute to the reliable grinding of Euro 7 brake discs.

SHW Brake Systems plans to produce one million hard-coated brake discs in the new hall.

SHW Brake Systems has commenced the series production of hard-coated brake discs. A water-soluble cooling lubricant from Bantleon and a central MicroPur® filtration system from KNOLL Maschinenbau contribute to the perfect quality of the ground surfaces.

The Euro 7 exhaust emission standard, which will come into effect from 29 November 2026 for the type approval of new car models and one year later for all new approvals in the EU, not only tightens the permissible limit for engine emissions. For the first time limits are also being introduced for brake dust particles – a challenge for the manufacturers of brake systems. They are responding with the development of coated brake discs, which have considerably less corrosion and wear. So too is SHW Brake Systems GmbH, technology leader in the area of brake discs for luxury class vehicles, sports cars and motorsport vehicles. The premium manufacturer has already been dealing with the new requirements for years and is currently on the verge of series production of brake discs which are coated with titanium carbides.

Boris Memel, who has been with SHW for 30 years and is currently Head of New Business Development Brake Discs, has been responsible for the Low Emission Brake (LEB) project since 2022. He reports: "Our Neuhausen ob Eck site is the competence centre for ready-to-install cast iron and composite brake discs. In the past year we set up a hall here where we solely manufacture hard-coated brake discs." Production already begun at the start of 2026 and four months later entered the second expansion phase. The final expansion stage is expected to be completed one year later, meaning production capacity of around one million LEBs per year will be available.

High level of vertical integration – from base body to the coating

A unique selling point of SHW Brake Systems GmbH is the huge vertical integration. The brake disc blanks are cast in Tuttlingen and finished in the Neuhausen factory. SHW even manufactures the ultralight composite brake discs pre-finished – including cast aluminium.

The KNOLL central system is initially designed for the cooling lubricant supply of three series grinding machines. The filter capacity can be further increased if needed.

The new low-emission brake discs are also based on these products. However, they also receive an extra finish. In automated ADCS systems (Advanced Disc Coating System) two layers are applied on both sides by means of laser deposition welding; the first layer is made of stainless steel and the second is made of a titanium-carbide mixture. A roughly 400 µm thick layer is created, which is then finished in the double face grinding process, also fully automated.

These are demanding procedures, which required several years of development work at SHW Brake Systems. Especially as there was hardly any experience in the grinding process in the company. Overall Project Manager Boris Memel explains: "Our integral and composite brake discs have been precision turned on cutting and milling centres for many years – in dry machining or with minimum quantity lubrication. This means that we achieve the required narrow tolerances and obtain very fine surface qualities. However, a grinding process is essential for the hard surfaces of the LEB discs."

Six MicroPur® filter modules supply three double face grinding machines with cleaned cooling lubricant at up to 1440 l/min.

Grinding process – a key task

Siegmund Tonn, an experienced production employee who has been with SHW for 24 years, is responsible for the grinding process. Three years ago, he assumed responsibility for the grinding process development. "Initially we created a test system to gather some experience.", reports Tonn. This grinding machine, designed for small-batch production, was filled with a standard lubricant (synthetic solution) by the manufacturer and configured with a KNOLL filtration system with consumable fleece.

However, problems occurred during the initial grinding tests with foam formation in the cooling lubricant. Tonn turned to KNOLL Maschinenbau, Bad Saulgau, to get a grip on this situation. Ralph Knobelspies, the KNOLL sales representative responsible for SHW, assisted with the optimisation mea-

KNOLL sales engineer Daniel Kujundzic demonstrates how simple it is to change the filter elements.

The two dirty water outflows for the filter modules can be seen to the left in the back of the picture. On the right are the two clean medium outflows, which supply the machines with clean medium redundantly.

sures: "Our recommendation was to first make contact with the cooling lubricant specialist Bantleon, with whom we share a long-standing partnership. It offers special synthetic solutions, which could also solve so many foam problems."

No sooner said than done! Siegmund Tonn met with Leonard Knaus, Technical Advisor at Bantleon, who suggested filling with Avilub Metacool ETA: "Mixed with water, this synthetic, i.e. free of mineral oil, cooling lubricant forms a clear solution of high stability, even with high salt exposure. It is characterised by good flushing action and a long life. The Avilub Metacool ETA also contains special additives that enable the foaming to be destroyed quickly."

The desired effect occurred, the foaming decreased. But the degree of contamination of the cooling lubricant after the filtration was still unsatisfactory. The problem: For the coating titanium carbides are applied, which produce a very fine sludge during grinding. These particles cannot be fully removed with normal belt filter systems. They accumulate, damage the machine and increasingly prevent the desired surfaces of the brake discs.

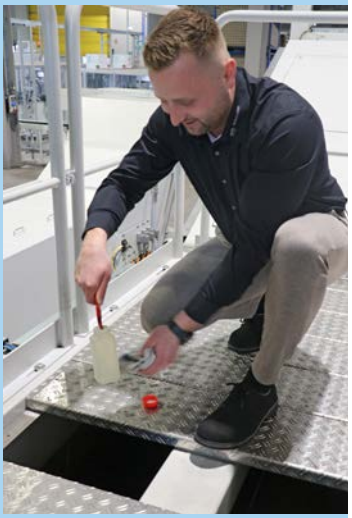
MicroPur® – a superfine filter for water-soluble cooling lubricant

Filter specialist KNOLL promised a solution for this issue immediately. "We swapped the fleece filter for our superfine filter MicroPur® – first in the bypass, then in the full flow", reports Ralph Knobelspies and explains: "The MicroPur® is a reverse-flow filter for separating the finest impurities from cooling lubricants. With it we are able to filter out impurities with a particle size from 1 to 3 µm from the synthetic solution. The contamination of the cooling lubricant improved to almost zero."

The KNOLL superfine filter system MicroPur® comprises individual modules equipped with filter cartridges. These ele-

A plate heat exchanger keeps the cooling lubricant at a constant temperature.

The water-soluble Bantleon cooling lubricant Avilub Metacool ETA which is free of mineral oil is automatically topped up from the red tanks.



Leonard Knaus, Technical Advisor at Bantleon, takes a sample every four weeks, which is then evaluated in the lab.

The KNOLL MicroPur® filtration system ensures that even the finest grinding dust is removed from the cooling lubricant and can be disposed of largely dry.

Siegmund Tonn and Boris Memel from SHW Brake Systems (2nd and 3rd from the left) are very satisfied with the support from Leonard Knaus from Bantleon (left) and Daniel Kujundzic and Ralph Knobelspies from KNOLL.

ments achieve a particularly large filter area because of their star-shaped folds. For use with synthetic solutions, the filter medium has a special coating that prevents the water penetrating into the fabric.

Another key feature of the MicroPur®: The filter cartridges can be backwashed individually with the solution without interrupting the filtration process. In order to achieve the highest possible backwashing effectiveness, KNOLL uses a separate flushing pump which is flushed back out with clean cooling lubricant instead of expensive compressed air. This results in a longer service life of the filter cartridges and lower maintenance costs. The backflushing process takes less than four seconds per filter cartridge and therefore has no impact on the overall performance and generates a very low backflush volume.

Tested and approved

After operation of the test system for one year, the product managers around Siegmund Tonn at SHW Brake Systems were convinced: "The Bantleon lubricant ETA and the KNOLL MicroPur® filter are perfect for the grinding of the hard-coated brake discs. This meant we could start series production."

Tonn, who has been responsible as Project Manager for the overall LEB industrialisation since 2025, together with Daniel Kujundzic, the responsible KNOLL sales engineer, planned a central system for the cooling lubricant cleaning of all three grinding machines included in the final expansion stage. The core element was six MicroPur® modules, each with four filter units.

The largest element of the filtration system is the sludge scraper, a tank that holds around 32 square metres of liquid. The heavy particles settle in the tank and are removed via a scraper conveyor. The cooling medium contaminated with lighter fractions is pumped from the dirt tank by the filter elements and then conveyed clean through the plate heat exchanger into the clean tank and on to the machines.

The sludge separated during the backflushing of the MicroPur® elements lands initially in an automatic concentrator where heavy particles again sink to the bottom. The liquid with suspended particles is cleaned via an additional MicroPur® element and fed back to the clean tank again.

Reliable and low maintenance

"With KNOLL and Bantleon we have succeeded in optimally designing the series production process", sums up Siegmund Tonn. "We have only minimal foaming, which is dissipated at the latest en route to the MicroPur® filters. We also benefit from the corrosion protection of the Bantleon ETA cooling lubricant and the good skin compatibility."

He also praises the central cooling lubricant cleaning: "It works superbly and requires very little maintenance." KNOLL also installed an automatic additional dosage. The measuring unit can determine the existing concentration and define the required quantity needed when refilling for a total concentration of four percent. "The automatic measurement and additional dosage work perfectly", confirms Siegmund Tonn, and Leonard Knaus agrees. In the 4-week cycle he takes a sample and performs strict monitoring. In this context, other parameters in addition to the pH value, nitrite and concentration, are evaluated in the Bantleon lab in order to ensure the process reliability over the long term. "The values match the results of the KNOLL probe almost 1:1", reports the Bantleon advisor.

Boris Memel and Siegmund Tonn are on the same page when it comes to the cooperation with KNOLL and Bantleon for the installation, planning and project management: "In terms of the technology and commitment, it was an exemplary performance. We also receive very reliable support during operation. We can only recommend these partners."

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AT SHW BRAKE SYSTEMS IN NEUHAUSEN OB ECK

Technology leader in the area of brake discs – the SHW AG

SHW AG, Aalen, is a leading global manufacturer of CO2-optimised pumps, motor components for all powertrain concepts, as well as high-performance brake discs – for the international automotive industry, the truck and off-highway market, as well as agricultural and construction machinery, stationary engines or turbines. In 2025, SHW AG achieved a turnover of 480 million euros with 1700 employees. Pankl AG, Kapfenberg (Austria) holds 93% of the shares in SHW.
SHW Brake Systems GmbH, which is part of SHW AG, is a technology leader in the area of brake discs for luxury class vehicles, sports cars and motorsport vehicles. Since 1954 around 4 million brake discs have been produced each year at the Tuttlingen and Neuhausen ob Eck sites with approximately 470 employees. The company also has a subsidiary in China.

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Lubricant specialist from Ulm – the Hermann Bantleon GmbH

The product portfolio of Hermann Bantleon GmbH includes universal cooling lubricants as well as material- and process-optimised product solutions. Many varieties were developed as special industry solutions for specific material and process profiles. This enables the company to offer a wide range of specialities, high-performance cooling lubricants and stable cooling lubricant technologies for the machining of plastics, non-ferrous metals and aluminium, high-alloy steels, titanium, carbides and cast steel. Bantleon employs around 250 staff, generates around 120 million euros every year and is one of the shareholders of the AVIA Group.

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KNOLL Maschinenbau GmbH

KNOLL is the leading provider of conveyor systems, filtration systems and pumps for metal processing. These systems transport and separate chips and cooling lubricants. KNOLL'S Automation Division deals with solutions for challenging assembly and logistics tasks. The comprehensive product range offers systems for decentralised or centralised applications.

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