

High-precision manufacturing thanks to high-end fine filtration

Cooling lubricants are indispensable auxiliary materials in manufacturing. Their functions include not only cooling workpieces and tools but also removing material. This results in an abrasive mixture.

To ensure effective, sustainable, and high-quality production, the material removed from the coolant must be filtered so that it can be reused in the machining process. Filtrating these fluids presents a challenge in high-precision manufacturing, and solving this challenge is a key focus of research and development at filter specialist Lehmann-UMT.



This was also the case at Berliner Glas, a company that grinds glass , glass- ceramics , and high-performance ceramics. Typical products include precision structural components, custom chucks, reference mirrors, and stage and optical modules used in complex chip manufacturing systems. Dimensional tolerances are below 10 nm; for the latest generation of equipment, tolerances of 5 to 3 nm are achieved.

The use of high-performance (glass) ceramics is essential here because they are characterized by extremely low coefficients of thermal expansion, good material homogeneity, long-term stability, and virtually non-fluctuating mechanical properties. However, these ceramics are extremely hard and therefore challenging to machine.

On specialized CNC machines, a ceramic blank is shaped through grinding, lapping, and polishing, resulting in polished functional edges or lightweight structures of the required final quality. Berliner Glas uses diamond-tipped grinding pins and grinding wheels in a wide variety of configurations, which are cooled internally and externally by high-performance grinding oil.



At the same time, the low-viscosity grinding oil carries away the glass or ceramic material from the workpiece. To reuse the grinding oil, the material must be removed from the medium. Despite various in-house trials, Berliner Glas was unable to achieve a process suitable for clean production, the desired filtration quality, or even a truly closed-loop system for the oil.

The company found help from the filter specialists at Lehmann-UMT.

Providing challenging solutions in fine filtration for high-performance production processes is a core business of the company from Pöhl. Following in-depth analysis, Lehmann-UMT, through numerous test applications and filtration trials with various filtration levels and combinations of filter technologies in its in-house laboratory and pilot plant, has finally developed a solution for achieving the desired fine filtration results reliably and consistently.

fine filtration system was developed that achieves the required filtration fineness of 2–3 without the use of filter aids. The filtration level is achieved in the full-flow filtration system. Between 100 and 400 liters of grinding oil per minute are passed through the 3-stage system, filtered, and returned to the CNC machine in a closed loop.

As Mr. Pisch, process engineer at Berliner Glas, explains, the integration of the filter system with the CNC machines represents a kind of 'merging' and a major step towards increased production output. The Lehmann-UMT fine filtration system enables continuous operation of the CNC machines, thus increasing the company's output without compromising quality. This is particularly true with regard to repeatability and accuracy of production results. Longer machine uptime is an additional benefit.



In general, it can be said that a closer look at the 'auxiliary material' grinding oil and its fine filtration is definitely worthwhile.

Berliner Glas now uses over 20 fine filtration systems from Lehmann, and the company certifies that the systems not only achieve the fine filtration results within the respective target range, but also reduce costs: the cleaned grinding oil remains in use longer, retains its properties and extends the service life of the tools and machines.



The investment in a fine filtration system pays for itself within a very short time thanks to this and perfect product quality.