

39 high-performance milling centers connected to a central filtration and chip disposal system

In which application area is the central filter system used?

A central filter system from Lehmann-UMT GmbH is used to filter cooling lubricants during aluminum machining. The aluminum is machined using 39 high-performance milling machines to produce carrier strips for battery systems used in electric vehicles. The system reliably filters aluminum chips down to 10 µm from the emulsion.



The very high proportion of chips produced necessitates the use of correspondingly large quantities of fluid. The system operates fully automatically around the clock, ensuring high process reliability and machine availability. Titus Lehmann, Managing Director of Lehmann-UMT, explains: "Our system is positioned in a highly relevant, future-oriented market and contributes to the sustainability of the production process and thus the end product."



The customer's machines are highly automated, meaning the parts are fed via an equivalent system and then transported directly into the machining center by robots. One robot always supplies three machining cells, where the components are manufactured and automatically removed.

What special features in the design of the central plant make it so powerful?

"We flush the chips from the machine at a rate of 500 liters per minute per machining center," explains Jonathan Gehmlich, Technical Director at Lehmann-UMT. The contaminated fluid flows from the machining center onto a scraper chain conveyor with an integrated slotted screen. This removes all chips larger than 0.5 mm from the process, thus relieving the load on the downstream filters. This mechanical pre-separation removes up to 85% of the chips, and only the emulsion containing the fine dirt particles is pumped back into the filter system.



The contaminated coolant then passes onto the compact filter, which reliably removes the fine chips from the process and filters down to a fineness of 10 µm. Below the compact filter is the clean tank with a

volume of 8,000 liters. Any foreign oils floating on the surface are removed from the process by a belt skimmer, leaving only the purified medium in the tank.

Frequency-controlled central pumps return the clean coolant to the machining centers. All systems are demand-driven, meaning that only the exact amount of fluid required for the machining process is supplied. Each machine is also equipped with an internal coolant pump, which is likewise efficiently controlled by the central filtration system, ensuring reliable internal cooling and long tool life.

The filtration system and conveyor technology are fully integrated and monitored by sensors. All system controls, including pumps and drives, are housed in a central control cabinet. This control system also interfaces with each connected machining center to communicate various status reports and maintenance intervals, and to provide coolant as needed. The entire system is very easy to maintain, readily accessible, and exhibits minimal wear. The control system, and therefore the entire plant, operates fully automatically, minimizing manual intervention and personnel costs.

The central system is equipped with an additional remote maintenance module, ensuring rapid support in case of adjustments or service issues. The filtration system is characterized by a high degree of automation, operates completely autonomously, and can be connected to the building management system. All Lehmann systems are Industry 4.0-ready and, thanks to the standard plug-and-play system, easily integrated into existing machine concepts.

What was the customer's task?

The initial goal of the project was to implement filtration for a small machining unit with three machines. 'In the course of the project, we also implemented filtration for an entire production hall with an integrated central chip disposal system,' reports Titus Lehmann.

In the first step, the technical parameters were defined based on a series of tests. Subsequently, the experienced engineers at Lehmann-UMT designed the system precisely to fit the customer's process and, by linking individual conveyor systems, developed the optimal solution for a central plant waste disposal system.

"The project was implemented over the last two and a half years. Across the various expansion phases, a total of 39 machining centers are now connected to the central filtration system, each requiring approximately 500 liters of filtered coolant per minute. This means the central system filters approximately 20,000 liters of emulsion per minute in this single production hall – that's truly enormous," explains J. Gehmlich. Plans are currently underway to equip further machining centers in this production line with filtration and conveying technology.

We place great emphasis on service and set new standards.

The comprehensive, worry-free package is one of the many reasons why Lehmann-UMT customers choose to work with them. This service ensures maximum security and provides 360° support from the Vogtland region of Saxony. From initial contact and design, through coordination with other trades and the end customer, to delivery, installation, and commissioning by qualified service personnel, the plant engineering company provides support with experience and expertise. Lehmann-UMT stands not only for long-term partnerships but also for quality 'Made in Germany.' The entire production process takes place in-house using state-of-the-art technology. From cutting on their own fiber laser systems and welding processes

performed by robotic welding machines, to powder coating, assembly, and comprehensive worldwide after-sales service, customers receive everything from a single source.

"A long-term partnership with our customers, extending beyond the sales process, is very important to us. For example, we ensure the availability of spare parts for several years and train our customers' employees so that service and maintenance work can be carried out professionally themselves," explains Titus Lehmann.

What makes the plant so extremely sustainable and environmentally friendly?

In general, Lehmann's systems are designed to primarily utilize naturally occurring energy in the environment, such as sedimentation through gravity, hydrostatic water pressure, magnetism, and adhesion forces. Titus Lehmann proudly reports: 'This makes our products particularly energy-efficient. They not only contribute to the sustainability of the customer's production, but are themselves manufactured in an environmentally friendly way, as we cover the energy requirements for production with our own solar energy and the use of waste heat from various other processes.' Just last year (2022), the Vogtland-based company invested in a solar power system that was installed on the roofs of the company buildings and now covers the energy needs of the entire company and feeds surplus energy into the local grid.



Filter fleece thanks to pre-separation using the scraper chain conveyor, as the main contaminant load is removed from the process before filtration by the compact filter. Furthermore, the compact filter features a demand-controlled filter fleece feed, meaning that the system automatically pulls new fleece into the filter chamber only when needed. This makes the overall system highly sustainable and cost-efficient in terms of disposal, energy, and operating costs.



The good filtration result and the dry filter cake allow the customer to remelt the chips, recycle them and thus protect the environment.

All pumps are equipped with intelligent frequency converter controls, ensuring that precisely the pressure required by the process is available on demand. This guarantees energy-efficient operation of the system and reduces electricity costs. At the same time, the high-pressure pumps are positioned very close to the processing machines, keeping pipe runs short and minimizing pressure and energy losses. In this way, Lehmann-UMT GmbH products contribute to the energy transition.