

Innovative Surface Technology for Maximum Throughput

Cleaning and Coating in Continuous Operation

At Bucher Hydraulics, the cleaning, degreasing, and coating of hydraulic units is carried out in high volumes. The environmentally conscious company implemented a pioneering system concept that flexibly links parts cleaning and coating, setting a benchmark in sustainability, productivity, and quality.

At its Klettgau, Germany, site, Bucher Hydraulics — an internationally leading provider of innovative hydraulic drive and control technology for mobile and stationary hydraulics — operates a state-of-the-art manufacturing facility. The product variety is very high. Almost the entire production runs through the new system, so both the parts cleaning and coating systems are expected to achieve near 100% availability. Any downtime of either system would impact the entire upstream production process.

To ensure a project of this scale was executed perfectly, Bucher Hydraulics entrusted the experienced surface technology engineering firm IBO with the planning of the entire system. Company owner Franz-Georg Just comments:

„Since this is a completely new system, we were able to realize a pioneering concept in which parts cleaning and coating are linked in a space-saving and flexible manner. Only the best available technologies were used. The result is impressive and fully meets the expectations of Bucher Hydraulics.“



Particular Challenge: Parts Cleaning

Cleaning the components proved to be a critical challenge within the system concept. This was not only due to the specified low residual contamination levels, but also because of a unique aspect of this application: the hydraulic units to be cleaned were fully operational, meaning they were completely filled with oil and equipped with the corresponding control electronics. Even the experienced experts at HEMO, responsible for designing and building the parts cleaning system for this demanding application, initially found these conditions challenging.

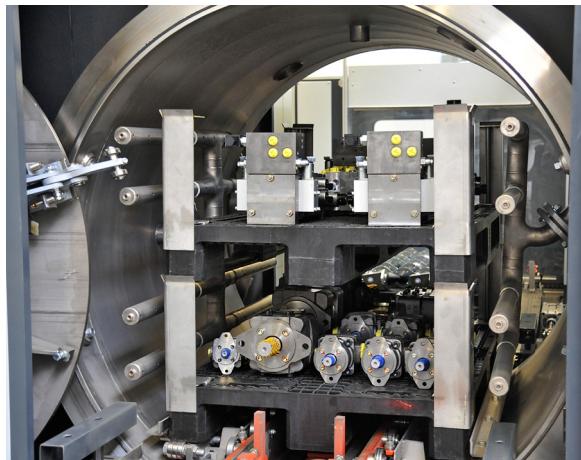
Volker Hösel, CEO at HEMO, nevertheless trusted that the task could be accomplished using the TITAN Throughput system:

„All cleaning steps in these systems are performed under vacuum. Of course, it raises concerns to expose fully oil-filled, mechatronic components with sensitive control electronics to solvent baths heated to up to 95°C under vacuum. Through extensive testing at the HEMO technical center, we were able to determine the perfect process combination for cleaning these components. It also demonstrated how robust and high-quality the Bucher Hydraulics components are. Concerns regarding oil leaks due to the vacuum or malfunctions in the control electronics proved to be completely unfounded.“

Continous Throughput System for High Output with Superior Cleaning Quality

To reliably meet the demanding requirements for cleaning quality while reaching high output, Bucher Hydraulics opted to invest in a throughput system. This system is the preferred solution for fine cleaning at high throughput rates. Loading and unloading are synchronized to save time. The cleaning chamber is equipped with two doors, simultaneously providing access to both the loading and unloading sides. When the doors are open, the roller conveyor system continues to advance, moving cleaned parts out of the system while dirty parts enter the cleaning chamber.

Another key advantage of throughput systems is the clear separation between dirty and clean zones. In HEMO's system, plastic pallets carrying unclean hydraulic units enter the system on one side via a roller conveyor and exit clean on the opposite side. This ensures that cleaned components never come into contact with the system's dirty areas or with oily rollers at the loading side. In this way, Bucher Hydraulics avoids recontamination of cleaned components immediately before coating.



VAIOCS Technology Makes the Impossible Possible

The throughput system operates in three-shift mode using HEMO's patented VAIOCS process with a solvent mixture as the cleaning medium, but it could also be run without modification using non-chlorinated hydrocarbon solvents or modified alcohols. In the first step, the parts undergo immersion cleaning, followed by solvent vapor degreasing, and finally rapid, residue-free drying. All process steps are performed under vacuum at elevated temperatures. The precisely tuned cleaning program, combined with the high-quality solvent continuously regenerated via distillation, ensures optimal cleaning results. Equally important, the intensive vacuum drying removes solvent residues even from recessed areas of the components.



“ The hydraulic blocks enter the machine on plastic Euro pallets in any arrangement. To maximize output, two pallets can be stacked if needed. In this configuration, up to three tons of parts per hour can be cleaned to the highest quality, highlighting the superior performance of our system technology, ” explains HEMO CEO Andreas Fritz.

After cleaning, the parts pass through a cooling tunnel before arriving at the transfer station to the coating line at temperatures below 40°C.

Coating System Optimized for Surface Quality and Energy Efficiency

For flexibility reasons, Bucher Hydraulics deliberately avoided an automatic, rigid link between the cleaning and coating systems. The wet coating system from Afotek GmbH is designed for manual loading onto the circular conveyor, which transports the hydraulic units to one of two manual coating booths. Two parallel overhead cranes are used synchronously to simplify loading and unloading at the circular conveyor, allowing higher material throughput.

Experienced operators apply 2K wet paint to the components. The electrostatic coating ensures excellent and efficient material deposition, even on complex geometries. After coating, the components pass through an off-gassing zone and then a 16-meter-long drying oven at a maximum of 120°C with circulating air, before entering a cooling zone and being transferred directly to the shipping area.

Thanks to careful planning and the expertise of the system manufacturers in both cleaning and coating, a space-saving layout with short transport paths and intelligent intralogistics was achieved. Various measures also significantly reduced the overall energy consumption, with the cross-flow heat exchanger in the supply and exhaust air system of the coating booths proving particularly efficient. With all requirements for quality and throughput successfully met, Bucher Hydraulics is highly satisfied with its investment.

Text: Ralf Högel