

Flexible machine concept

Cleaning and coating non-stop

At Bucher Hydraulics, they are involved in the high-volume cleaning, degreasing and coating of hydraulic units. To deal with this, the company implemented a ground-breaking and environmentally friendly machine concept that flexibly combines parts cleaning and coating, and thus makes higher sustainability, productivity and quality possible.

At its location in Klettgau, Bucher Hydraulics, a leading international provider of hydraulic drive and control technology for mobile and fixed hydraulics, operates a modern production facility. The product range is marked by numerous different model versions. Almost the entire production is carried out by a new system, which is why an availability of almost 100 percent is expected for both the parts cleaning and coating machines. If one of the machines has a breakdown, there would be consequences for the entire upstream production process. To provide certainty in the implementation of a project of this size, Bucher Hydraulics trusted the engineering firm Ingenieurbüro für Oberflächentechnik (ibo) with the planning of the complete system. "As we were dealing with a completely new system, we were able to implement a ground-breaking concept with parts cleaning and coating incorporated flexibly and using the minimum space," explained the firm owner, Franz-Georg Just. "In the process we only used the best technology available. The result is impressive and completely fulfils the expectations of Bucher Hydraulics."

Cleaning filled hydraulic units

The cleaning of the parts emerged as the sticking point within the system concept. This was not only due to the specified low residual contamination, but also due to another feature of this application: the hydraulic units to be cleaned are already fully functional, i.e. fully filled with oil and equipped with the appropriate control electronics. These requirements gave even the experienced experts at Emo Oberflächentechnik, who are familiar with the development and construction of parts cleaning machines for this demanding application, plenty to think about at the beginning.



The overall concept was designed especially for Bucher Hydraulics, manufacturer of hydraulic units, and connects the parts cleaning machine (left) with the coating machine in a space-saving configuration

Peter Hösel, Chief Technician at Emo, was still certain that the task could be fulfilled with a solvent-based system: "All cleaning steps take place in this machine under vacuum. You are naturally a little concerned about sending mechatronic components filled with oil with sensitive control electronics through baths of hot solvent at up to 95 degrees Celsius under vacuum. In extensive test series at the Emo Technical Test Centre we were able to find the perfect process combination for cleaning the components." In the process, the solidity and high quality of the component production showed itself. Worries concerning oil leaks due to the vacuum or defects in the control electronics proved to be unfounded.

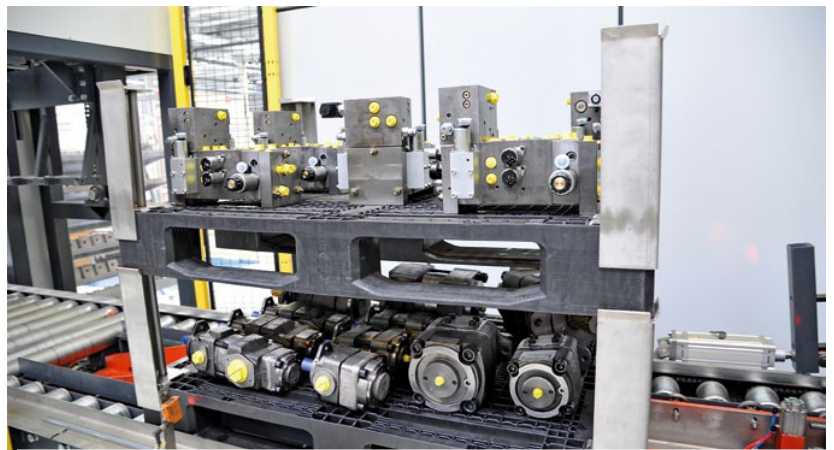


The parts enter the throughput machine on plastic pallets and leave the machine ready to coat on the clean side on the right in the picture.saving configuration.

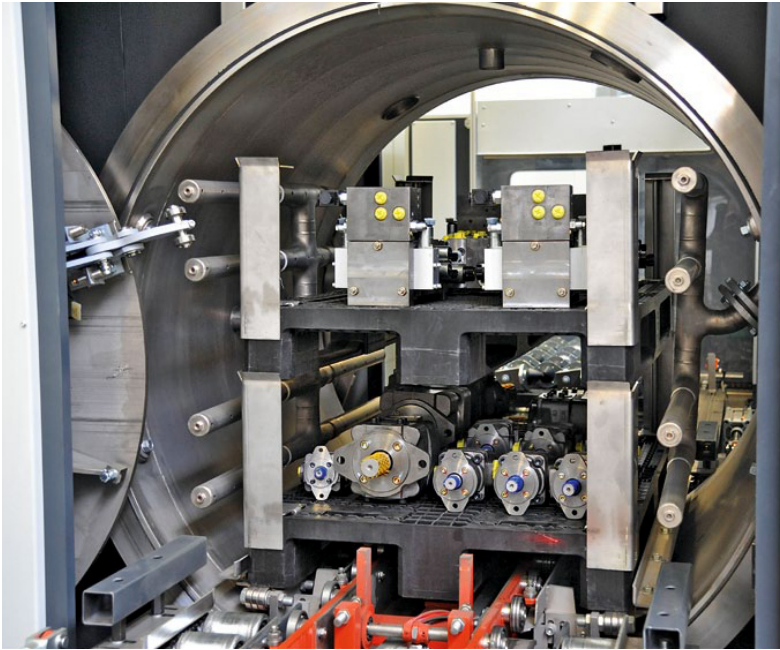
High output with very good cleaning quality

To reliably fulfil the demanding requirements for cleaning quality with high output, Bucher Hydraulics decided to invest in a throughput system. This machine technology is the first choice for ultra-fine cleaning with high throughput. Loading and unloading is carried out synchronously, thus saving time.

For this purpose, the treatment chamber is equipped with two doors, which release the loading and unloading sides at the same time. The conveyor system continues moving with the doors open and conveys the cleaned parts out of the machine while the uncleaned parts enter the treatment chamber.



Two plastic pallets with different hydraulic units on their way into the treatment chamber



The maximum cycle load for two-level loading of the working chamber is 1000 kilogram

Another decisive advantage for the throughput system is the clear separation of clean and dirty areas: in the Emo machine, the plastic pallets with uncleaned hydraulic units enter the machine on one side via a roller conveyor and come out clean on the other side. In this way, the cleaned parts do not come into contact with the dirty area of the machine or the oily conveyor on the loading side. As a result, Bucher Hydraulics prevents renewed contamination of the cleaned components directly before coating.

Effective cleaning under vacuum

The throughput machine operates in a 3-shift system using the Vaiocs process with a solvent mixture as the cleaning medium, but it could also be operated with unchlorinated hydrocarbon cleaners or modified alcohol without any conversion costs. The first step in the machine is an immersion cleaning cycle, then degreasing with solvent vapour and finally drying is completed quickly and without residues.

All cleaning steps run at high temperature levels under vacuum. The precisely tailored cleaning programme and the high solvent quality provided by the permanent distillation provide the best cleaning results. At least as important: with the intensive vacuum drying, solvent residues are also completely removed from areas of the components where liquids collect.



The hydraulic units are manually coated directly after cleaning with 2K varnish

"The hydraulic blocks move into the machine in any arrangement on plastic euro-pallets. To ensure the maximum output, if required, two pallets can be arranged one on top of the other. In this configuration, up to three tonnes of items can be cleaned at the best quality each hour, which underlines the superior performance of our machine technology" stressed Thomas Weiss, Project Manager at Emo for this machine. After cleaning, the parts move through a cooling tunnel until they arrive at the coating machine cooled down to 40 degrees Celsius.

Designed for energy efficiency

Bucher Hydraulics made a conscious decision not to have an automatic, fixed linking of the cleaning and coating machines for flexibility reasons. The wet coating machine from Afotek GmbH is designed for manual loading of a circuit overhead conveyor which conveys the hydraulic units to one of the two manual coating booths. Two crane rails working in parallel are used synchronously for simple loading and unloading of the pieces on and off the circuit conveyor. This allows a high material throughput to be achieved.

Experienced sprayers undertake the coating of the components with 2K varnish. The electrostatic coating achieves a very good and efficient material application, especially with difficult geometric shapes. After varnishing, the components move through an evaporation zone and then a 16-metre long varnish dryer at a maximum of 120 °C circulating air temperature until they pass through a cooling zone and then arrive directly in the despatch area.

With careful planning and the competence of the machine manufacturer in the field of cleaning and coating, it was possible to implement a space-saving concept with short paths and intelligent materials handling. Various measures have allowed the energy consumption of the complete system to be significantly reduced. In the process, the cross-flow heat exchanger in the supply and exhaust air system for the varnishing booths turned out to be very efficient. As all other requirements regarding quality and throughput were also fulfilled, Bucher Hydraulics is very happy with the investment.

Ralf Högel

Contact:

www.bucherhydraulics.com

www.emo-ot.de

www.afotek.de

www.ibo-just-lackieranlagenplanung.de