

## New System More Cost-Effective

# Perchloroethylene Instead of Aqueous Cleaning

A well-known manufacturer of bolt-on engine components planned to replace its solvent cleaning machine with an aqueous system. After carrying out numerous tests with several different machine suppliers, the company opted instead for a new solvent system. This article explains why.

The manufacturer of bolt-on engine components based in southern Germany is an OEM for almost all European car brands. The blanks for the end product are a variety of stamped, bent and deep-drawn parts which are mass produced from galvanised sheet steel. The individual parts are transported internally as bulk goods in large wire mesh pallets. In order to avoid having to remove them from the pallets with the accompanying risk of causing damage, the pallets, which are 1000 x 800 x 1000 mm in size, are also used as baskets for the degreasing system.

### Thorough planning is crucial

The supplier to the automotive industry has had solvent degreasing machines from several different suppliers in operation at its site for a number of

years. The planning process for the replacement of an outdated system began in 2010.

Initially, the planning team focused on replacing the existing solvent process with an aqueous cleaning machine. The team members spent several months looking in detail at this concept and ran large numbers of tests with almost all the well-known suppliers of cleaning machines. However, their efforts were unsuccessful, because the aqueous process proved to be highly problematic and not as environmentally friendly as it had first seemed. Corrosion formed on the cut edges of the sheet steel, drying the bulk goods in the large wire mesh pallets was impossible using only a vacuum system as a result of the volume of parts and reinforcing the drying process with hot air

or infrared units used too much energy and took too much time.

Most importantly, the aqueous machines were more expensive to run and had a greater environmental impact than the tried-and-tested solvent system because of the large amount of oil to be removed from the parts and the resulting operating costs for recycling and changing the cleaning agent.

### Efficient full-vacuum system

After in-depth testing, the company took the logical decision and opted for a system based on the use of the familiar solvent perchloroethylene, but in this case a state-of-the-art solution with a modern, efficient full-vacuum process.

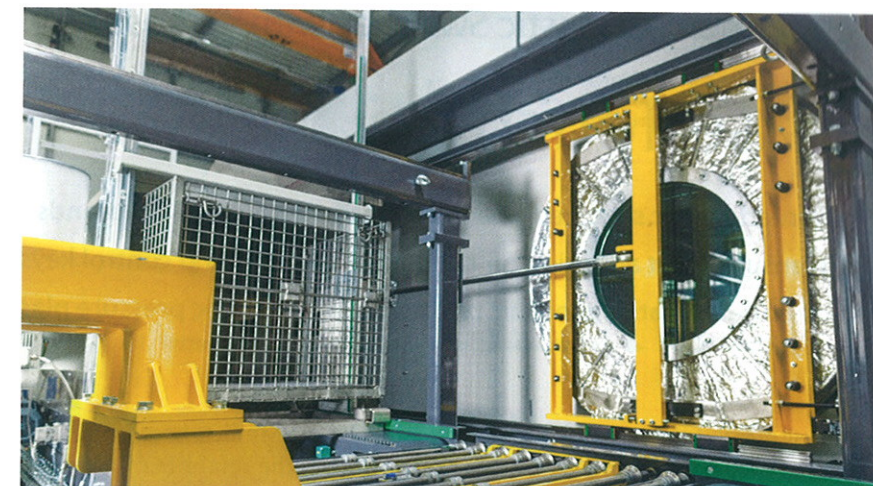
After the new project definition had been drawn up internally, a series of comprehensive tests was car-

ried out with different manufacturers, a requirements specification was prepared and quotations were compared. The planners were most impressed by the concept from Höckh Metall-Reinigungsanlagen. After over a year spent on planning and construction, the new Multiclean-D-4-4-F machine was ready for operation at the end of the summer of 2012.

### Configured to meet the customer's needs

For the design team at the cleaning machine manufacturer, the task presented a major challenge. In addition, the requirements specification was very detailed. The machine had to degrease sheet steel components with thin walls in large wire mesh pallets with a throughput of at least eight batches per hour, each of which weighed 500 kg. In addition, the machine had to be integrated into a complex transport system along with a number of other machines. Höckh acted as general contractor, taking responsibility for the entire group of machines. In order to keep downtimes for the purposes of maintenance to a minimum, a two-chamber system was developed with a redundant design in all areas. This allows parts of the machine to be shut down for maintenance or to save energy if its full capacity is not being used. In addition to the central cleaning chamber, both cleaning modules have two storage tanks and pump circuits with filters, a central distillation unit to produce the vapour and circulate the solvent and a bypass distillation unit to distil any residual solvent and remove the oil. A central supply module houses three dry-running screw-type vacuum pumps and an double carbon adsorber system with automatic regeneration which recycles the process air. The machine is heated by a gas-fired steam boiler which was also integrated into the group of machines.

Automating the system proved to be much more complex than designing the cleaning process. Conventional fully automatic machines are equipped with a loading station and a buffer zone before and after the clean-



A large porthole in the door of the cleaning chamber gives a view of the cleaning and drying process.



The wire mesh pallets are loaded onto the machine using forklift trucks. Large graphical control and display panels make the complex machine easy to use and to monitor.

ing process. At the customer's request, a cooling tunnel was also added on the output side, so that the cleaned parts could be cooled quickly, and a fully automatic stretch wrapping system was incorporated into the machine, to allow the cleaned pallets to be packed ready for shipping. The general contractor was responsible for integrating these units into the group of machines from a software and a safety perspective. As the feet of the pallets are not suitable for use with a roller conveyor, a transport system for base frames was also added. The transport system

is loaded and unloaded using forklift trucks and all the components have been designed to be sufficiently robust to withstand this. ■

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Front view of the two-chamber cleaning and degreasing machine with part of the transport system.