

Cleaner and More Economical

At the heart of every weighing machine is its measuring cell. These high-precision mechanical components must be cleaned to an extremely high standard. A Swiss manufacturer of precision weighing systems has replaced its existing open multi-chamber aqueous cleaning plant with a closed cleaning system using non-halogenated hydrocarbons.

Mettler Toledo's weighing systems cover a range of weights from 0.000001 grams to 100 tonnes. They are used by laboratories, industrial concerns and food retailers throughout the world. Mettler Toledo is the world's largest manufacturer of weighing systems and manufactures its machines on three continents. The measuring cell at the heart of every machine comes from the Swiss town of Nänikon. "The blanks for the measuring cells, which are made of a pressed aluminium-plastic alloy, are processed on six sides in CNC machines. A very high level of precision is essential, because the tolerances are less than

one hundredth of a millimetre," explains Peter Winzenried, the manager of CNC manufacturing at Mettler Toledo. After the CNC processing, the components must be cleaned to remove any residues of the processing emulsion and the very fine swarf that cannot be removed using pressurised air.

High-Quality Cleaning Required

Free of grease, free of particles and dry: these are the results that Mettler Toledo requires of the cleaning process. "For example, after cleaning

the steel bearings are tempered using an inert gas. Even a tiny amount of oil or grease on the components would result in unacceptable discolouration," says Winzenried. For around ten years, the company has been using an open multi-chamber aqueous cleaning plant. As the plant was no longer able to fulfil the company's demanding cleaning requirements and was prone to faults, it was replaced by a Compact 80C hydrocarbon cleaning system manufactured by Dürr Ecoclean GmbH.

Decision Based on Internal Evaluation System

The decision itself was preceded by an intensive selection process that initially focused on aqueous cleaning. "We carried out tests of aqueous cleaning systems from several manufacturers and also tried one hydrocarbon plant. The results of the tests showed that a hydrocarbon plant could give us the high quality cleaning results we needed. The process also appealed to us from an environmental and cost perspective. We discussed this with the manufacturers of this type of plant and, following further cleaning tests, included them in the selection process," says Winzenried, the manager of CNC manufacturing.

The Compact 80C, made by Dürr Ecoclean GmbH in the German town of Filderstadt, was chosen on the basis of an internal evaluation system. The criteria included the cleaning quality, work safety requirements, the safety concept, the finish of the plant, reliability, maintenance, servicing and the price. In addition, the system had to fulfil the environmental criteria specified by Mettler Toledo, which has ISO 14001 certification. "Dürr Ecoclean's price wasn't the lowest, but their system had the best price/performance ratio. For example, the system has stainless steel piping as standard and a high quality finish. The safety concept,



Improved cleaning quality, less harm caused to the environment and a significant increase in the efficiency of the entire cleaning process – the results of Mettler Toledo's installation of a new hydrocarbon plant.

which involves double protection for all the appropriate components, and the ease of access for servicing were also important factors in our decision. The fact that Rein-Prozess-Technik in Ettiswil, a specialist sales and service partner of Dürr Ecoclean, is not far away from us also played a role," says Winzenried.

The hydrocarbon cleaning plant is designed for a multi-stage cleaning process and equipped with two fluid tanks. Any combination of options such as wash cycles, rotations, temperature, ultrasound and high-pressure injection spray washes can be selected using eight different programmes. The measurement cells undergo pre-cleaning at around 80°C and then fine cleaning at around 50°C using the medium from the second tank. The finishing stage involves steam degreasing at 110°C.

Rapid and Reliable Drying

The vacuum drying process that follows guarantees that the cleaning medium is rapidly removed from blind holes and undercuts. The plant is also used for cleaning die cast aluminium components. Around 90% of the parts must be carefully positioned at a specific angle in the parts containers before cleaning. It was therefore important for Mettler Toledo to be able to use its existing container systems in the new plant.

The cleaning process takes between ten and eleven minutes, and is considerably shorter than with the old plant. As a result, the throughput of parts has increased. Another contributory factor to the increase in throughput is that more wash racks can be included in each batch. The current throughput consists of up to seven batches with a maximum of 50 kilograms per hour. Because the capacity of the cleaning plant can be exploited to the full, all the parts produced during three shifts can be cleaned in one shift. The parts containers are inserted and removed manually.

For quality assurance purposes, Mettler Toledo carries out checks on

the surface tension of the clean measuring cells using Arcotec no. 36 testing ink. The ink is applied to the clean component, and if the surface absorbs the ink, this shows that it is clean and free of grease. "We're very happy with the results. The parts coming out of the plant are completely free of particles and grease," says Winzenried.

The integral distillation and filtration system constantly recycles the solvent and removes swarf using a bag filter and cartridge filter system. As a result, the cleaning agent used is always of the highest possible quality.

Reducing Costs and Minimising Environmental Damage

As a result of the improvements in the cleaning process, the risk of impurities contaminating the chemical treatment baths that form the next stage of production and the risk of the chemicals therefore having to be disposed of as hazardous waste at significant expense have been considerably reduced. In addition, the cleaning plant is considerably more economical, as it uses less power.

The water savings are even more significant. The aqueous plant used around 64,000 litres of tap water per year, which also resulted in disposal costs being incurred. In addition, consumption of reverse osmosis water was around 104,000 litres per year. The plant also used approximately 5600 litres of caustic alkali each year. The cost of testing the cleaning agent every two weeks in the laboratory also had to be taken into account. "All of this no longer applies now that we are using the new plant. The cleaning process is not only much more economical but also more environmentally friendly," says Winzenried in summary.

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