

## Dürr Ecoclean's Technology Centre.

### Process reliable cleaning of hydraulic parts

### **Better cleaning with less manpower and space requirements**

Cleaning is one of the crucial production steps in manufacturing hydrostatic and hydraulic components. Therefore an Indian-based manufacturer demanded a high level of cleanliness when the company invested in a cleaning solution for a new production line. Other requirements Dürr Ecoclean's Universal 81W has fulfilled are a space-saving design, short cycle times and a full automation of the cleaning process.



Fig 1. Universal 81W.

The company produces mainly hydrostatic steering units and hydraulic braking systems for manufacturers of construction machines and agricultural equipment. These components are made in more than 40 variants.

### **Cleaning – a critical manufacturing step for quality**

The main housings are produced in a cast iron process; the other parts are manufactured from steel. After machining and honing, the housings and parts get cleaned in workpiece-holders as an assembly set comprising seven components. This is a critical production step because there are very small orifices and clearances in the workpieces. If any contamination remains there the steering unit or braking system may not work correctly and will not pass the performance and quality tests.

### **High cleanliness and throughput requirements**

Accordingly, high cleanliness requirements, such as no metallic particle bigger than 400 microns and no remaining contamination more than five milligrams in total per as-

sembly, were essential when the company invested in a cleaning system for a new production line. Another request was the cycle time of 60 seconds. And due to the enormous space consumption of an existing multi-chamber cleaning machine they were looking for a compact designed machine to save floor space. In addition the new system was to provide a fully automated process including a loading and unloading conveyor and to operate with a minimum of manual work and maintenance to reduce manpower on cleaning and to increase the machine's availability.

With their requirement profile, the company approached several cleaning equipment manufacturers. Based on the machine's design and the cleaning capabilities, the decision was made on the Universal 81W from Dürr Ecoclean's facility in Pune. The decision was also influenced by the opportunity to visit some of the cleaning equipment manufacturer's customers and to see the machine in operation.

### **Designed to customer specifications**

The Universal 81W is a low-cost, highly efficient single-chamber cleaning system for aqueous media. It is engineered to 670 x 480 x 300 mm (L x W x H) batch dimensions which allow for cleaning 12 assembly sets in one batch. Thanks to the modular machine design, it can be used for a very wide range of applications in industrial parts cleaning. Before finalizing their speci-

fications, the company conducted cleaning tests with originally contaminated parts at Dürr Ecoclean's test center. This was very helpful to ideally adapt the machine's layout to the individual needs.

Thus, the Universal 81W is equipped with three media tanks for cleaning, rinsing and preservation of the parts. In order to ensure reliable removal of particles, chips and honing abrasion adhering to the part surface, as well as of fluid residues left from machining and honing processes, the machine's working chamber is equipped with special devices for spray-cleaning, injection flood washing (IFW) and an ultrasonic unit with a performance of 20 watts per liter bath volume. In addition, the company's Universal 81W includes both hot air and vacuum drying for quick and effective drying of parts. These features in combination with a specific fixture for handling the parts in a tighter load assure the achievement of the required cycle time of 60 seconds.

A user-friendly design feature is the machine's ability to store eight individually programmable and selectable cleaning programs in its controller. The parameters include rotating and oscillating movements of the basket during cleaning and drying, spray cleaning, ultrasonic, and IFW settings. Thus the cleaning treatment can be customized to every batch of parts.

**Integrated in the production line**

In order to integrate the Universal 81W into the production line the cleaning chamber usually placed on the left hand side has been moved to the right of the cleaning machine. This allows for a fully automated process: Twelve of the assembly sets are loaded into a basket as one batch at the machining station. The batch is then transported into the cleaning chamber by an automatic conveyor feeding system. After the cleaning process the conveyor system transports the batch directly to the assembly station where a worker unloads the basket and workpiece-holders. They are then automatically transported back to the loading station.

**Efficient bath cleaning for reduced consumption**

A feature contributing to the system's cleaning performance is the continuous treatment of fluids using integrated bath reconditioning technology. This ensures a long bath life, which is key to achieving the objective of reduced water consumption. For removal of particulate contamination, the fluids from the three media tanks are each subject to full-flow filtration. Film-like contaminants such as oils and grease are continuously removed by an oil separator.

*As a leading supplier, Dürr Ecoclean supplies automotive manufacturers and*

*suppliers, as well as the broad industrial market, with the latest cleaning technology. Appropriate solutions for automation are also offered and integrated by the Ecoclean Group. With individually tailored technology from Dürr Ecoclean, customers can exploit potential savings for example in unit costs, energy consumption and process time. Dürr Ecoclean is part of the Dürr Group worldwide and has over ten sites in eight countries with approximately 1,000 employees.*

*Dürr is a mechanical and plant engineering group that holds leading positions in the world market in its areas of operation. It generates a good 80% of its sales in business with the automotive industry. It also supplies the aircraft, machinery, chemical, and pharmaceutical industries with innovative production and environmental technology. The Dürr Group operates in the market with four divisions: Paint and Assembly Systems plans and builds paint shops and final assembly systems for the automobile and aircraft industries. Application Technology provides automated paint application, sealing, and glueing with its robot technologies. Machinery and systems from the Measuring and Process Systems division are used for balancing and cleaning in engine and transmission manufacturing as well as in final vehicle assembly, among other areas. The*



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*fourth division, Clean Technology Systems, specializes in processes to improve energy efficiency and exhaust air purification. Dürr has 54 business locations in 26 countries worldwide and approximately 8,320 employees. The Group achieved sales revenues of € 2.4 billion in 2013.*

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