



APOLLO

Combined Spray-Immersion Cleaning Systems

The APOLLO series combines the advantages of a chamber system and an immersion system. The cylindrical shape enables the carrier to be rotated and swiveled, thereby optimizing the spraying as well as injection flooding. The cleaning process can be further enhanced by integrating ultrasonics into the wash process. APOLLO's design also enables different drying modules to be installed, thus allowing it to be adapted to different part requirements.

Online inquiry
for your cleaning system

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OVERVIEW

Technical Process

- Combined spray and immersion cleaning
- Various cleaning and rinsing processes in a single chamber
- Multiple cleaning agent containers for different mediums
- Automatic loading
- Can be rotated and swiveled in all directions
- Programmable cycle timing

Optional Components

- Ultrasonics
- Robotics
- Customized programming
- Vacuum, infrared or hot air drying processes
- Oil separator
- Centrifuge system
- Swarf removal belt
- Water treatment system

Advantages

- Effective cleaning of both the outside and hard to access boreholes inside of the part
- Easily accessible for maintenance
- Low servicing costs due to anti-twist snap closure on the nozzle line

FUNCTION

Apollo comprises one or several cleaning chambers and the related media tanks situated underneath. The parts are placed in a basket, box, or carrier designed for the goods to be cleaned. For easier handling, the containers are loaded into the chamber by means of a feeding unit (e.g. loading table). Loading is available as a manual or automated process. After completed loading, the chamber is closed for the cleaning and drying process.

Available treatment steps

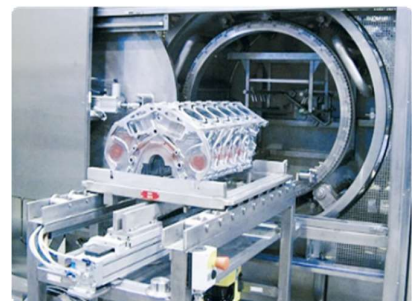
- Cleaning
- Rinsing
- Flooding
- Vacuum drying

Cleaning and rinsing is possible either by spraying the goods or by flooding the chamber. The plant is also capable of rotating or swiveling the goods past the spray headers for cleaning.

That way, even hard-to-reach areas of the parts to be cleaned will be thoroughly coated by the cleaning medium. The cleaning medium is heated to the required heating temperature either by electrical heat (immersion heater) or by technical heat, using heat exchangers (hot water, thermal oil, gas heater, etc.). The heating temperature is maintained at a constant level for the entire duration of the process. To reduce any carry-over of media to a minimum, the lines are air-blasted after every process.

The main advantage of this cleaning system is its hermetic sealing – that way, the entire cleaning chamber can be flooded with media for ultrasound cleaning and vacuum drying. The most suitable drying process or filtration method can be selected to meet the requirements of the various parts and their desired final condition.

Loading & unloading is available as a manual or automated process. All process media present in the plant are filtered for recycling and remain within the circuit.



Tanks

The water necessary for machine operation is normally supplied directly from the customer's water supply mains and is controlled via filling level sensors. Replenishment of the water and cleaning agent is automatic. If several tanks are used simultaneously, water supply is available via cascade pumps at customer request. The media are returned from the process zones via a return line with integrated screen. A specially developed control system guarantees that the respective medium is led back into the correct tank in case of several cleaning-and/or rinsing processes. All media tanks are made of stainless steel and heat-insulated.

Enclosure

The entire machine can be enclosed to reduce noise emissions. Large-surface doors will be integrated to ensure adequate accessibility for maintenance and inspection works.

Floor trough

An integrated floor trough is used to ensure collection of the fluids in case of tank leakage. In larger-sized machines, the floor trough is integrated in the machine's supporting frame. The floor trough is made of stainless steel and equipped with a leakage warning probe. The collecting volume is at least identical to the volume of the largest tank.

Bath care

To achieve maximum service life for washing liquids, the washing media can be filtered in many different ways. Coarse dirt is separated during a first phase while the medium is returned to the tank. Further residue is separated during full flow by an adequately designed fine-mesh filter. This process involves duplexed, double filter systems which can be switched over manually to allow filter changes during ongoing operation.

This equipment is standard in every Zippel cleaning system. For special needs, additional bath care systems are available as full-flow or bypass systems, including e.g. screen inserts, band filters, swarf conveyors, solenoid separators, three-phase centrifuges, evaporators, osmosis systems, etc. For oil separation, we recommend our proprietary, highly-effective ECOSEP gravity oil separator which works through coalescing action. It separates the oil, passes it into a separate tank, and returns the cleaned water into the container. Even physical water treatment is possible with this system.

Drying

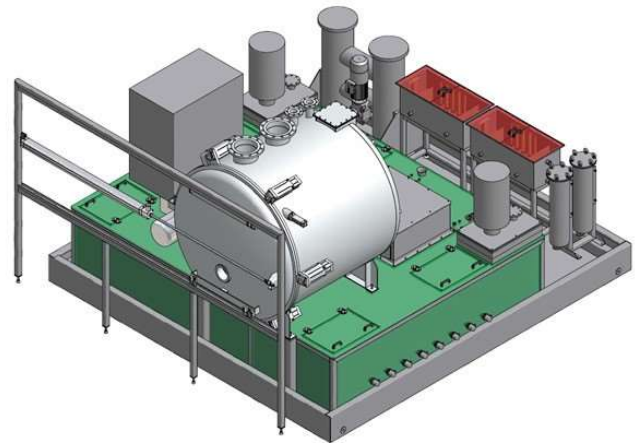
There are a number of different systems available for part drying. Normally, side channel blowers or high-pressure fans are used for this purpose. These fans are designed specifically for the required volume flow rates and pressure rates and are adapted to the specified requirements. The air is applied to the parts either by a specially developed blasting pipe system (capillary system with air heating) and/or blasting fan. Air heaters may be used to increase the temperature. Another available drying method involves the use of infrared rays to heat the parts and evaporate the residual moisture.

Nozzle system

A variety of different nozzle systems are used for application of the cleaning media. The system supports pressures ranging from low pressure to high pressure (up to 1,000 bar). The nozzle type and volume flow rate are configured and calculated during the design phase. To ensure optimum maintenance and manageable repair, we generally use nozzle clip systems and the nozzle fittings which are equipped with quick-release fasteners. High-pressure nozzles can also be used for flake deburring, if needed.

Closed circuits

All media present in the machine are filtered and reintroduced into the circuit for an effluent-free machine operation.



ECOLOGICAL COMPONENTS

The increase in environmental protection requirements for industrial enterprises is the reason behind our search for environmentally-friendly methods for preventing air and water pollution. Over the last 40 years many of Zippel's innovations have been awarded prizes and have redefined standards for water and air treatment. Such inventions combine ecology with economy in an exemplary way since they minimize current costs for energy, waste and recycling.

Our systems usually operate within closed loop systems in all medium-conducting sectors. The closed loop does not channel wastewater out of the machine, rather it feeds it back in after it has been filtered. To lower the costs for disposal of solid waste and reduce its quantities, there is an option to filter the discharged waste further and discharge it as a concentrate. Zippel has been developing such optimized systems for filtering, exhaust air treatment and water treatment with its suppliers for years. Closed, segregated loop systems are the best way to lower operating costs such as chemical consumption, water consumption, energy consumption, and heating. In order to increase the efficiency of our machines, we attach great importance to energy-efficient planning and design of components used.

Environmentally friendly components

- BioJet: Hydrophysical water and fluid treatment to prevent and reduce the biological contamination of industrial water and process water
- AquaCorrect: Reduces the surface tension of process water and improves oxygen enrichment
- ECOSEP gravity oil separator: Reduced costs and longer service life due to permanent oil separation
- Water treatment plant
- ZUT vapor exhaust: Extraction and filtering of water steam. Recycled fluids are returned to the plant
- Three-phase centrifuge
- Filtration and separation technology: custom- designed for the plant in compliance with the most stringent environment requirements; for improved production results
- Osmosis systems: Compact systems for the desalination of softened potable water
- Closed fluid and exhaust-air circuits



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TECHNICAL DATA

Sample Technical Data for K1-100-2-LB-V Apollo

The APOLLO cleaning machine K1-100-2-LB-V is a single-chamber system comprising a spraying, flooding & drying system. Parts are loaded onto the conveyor system by a roller conveyor cart. The baskets containing the goods can be cleaned either stacked on top of each other or in a row, i.e. one after the other. While inside the chamber, the baskets containing the goods can be swiveled and/or rotated for optimized spraying and injection flooding. The cleaning media are heated to the required temperature by means of a pipe heat exchanger. Filtering of the cleaning media is done by manually operated fine-mesh filters.

Machine specification (circa values)

Length	Breadth	Height	Weight	Process sections	Cycle time
6,500 mm	4,700 mm	3,000 mm	5 t	4	150 pcs/h

Temperature of bath	Agent	Sound level
60 – 65° C (140-150F)	acid/alkaline	< 80 dB(a)

Connections

Water intake	Compressed air	Electrical
60-90 PSI, R 1"	60-90 PSI, R 3/4"	480V/3ph/60Hz

Cleaning areas

spray-flooding | dripping | rinsing | vacuum drying

Cleaning

Tank capacity	Pump	Filter
500 Gallon	150 GPM @ 60 PSI	100 µm

Rinsing

Tank capacity	Pump
250 Gallon	100 GPM @ 60 PSI

Vacuum drying

2 blowers		
175 ft³/min	6,5 kW, 13 A	10 mbar