Subframe cleaning machine

Efficient cleaning of subframes using high-pressure water systems
Made by RST for the automotive industry

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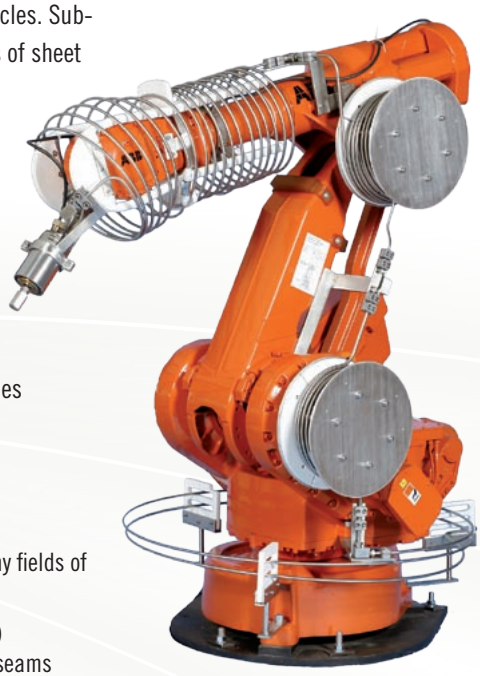
Clean body parts more efficiently with RST's ITRA

Profit from the advantages of high-pressure water-jets for cleaning subframes using innovative integrated solutions from a single source – RST. In the automotive field, a wide range of body parts can be cleaned using high-pressure water-jet technology. Subframes are safety-related vehicle components used by the automotive industry in all kinds of vehicles. Subframes are manufactured by MAG-welding sections of sheet steel together. As a result of the welding process, silicates will end up adhering to the weld seams of the subframes. These silicates will become a serious problem later if they peel off after the anti-corrosion protection has been applied, in other words, the subframes lose their protection against corrosion.
The solution to this problem involves completely removing the silicates and traces of welding residues before the protective coating is applied.

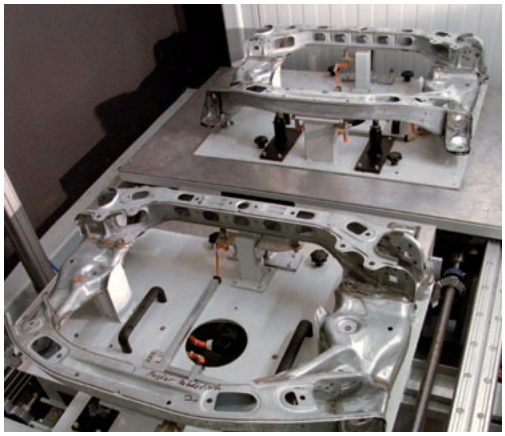


A six-axis articulated robot allows accurate programming of the path to be followed to guarantee optimum part cleaning results. The water is supplied from a new high-pressure helical pipe development.

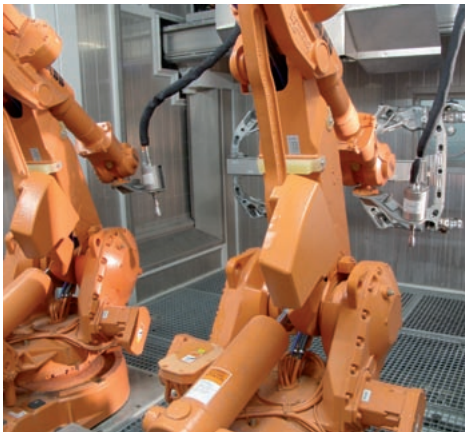
The high-pressure water process is used today in many fields of industry for a wide range of different applications:

- Removal of thermal coatings (e.g. plasma coatings)
- Cleaning welding residues and silicates from weld seams
- Cleaning off sand and ceramic residues from castings
- Removing paint and other coatings from many kinds of workpieces

Subframe cleaning machine, ITRA (left) with the water recovery unit, WAA (right)



Duplex loading table for two subframes



Robots fitted with high-pressure water jets

Automatic subframe drying and subsequent inhibitor processing

The individual operations in the cleaning machine

The subframe cleaning unit comprises charging, cleaning and discharging sections. A specially developed gripper system, which travels on a gantry, picks up the subframes from the charging station and places them in the cleaning machine ready for the robot.
The robot controlled high-pressure jets work together to traverse the programmed path of the weld seam extremely accurately. In the process, the weld seam region is blasted by high-pressure water jets to achieve the required level of cleanliness. The high-pressure water is fed to the nozzles either through high-pressure hoses or the newly developed high-pressure helical pipes, which provide greater throughput.
A high-performance extraction unit removes the clouds of water vapour from the machine and this vapour is then passed through a condensing separator on the roof of the installation.
In subsequent operations, the components are sprayed with corrosion inhibitor, air-dried with airknives and deposited in the discharge station.

Quality advantage for components in corrosion tests

Subframes subjected to extended corrosion tests after electrocoating, the VDA multi-cycle test, showed dramatically improved lifetimes. The VDA multi-cycle test, which simulates a 10-year usage under normal environmental conditions, demonstrates considerable quality improvements for those components treated with high-pressure water. Components not subjected to this surface treatment do not achieve the high quality standards for these parts (resistance to corrosion in the vicinity of the weld seams).

Water treatment applied economically and sensibly

In most cases, the process water can be recycled in line with environmentally-friendly principles. To this end, a multistage water recovery unit removes the contamination from the water and returns the cleaned water to the high-pressure pumps. In this way, 90% of the water used for the cleaning process in the WAA cleaning machine is recycled, which saves considerably on clean water and waste water disposal costs. The water quality has been calculated to ensure maximum lifetimes for the high-pressure pumps.

Modular setup - flexible answers to varying needs

The individual cleaning units, each with one robot, can be activated as needed. It is possible to purchase expansion units individually to spread the investment over a longer period or with a view to expanding capacity as and when it is required.

At a glance

High-performance high-pressure plunger pumps with programmable water pressures of up to 3000 bar allow the silicates and welding residues to be removed.

Computer optimised positioning of the sub-assemblies guarantees efficient cycle times while simultaneously ensuring very high quality standards.

The robot-controlled rotating high-performance water jets remove silicates and weld residues quickly and accurately.

The subsequent treatment with corrosion inhibitor prevents the creation of a rust film on the subframes.

The high-performance water-jets clean the weld seams exactly

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Machine data and advantages ITRA

All the advantages at a glance

- **Efficient system solutions from a single source - RST**
- **Fully-automated cleaning system**
- **Minimum staffing requirements**
- **Extremely short high-pressure phases**
- **Ensuring the cleaned workpieces are in perfect condition guarantees high end-product quality**
- **Environmentally-friendly water treatment; the process water can be reused in this recirculating system**
- **High degree of machine availability**
- **No wear on the workpiece material because the medium is non-abrasive**
- **No need for subsequent cleaning of the workpieces to remove dust or residues of the medium**
- **No wear on the medium itself**
- **No disposal of worn medium or cleaning liquor necessary**
- **No costly extraction filters for contaminated air required**
- **Maintenance and operating costs are lower than for systems using other media**
- **Corrosion protection medium can be added to the process water**
- **The economic advantages over other cleaning methods have been demonstrated**

Technical specifications and components

Total weight	approx. 14 t
Moving mass	530 kg
Cycle time	115 s per subframe, for approx. 7 m of weld seam
Water pressure	up to 3000 bar
Volume flow	approx. 20 l/min.
ITRA power requirements including two high-pressure pumps and two robots	approx. 240 kW

Fully automated controller	☑
Measuring technology	☑
Blow-drier	☑
Suction fan	☑
Inhibitor operation	☑
Automated loading system	☑
6-axis articulated robot and controller	☑
Manipulator	☑
Frequency regulated, motorised high-performance water-jet tools	☑
Cleaning machine booth lined with stainless steel	☑
Welded-in booth sump	☑
High-pressure water pumps	☑
Sensor technology	☑

Plant engineering

- Cleaning systems
- Water treatment systems
- High-pressure water-jet technology
- Robotics
- System integration

Electrical engineering

- Automation
- Drive technology
- Software engineering
- Process visualisation
- Switchgear manufacturing

Sheet-metal working

- Sound-absorbing hoods
- Machine covers
- Containers and tanks
- Control desks
- Housings

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