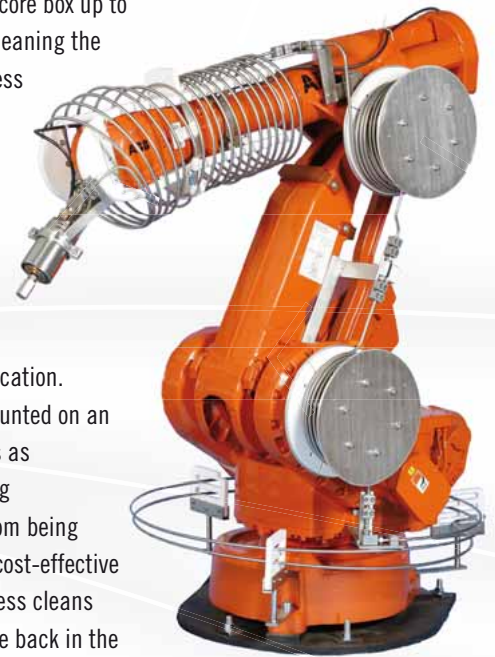


## Core box cleaning machine

Efficient cleaning of core tools using  
high-pressure water systems made for foundries by RST

# Efficient cleaning due to innovative all-round solutions

Benefit from the advantages of high-pressure water jet technology for cleaning your core tools and profit from the innovative and holistic solutions for industrial applications from a single source – RST. During the manufacture of castings such as engine blocks and cylinder heads using cold-box aluminium casting, moulding materials, i.e. sand and bonding agent, are injected into the core box up to 250 times per shift to make the negative forms. Cleaning the copes and drags is a highly time-consuming process because the mixture injected closes off the vents as it hardens and often clogs the highly complex surface structures of the moulds. To provide a cleaning process which meets quality requirements and protects the workpiece, the system uses rotating high-pressure water jets and nozzles individually optimised to meet the specific needs of each application. To guarantee reproducibility, the water jets are mounted on an industrial robot. Until now, such cleaning methods as ultrasound and dry ice have prevented the cleaning downtimes for core boxes in cleaning machines from being drastically reduced and have not permitted rapid, cost-effective recovery of the medium used. RST's water-jet process cleans and dries the moulds so efficiently that they can be back in the production process in less than 20 minutes. In the course of the environmentally friendly process, an optional water recovery unit (WAA) made by RST can recover the water used in the cleaning process, clean it and return it to the process. Hydrodynamic mould cleaning uses variable water pressure of up to 2500 bar to enable even the most complex shapes to be individually and carefully cleaned.



*A six-axis articulated robot allows the exact path to be followed to be accurately programmed to guarantee optimum mould-cleaning results. The water is supplied from a new high-pressure helical pipe development.*



*Fully-automated single-track core box cleaning equipment – the complete solution by RST. Site: Saltillo, Mexico*





*The manipulator attachments transfer the drag (foreground) and cope (left) to the cleaning operation in a fully automatic process.*



*The cope & drag are collected after the cleaning process by the manipulators and refitted to make a complete core box.*



*The cleaned and dried core box on its way back to the core shooter.*

### Individual programming for every tool section

The cleaning of core tools is a time and quality-critical factor in the manufacture of sand cores. The fully-automated double-track core box cleaning machine enables part-specific hydrodynamic mould-cleaning with water pressures up to 2500 bar. A transponder detection system transmits the code for each half of the box to the robot, which enables the cleaning program to be individually optimised for each part of the tool. High-performance high-pressure plunger pumps with programmable water pressures of up to 2500 bar allow even the most stubborn contaminations and encrustations to be removed. Computer optimised positioning of the subassemblies guarantees efficient cycle times while simultaneously ensuring very high quality standards. The robot-controlled rotating high-performance water jets remove all manner of contaminations quickly and thoroughly. The subsequent treatment with corrosion inhibitor prevents the creation of a rust film on the costly core tools.

### Environmentally-friendly recovery of process water

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. The water quality has been calculated to ensure maximum lifetimes for the high-pressure pumps. In this way, up to 90% of the water can be reused.



*Contaminated and cleaned core boxes*



*Contaminated and cleaned slotted nozzles*

### The advantages of the KKRA unit at a glance

- Efficient system solutions from a single source - RST
- No longer necessary to dismantle the core tools, which results in a time saving of over 3.5 hours per cleaning operation in comparison with manual cleaning
- Extremely short high-pressure times of approx. 6 to 8 minutes for each side of the tools (ultrasound cleaning required 30 min.)
- Cycle time < 20 min. (ultrasound required 120 min.)
- Fully-automated cleaning system
- Minimum staffing requirements
- Environmentally friendly water treatment; the process water can be reused in this recirculating system
- Just in time production of sand cores, no costly intermediate storage required
- Core tools in perfect condition guarantee high product quality
- High degree of machine availability
- High-pressure water used for cleaning
- Anti-corrosion protection can be added

# The ideal addition: Cleaning of shooting heads



*The manipulator attachment turns the head over and tips out loose sand*



*Shooter nozzles clogged with sand before cleaning*



*Integrated vibrating function (front), shooting head on its way to the cleaning machine (rear)*



*Shooter head cleaner with internal cleaning head*

Inside the shooting heads there is moulding sand which is shot into the core tools at pressure. The shooting head is placed on the cope of the core tools during production. The moulding sand is shot into the mould through the shooting head. These heads also need thorough cleaning. Clean nozzles are of crucial importance to ensure good quality sand cores.

The shooting-head cleaning machine consists of four operations: desanding, high-pressure water cleaning, radial blow-drying and, finally, inspection by quality personnel.

The separate header manipulator grasps and rotates the sand-filled shooter head. This removes the loose sand which is mixed with polyurethane resin. A vibrating function removes any sand which is relatively loose. The nozzles which are clogged with sand are then cleaned with high-pressure water at 200 bar in the machine. Here, the remaining sand adhering to the shooting head is washed out.

In the drying operation, the water is blasted off with high-speed air jets, at speeds carefully determined by RST in numerous in-house tests.

The inspection station enables the operator to monitor the effects of the cleaning process in detail. The result is a completely clean shooting head which can be reused immediately.



*Drying operation for internal and external drying*



*Cleaned shooter nozzles ready for inspection*



*The shooting-head cleaning machine (KSHRA) by RST (foreground) as an addition to the KKRA (background). Site: Dillingen, Germany*

# Machine data and applications

## KSHRA



### Technical specifications and components

Total weight of KSHRA	approx. 13 t
Moving mass	approx. 2 t
Cycle time	approx. 30 min.
Water pressure	up to 200 bar
Volume flow	approx. 250 l/min.
Power requirement for KSHRA	approx. 90 kW

Fully automated controller	✓
Measuring technology	✓
Hydraulics unit	✓
Shooter-head manipulator	✓
Vibrator unit	✓
Sensor technology	✓
Moulding sand conveyor belt	✓
Shooter head internal cleaning process using rotating washer head	✓
Shooter nozzle cleaning using jet beam	✓
Blow-drier	✓
Inspection station	✓



# Machine data and applications KKRA



## Applications

- Removal of thermal coatings (e.g. plasma coatings)
- Removal of weld residues from weld seams
- Removal of sand and ceramic residues from castings
- Removal of paint from numerous workpieces

## Technical specifications and components

Model	Single-Track	Double-Track
Total weight of KKRA	approx. 17 t	approx. 25 t
Moving mass	approx. 6 t	2 x approx. 6 t
Cycle time for one half of a mould	approx. 16 min.	-
Cycle time for both halves of a mould	-	approx. 20 min.
Water pressure	up to 2500 bar	up to 2500 bar
Volume flow	approx. 20 l/min.	approx. 20 l/min.
Power requirements for the KKRA	135 kW	150 kW

Fully automated controller	<input checked="" type="checkbox"/>
Measuring technology	<input checked="" type="checkbox"/>
Hydraulics unit	<input checked="" type="checkbox"/>
Blow-drier	<input checked="" type="checkbox"/>
Suction fan	<input checked="" type="checkbox"/>
Inhibitor operation	<input checked="" type="checkbox"/>
Automatic loading system	<input checked="" type="checkbox"/>
6-axis articulated robot and controller	<input checked="" type="checkbox"/>
Drag manipulator	<input checked="" type="checkbox"/>
Cope manipulator	<input checked="" type="checkbox"/>
Forced-air powered high-performance water jet system	<input checked="" type="checkbox"/>
Cleaning machine booth lined with stainless steel	<input checked="" type="checkbox"/>
Welded-in booth sump	<input checked="" type="checkbox"/>
High-pressure water pumps	<input checked="" type="checkbox"/>
Sensor technology	<input checked="" type="checkbox"/>

## Machine engineering

- ▶ Cleaning machines
- ▶ Water recovery units
- ▶ High-pressure water technology
- ▶ Robot technology
- ▶ System integration

## Electrics

- ▶ Automation
- ▶ Drive technology
- ▶ Software development
- ▶ Process visualisation
- ▶ Switchgear manufacture

## Fine metal-sheet machining

- ▶ Sound-insulating hoods
- ▶ Machine housings
- ▶ Containers and tanks
- ▶ Control desks
- ▶ Enclosures

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