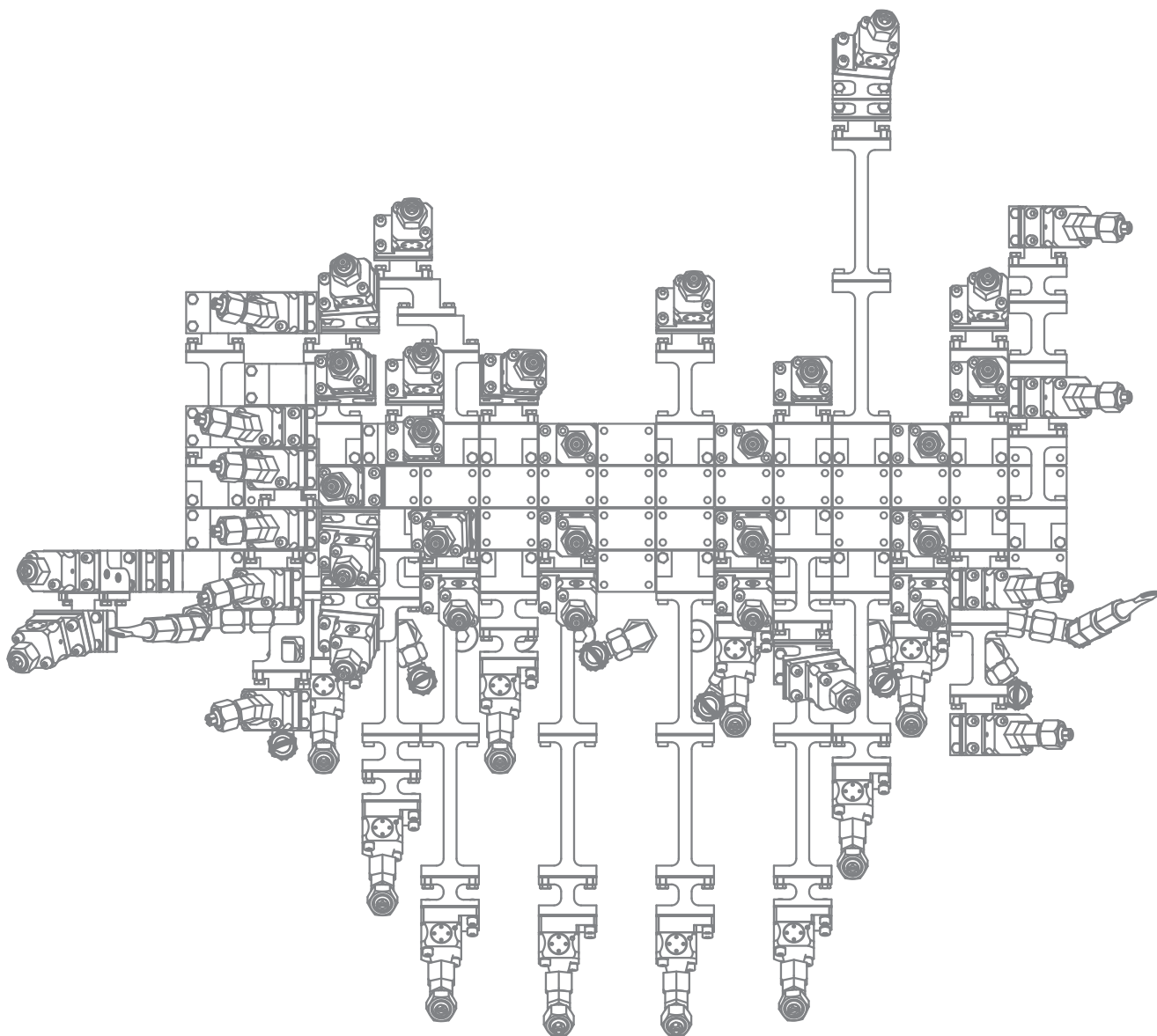


# Böhrmer

Maschinenbau



FOUNDRY AUTOMATION

## ABOUT US

Since 1983, Maschinenbau BÖHMER GmbH with its cutting-edge machinery and highly qualified staff has been designing and manufacturing machines and components for OEMs and TIER 1 suppliers in the automotive industry.

Our know-how and manufacturing expertise enable us to provide a wide range of solutions in customised special-purpose machinery. From consulting and on-site analysis to installation and service, we offer complete solutions from one source.

A high level of vertical integration in our production processes enables us to realise projects with high flexibility, short response times and a comprehensive quality control.

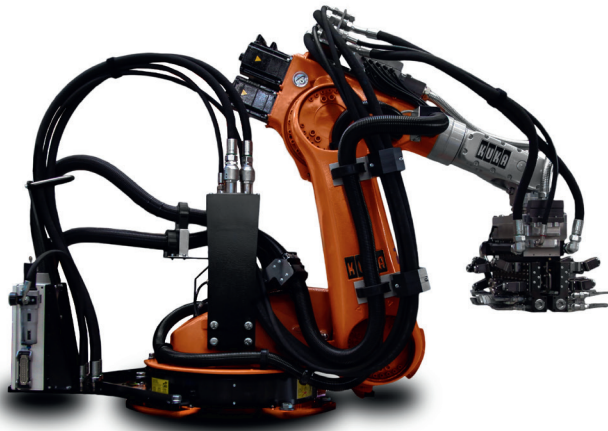
COMPANY HEADQUARTERS STEINEBACH/SIEG



**Böhmer**  
Maschinenbau

## PRODUCTS AND SERVICES

### FOUNDRY AUTOMATION



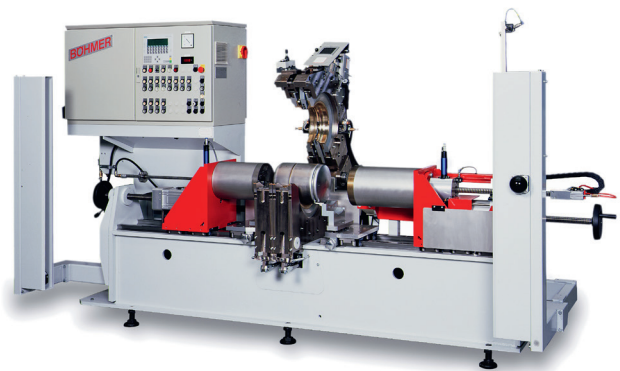
### TURBOCHARGER WELDING TECHNOLOGY



### TURBOCHARGER BALANCING TECHNOLOGY



### SPECIAL-PURPOSE MACHINERY MANUFACTURING



### MEASURING ROOM AND TESTING LABORATORY



- Materialography test room
- Climate-controlled grade 3 measurement room
- 3D coordinate measuring
- Mobile 3D measuring arm

### REFINISHING

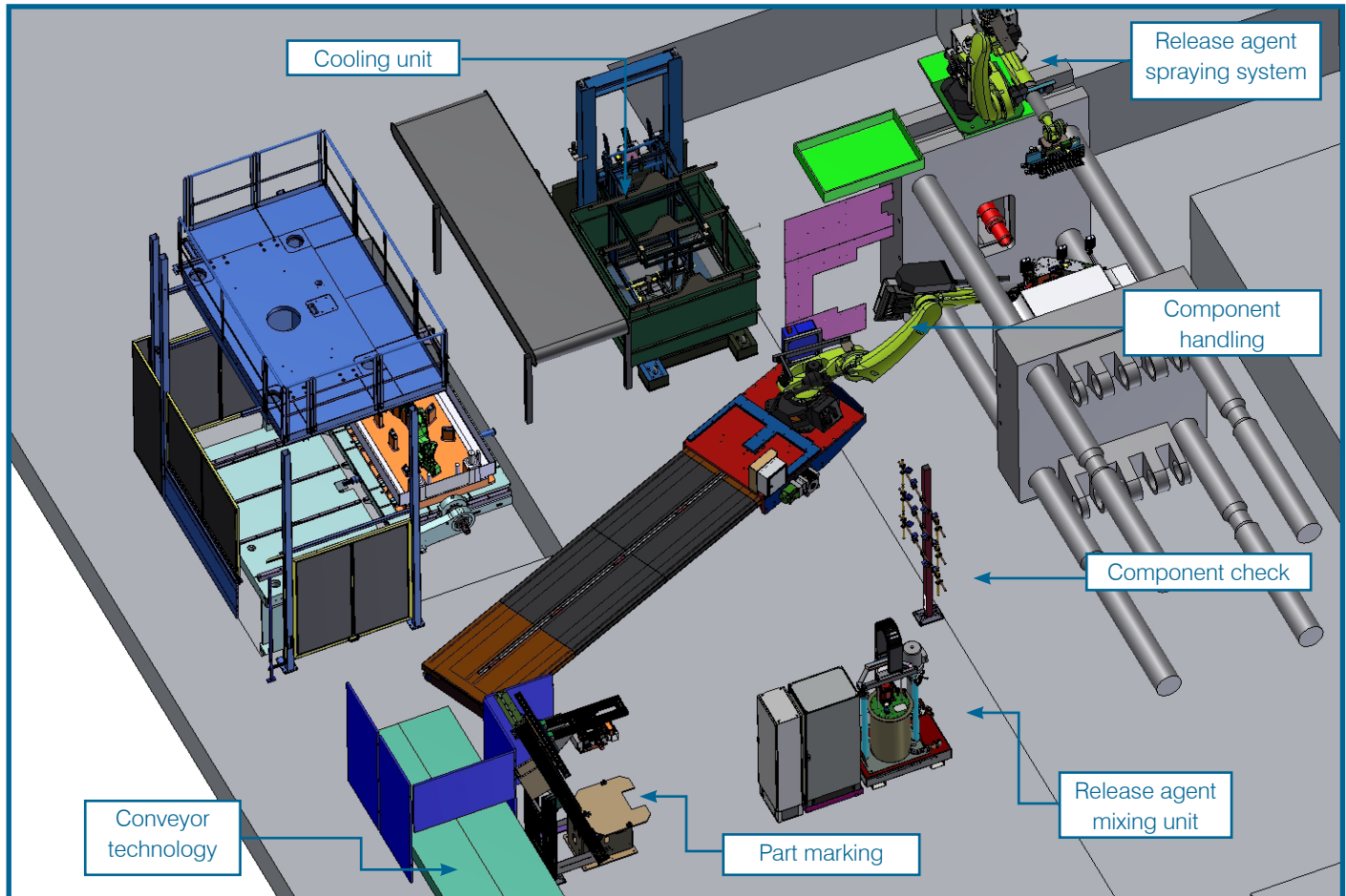


- Lathing
- Milling
- Water jet cutting
- Grinding
- Laser marking

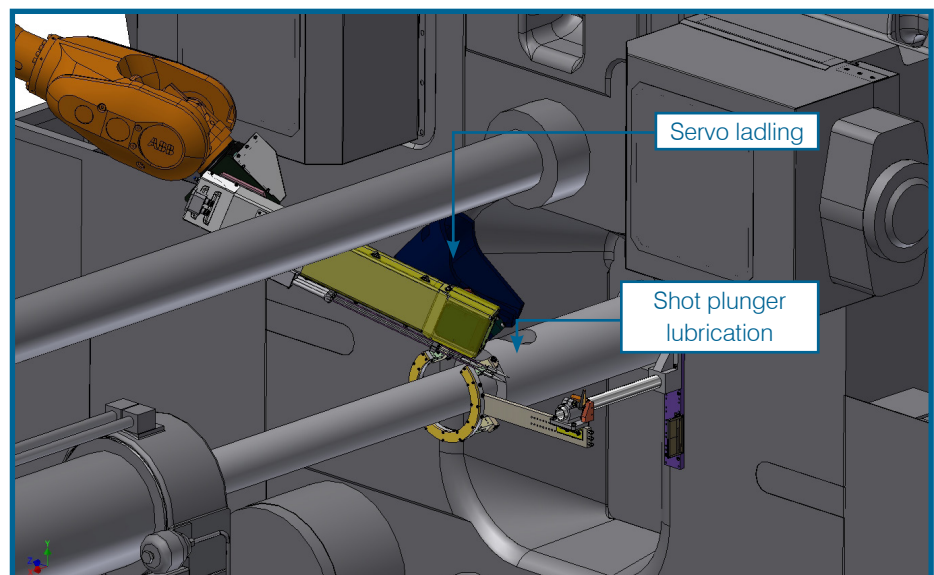


# FOUNDRY AUTOMATION

## RANGE OF PRODUCTS



## SUPPLY STATION FOR PISTON LUBRICANT



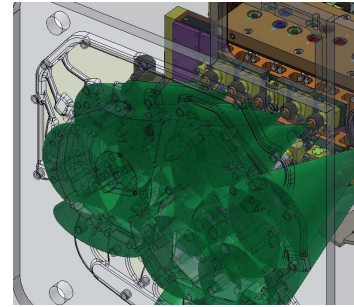
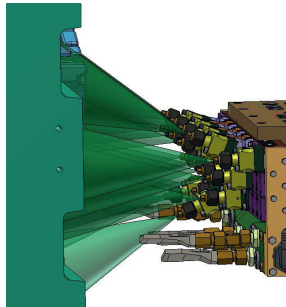


## SPRAYING SYSTEM

The spraying tool is the most creative element in our line of products.

To ensure the best possible performance, the tool is custom-designed to suit its range of applications in terms of dimensions, number of spray circuits, and quantity and arrangement of spray nozzles. A process cannot be optimised without an individual adaptation to the customer's requirements first. Even at the preliminary stage, it's possible to narrow down the construction of the spray tool based on the CAD data and a casting simulation, so that the optimisation phase of the spray programme during operation is significantly shortened.

### SPRAY SIMULATION



### SPRAY NOZZLES

In order to meet the various spraying applications in the field, we select the spray nozzle that is best suited for the task from three basic types. Thanks to an identical mounting face, the various types of spray nozzles can be combined and replaced on the same spraying tool.

When cooling the die, the standard spray nozzle is used which can accommodate release agent pressures of up to 25 bar. For coating the dies, the micro-spray nozzle is used, as it can deliver outstanding results at release agent pressures as low as 0.3 bar.

Spraying tools for squeeze casting and forging applications are specially designed with stainless steel bodies and spray nozzles, and internal circulation of the material up to the nozzle's orifice. This version ensures trouble-free operation, even with spray media having a high solid content.

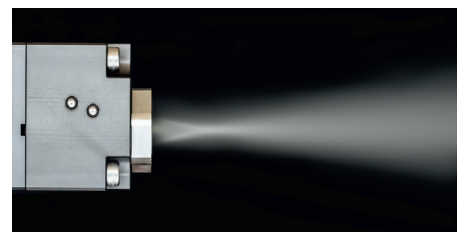
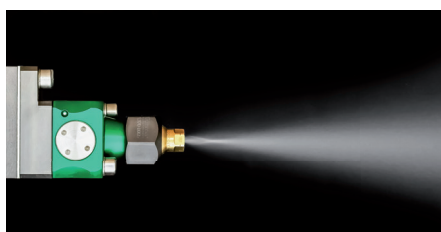
STANDARD SPRAY NOZZLE



MICRO-SPRAY NOZZLE

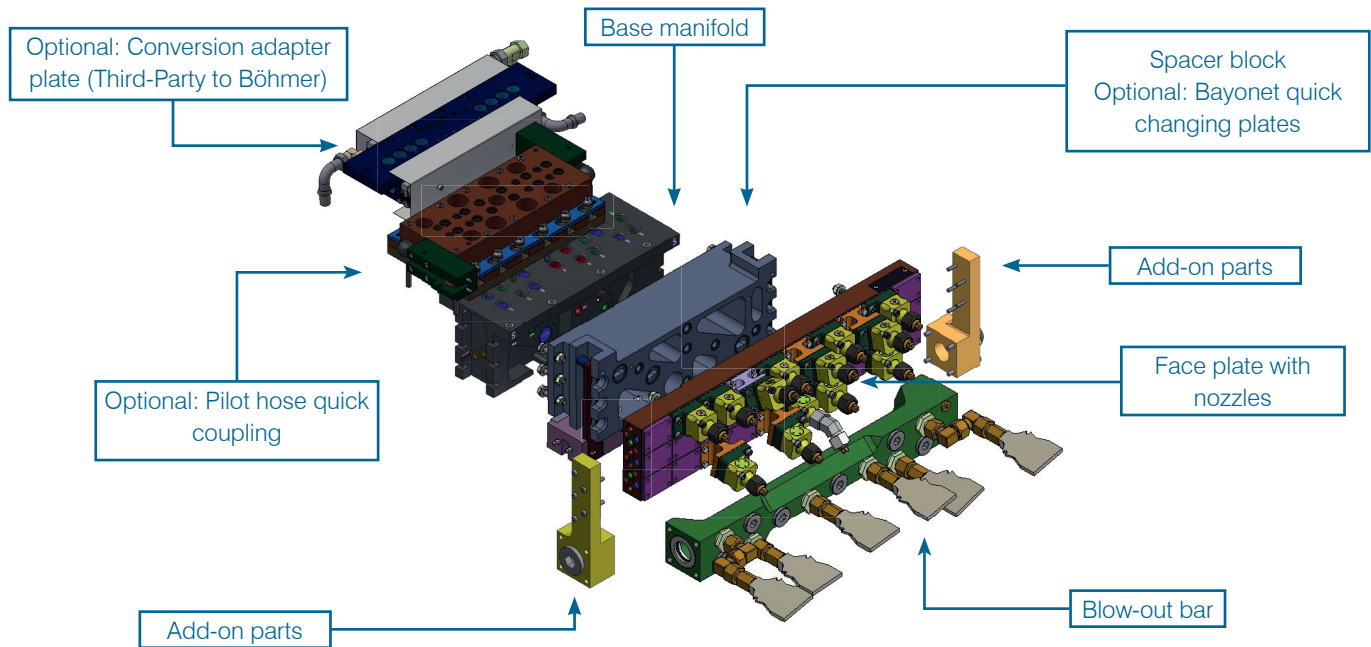


SPECIAL PURPOSE NOZZLE



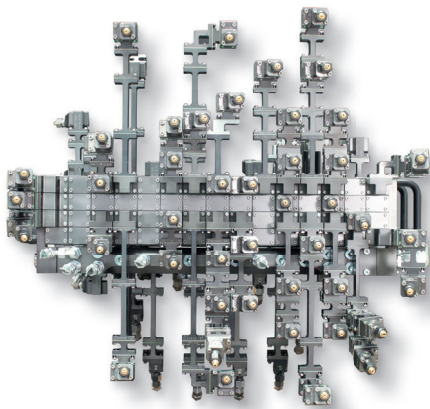
# SPRAYING TECHNOLOGY

## SPRAYING TOOL DESIGN

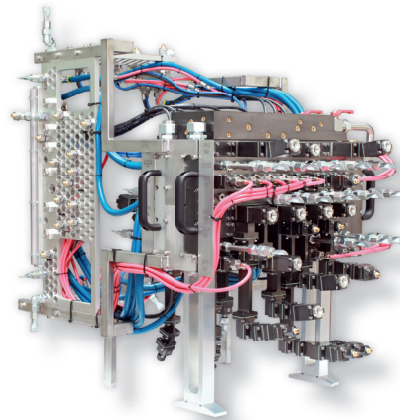


## SPRAYING TOOLS

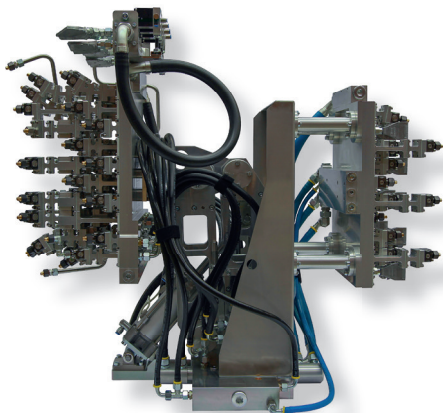
STANDARD SPRAY TOOL FOR  
STRUCTURAL COMPONENT



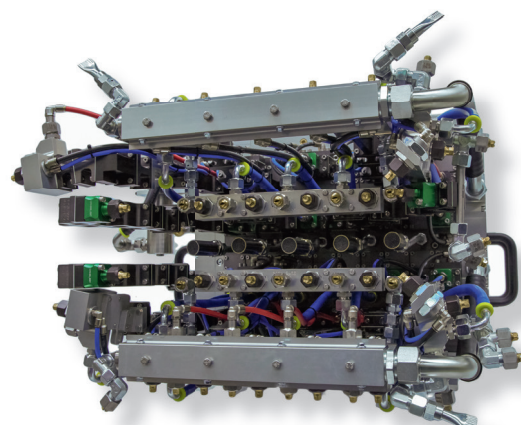
MICRO-SPRAY TOOL FOR  
GEARBOX HOUSING



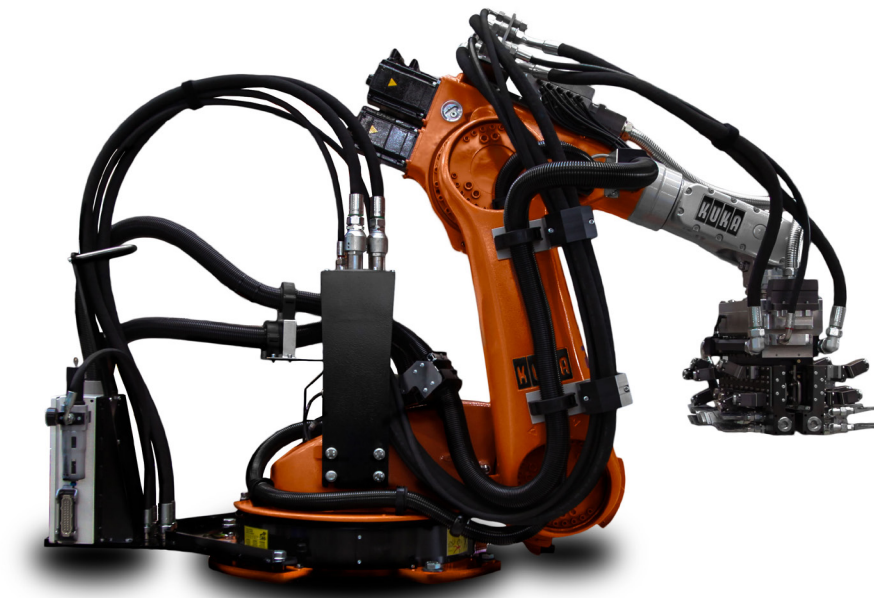
TELESCOPIC SPRAY TOOL FOR ENGINE BLOCK



MICRO-SPRAY TOOL FOR ENGINE BLOCK



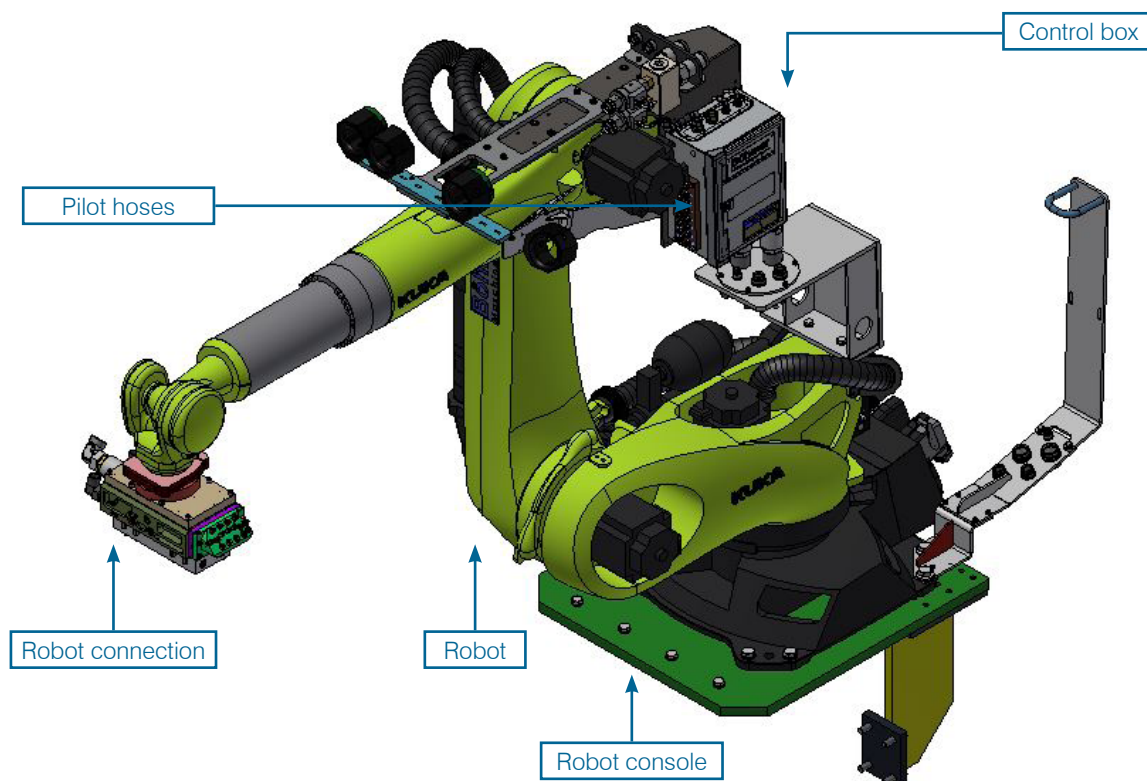
## SPRAYING TECHNOLOGY



### ROBOTIC SPRAYING SYSTEMS

We offer complete robotic spraying systems regardless of the robot manufacturer (e.g. ABB, FANUC, KUKA). Our range of services includes robots, spraying tools and controls, in addition to the commissioning and component-specific programming.

During the construction phase, the work areas and installation spaces of the equipment are already defined in 3D simulation programmes and serve as a basic programme for the subsequent on-site programming. As a result, start-up times can be significantly shortened.





# SPRAYING TECHNOLOGY

## LINEAR SPRAYING SYSTEMS

Our linear sprayers range from single-axis machines to heavy-duty multi-axis gantry systems with a capacity of up to 300 kg.

The single-axis sprayer has a freely programmable servo axis, up to 18 individually controlled spray nozzles, and continuously variable spray settings.

The bi-axial gantries are available in two standard sizes, and are characterized by a sturdy design, generously dimensioned media cross-sections, and a resolute enclosure for protection against external influences.



### Linear One-Axis Die Sprayer

- Vertical stroke of up to 1,300 mm
- High frequency
- Highly dynamic AC servo motor drives
- Freely programmable spray positions
- Anti-corrosion profiled rail guide
- 3 to max. 8 double spray nozzles
- Individual control of each spray nozzle
- Continuously adjustable release agent quantity
- Articulated tripod for flexible adjustment of the home position
- Handheld programming device with user friendly interface



### Two-Or Three-Axis Die Sprayer

- Vertical stroke of 1,000 to 1,500 mm
- Horizontal stroke of 1,000 to 1,500 mm
- AC servo motor drives
- Anti-corrosion profiled rail guides with automatic lubrication
- Controls analogous to material handling robot (ABB, FANUC, KUKA) available
- Quick-change tool system
- Max. payload 120 kg
- Torsion-resistant base support consisting of aluminium hollow sections
- Optional carriage (3rd axis) for transverse motion



- Vertical stroke of 1,000 to 1,500 mm
- Horizontal stroke of 1,000 to 1,500 mm
- AC servo motor drives
- Anti-corrosion profiled rail guides with automatic lubrication
- Controls analogous to material handling robot (ABB, FANUC, KUKA) available
- Quick-change tool system
- Max. payload 300 kg
- Torsion-resistant base support consisting of aluminium hollow sections
- Optional carriage (3rd axis) for transverse motion

## MIXING & DOSING

### RELEASE AGENT MIXING SYSTEMS

The line of release agent mixing systems ranges from single stations to complete central-mixing plants with a capacity of up to 10,000 litres / hour.

All release agent mixing systems are custom-designed to meet your needs and are realised with the use of proven components.

The logical extension of the mixing plant is the spray control. The spray media are purified by maintenance-free filters, while the operating pressure is regulated by proportional valves. A quantity monitor provides data on the consumption of release agent per component and signals any deviations.

Through the integration of a frequency-controlled centrifugal pump, new concepts for the application of release agent are made accessible. Not only can an absolutely consistent release agent pressure be achieved independent of the central supply system, but also pressure increases of up to 25 bar are possible. This way, the release agent can be circulated at low pressure in the loop until needed, upon which high pressure is generated only for the brief amount of time needed to apply the release agent. The spraying process is documented for absolute repeat accuracy and logged continuously in a database if necessary.

#### Mixing Station for Simple Supply

- One release agent mixture from a concentrate
- Adjustable mixing ratios from 1:0 (= no added water) to 1:999
- Compressed-air maintenance unit with proportional pressure control
- Release agent quantity monitor
- Frequency-controlled release agent pump (25 bar)

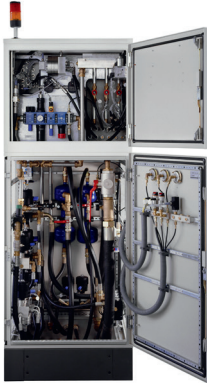


- Two release agent mixtures from a concentrate
- Adjustable mixing ratios from 1:0 (=no added water) to 1:999
- Compressed-air maintenance unit with proportional pressure control
- Release agent quantity monitor
- Pneumatic diaphragm pump with pressure intensification (10 bar)

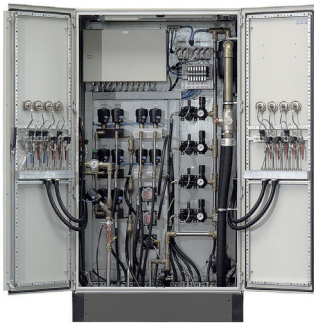


## MIXING & DOSING

### SPRAY CONTROLS



- Media control cabinet for connection of all media required for the spraying process and for setting the spraying parameters
- Compressed-air maintenance unit with proportional pressure control
- Maintenance-free release agent filter for 2 release agents
- Pressure control and quantity monitoring for 2 release agents



- Media control cabinet for connection of all media required for the spraying process and for setting the spraying parameters
- Maintenance unit with proportional pressure control
- Pressure control and quantity monitoring for 4 release agents



- Media control cabinet for connection of all media required for the spraying process and for setting the spraying parameters
- Maintenance unit with proportional pressure control
- Maintenance-free release agent filter for 1 release agent
- Pressure control and quantity monitoring for 2 release agents



- Media control cabinet for connection of all media required for the spraying process and for setting the spraying parameters
- Maintenance unit with proportional pressure control
- Quantity monitoring for 2 release agents
- Storage vessel with pneumatic agitator for 2 coatings
- Pneumatic diaphragm pump for 2 coatings
- Media circulation system in stainless steel

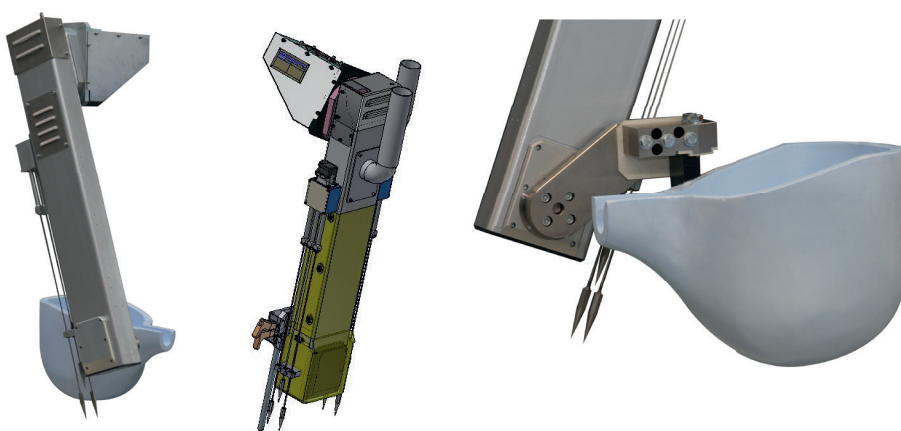
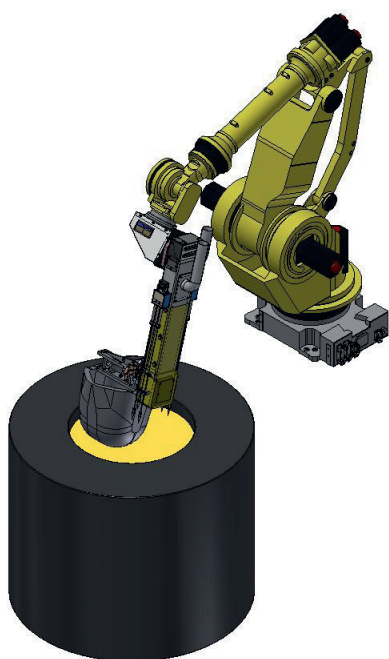


# SERVO LADLING AND SHOT PLUNGER LUBRICATION

## LADLE

In order to adhere to our principle of reproducibility combined with high availability when it comes to melt dosing, we created a ladle for attachment to our linear devices or to a robot. Especially at low temperatures and low dosage weights, the use of a dosing furnace is critical, and a ladle can offer process advantages in this respect.

Our ladles combine features, such as a sturdy construction, full enclosure of the drive train, and a play-free shaft drive to produce a dosing device of the highest precision and reliability.



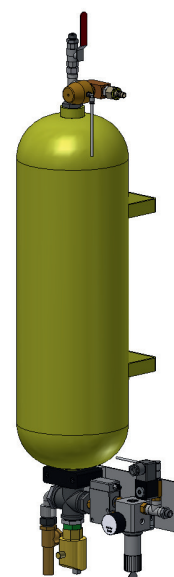
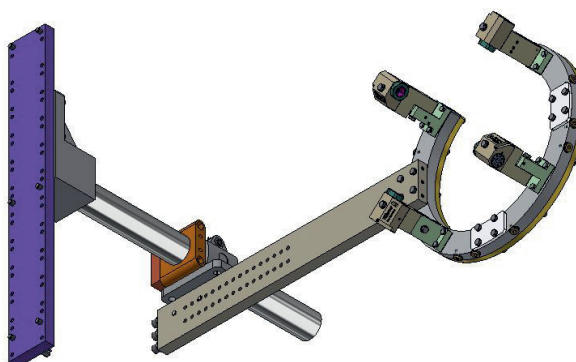
- Ladle for attachment to a linear unit or a robot (ABB, KUKA, FANUC)
- Sturdy construction
- Full enclosure of the drive train
- Play-free shaft drive

## SUPPLY STATION FOR PISTON LUBRICANT

Our piston lubrication systems emerged from our many years of experience in spraying liquids with a high solid content.

All versions are based on the same system and consist of a material pressure vessel and the proven BÖHMER micro-nozzles in a special design with a cleaning needle. This cleaning needle penetrates the nozzle orifice during each closing stroke, thus ensuring reliable operation even with nozzle diameters of less than 1 mm and even when using graphite lubricants.

In order to achieve a uniform coating here, the piston lubricant is applied at low pressure and supplemented with atomisation.



## COMPONENT HANDLING

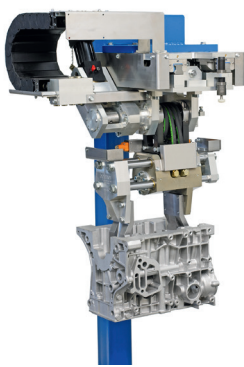
Regardless of the workpiece size and weight, we develop grippers for all foundry automation tasks.

These products range from the simple biscuit gripper to contour grippers and combination grippers for insertion and removal.

Our product line also includes hydraulic grippers and vacuum grippers.

### GRIPPERS

ENGINE BLOCK REMOVAL GRIPPER  
WITH HYDRAULIC PIVOTING MOTION



STRUCTURE PART REMOVAL GRIPPER  
WITH VACUUM CUPS



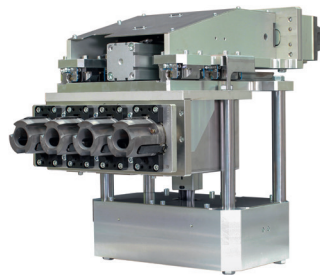
INSERTION GRIPPER FOR STEEL PARTS  
WITH ELECTROMAGNETS



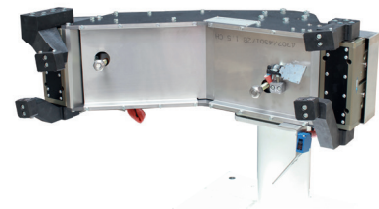
BISCUIT REMOVAL GRIPPER WITH  
ADDITIONAL LINEAR AXIS FOR EJECTOR  
STROKE



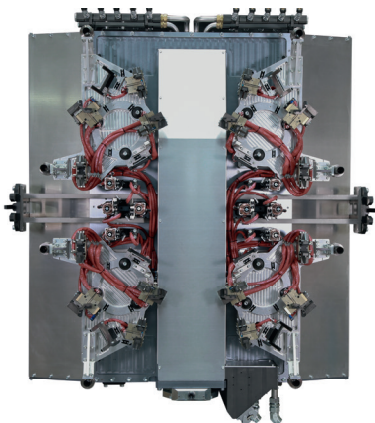
BUSHING GRIPPER



STRUCTURAL PART REMOVAL GRIPPER



### COMBINATION GRIPPER FOR THE INSERTION OF SAND CORES AND REMOVAL OF CASTINGS

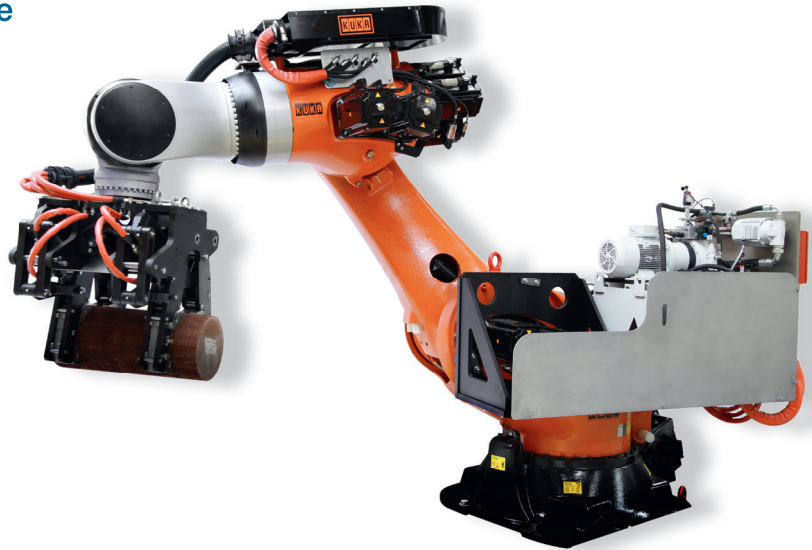


## MATERIAL HANDLING

### REMOVAL ROBOTS

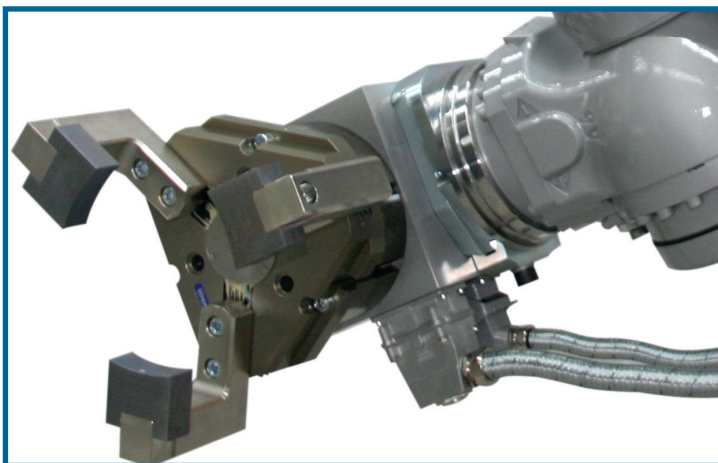
#### Handling Gripper with Hydraulic Drive for Titanium Shafts

- Workpiece weight 500 kg
- Workpiece temperature 350°C
- Hydraulic unit on the robot



#### Removal Gripper for Battery Cases

Additional linear axis for ejector stroke through side-shifter



#### QUICK-CHANGE COUPLING

Another option is our foundry-grade quick-change coupling.

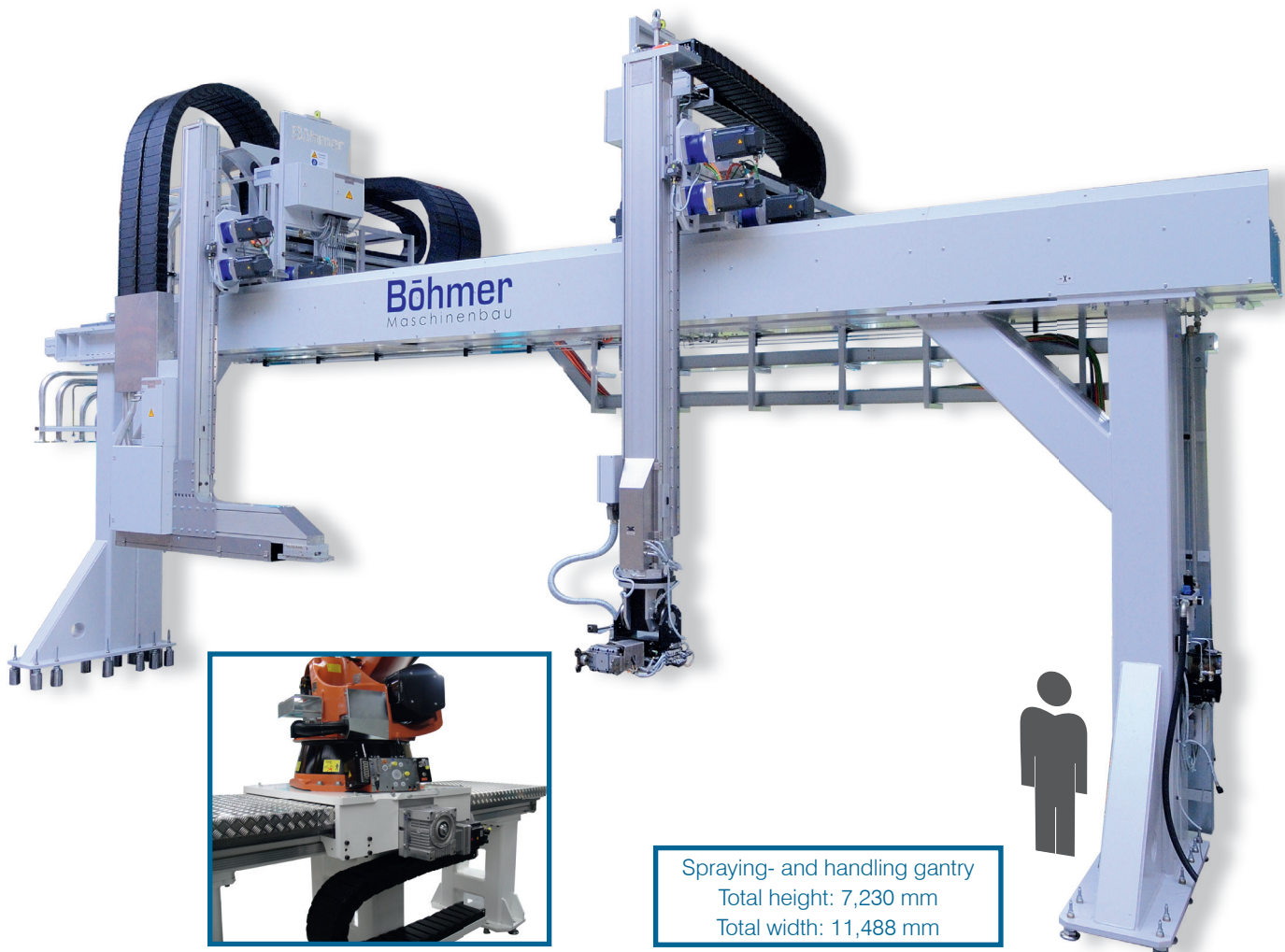
The connection between the gripper and the robot is established entirely by a central bolt and two screw-type connectors, thus allowing the gripper to be changed within minutes.



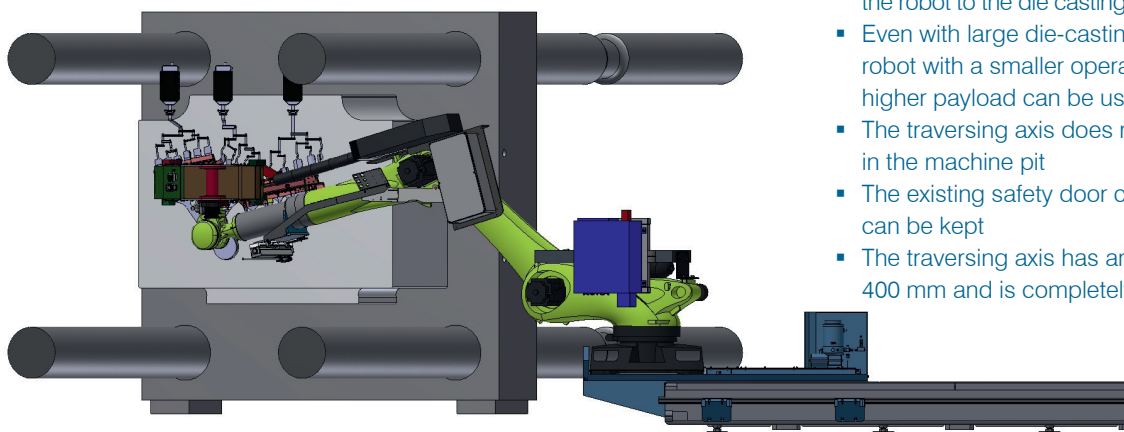
## MATERIAL HANDLING

### TRAVERSING AXIS

The material handling products are supplemented by a dedicated line of traversing axes for robots in linear and rotational design, in addition to manual axes for linear gantries.



### TRAVERSING AXIS WITH UPSTREAM ROBOT POSITIONING



- This special traversing axis shifts the positioning of the robot to the die casting machine
- Even with large die-casting machines, a robot with a smaller operating range and a higher payload can be used
- The traversing axis does not require any support in the machine pit
- The existing safety door concept without recess can be kept
- The traversing axis has an overall height of only 400 mm and is completely covered

## MARKING & CONTROL

### PART-MARKING STATION

High-quality cast products require documentation of the casting data. For this purpose we provide part-marking stations with the labelling systems of all major manufacturers. Furthermore, we offer foundry-grade vision systems for parts inspection and control of the marking quality.

This equipment is topped off by conventional systems for component completeness checks using laser or infrared sensors.

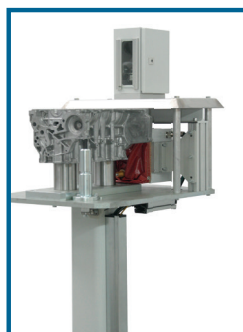
### Stamping Station for Structural Components

- Frame with carrier for workpiece support fixation for interchangeable supports
- Pneumatic axis for delivery of the stamping tool to insertion and removal



### Stamping Station for Engine Blocks

- Workpiece support with object detection
- Blow-out device for workpiece support



## MARKING & CONTROL

### PART-MARKING STATION

#### Stamping Station for Structural Components

- Stainless steel interchangeable part supports
- Can be combined with lifting station for quenching tank



#### Stamping Station for Gearbox Housing

Automatic discharge of the stamping station for load relief of the handling robot for cycle-time optimised casting processes.

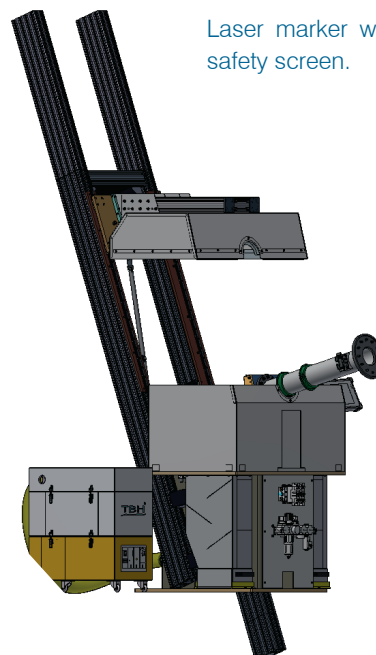
### COMPLETENESS CHECK

Cast part is checked for completeness by means of infrared reflex sensors or laser sensors.



### Marking Station for Chassis Parts

Laser marker with suction system and safety screen.





## COOLING



### QUENCHING TANK WITH LIFTING STATION

- Quenching tank with flash filter
- Installation with heat exchanger, circulation pump, and replaceable filter
- Electrical installation in splash-proof design
- Lifting frame for attachment to the quenching tank
- Driven by pneumatic cylinder and position sensor
- Stainless steel boom with frame for workpiece support
- Interchangeable supports for various workpieces



### COOLING CABINET

- Base frame in galvanized steel design
- Component support with object detection sensor
- Fans with adjustable air baffle
- Additional fan for deflecting the air flow to the ceiling

### COOLING TUNNEL

- Cooling tunnel for installation on the parts conveyor
- Cooling by separately activated fans



# DEBURRING

## ROUGH DEBURRING STATION

Economic die-casting processes require a rethinking, also with regard to the deburring of components. Our deburring stations forgo the use of hydraulic components, and therefore require only a conventional compressed air connection.

Through the use of segmented blades, mechanical loading during deburring is kept to a minimum, and the adaptation to changing component geometries is made possible by reworking or the replacement of individual blades.

The modular design of the stations allows for easy adaptation to your operational needs with respect to the circulation material.

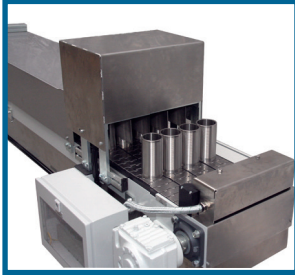
Likewise, the use of various deburring stations on the same base frame is also possible.



## CONVEYOR TECHNOLOGY

We deliver proven transport solutions for feeding cast-in parts and discharging the finished parts.

The emphasis here is on providing rugged, special-purpose solutions for reliable continuous operation.



### FEED CONVEYORS

The feed conveyors can be supplied complete with component-specific holding fixtures, separations, and heating sections for heating of the cast-in parts.



### DISCHARGE CONVEYORS

The range of discharge conveyors includes linear and Z conveyors in all lengths and widths along with the required accessories, such as container centring and cooling tunnels.



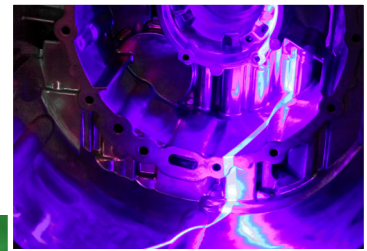


## MOBILE 3D MEASUREMENT TECHNOLOGY



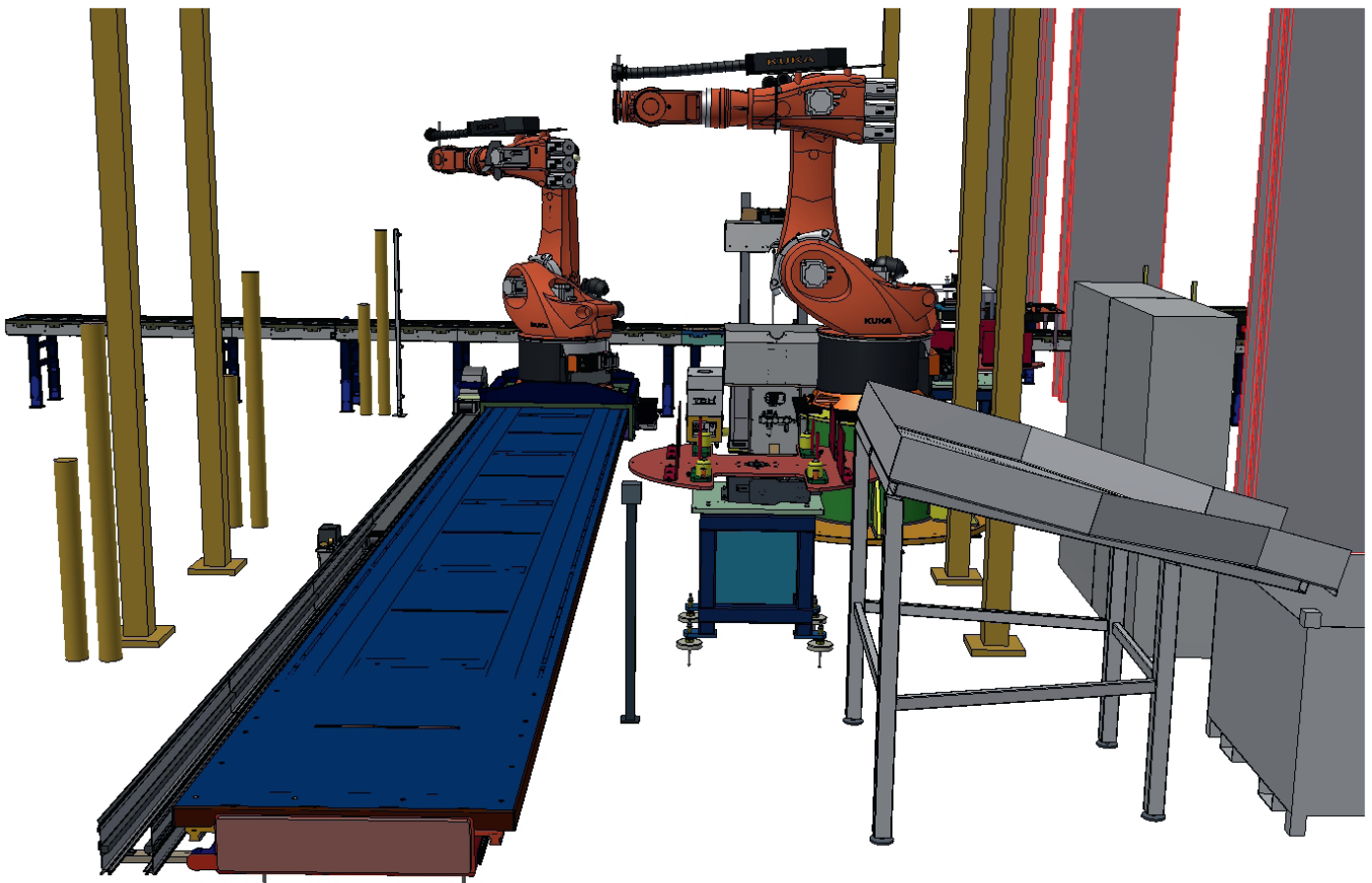
## CAD-BASED TARGET-PERFORMANCE COMPARISONS

- Mobile coordinate measuring machine
- Can be used for tactile and non-contact measuring
- Range 2.7 m
- Repeatability of 0.03 mm
- Process-accompanying examinations



# MOBILE 3D MEASUREMENT TECHNOLOGY

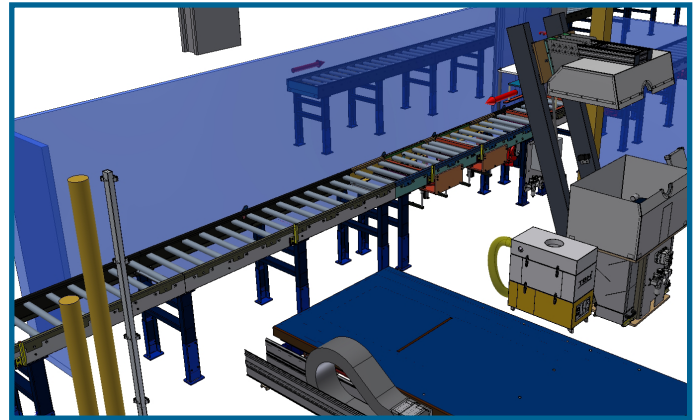
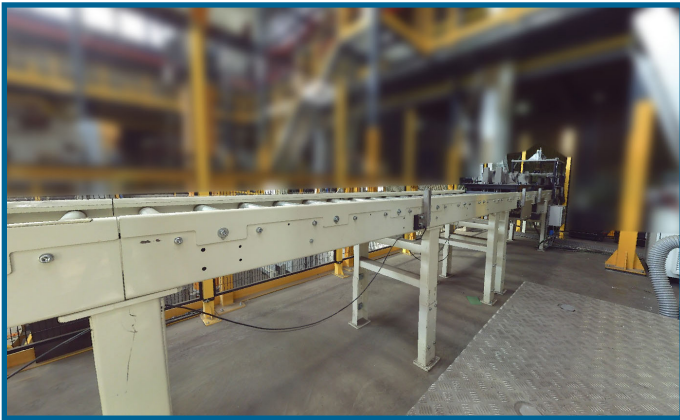
## 3D MODELLING AND DOCUMENTATION





# MOBILE 3D MEASUREMENT TECHNOLOGY

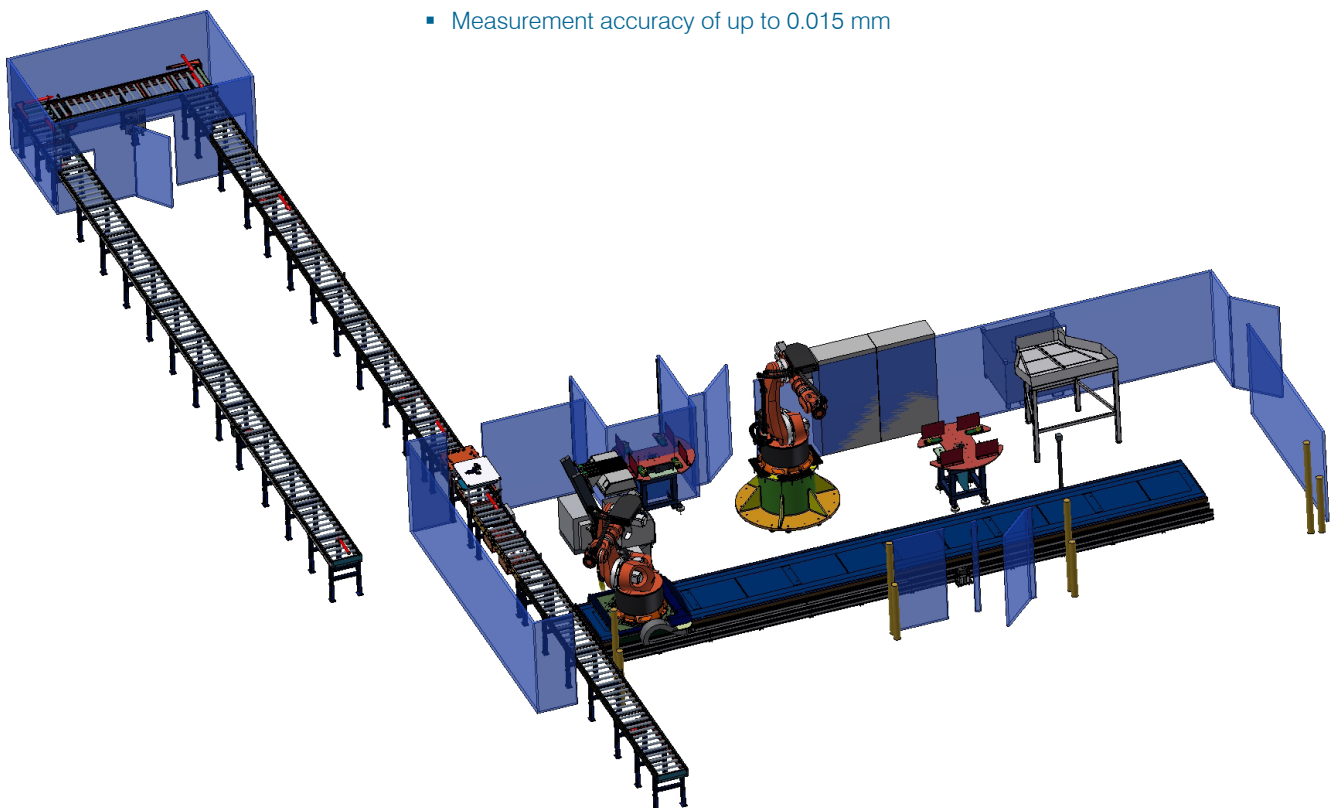
## 3D MODELLING AND DOCUMENTATION



- 3D modelling and documentation
- Indoor and outdoor use
- Range 330 m
- Measurement accuracy +/- 2mm

## POSITIONING AND ALIGNMENT OF MACHINE INSTALLATIONS

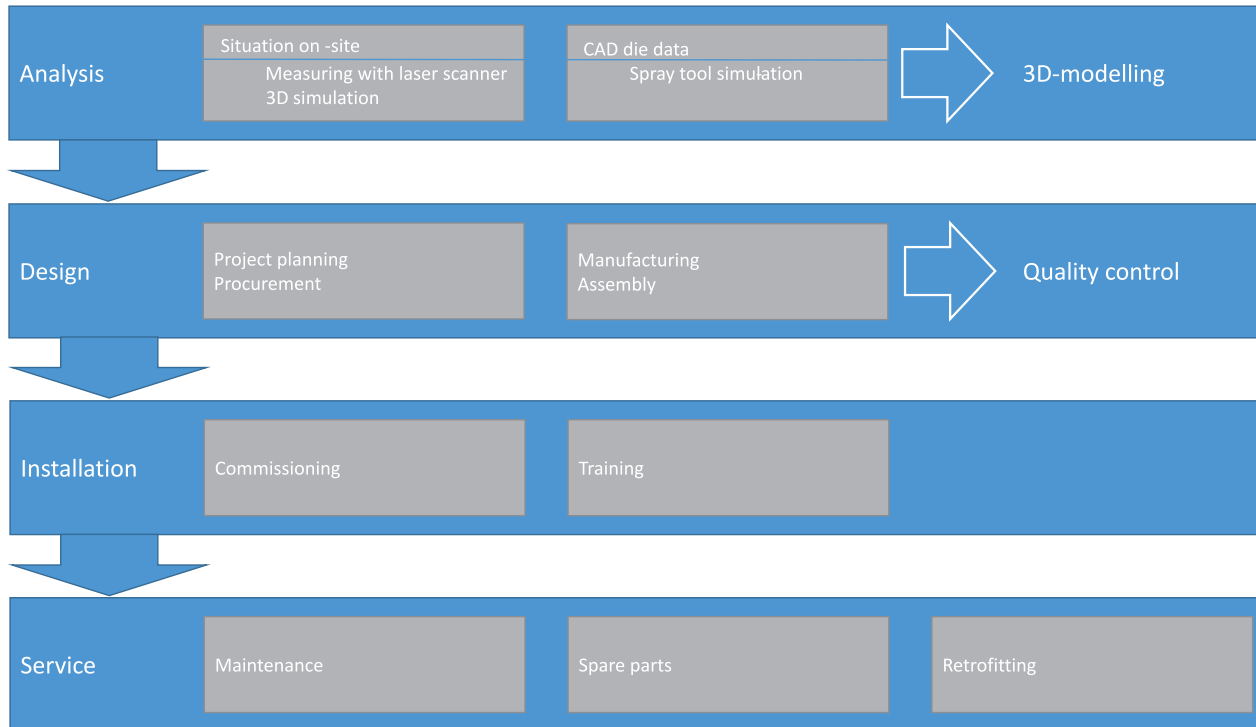
- Mobile coordinate measurement machine
- Reach: 160 m
- Measurement accuracy of up to 0.015 mm





## SERVICES & BERATUNG

### SERVICE PROCESS



### OUR INTERNATIONAL SERVICE TEAMS

Asia



Eastern Europe



USA - Canada - Mexico



# Böhmer

Maschinenbau

Industriestrasse 15  
57520 Steinebach / GERMANY  
Tel.: +49 (0) 27 47 / 92 36-0  
Fax + 49 (0) 27 47 / 92 36-36  
[info@boehmer-maschinenbau.de](mailto:info@boehmer-maschinenbau.de)  
[www.boehmer-maschinenbau.de](http://www.boehmer-maschinenbau.de)