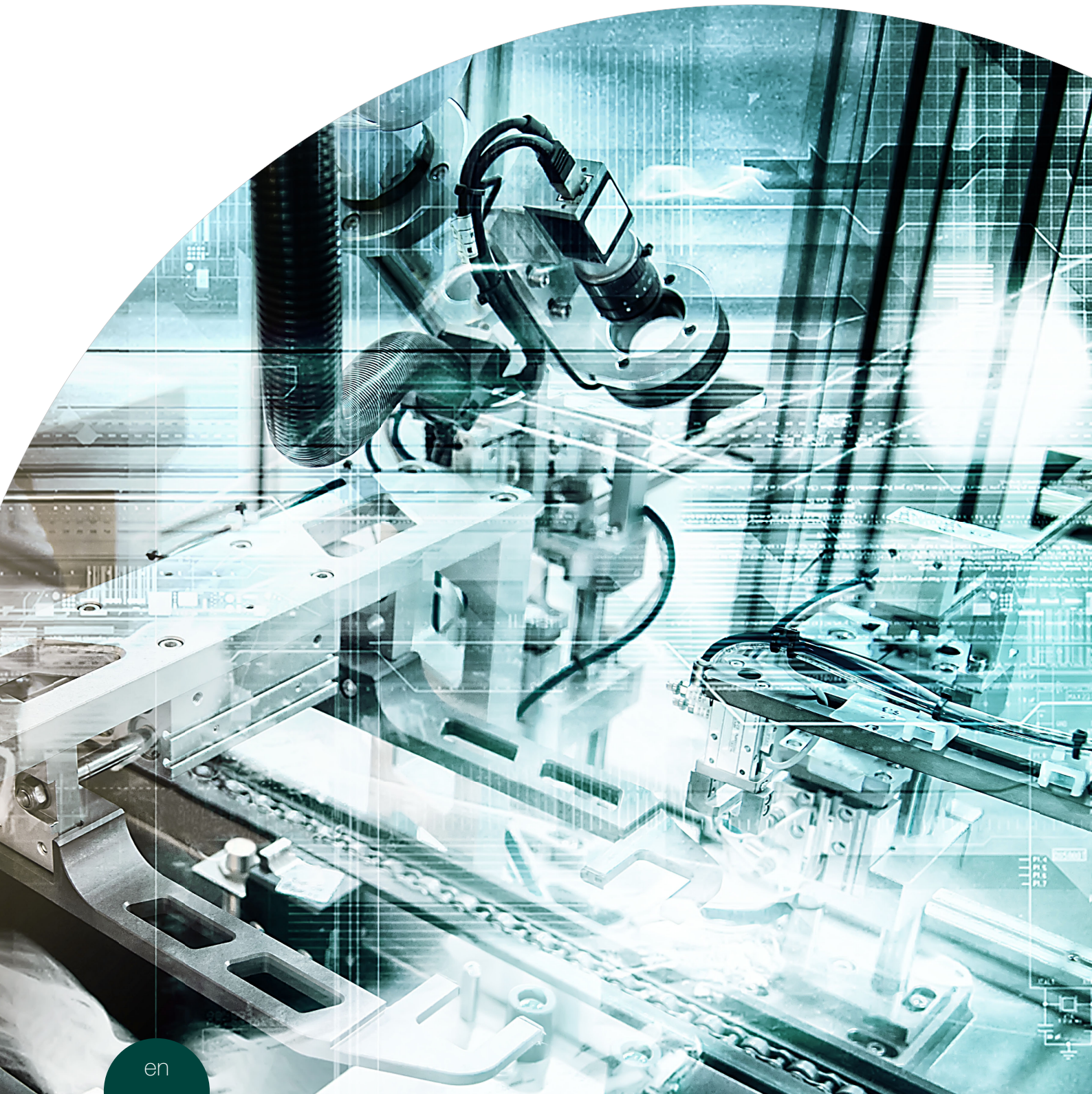
ALPINE METAL TECH
A COMPANY OF MONTANA TECH COMPONENTS AG

ADVANCED TECHNOLOGY



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Advanced Technology represents a combination of existing know-how, such as marking, reading, measuring, automation and machining, resulting in innovative customer solutions.

Alpine Metal Tech is your partner for customized and industry-independent automated solutions.

Innovation paired with proven technology in the field of special machinery forms the business segment Advanced Technology. In order to offer the most efficient solution between economic efficiency and technical feasibility, Alpine Metal Tech analyzes existing processes on customer purpose and develops specific solutions. The application portfolio starts from simple pick and place systems and ends at multiaxial optical surface inspection.

Latest application is developed around removing casting flashes and machining burrs on casted aluminum parts. By combining newest 3-D measuring systems and offline robot teaching Alpine Metal Tech is able to offer unique deburring solutions.

Combinations of marking and reading systems with customized automation solutions pared with quality inspection technologies like leak testing or surface inspection show the whole capabilities of Alpine Metal Tech and bring maximum benefit to its customer.

Alpine Metal Tech with its business unit Advanced Technology is able to cover highest quality demands on product and measurement systems. Measuring devices, leak testing and image processing systems assure constant performance and top production standards.

APPLICATION AREAS

» Deburring

» Vision & Inspection

» Marking & Reading

» Automation & Robotics

DEBURRING

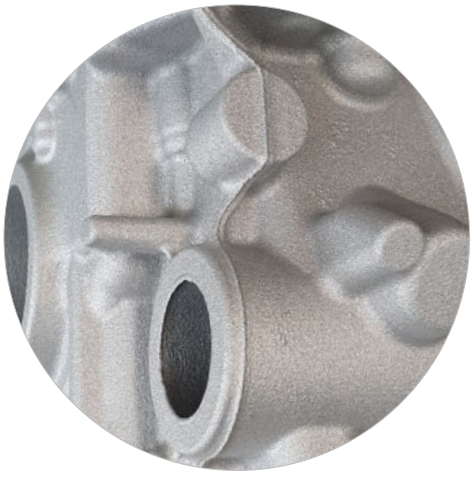
Casted aluminum parts especially for the automotive industry require high surface quality. Casting burrs, machining flashes or sharp edges are not acceptable at many applications. Alpine Metal Tech with its decades of experience in robot automation, part handling, surface inspection and laser measuring is the perfect turnkey partner. From rough sawing of casting sprues, deburring of complex parting lines by using 3-D real-time component measurement up to brushing of CNC machined edges, special turnkey deburring lines for battery housings, motor blocks and chassis parts for cars and motorcycles and aluminum wheels are available. Alpine Metal Tech is able to ensure steady deburring results due to combination of 3-D measurement and new calculated robot paths for each part. With our new developed ADoC system (Automated Deburring of Castings) deburring is lifted to a new level.

Fit for use is our challenge – we supply the machining line for each specific requirement. From mono-material production lines with teached deburring contours up to full flexible deburring lines with 3-D real-time component scans including offline teach-in and automatically variating machining parameters – everything is possible.

To develop tailor-made turnkey deburring solutions for aluminum casting parts by using our wide range of in-house developed technology is our strength and your advantage.

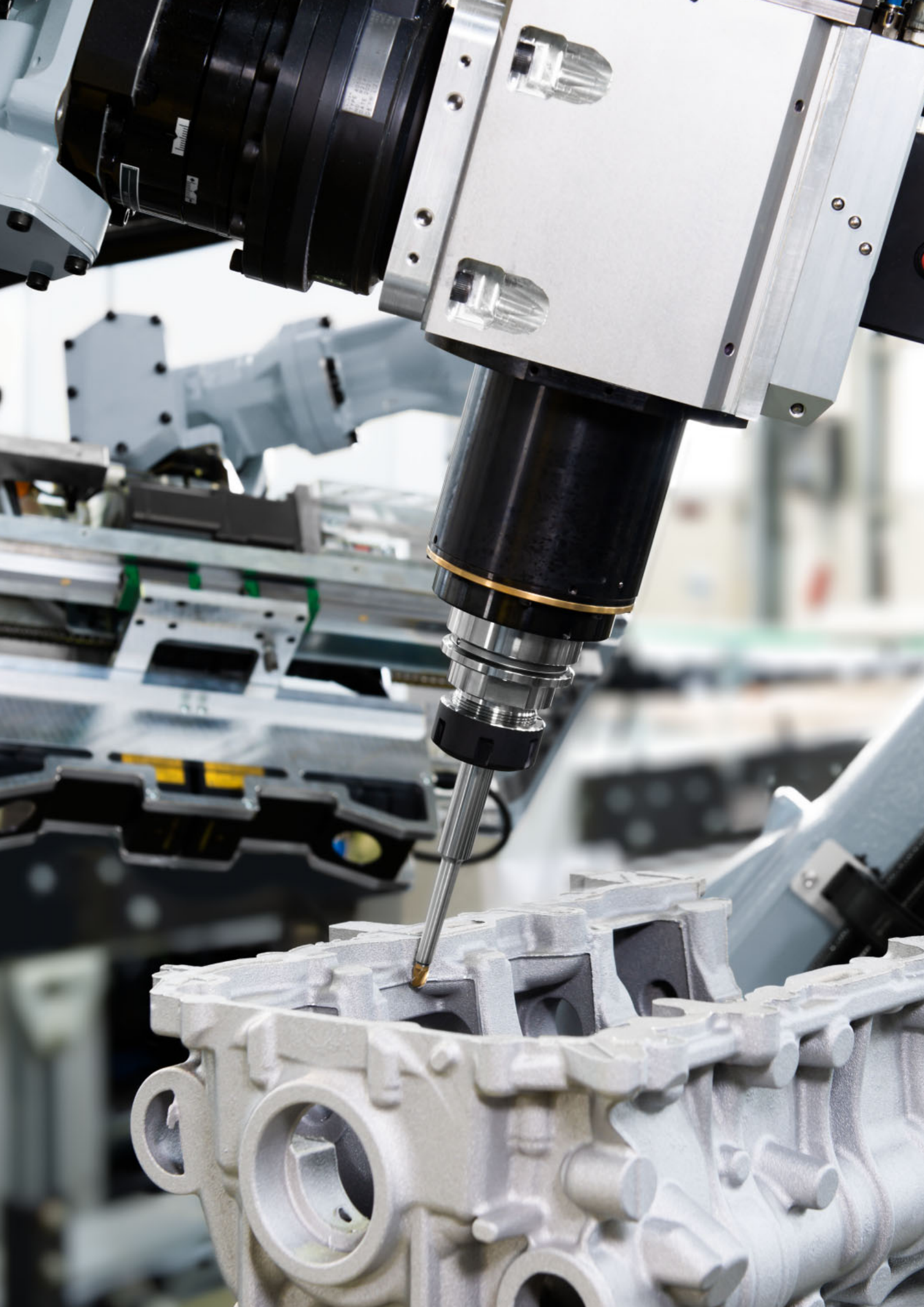
Your advantages

» Fit for use deburring lines
» Combination of automation and measuring technology for precise and repeatable deburring quality
» Reduction of manual rework and inspection
» One-stop solution: project management, engineering, programming and installation



before deburring

after deburring



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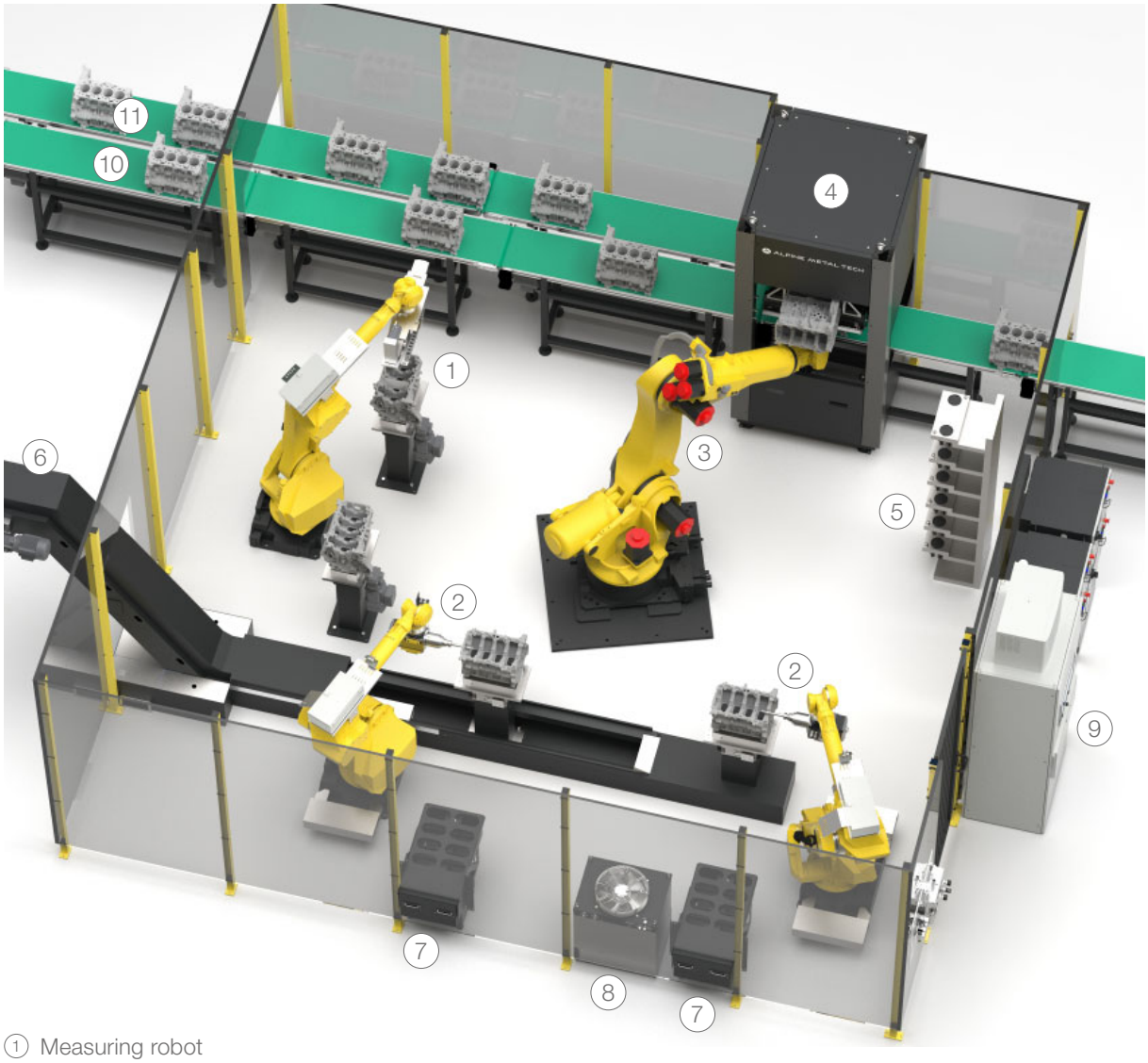
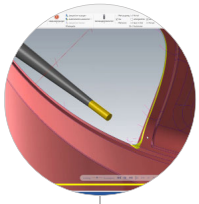


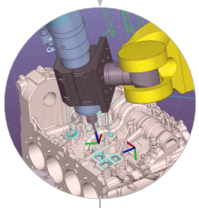
① Measuring robot
② Deburring robots
③ Handling robot
④ Type recognition
⑤ Workpiece holder magazine
⑥ Chip conveyor
⑦ Tool changer
⑧ Tool cooling system
⑨ Control of cell and robot
⑩ OK parts
⑪ NOK parts

PROCESS FLOW



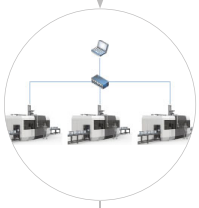
Offline preparation

The 3-D model of the part will be loaded into the delivered CAD/CAM software and all requested deburring contours, tools and further machining parameters are taught in offline. The teaching process is as easy as at well known CAD/CAM systems.



Offline simulation

To check all taught parameters a full offline simulation of the complete machining process is available. If there is a crash detected it will be shown in the visualization and according amendments can be made easily offline. Additionally, first optimization can be made after reviewing actual simulation.



Ethernet data transfer

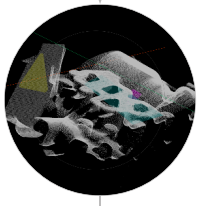
After successful simulation all relevant data can be transferred to all connected machines at the workshop with one click. No additional part teaching is necessary directly on the machine.

Trial run

Directly after completed data transfer, first trial run is performed at 10% speed to check all functions in safe environment before starting production in full speed.

Laser measurement

Each part which passing the cell is fully automated measured by the scan robot. This flexible system enables scans from different perspectives to reach all interested areas.



Correction of machining contour

Out of the scanned data, our Alpine Metal Tech calculation software provides the new needed machining contours for the deburring. This allows to correct all deviations of the part itself and also position differences due to clamping will be corrected.

Flexible robot deburring

The corrected path is calculated after the laser measurement and the machining takes place afterwards. A combination of absolute calibrated robots and laser measurement brings the best possible path truth and maximum flexibility for different machining scenarios.

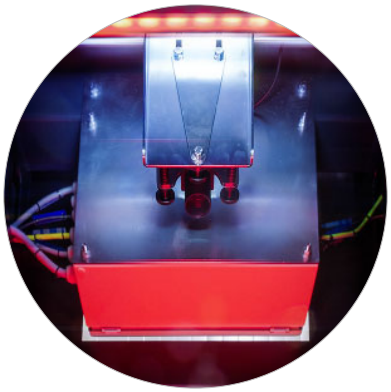
FEATURES

Automation

- Full flexible part handling
- Mixed production possible
- Interchangeable gripper solutions with zero clamping system (option)
- KPI analyses of machining line
- Interface to customer system for analytics (option)

Part detection

- Alpine Metal Tech solution for automated part detection
- Correction for robot pick-up
- Easy installation on available conveyor systems



Flexible measuring axis

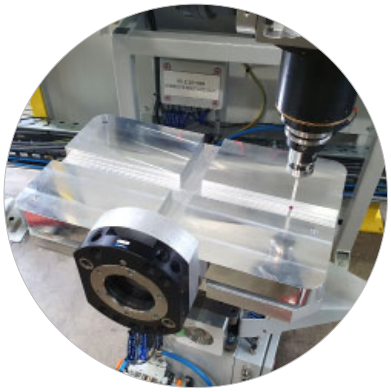
- High precision Alpine Metal Tech measurement axis
- Fast scan speed
- Temperature controlled
- Double scan head design

Deburring unit

- Robot solutions for maximum flexibility for different machining scenarios
- Different deburring spindles with standard tool mounting (HSK25/32/63)
- Tool fracture control after machining
- Torque detection to reduce feed rate to avoid damages (option)

Calibration tool and system check

» Absolute calibration of robots to have best possible path truth
» Special designed calibration tool used for system check
» Easy calibration of the whole system
» Calibration with standard touch probe and laser of measurement axis



Tool changer

» Automated and flexible tool change
» Magazine for sister tools
» Included tool fracture control after machining
» Tools can be changed during production

Cooling system

» Cooling system for machining spindles
» Minimal quantity lubrication (MQL) for tools available
» Level control and flow control

Torque detection

» Reduce feed rate to avoid damages
» Monitoring of machining forces
» Can be used for predictive maintenance

LEAK TEST INSPECTION

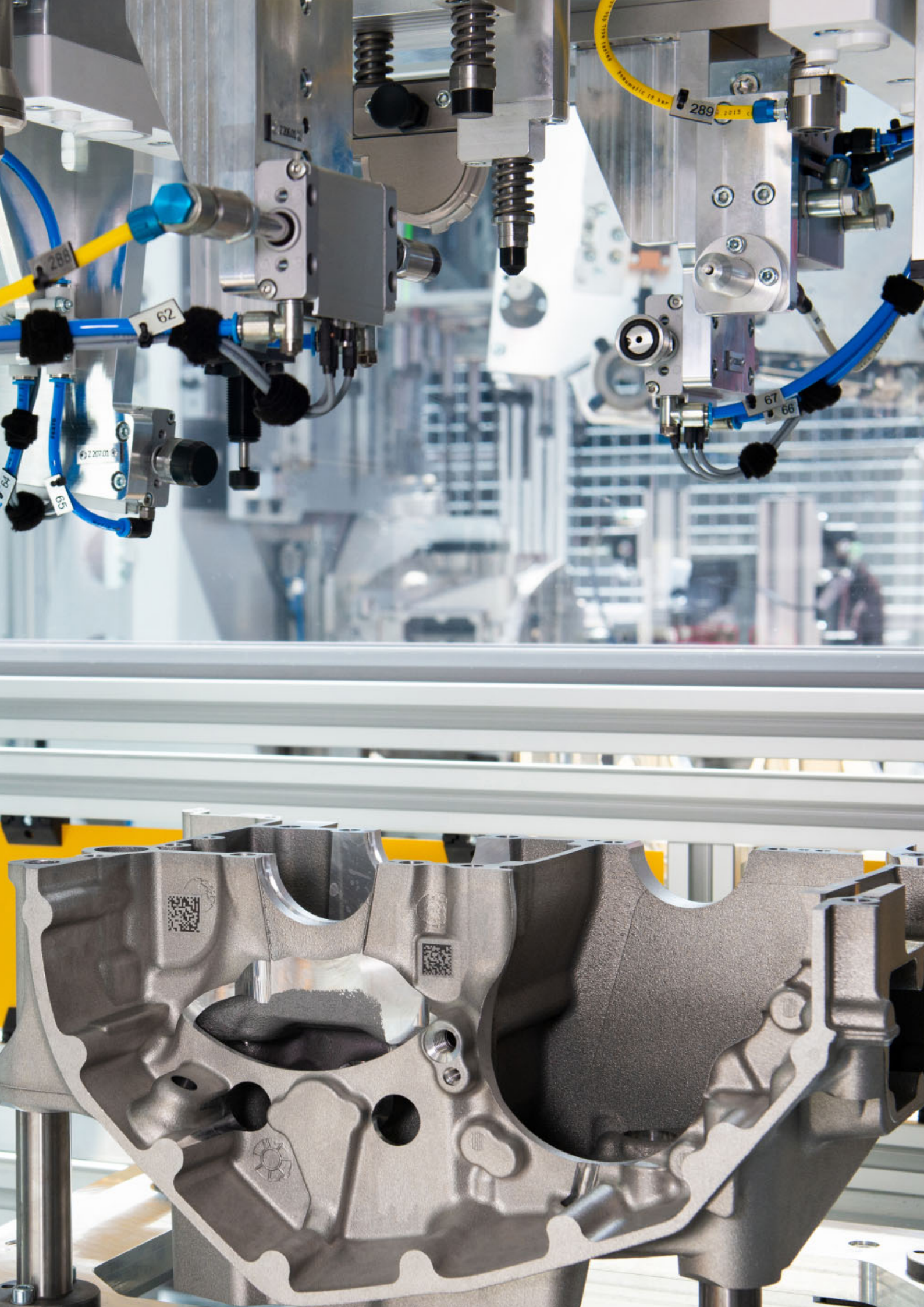
Casted aluminum parts like motor blocks, e-housings, gear boxes, oil reservoirs or battery housings have to fulfill special requirements in respect of leak tightness within the automotive industry. Full automated turnkey leak testing lines from Alpine Metal Tech ensure that all produced and delivered parts passing through are 100% approved. Especially for motor blocks it is necessary to test independently different pressure rooms, e.g. pressure and pressure less oil circle, water cooling system and combustion chamber. Many years of experience and continuous development of special sealing materials and material handling to avoid mechanical contacts made Alpine Metal Tech a leading turnkey supplier of leak testing machines.

Modular engineering provides full flexibility to our customer. If more capacity is needed just add one more leak testing unit, if a new part design will be integrated just change the sealing unit with quick change-over system, if a new leak testing line needs to be integrated into a tight existing production line use our huge engineering experience and make it happen.

Of course, Alpine Metal Tech provides leak testing solutions for e-mobility and we are proud to be again front runner in this fast evolving technology.

Your advantages

» Turnkey solution, one partner
» Modular machine concept, easy extendable, fast integration of new types
» Reliable leak testing system with high class components also for big volumes
» Flexible data handling, tailor-made customer interfaces
» Project management, engineering, software and in-house installation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LAYOUT

① Loading & unloading
② Safety door for easy access to test room
③ Part lifting axis pneumatic or electric driven
④ Leak test station
⑤ Machine cover to avoid environmental influence
⑥ Leak test equipment integrated in machine
⑦ Pneumatic control unit

PROCESS FLOW

Loading

The part is automatically loaded into the leak test machine with a robot or handling system. It can also be equipped with a manual loading option for use in semi-automatic mode.

DMC reading

To check if the right part is loaded in the cell, the DMC code is read by a standard DMC reading system. It is necessary to combine result data with customer database and avoid collisions by checking part number.

Part fixation and orientation for leak test process

Positioning of loaded part with pins and fixations. Included turntable to move the part to the leak test station and present it to the lifting unit.

Part sealing

The part is fully automatically sealed with special design sealings for complex contours. All sealings are fed pneumatically to the plugging area.

Leak test

Automated leak test sequence according requirements. Testing of different test channels sequentially or in parallel.

Unloading

The part is provided with all needed data and sent to the customer interface.

FEATURES

Leak test equipment

» Different manufacturers possible
» Fully integrated in machine housing
» Automated controlled with machine PLC

Automatic test leak

» Test with defined leak and without leak to identify proper working system
» Check of all different channels possible
» Automated leak search sequence

Flexible loading and unloading

» Tailor-made loading and unloading situation
» Automatic or manual loading possible
» Turntable or single loading station

Master part

» Ensures easy check of machine and leak test equipment
» Periodic system check possible
» Used for Gage R&R

Sealings and expansion elements

» Different sealing techniques used (surface seal, expanding mandrel)
» Quick change system for easy replacement of sealings
» Expansion elements for faster fill-up of pressure rooms

Easy leakage search

» Special sequence for leakage search
» Easy accessible after positioning of cylinders
» Test pressure charged with open safety doors

Temperature compensation

» Included temperature sensors
» Monitor part temperature
» Monitor environment temperature
» Adjustment is done directly on the leak test equipment

OPTICAL INSPECTION

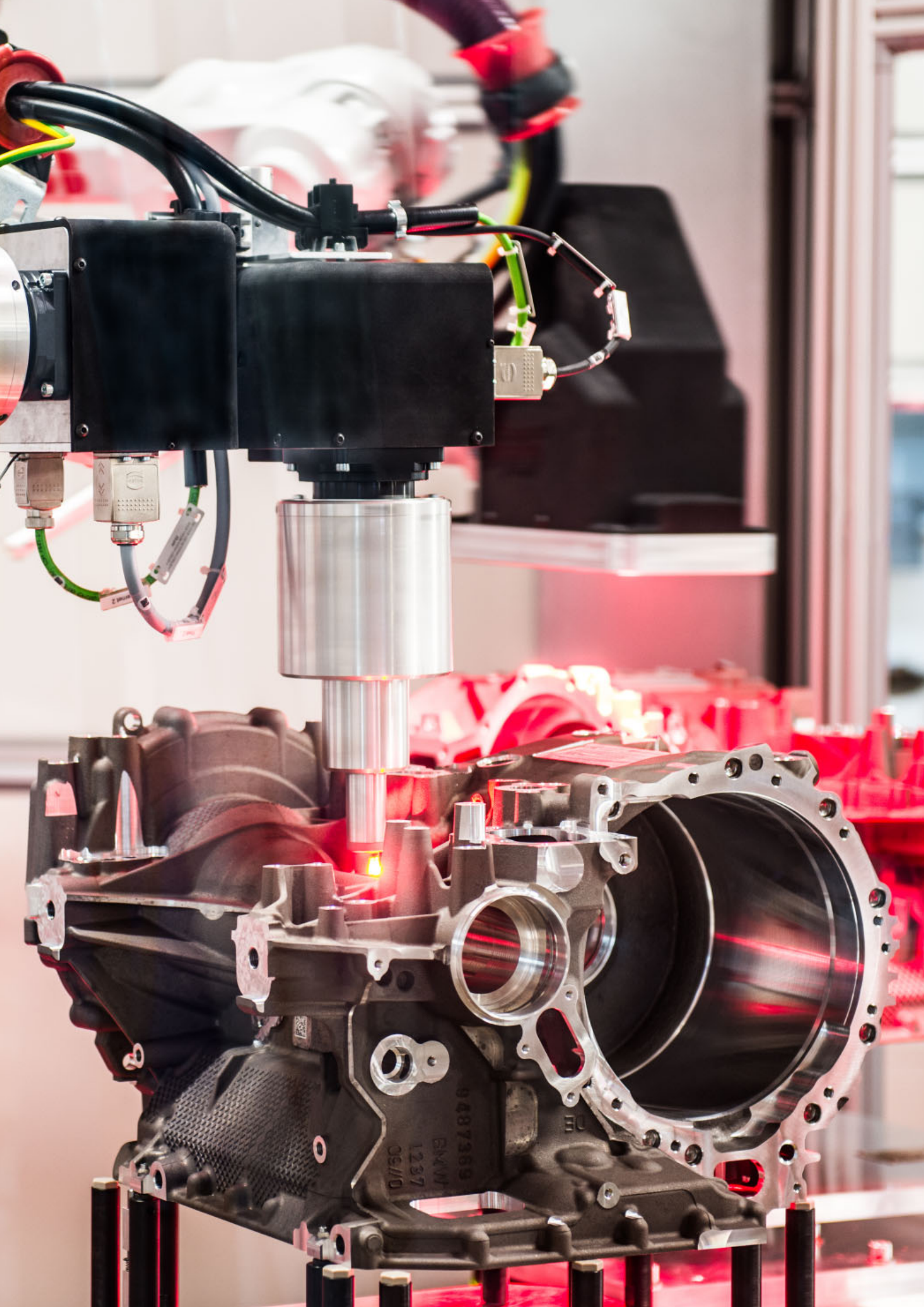
In the case of cast aluminum components, blowholes on functional surfaces can be visible after machining. As a result, the part is scrap or the quality for subsequent processes is not achieved and rework is necessary. To ensure that only high-quality products are delivered, Alpine Metal Tech offers a fully automatic optical inspection cell for 100% control during production.

Workpieces are manufactured with different surface finishes, where also different tolerances are needed; e.g. liquid sealing area (rough surface), solid sealing area (smooth surface), water connections (very fine surface), complex manufactured functional surfaces. The optical test system checks these surfaces for damages, blowholes, dirt and various surface anomalies and records and documents the results. These results can be visualized for the final check at the final test station.

With the help of a combination of different sensor technologies, complex components such as cylinder heads, crankcases or e-housings can be tested. Alpine Metal Tech offers a customer-specific inspection cell adapted to the requirements from a single source.

Your advantages

» Measurement of different features like bores and plane surfaces possible
» Flexible machine layout to archive measurement of complex parts
» Fast cycle times
» Combination of different sensors, 2-D cameras, 3-D laser measurement
» One-stop solution: project management, engineering, programming and installation



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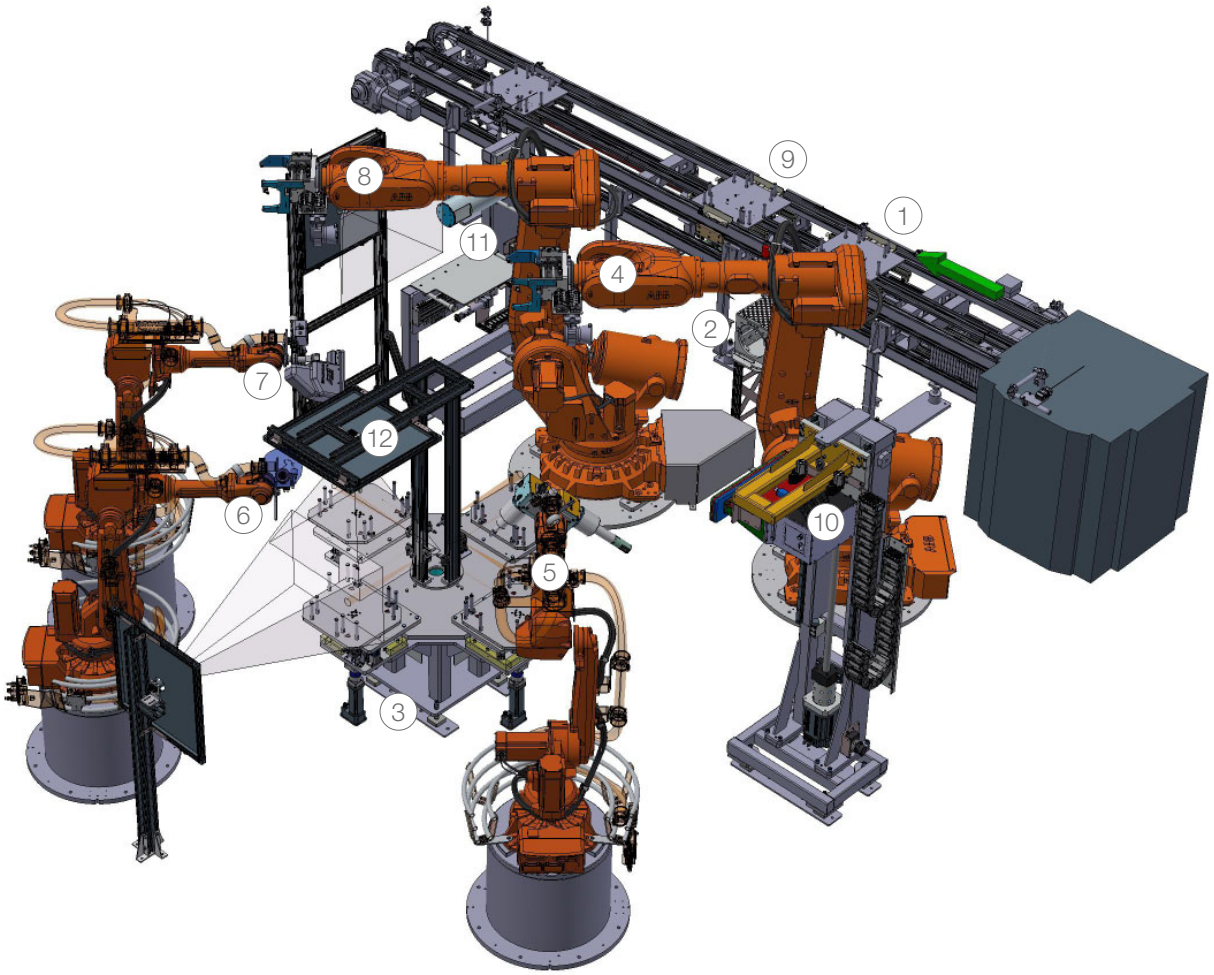


① Loading station with DMC reading
② Master piece
③ Turntable
④ Handling robot 1 for loading and surface inspection
⑤ Measurement robot 2 equipped with rotation sensors for different diameters
⑥ Measurement robot 3 for cylinder barrels
⑦ Measurement robot 4 for surface and bore inspection with endoscope
⑧ Handling robot 5 for bore sensors and unloading
⑨ Unloading
⑩ Surface inspection
⑪ Bore inspection
⑫ Cam for side pictures

PROCESS FLOW

DMC reading

To identify the part and its serial number a standard DMC reading system is integrated in the loading conveyor system.

Robot handling & turntable

Flexible robot handling solution with Alpine Metal Tech gripper and an included turntable with four separate turnable stations is necessary to get all sides of the part accessible.

Bore inspection

Measurement of different bore diameters is possible with different sensors and different part handling. On the one hand sensors are guided with a robot and on the other the part is guided to bore inspection sensors.

Surface inspection

Inspection of big or small surfaces. Topographic scan with different lightning directions enables optimized results in 2-D format.

3-D scan

3-D scanning technology for precise surface inspection and an additional check to get rid of pseudo faults of 2-D measurements.

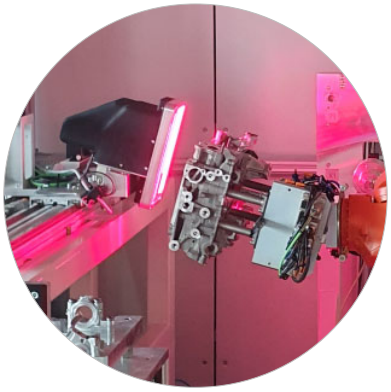
Final check

Visualization of all interested areas of the part with detailed fault information and the possibility to set special areas OK or NOK.

FEATURES

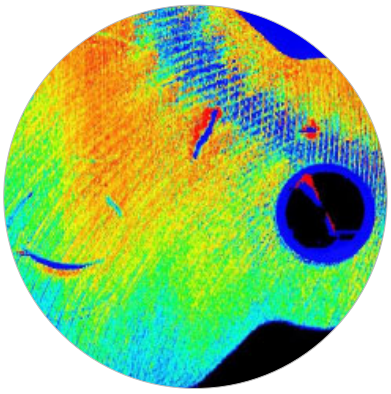
Line camera with topographic scan

» Five different lightning directions
» Topographic scan enables calculation of depth information
» Suitable for big and plane surfaces



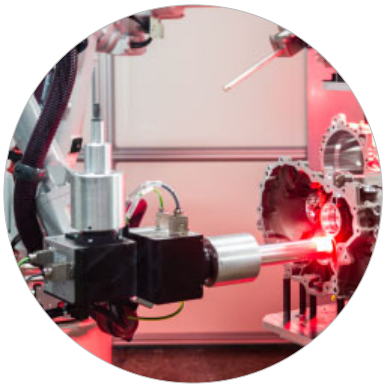
High quality evaluation

» Detection of defects up to 0.3 x 0.3 mm
» Over 20 different features are calculated for the found defect
» Thereon AI classification and evaluation delivers a robust OK/NOK declaration



Rotation sensors

» Three lightning directions included
» Topographic scan ensures calculated depth information
» Can be used for different holes (D20-D21, D62-D78, D170-D220)
» Detection of defects up to 0.3 x 0.3 mm



3-D measurement

» Capture out of different positions and orientations possible
» 3-D calculation from recorded 3-D values
» Safe differentiation of water spots and roll marks to deepenings and raisings

Master part

» Ensures easy check of sensors and measurement system due to included defects
» Periodically system check possible
» Used for Gage R&R

System check

» Fast check if sensor hardware is OK
» Use of masterpiece, located inside cell
» Automatic sequence for periodic check
» Check during production

End control desk

» Visualization of measurement results on touch display with highlighting of interested areas
» Easily enables movement and rotation of parts by hand
» Perfect lightning for human eye
» Buttons for re-classification of OK/NOK state parts or features
» Additional information of customer test instructions

High-speed turntable

» Suitable for different parts
» Main turntable with 90° turn-angle
» Four separate turntables for each station to cover all sides of the parts

MARKING

Alpine Metal Tech GmbH has developed a wide range of marking systems over the last decades. To cover different requirements of customers and their products, different technologies are available. Special pneumatic needle marking systems for OCR marking on different materials ensure permanent markings to guarantee full traceability till end of life of your product.

Laser marking systems have their strength in very short cycle times and precise marking quality. This technology is a perfect choice to apply Data Matrix Codes on any kind of product. Data Matrix Codes are able to store big information on comparable small surface spaces at high redundancy. Due to precise marking by laser, these codes are easily readable through the whole production process. Beside Data Matrix Code marking, laser marking units are also able to generate OCR marking and logo marking.

Another possibility to apply OCR, DMC or company logos on products is to apply labels which carry all required information. The size of the marking affects the cycle time only with low impact. Additionally, the marking shows the highest possible contrast and the marking surface is perfect – so the precision of marking and the readability is on the highest level.

According to each individual requirement we supply standard and well-known marking systems from the market and combine them with Alpine Metal Tech automation know-how or, if available systems are not suitable, we develop customized marking solutions.

Your advantages

» Common marking technologies from one hand guarantee best marking method for your unique product
» Combination of machine building know-how and using available technology from the market ensure best economical solutions
» Special marking solutions if available technology is not enough
» Data handling, data storage and interfaces are our business
» Full integration of marking and reading systems into automated turnkey solutions

FEATURES

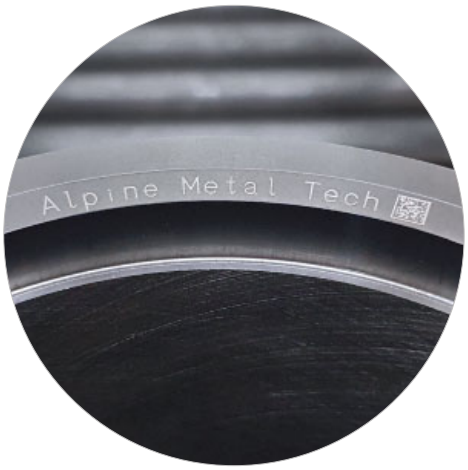
Needle marking

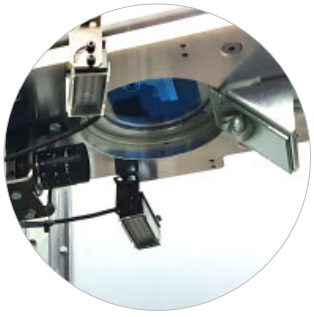
The Alpine Metal Tech needle marking is a fully automatic system to needle stamp any graphic characters onto casting parts. It can mark various types of stamps (day, hour, shift, x-ray stamp) on predefined positions. The marking is punched in approx. 0.8 mm depth and remains visible even after coating or painting.
The MX01 embossing head developed by Alpine Metal Tech is a marking system for casted parts. Due to its pneumatic drive, the MX01 offers more flexibility in terms of impact energy and marking distance in comparison with conventional electric-mechanical marking systems. Based on the technology it can compensate part deviations easily.

- Alpine Metal Tech marking unit MX01
- Reliable marking
- Adjustable impact energy and the penetration dept
- XYZ axis system for positioning
- Also standard needle markers available

Laser marking

Alpine Metal Tech develops laser marking systems for continuous part traceability throughout the entire production operation. Different machine layouts for a perfect fit to your production are possible. Parts will be automatically marked by different laser markings like DMC, logos or customized text. Additionally the marking can be verified by AMTident system to make sure the quality fits to your needs.





- Various markings possible (logos, characters, DMC,..)
- Position correction of marking
- Combination with reading system possible to verify marking

Label marking

The label machine provides a solution for application of labels without having human action close to danger production areas. The machine also ensures a high positioning accuracy which allows placing the label/tag exactly on the requested area. The applicator picks up and transports the label to the product surface with high position accuracy.

A variety of labels and tags for different needs are available and enable the possibility to be applicated even on hot surfaces up to 900°C.

- Short marking cycles – label picked up by the applicator before the product arrives
- Flexibility to place the labels in different positions and angles
- Thermo-transfer printed high definition label
- High resolution codes readable by standard equipment

READING

Alpine Metal Tech and its Vision Software Team has been able to develop specific ready solutions especially on products or surroundings where standard of the shelf systems get to their limits. Barcode reading on labels with perfect contrast can be done with any kind of available reader but on casted parts where no label can be applied and the barcode is directly casted on the part then Alpine Metal Tech is the right partner to supply special reading technology to ensure highest performance.

Beside barcode reading Alpine Metal Tech has also been able to develop OCR reading systems. By using own software know how, reading systems even can reengineer damaged or partly lost markings and gain highest reading rates.

Data Matrix reading systems especially on aluminum or steel surfaces became a special task for Alpine Metal Tech. With our CAM220 we have been able to present a reliable reading system with full connectivity in respect of data storing and handling.

Beside software, laser and camera know-how a big influence for successful reading systems is coming from perfect lightening systems adopted on each unique product. Alpine Metal Tech as a nameable special machine builder is able to use full in-house knowledge of mechanical and electrical design engineering to get light also into darkest product areas.

Of course, if the marking and the product have no special requirements, especially for example in random production lines to identify the arriving part Alpine Metal Tech can supply and integrate a wide range of standard reading systems.

Your advantages

» Marking and reading systems from one source → perfect match
» Specific software and hardware solutions for unique parts to achieve highest reading rates
» Data handling and storing according customer needs
» Off the shelf and special reading solution know-how

ALPINE
No.790026
No.790052
58°
82°
mm

FEATURES

Barcode reading

The Alpine Metal Tech barcode is a three-dimensional identification system and is the basis for full automation from casting to the machining area. The code lines are machined in the mold, resulting in an embossed code in relief on the cast part. Since it is a 3-D code, the reading is done with laser-based systems, which ensures a very reliable reading of all parts during production. The barcode system reads barcodes during rotation or transport. It can be directly integrated into the plant Ethernet systems.

- Very high reliability, reading rate over 99%
- Mold-based coding system
- Used for identification and rotation angle positioning
- Fully readable before and after heat treatment
- Standalone laser based reading system

OCR reading

AMTident is developed to meet the demand of reading product IDs independent from product, marking technology and environmental conditions. In order to provide highest identification rates, AMTident utilizes a wide spectrum of industrial vision technology like CCD and infrared cameras, laser scanners and corresponding illumination equipment to ensure a stable lighting and acquisition scenery. Marking performance assessment to stabilize marking results at highest level.

- Character recognition, 1-D / 2-D code and company logo identification
- Closed data gaps – product tracking over the whole production process possible
- Live process visualization
- Parameter surveillance signals deviations at an early stage
- Data storage

DMC inline reading

The DMC inline reading system is specially designed for on-the-fly reading in rough environment areas. An optional self-cleaning protection cover, makes it suitable to any position in production even if regular cleaning is not possible. Marked codes are identified on parts and stored on an internal database as a buffer. At the same time, all data can be automatically entered into a SQL database provided by the customer. With the CAM220, the production data is also simultaneously available in the factory IT – without additional equipment such as PLC connections.

- Modular design
- Separate control cabinet
- Read on-the-fly
- Interface to customer database
- Data storage as a buffer

AUTOMATION

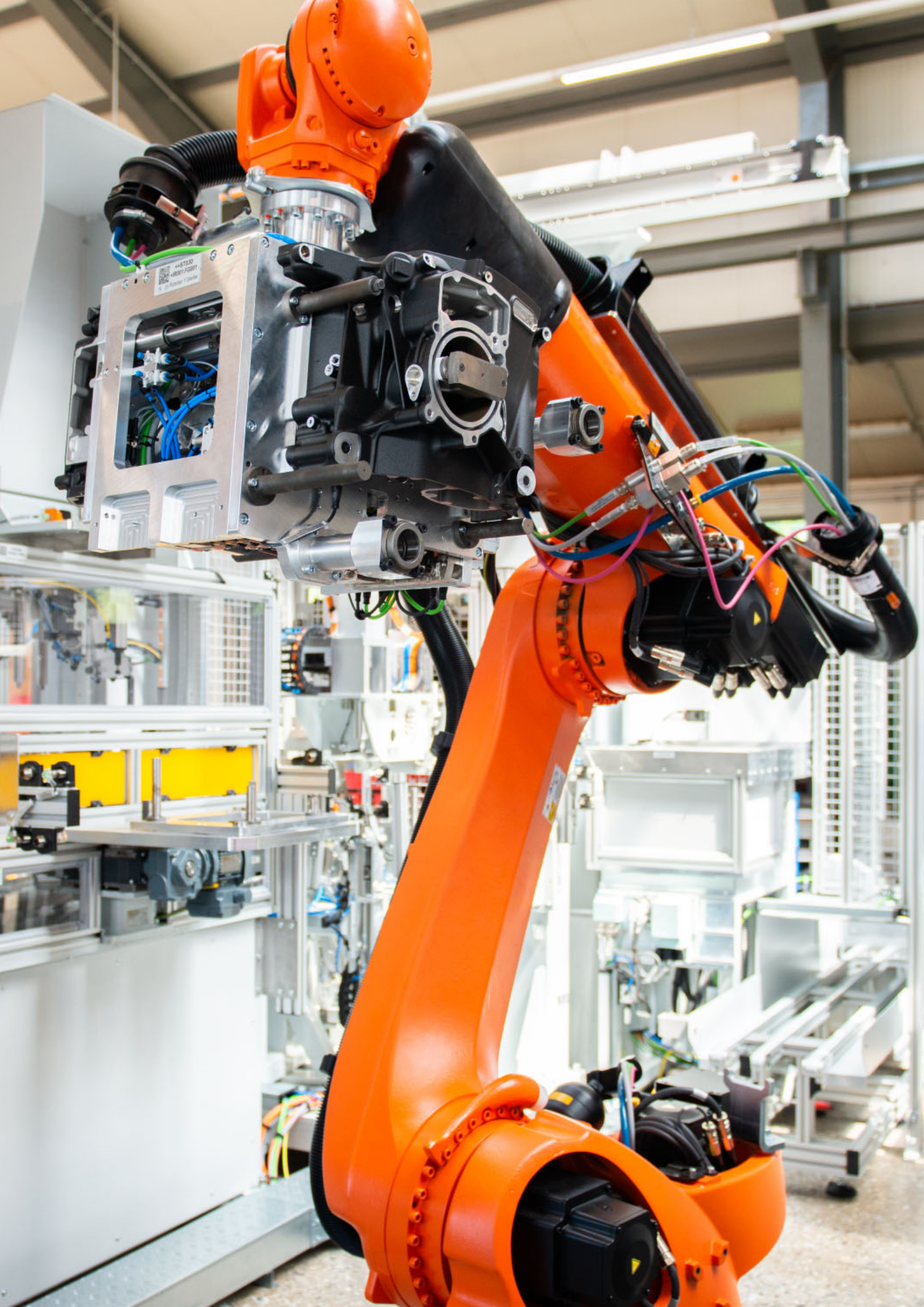
Due to many years of experience in special machine construction and high expertise in robotics and automation, Alpine Metal Tech is the perfect contact for customer-specific solutions. The combination of existing technology and know-how forms the basis for a system tailored to your production. From today's perspective, it is becoming increasingly important to automate manual processes 24/7 in order to get a grip on the high demands on quality standards, increasing productivity and the shortage of skilled workers.

In close cooperation with the customer, we develop special cell layouts which are perfectly aligned with your production environment in terms of operation, production flow and size. Integration of high-quality components and various technologies, e.g. gluing & screwing, reading & marking, checking & testing, enables many areas to be covered. A wide variety of systems such as vacuum technology, conventional conveyor technology, loading portals, lifting stations or robotic gripping systems are available for parts handling.

Together with experience, proven components and a variety of possibilities, we generate your individual automation and ensure complete customer satisfaction with our Alpine Metal Tech service.

Your advantages

» Flexible machine layouts for tight production areas to archive measurement of complex parts
» Proven technology for fail-safe production
» Different robot manufacturers possible
» Fully safety integration
» Combination of different technologies enables fully automated production processes
» One-stop solution: project management, engineering, programming and installation



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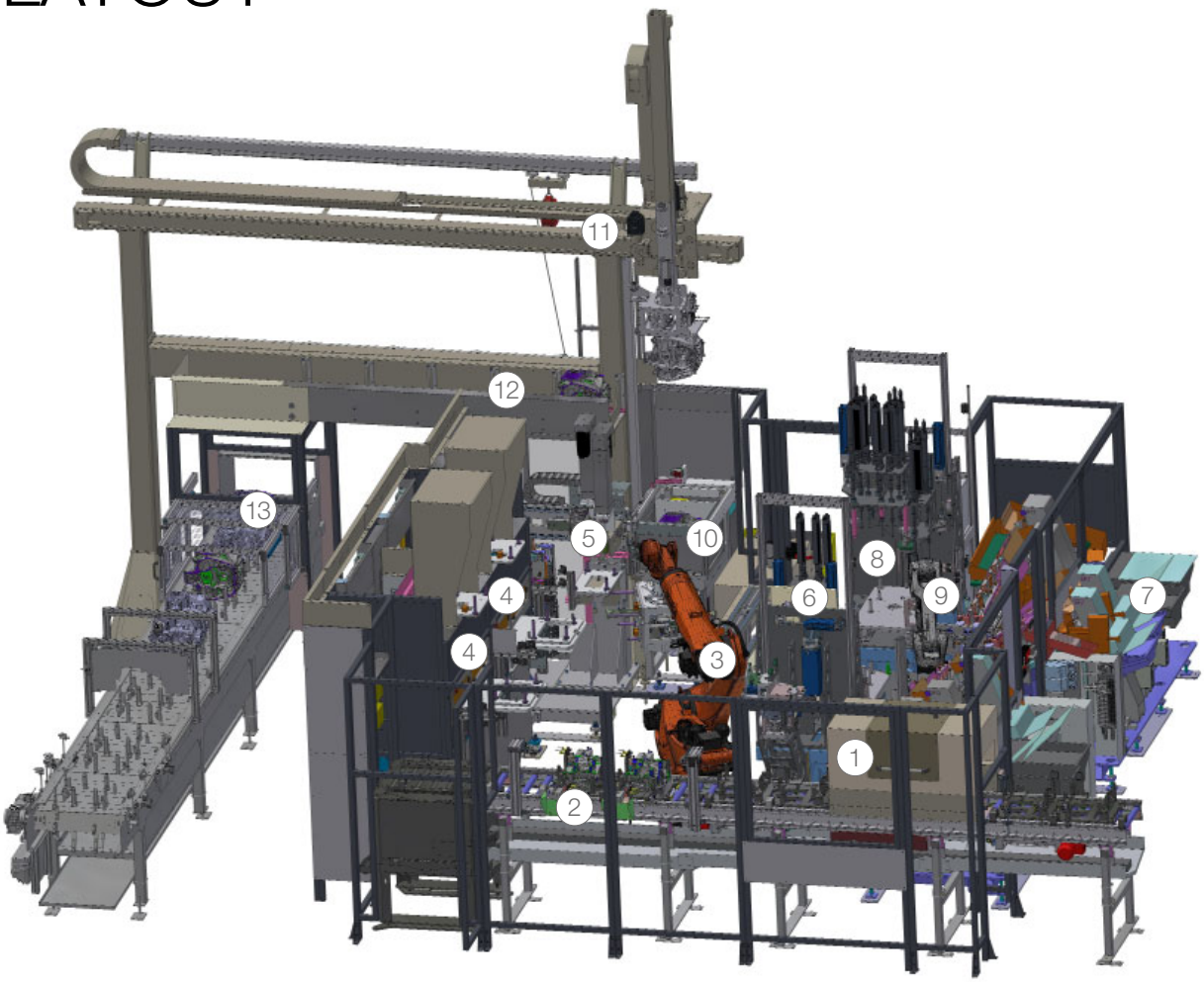


① Cleaning station
② Loading & DMC reading
③ Handling robot
④ Leak test
⑤ Alignment pin station
⑥ Pressing station
⑦ Screw feeder
⑧ Screwing station
⑨ Handling robot for screws
⑩ DMC marking
⑪ Portal handling
⑫ Buffer place
⑬ Unloading

PROCESS FLOW

DMC reading

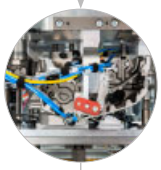
Reading systems to identify part and serial number

Robot handling

Flexible handling with robots enables complex sequences on small spaces;
Custom-fit Alpine Metal Tech gripping solutions for handling

Leak test turning table

Optimized loading and unloading to reach fast cycle times



Leak test

Alpine Metal Tech leak test machines ensure stable processes

Pressing

Pressing alignment pins into drilled holes and combining two separate parts to one

Screw feeder

Proofed feeding systems to provide needed screws and pins

Assembling

Assembly and press two part sides together

Automated screwing

Tighten parts with different screws with powered screw drivers

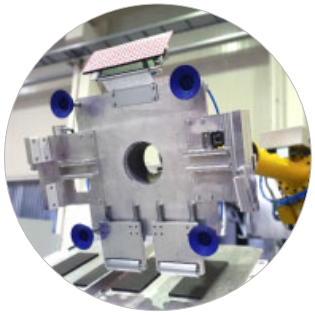
DMC marking

Included marking system to remark parts with new customer DMC

FEATURES

Alpine Metal Tech gripper systems

» Flexible gripper systems for different parts
» Vacuum technology or electric / pneumatic gripping
» Double gripper systems
» Adapted gripper according requirements



iRob feeder

» Handling gripper adapted to part requirements
» 2-D and 3-D vision system for calculation of part position
» Preprocess part placement
» Palletizing and packing

Part machining

» Flexible machining cell with robots
» Offline program preparation in CAD/CAM system
» Automatic tool changer
» Part changing table

Assembly systems

» Assembly cells for fully automated production
» Application of sticked plates of e-cover plates
» Used to produce two-part crankcases

Operating system

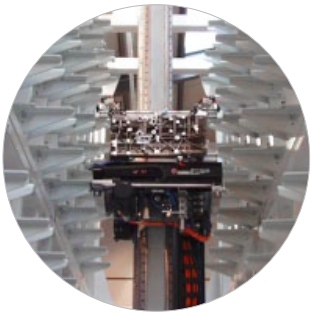
» Good overview of cell layout
» Easy to handle
» Current part data shown for each step
» Display of logs and results
» Log in via RFID reader possible

Screwing and pressing systems

» Screw feeding systems
» Automatic power screwdrivers with recording of process data
» Automatic pressing units for alignment pins

Part buffer and storage area

» Part rack for buffering
» Includable in cell layouts
» Flexible and fast cycle times



Measurement equipment

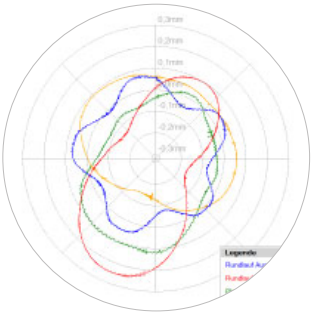
» Included measurement systems to monitoring production
» Systems to calculate correction values for machining processes
» Vision systems for part detection

Paint layer thickness measurement

» 100% paint thickness monitoring
» Used for CNC optimization (cutting speed, correction value)
» Calibration of different paint styles

Graphical result analysis

» Graphical display of measurements
» 100% production monitoring
» Fast and easy trend analysis
» Database used for storing results



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