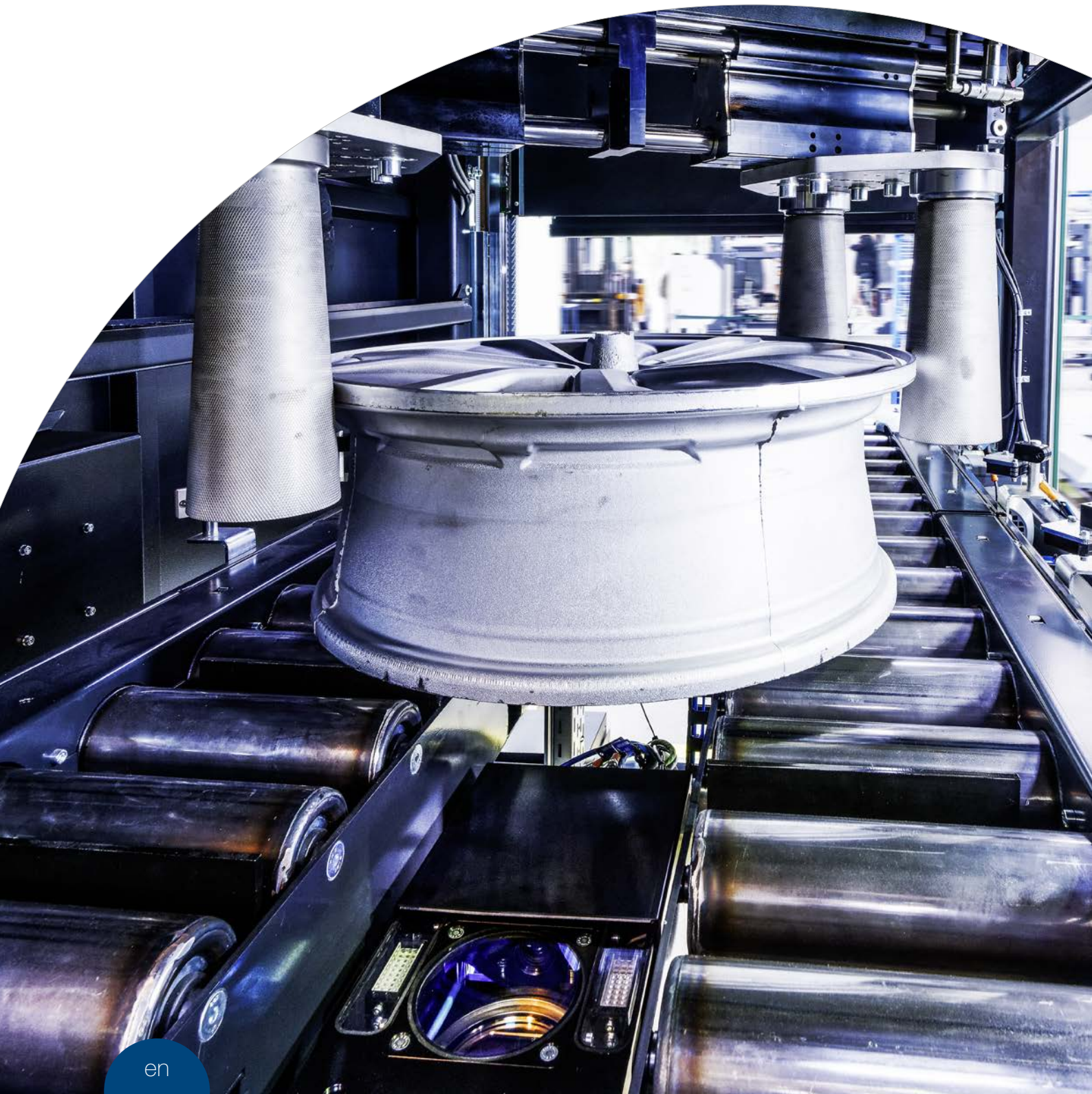# MARK420 / CAM220

Data Matrix marking and reading

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Complete system for single part tracking
for aluminum wheels

MARK420 / CAM220

Data Matrix marking and reading

Constantly increasing requirements in the automotive industry for the tracking of all work steps carried out make a separate serial number for each component necessary.

With the MARK420, unfinished cast wheels are marked fully automatically with a serial number shortly after the casting process. In addition to plain text, the laser technology used also enables Data Matrix Codes for automatic process tracking and control system of all subsequent production steps in wheel manufacturing. The attachment face with the lightening pockets has become the preferred marking position, since these surfaces are available immediately after the casting process and are neither further processed nor painted afterward. The MARK420 has been designed to provide shortest possible delivery times for Data matrix Code marking to the wheel industry. Key for reducing the cycle time is to split wheel recognition and laser marking and execute them in parallel. With the experience from other applications, the MARK420 has been equipped with special features right from the onset, e.g. fine positioning using a camera system and a scanner system for checking and confirming the code that has just been marked. Thus the MARK420 offers a maximum of process safety and reliability. In order to have the entire process chain come from a single source, the CAM220 Data Matrix Code reading system is an ideal camera system from Alpine Metal Tech that was specially optimized for aluminum wheels. In addition, the CAM220 is equipped with additional features such as database connection and automatic intermediate buffering in the event of a network failure, making it ideally suited for implementing a highly accessible and future-proof solution.

YOUR ADVANTAGES

» ## Genuine serial number
Each wheel has a unique number. Continuous tracking from the casting machine up to delivery is guaranteed.

» ## Improvement in the production process
Production errors can be narrowed down to each individual wheel and precise production times.

» ## Complete system from one single source
Marking machine and reading systems come from one supplier.

» ## High level of reliability
Immediate check of the encoding directly after marking to ensure automatic readability.

MARK420

Laser marking

Data Matrix Code

The Data Matrix Code is a 2D code and is used for permanent direct marking by laser in production. It contains information and error correction data. The 14 x 14 variant with a data capacity of 16 numbers is typically used in the wheel industry. Due to the redundant design, almost 100% reading rates are achieved.

Marking area

The code must be marked on a surface that is not painted and is not exposed to mechanical stress in the production process. Basically, the surface must be approx. 1 mm larger than the code on each side and approximately level. An arrangement of approx. 90° to the wheel axle must be ensured.

Details on coding

The information contained in the Data Matrix Code can be assigned as needed. For example, 2 characters can be used for a manufacturer identification, 2 characters for the production year and 12 characters for the mold number, wheel type and unique serial number (ID). Customer-specific modifications and extensions are possible at any time.

Example of a code structure

2 8 1 9 0 2 6 5 8 9 4 2 0 1 7 3

| Manufacturer | Year | Wheel type / mold | ID |
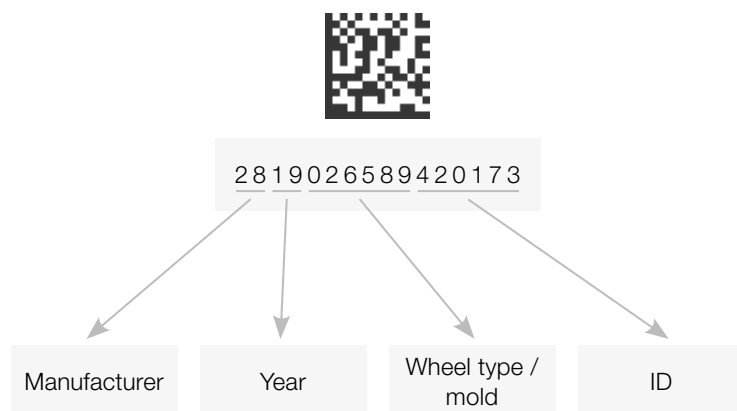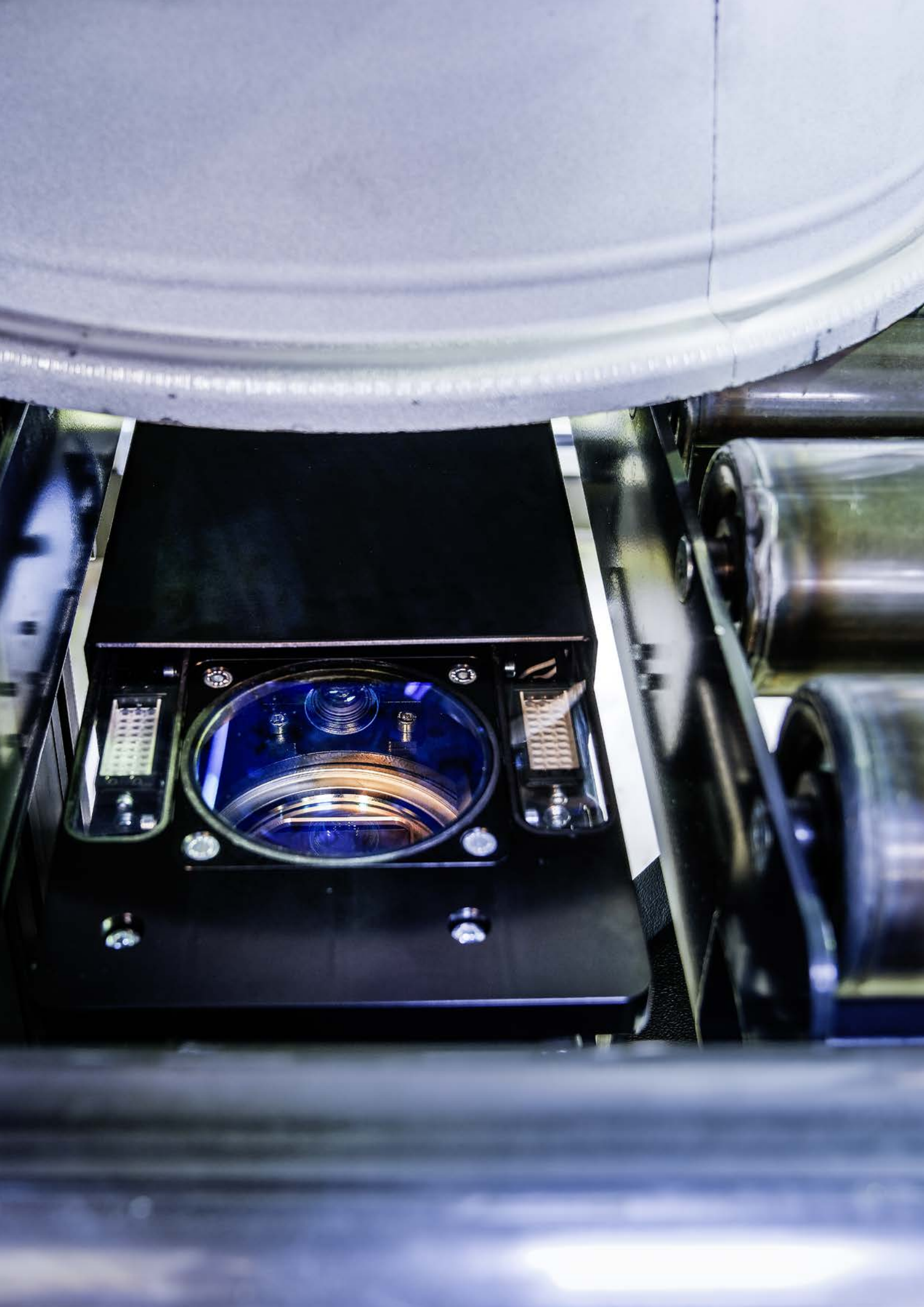
FEATURES

Wheel type identification and positioning

In the MARK420 marking machine, the wheel is identified via the integrated NUMTEC barcode scanner. The wheel with the integrated turning unit is rotated past the scanner; after reading, it is rotated into the appropriate angular position.

ADC system

The integrated ADC system controls the exact focus distance for the laser process. For blanks, the distance from the rear flange to the contact surface can vary greatly due to casting residues and hub float. In order to rule out any influence on the marking quality, for each wheel, the actual distance is measured again using special laser sensors and corrected accordingly.

APC system

The integrated APC system controls the exact position of the marking in the lightening pocket. In the case of blanks, the positioning accuracy can fluctuate above the lateral barcode due to side part offset and casting residues. In order to mark very small lightening pockets exactly in the middle, the integrated APC camera system measures the exact bead position and corrects the marking position accordingly.
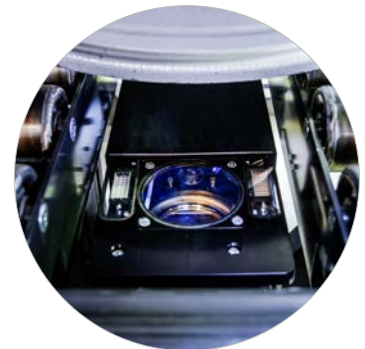
Automatic check

The marked data matrix code is checked in the marking machine with an integrated reading system. This ensures permanent marking quality and 100% legibility at the downstream scanner stations in the plant.

Intuitive software

To operate and teach in new types of wheels. The software is available in various languages.

PHD gripper unit

Reliable and fast wheel centering and wheel rotating with PHD gripper unit

Laser system

30 W laser marking system with 3-axis control system

Compact design

For subsequent implementation in existing lines; no additional safety fence required

Remote maintenance

Optimum access via remote maintenance for quick assistance

OPTIONS

Flow forming wheels

With an additional axis, flow forming wheels can also be identified and marked.

Marking of machined wheels

This option allowes to mark casted wheels but also already machined wheels in the same MARK420 laser marking machine. Cause of the height adjustable gripping system the already machined wheel will be gripped on a special rubber section at the gripper rollers to avoid damages on the wheel. For finished wheels the orientation will be recognized by camera to get the right marking position, for casted wheel as usual the Numtec Barcode-Scanner will be used.

① Control panel

② Wheel infeed

③ Maintenance door

TECHNICAL DATA

Machine features	marking system	laser marking, 30 Watt hybrid laser
	available marking characters	data matrix code, numbers, letters, characters
	process safety	integrated code reading system
	type identification	NUMTEC barcode or camera system (optional)
Wheel parameters	wheel size	14 – 22"
	wheel weight	max. 45 kg
Performance characteristics	machine capacity	220 wheels/hour
Technical components	HMI	19" touch display
	control system	Siemens S7-300 series
Interfaces		Profibus, Profinet, EtherNet/IP, Parallel I/O
Media	electrical connection	3 x 400 VAC, 50 Hz, 10 kVA
		optional 3 x 400-480 VAC, 50/60 Hz, 10 kVA
	pneumatic connection	at least 6 bar
Machine dimensions	machine (L x W x H)	2096 x 1460 x 2354 mm
	control cabinet (L x W x H)	1200 x 600 x 2200 mm
Weight		1800 kg

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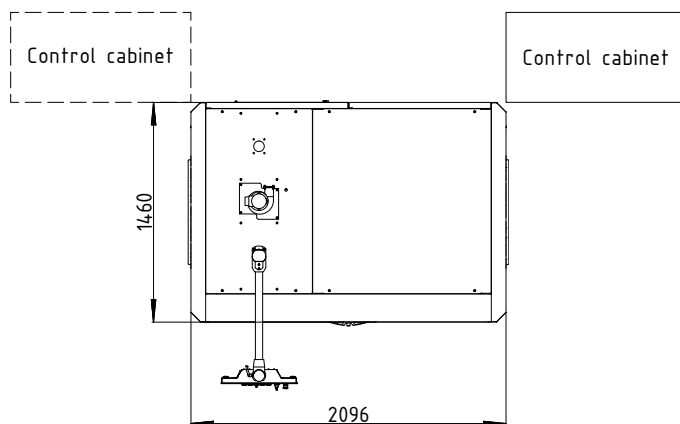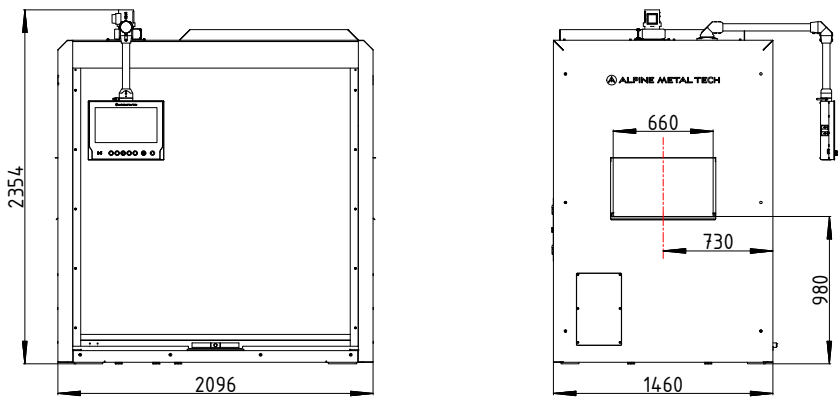
Position of control cabinet:

Backside of the the machine; acc. to production flow direction left or right at the inbound

CAM220

DMC scanner system

DMC code for aluminum wheels

The CAM220 scanner system has been specially designed to read data matrix codes on aluminum wheels. The design of the optical components enables universal use of the devices with the full range of wheel sizes in the 14 – 24" range.

Control unit

The scanner system is controlled by an industrial PC. By using a standard Ethernet connection, the scanner head can be easily installed up to 50 m away from the control unit. The industrial PC also acts as a buffer memory for the read wheels; at the same time, all data can be automatically entered into an SQL database provided by the customer. With the CAM220, the production data is therefore also simultaneously available in the factory IT – without additional equipment such as PLC connections.
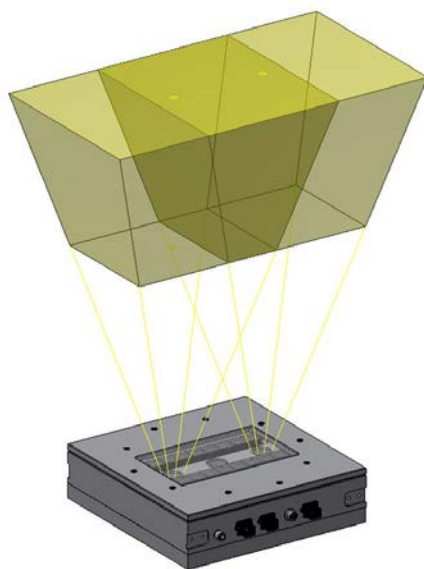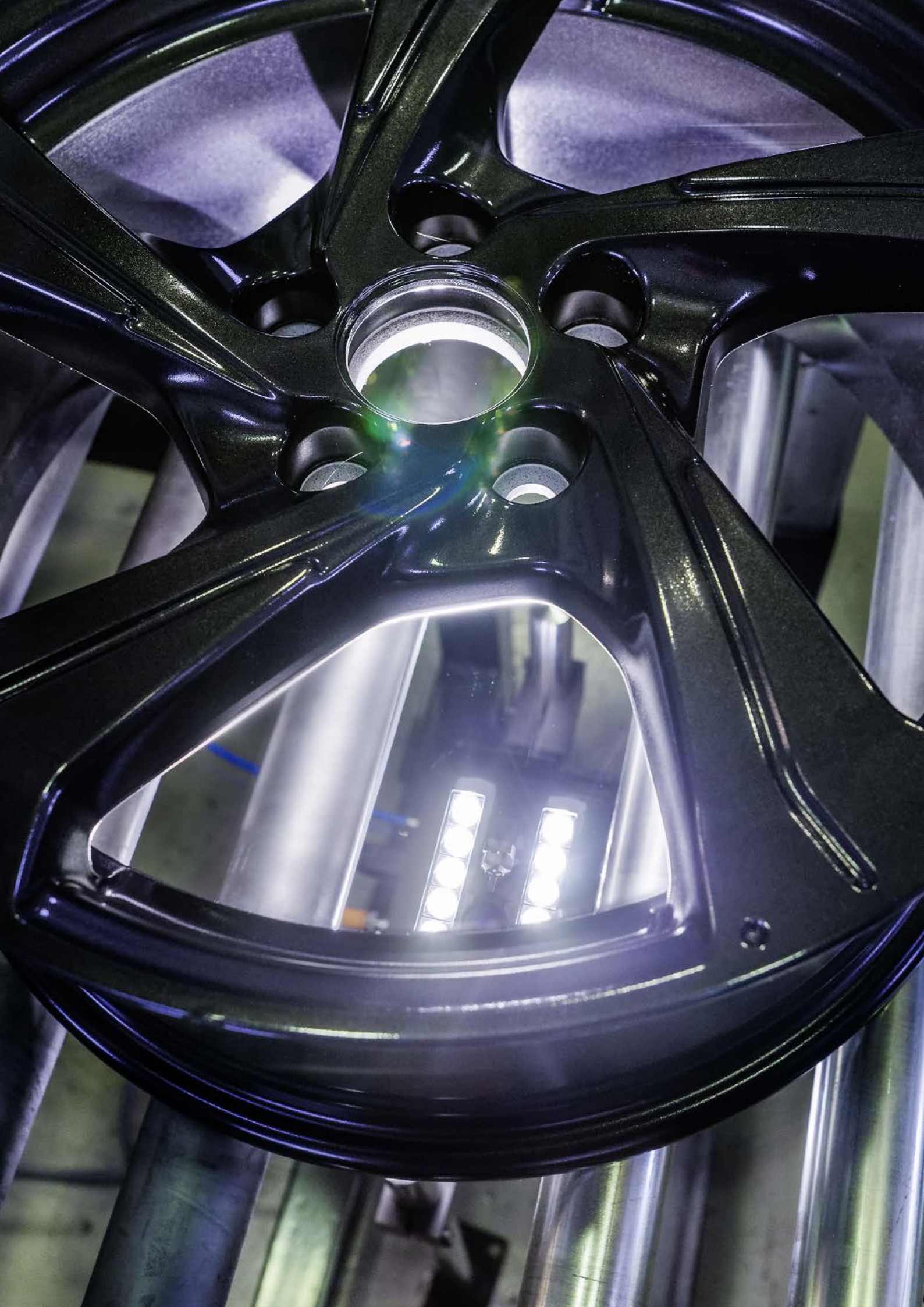
FEATURES

Scanner head

All components installed in the field are installed in a premium-quality aluminum housing with IP67 protection. With the supporting feet available as accessories, no additional equipment is required for installation under a roller conveyor.

Modular design

Depending on the application, the scanner head can be equipped with one or two cameras. The covered reading range is 200 mm with one camera and 350 mm with two cameras (reading range transverse to the transport direction on the roller conveyor). For use at extreme conditions (water, dirt, etc.), the scanner can be equipped with an automatic self-cleaning unit.
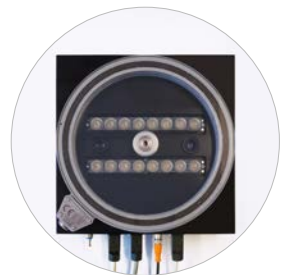
Control cabinet

All technical control parts such as industrial PC, power supply units, monitor, etc., are installed in a terminal box in a format of 500 x 500 x 210 mm. This box is also the only transfer point to the customer for power supply and data connection.

1. Camera
2. LED lighting
3. Automatic cleaning unit (optional)
4. Compressed air connection (optional)
5. Ethernet port 1
6. Electrical supply
7. I/O ports
8. Ethernet port 2

TECHNICAL DATA

Machine features	measurement method	CMOS camera
Performance characteristics	machine capacity	1200 wheels/hour
Technical components	HMI	touch display
	control system	industrial PC
	camera type	industrial camera, 2 megapixel
	lighting	LED bar (2x)
	code type	standard data matrix code
	code sizes	typ. 14 x 14 or 8 x 32 pixels
	physical code size	typ. 11 x 11 mm
	scan speed	in motion, max. speed 30 m/min
	scan area horizontally (transverse to the conveying direction)	standard version: 200 mm extended version: 350 mm
	vertical scan range	200 mm (400 – 600 mm distance)
Interfaces		Profibus, Profinet, EtherNet/IP, Parallel I/O
Media	electrical connection	1 x 230 VAC, 50 Hz, 0.5 kVA
Machine dimensions	L x W x H	304 x 304 x 100 mm (scanner head only)
Weight	scanner head	10 kg
	control cabinet	50 kg

Standard version   Extended version

Reading ranges (transverse to the direction of transport on the roller conveyor)
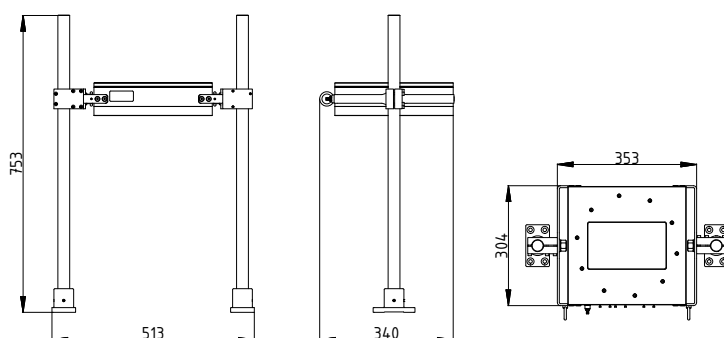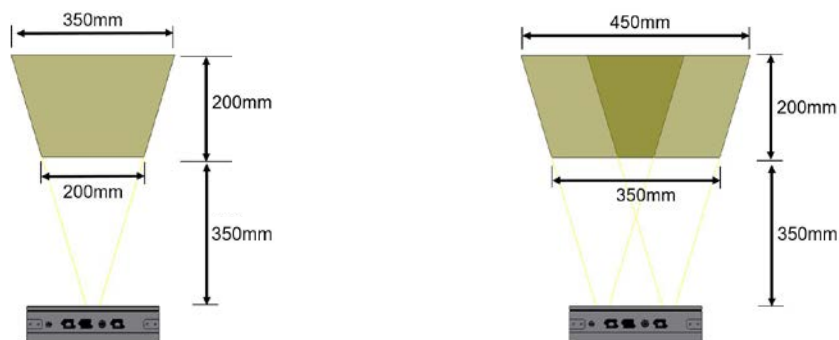
PRODUCTION PROCESS

The use of NUMTEC barcode and data matrix code
in the wheel production
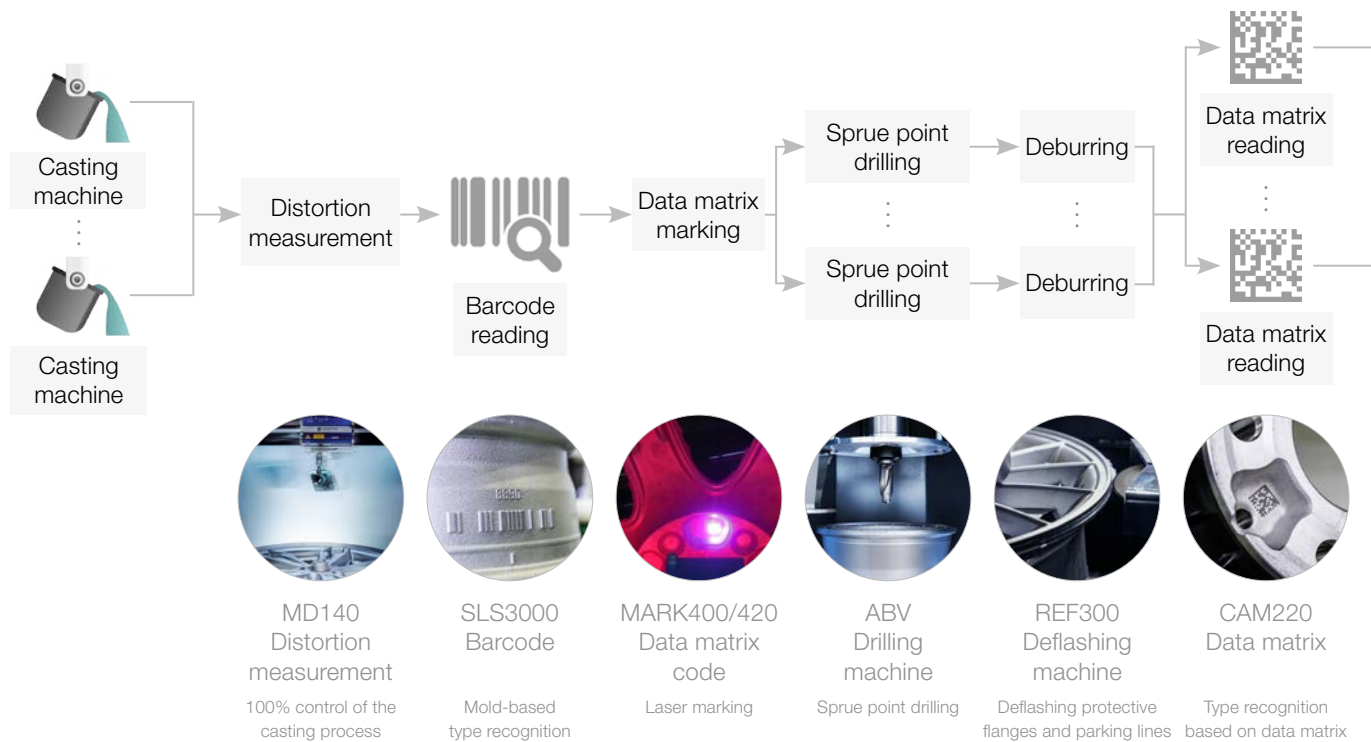
Casting machine → Casting machine → Distortion measurement → Barcode reading → Data matrix marking → Sprue point drilling / Sprue point drilling → Deburring / Deburring → Data matrix reading / Data matrix reading

MD140 Distortion measurement

100% control of the casting process
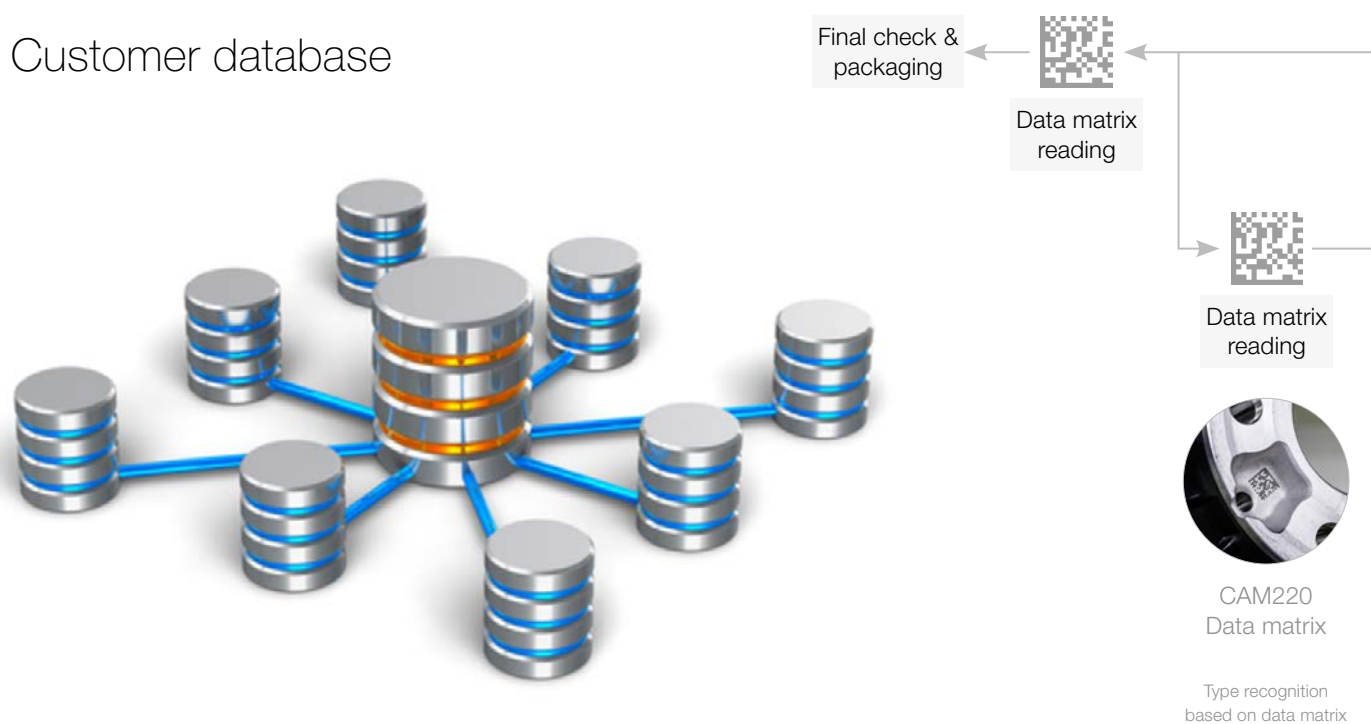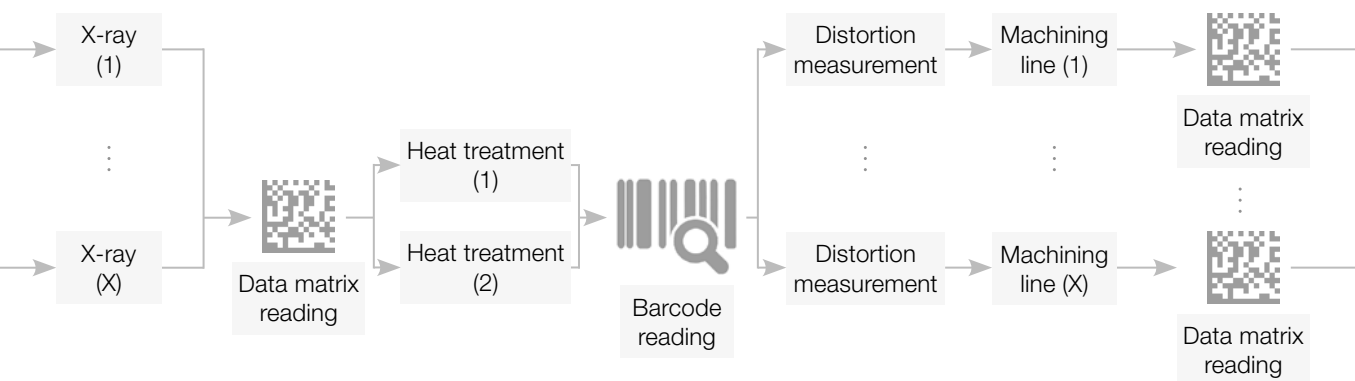
SLS3000 Barcode

Mold-based type recognition

MARK400/420 Data matrix code

Laser marking

ABV Drilling machine

Sprue point drilling

REF300 Deflashing machine

Deflashing protective flanges and parking lines

CAM220 Data matrix

Type recognition based on data matrix

Customer database

Final check & packaging ← Data matrix reading ← Data matrix reading

CAM220 Data matrix

Type recognition based on data matrix

```
X-ray          Data matrix      Heat treatment                    Distortion        Machining           Data matrix
(1)            reading          (1)                               measurement       line (1)            reading
  ⋮                             Heat treatment    Barcode           ⋮                 ⋮                    ⋮
X-ray                           (2)               reading         Distortion        Machining           Data matrix
(X)                                                               measurement       line (X)            reading
```

CAM220   SLS3000   MD322   Robot cell   CAM220
Data matrix   Barcode   Distortion   Data matrix
                                     measurement

Type recognition   Mold-based   Measurement of   Fully automated   Type recognition
based on data matrix type recognition distortion, hub area flexible production based on data matrix
                                     and positioning   cells

```
                   Radial and                  Helium                    Data matrix
                   axial runout                leak test                 reading          Brushing

Painting    Data matrix   Balancing    Data matrix     ⋮                      ⋮              ⋮
            reading                     reading
                                                       Helium                 Data matrix
                   Bolt hole                           leak test             reading          Brushing
Design      Diamond        measurement
measurement cut                                                              Data matrix
                                                                             reading
```
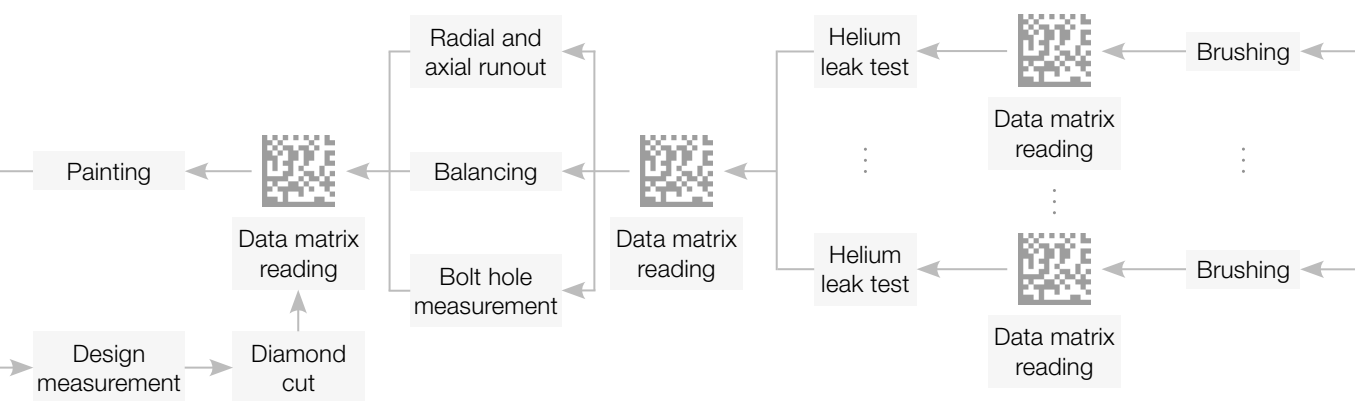
MD220   CAM220   MD860   CAM220   CAM220
Measuring   Data matrix   Testing   Data matrix   Data matrix
machine   machine

Design measurement Type recognition Modular inline   Type recognition   Type recognition
before the diamond cut based on data matrix testing machine based on data matrix   based on data matrix

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