NUMTEC
ALPINE METAL TECH

MARK410 | MARK420
CAM220

Data Matrix Code marking and reading

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Complete system for single part tracking
for aluminum wheels

MARK410 | MARK420 CAM220

Data Matrix marking and reading

Constantly increasing reqiurements in the automotive industry for the traceability of all work steps require a separate serial number for each component.

With the MARK410 and MARK420 laser marking machines, raw cast wheels are marked fully automatically with a serial number shortly after the casting process. In addition to plain text, the technology used also enables Data Matrix Codes for automatic process tracking and control of all subsequent production steps in wheel manufacturing. The wheel support with the lightening pockets has become the preferred marking position, as these surfaces are available immediately after the casting process and are not subsequently processed or painted.

In the MARK410, wheel detection and marking take place in the same position. This makes this machine variant particularly suitable for space critical production sites. With its minimal machine dimensions of 1300 mm in wheel transport direction, the MARK410 fits in alomost every layout.

The MARK420 has been designed for the shortest possible cycle time. By synchronising the laser marking process and wheel type recognition, a very high throughput is achieved.

To check and confirm the marked code, the marking machine can be supplemented with a CAM220 Data Matrix Code reading system from Alpine Metal Tech. The CAM220 is equipped with additional features such as a database connection and automatic intermediate buffering in the event of a network failure, making it ideal for implementing a highly accessible, future-proof solution.

YOUR ADVANTAGES

» Genuine serial number
Each wheel has a unique number. This guarantees continuous traceability from the casting machine to delivery.

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

» Complete system from a single source
Marking machine and reading system come from a single supplier.

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

MARK410
MARK420

DMC laser marking

Data Matrix Code

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

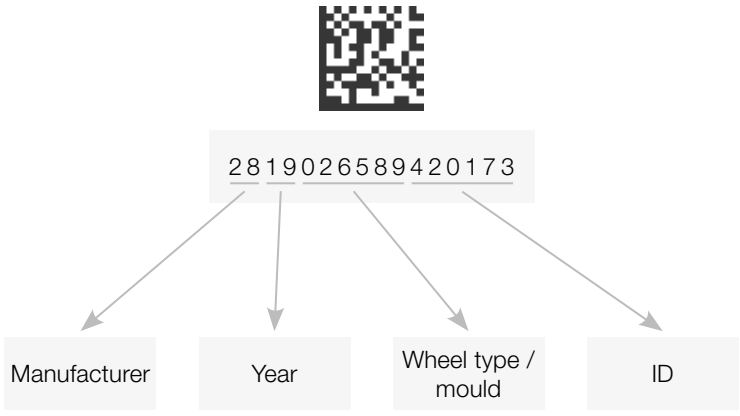
Marking area

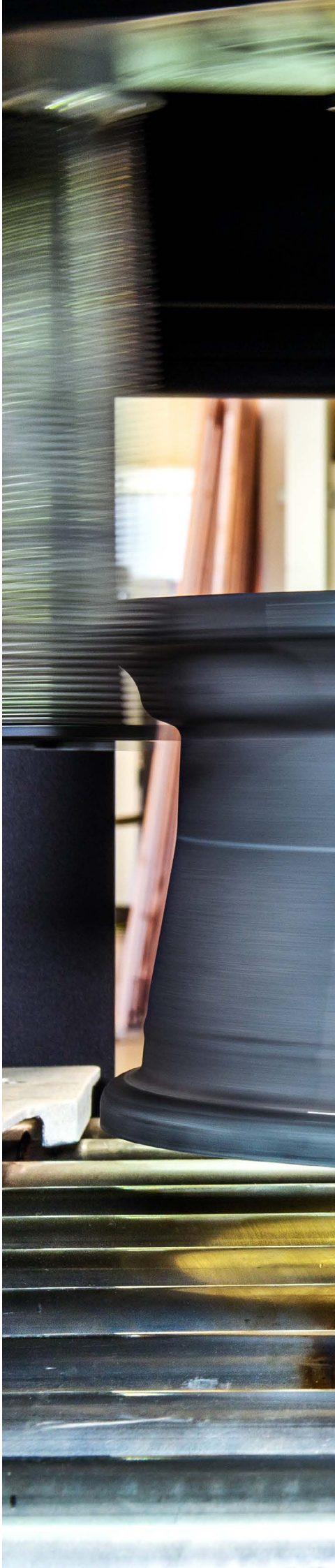
The code must be marked on a surface that is not painted and is not exposed to mechanical stress during the production process. Basically, the surface must be approx. 1 mm larger than the code on each side and approximately level. An alignment of approx. 90° to the wheel axle must be ensured.

Details on coding

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

Example of a code structure:





FEATURES

Marking unit

Excellent measurement quality is achieved by using a 50 W laser marking system with 3-axis control. The laser marking unit is housed in a fully protected housing under the roller conveyor. A pneumatic protective flap effectively prevents contamination of the unit during wheel changes.

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.

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.

ADC system

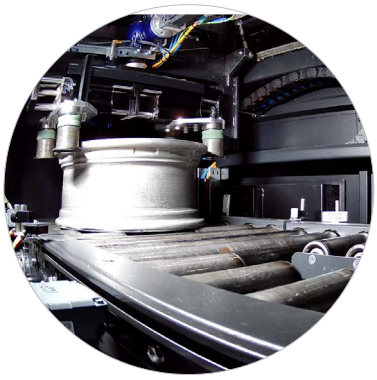
The integrated ADC system controls the exact focus distance for the laser process. For blanks, the distance from the rear flange to the contact surface can vary greatly due to casting residues and hub float. In order to rule out any influence on the marking quality, for each wheel, the actual distance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

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% readability at the subsequent scanner stations in the plant.
A record of this check is also logged in the integrated database.

Live image display

For laser safety reasons, the interior of the machine is completely closed. A live image camera with lighting is installed inside for monitoring and diagnostic purposes. The live image is permanently displayed on the machine visualisation. This ensures that the machine operator is always aware of the current status of the marking process, even in automatic mode. The camera image can also be transmitted to any location via remote maintenance.

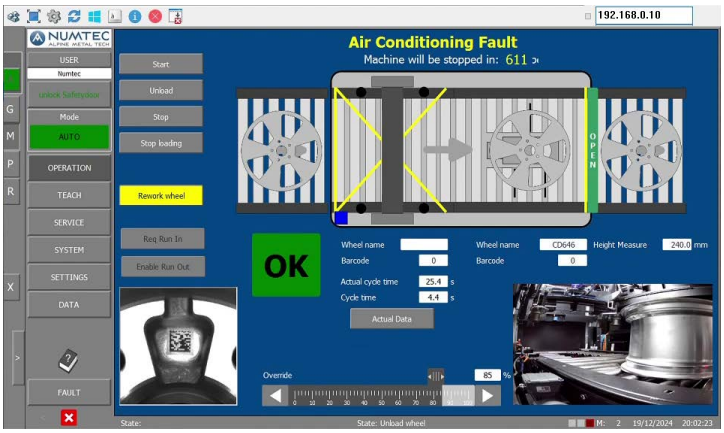


Gripper unit

The gripper unit ensures reliable and fast wheel centering and turning.

Intuitive software

The software, which was specially developed by Alpine Metal Tech, enables new wheel types to be taught in intuitively. It is available in various languages.



OPTIONS

Flow-forming wheels

With an additional axis, flow forming wheels can also be identified and marked.
The system searches for standard and flow-forming wheels simultaneously. This means that the cycle time does not increase during mixed production.

DMC qualifier

This option is used to check the quality of the codes marked directly on the wheel (DPM) in accordance with ISO/IEC TR 29158. Low-quality markings can therefore be recognised as quickly as possible. Assigning possible causes helps to identify problems and avoid unfavourably selected code positions during set-up.

Marking of machined wheels

This option enables both casted and machined wheels to be marked in the same machine. Thanks to the height-adjustable gripping system, the already machined wheel will be gripped by a special rubber section on the gripper rollers to avoid damages on the wheel. An integrated camera system determines the orientation of the finished wheels for subsequent marking. For the casted wheels as usual the NUMTEC barcode scanner will be used.

Needle marking

Using the optional needle marking unit, casted wheels can be marked with a needled code in the MARK420 directly after barcode reading. The code, which usually consists of two characters, serves as proof that the wheel has passed through the X-ray process and provides information about the production day and shift. Additional characters can also be marked at the customer‘s request, provided the marking position is accessible.

The needle marking unit consists of the following main components:

» XYZ cross slide for positioning the marking head
» Pneumatic needle marking head
» Roller conveyor
» Separate control cabinet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MARK410

1. Operation via touch display
2. Safety door infeed area
3. Safety door outfeed area
4. Maintenance door

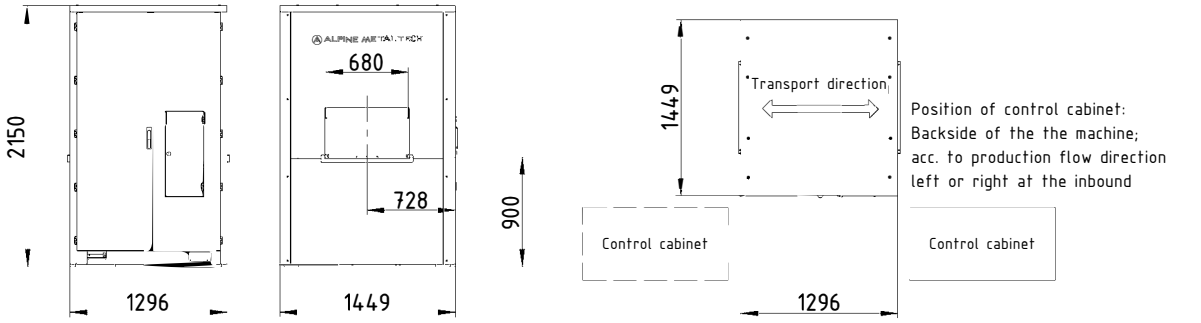
MARK420

1. Operation via touch display
2. Safety door infeed area
3. Safety door outfeed area
4. Maintenance access via roller shutter

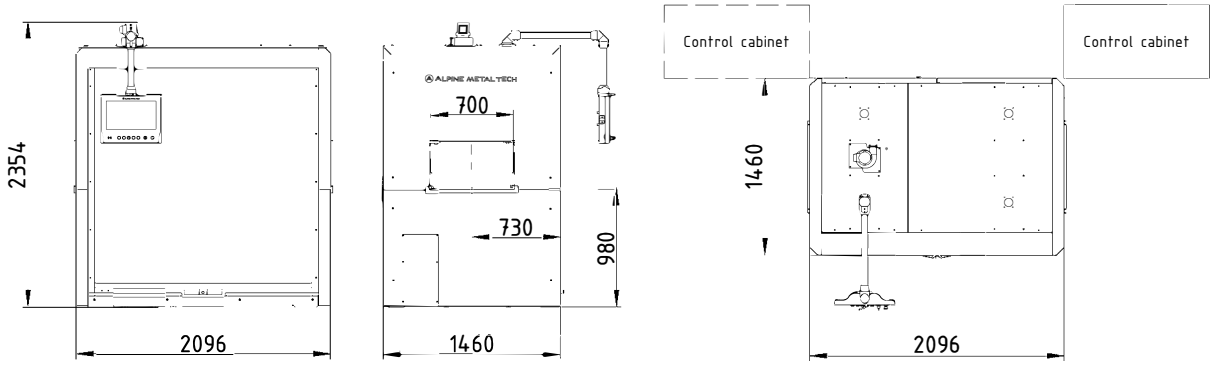
TECHNICAL DATA

		MARK410	MARK420
Machine features	marking system	laser marking, 50 Watt fibre laser	laser marking, 50 Watt fibre laser
	available marking characters	DMC, numbers, letters, characters	DMC, numbers, letters, characters
	process safety	integrated code reading system	integrated code reading system
	type identification	NUMTEC barcode system	NUMTEC barcode system
Wheel parameters	wheel size	15" – 24"	15" – 24"
	wheel weight	max. 45 kg	max. 45 kg
Performance characteristics	machine capacity	164 wheels/hour	220 wheels/hour
Technical components	HMI	19" touch display	19" touch display
	control system	Siemens S7-1500 series	Siemens S7-1500 series
Interfaces		Profibus, Profinet, EtherNet/IP, Parallel I/O	Profibus, Profinet, EtherNet/IP, Parallel I/O
Media	electrical connection	3 x 400 VAC, 50 Hz, 10 kVA, TN system	3 x 400 VAC, 50 Hz, 10 kVA, TN system
	pneumatic connection	at least 6 bar, class 4 acc. DIN ISO 8573-1	at least 6 bar, class 4 acc. DIN ISO 8573-1
Machine dimensions	machine	1842 x 1300 x 2459 mm (LxWxH)	2096 x 1460 x 2354 mm (LxWxH)
	control cabinet	1200 x 600 x 2200 mm (LxWxH)	1200 x 600 x 2200 mm (LxWxH)
Weight	machine	1600 kg	1800 kg
	control cabinet	600 kg	600 kg

MARK410



MARK420



CAM220

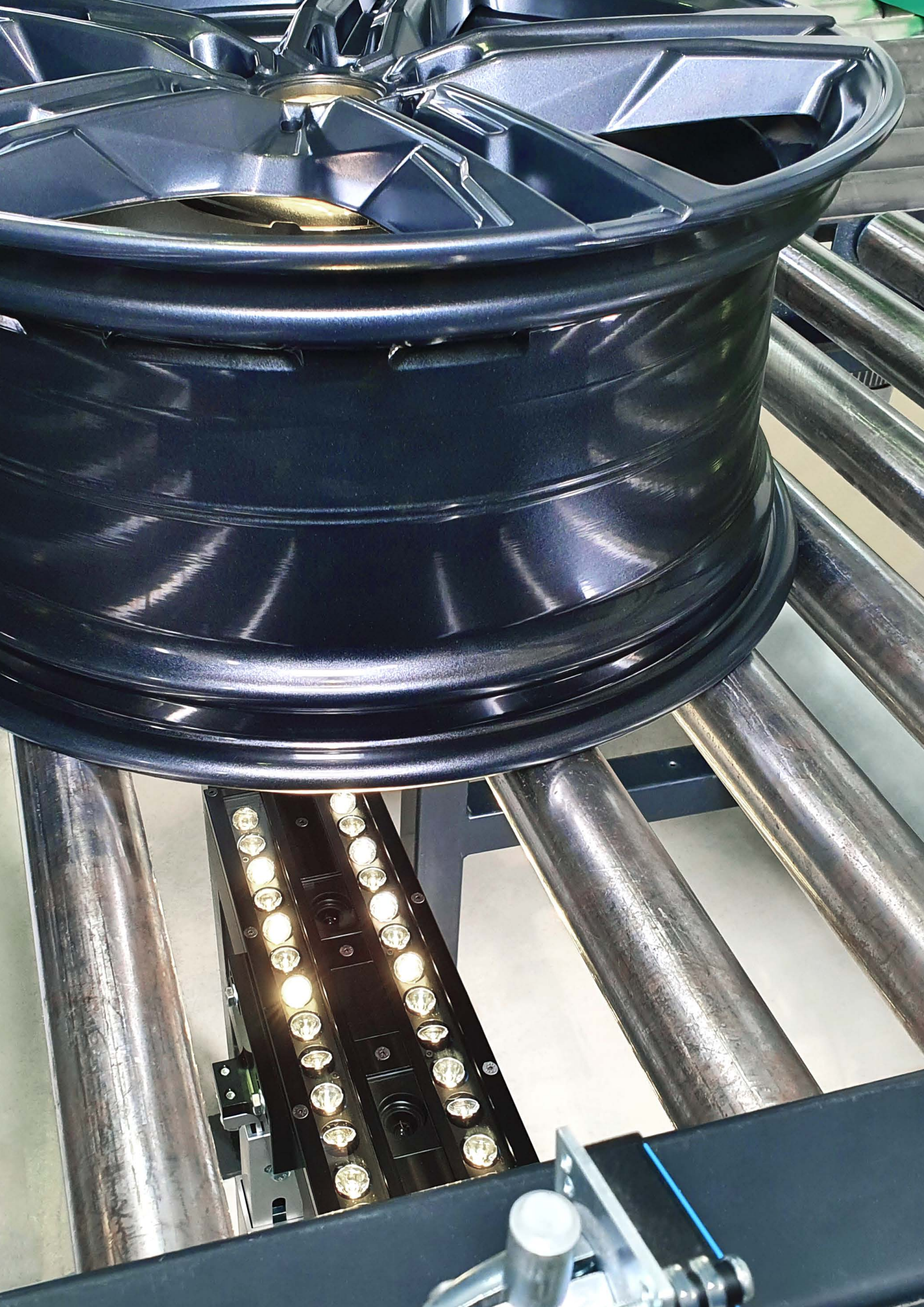
DMC reading system

DMC for aluminum wheels

The CAM220 reading system was specially developed for reading 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 14" – 24".

Control unit

The camera system is controlled by an industrial PC. By using a standard USB connection, the reading unit can easily be installed up to 50 m away from the control unit. The industrial PC also acts as a buffer storage for the read wheels in its own database. Access to this database enables easy integration of this data into a customer's existing database system. The production data is therefore also simultaneously available in the plant IT system with the CAM220, without additional equipment such as PLC connections.



FEATURES

Reading unit

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

Modular design

Depending on the application, the reading unit 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).

Control cabinet

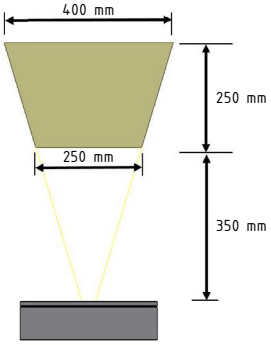
All technical control parts such as industrial PC, power supply units, monitor, etc., are installed in a terminal box. This control cabinet is also the only transfer point to the customer for power supply and data connection.

1. Camera
2. LED lighting
3. Aluminum housing
4. Supporting foot
5. Connections
   - » Camera connection 1
   - » Camera connection 2
   - » Electrical supply
   - » I/O port

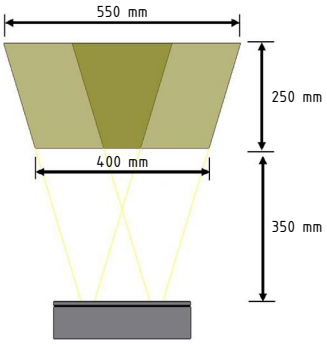
TECHNICAL DATA

		CAM220
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
	reading speed	in motion, max. speed 30 m/min
	reading range horizontally (transverse to the conveying direction)	standard version: 200 mm extended version: 350 mm
	reading range vertically	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)	reading unit	475 x 280 x 605-795 mm (LxWxH)
	control cabinet	500 x 500 x 210 mm (LxWxH)
Gewicht	reading unit	10 kg
	control cabinet	50 kg

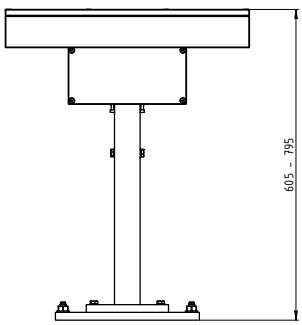
Reading range standard version:

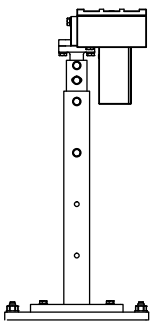


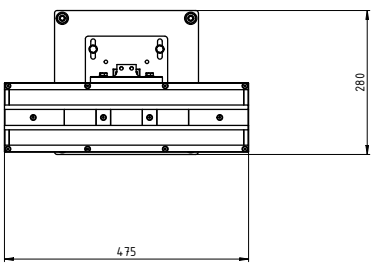
Reading range extended version:



Reading range transverse to the direction of transport on the roller conveyor





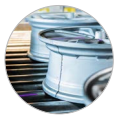


PRODUCTION PROCESS

The use of NUMTEC barcode and Data Matrix Code in the wheel production

Casting


Casting Machine


MD380
Inline Distortion
Measurement


BCU700
Barcode
Reading


MARK400/410/420
Data Matrix Code
Laser Marking

BCU700
Barcode
Reading


ABV300
Sprue Drilling

BCU700
Barcode
Reading


REF300
Deflashing

BCU700
Barcode
Reading


CAM220
Data Matrix
Code Reading


X-ray


BCU700
Barcode Reading


Heat Treatment

Inspection


CAM220
Data Matrix
Code Reading


MD860
Testing
Unbalance,
Wall Thickness,
Center Bore,
Bolt Hole,
Concentricity & Runout


Robot Cell
Balance
Correction


DHS
Valve Hole Closing


Helium Leak Test


DES
Sealing Plug
Removing


Automation


WB24
Vertical Lathe

Machining



BCU700 Barcode Reading

Robot Cell Machining OP1 | OP2 | OP3

BCU700 Barcode Reading

RDW100 Robot Deburring








Automation

MD322 Distortion Measurement & Positioning

AW/JW Series OP1 | OP2 Vertical CNC Lathe

CAM120 Valve Hole Orientation

Measuring Bench

MD422 Center Bore Measurement

EXA-K5 Concentricity and Runout Measurement

FW Series OP3 CNC Drilling

Finishing







CAM220 Data Matrix Code Reading

Painting

CAM220 Data Matrix Code Reading

Robot Cell Diamond Cut

CAM220 Data Matrix Code Reading

MD860 Testing Unbalance, Wall Thickness, Center Bore, Bolt Hole, Concentricity & Runout

Final Check & Packaging



Automation

M220 Diamond Cut Measurement

WD OP3 Vertical CNC Lathe Surface Finishing

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