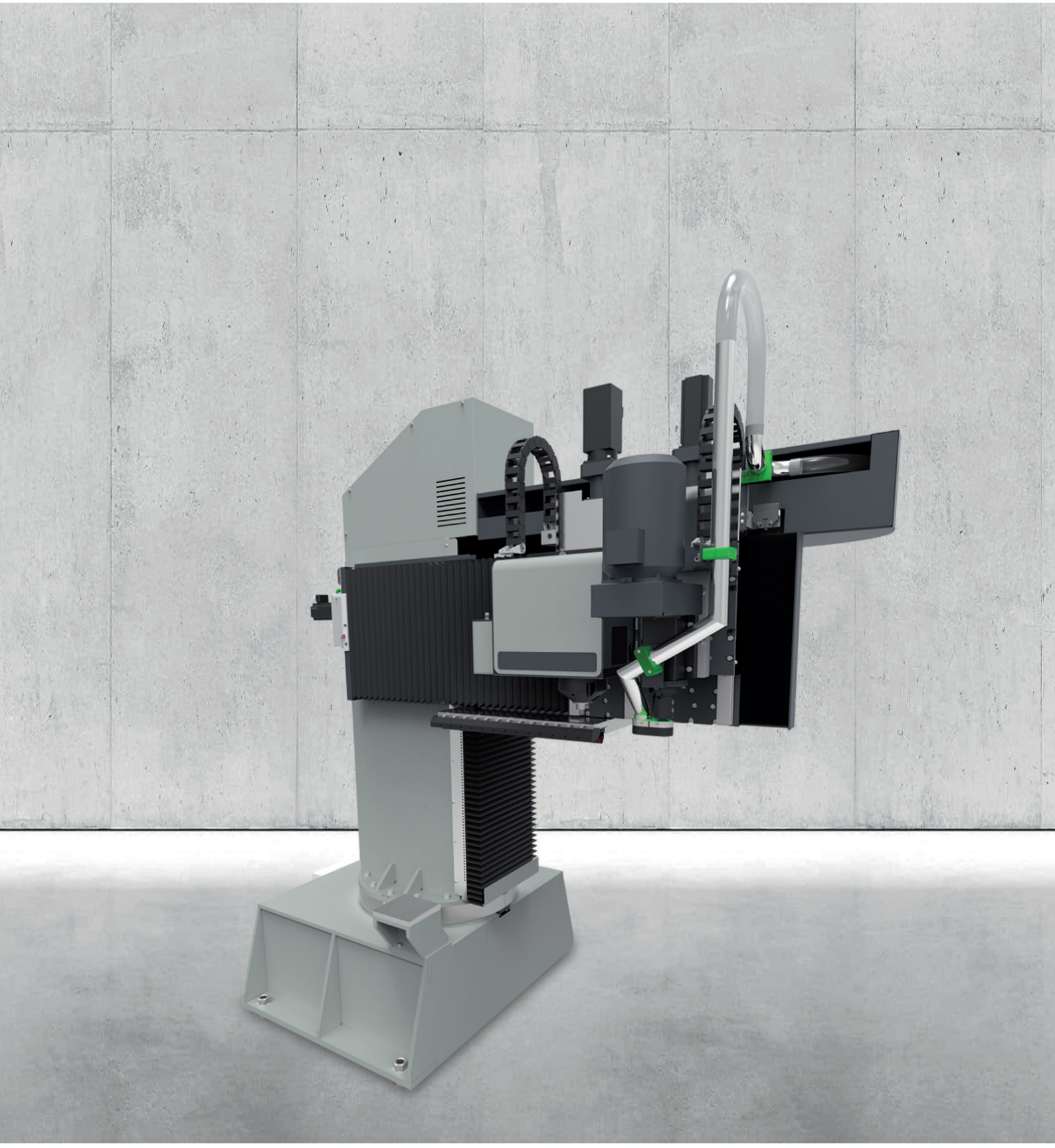
VR5C

Your hardness testing system for special requirements



EMCO-TEST

Intelligent Testing

All for you.

Test methods

Brinell according to EN ISO 6506/ASTM E-10
Vickers according to EN ISO 6507/ASTM E-92, ASTM E-384
Rockwell according to EN ISO 6508/ASTM E-18

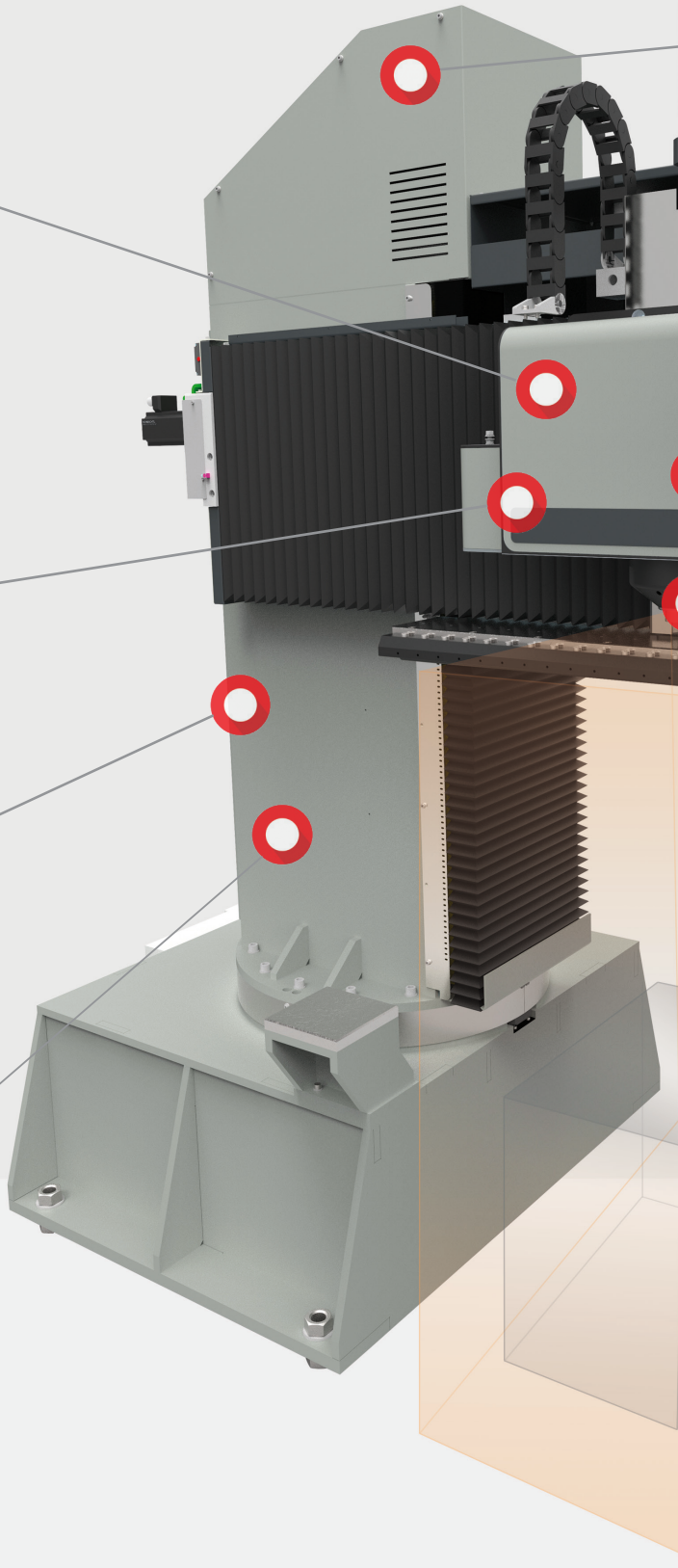
Brinell SmartLight evo

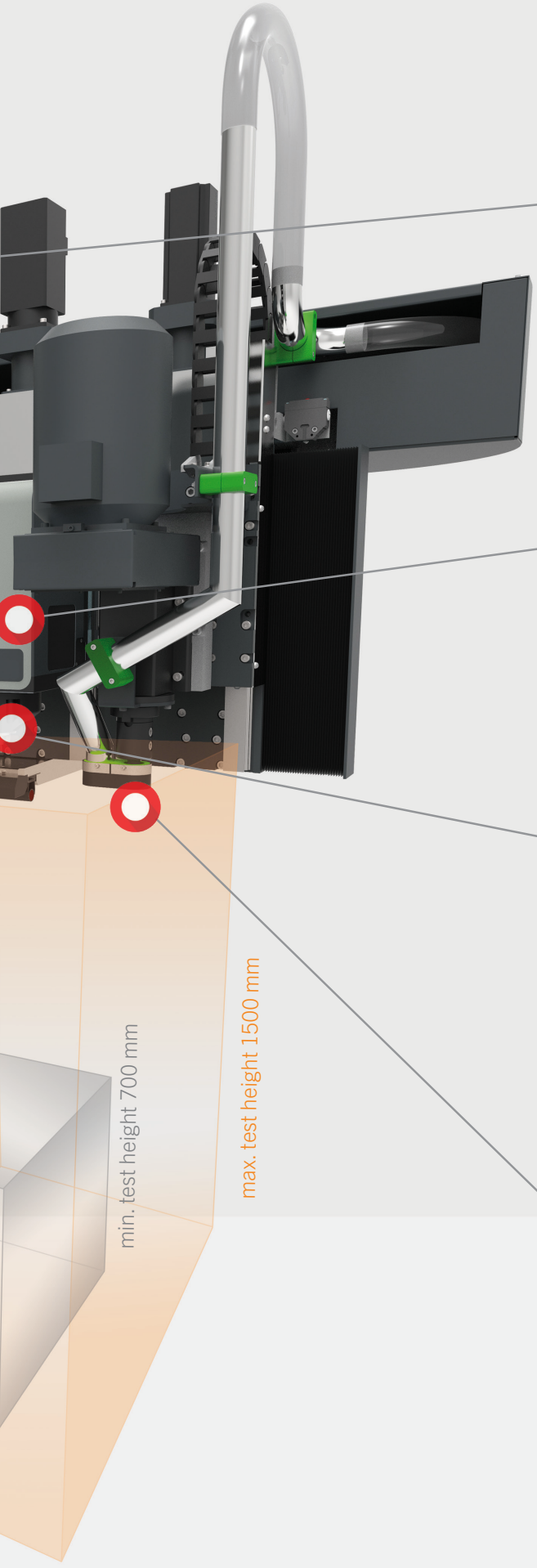
For impeccable evaluation
of Brinell indentations

Motorized rotation axis

Rotation area: -90° 0° + 90°

Siemens S7 controller





Suitable for industrial use

The robust construction in combination with an easy operation and precise measurement, the VR5C- hardness tester is the perfect solution for rough industrial environment.

Optimised test cycle

- Positioning
- Milling
- Testing
- Evaluation

ecos Workflow™

Test software

Ease of use with extensive automation and comprehensive data exchange

Milling module

For surface preparation of the workpiece, incl. suction device for removing the chip waste.

Functional highlights

Operation

- Control of the hardness test module by touchscreen display
- Modern Siemens PLC controller and control console with evaluation system
- Rotatable vertical column for easy workpiece loading (pivot range -90° to +90°)

Positioning

- Laser point for determining the milling/test point position

Milling

- Milling depth, individually adjustable (0,1 - 6 mm), according to the tested material
- Milling unit, incl. hold-down clamping device and 1 set of milling cutters. Suction device with air blow-off nozzle – for removing the chip waste, rest from the milling.

Measurement

- Brinell according to EN ISO 6506/ASTM E-10
- Vickers according to EN ISO 6507/ASTM E-92, ASTM E-384
- Rockwell according to EN ISO 6508/ASTM E-18
- Fully automatic test cycle, incl. swivelling in the lens for uninfluenceable and standard-compliant image evaluation

Evaluation

- Brinell evaluation with EMCO-TEST Brinell Smartlight evo
- Fully automatic, standard-compliant and uninfluenceable evaluation
- Clear data management with powerful import and export functions via xCHANGE
- Statistics, histograms and hardness curve diagrams

Service highlights

- Certification of management and quality system to EN ISO 9001
- Validated, standardised ecos Workflow test software
- Technical documentation

Specimen positioning

EMCO-TEST does not include specimen positioning. The equipment for this is either provided by the customer or offered in an additional quotation.

ecos Workflow Touch test software

ecos Workflow Touch is our intuitive operating software, the mainstays of which are process logic, transparency, and simplest operation.

ecos workflow Touch is continuously enhanced by our in-house software development team in cooperation with our customers. Regular updates are rolled out based on this customer feedback. Our software is equipped for the challenges of the digital factory (Industry 4.0).

The quality of our software, as well as its compatibility with the applicable standards and common test methods, is ensured by our in-house Software Quality Engineering (as per DIN EN ISO 9001:2015).

Hardware: Machine stand

The entire performance control system is integrated into the machine stand. The servomotors are all controlled by Siemens Sinamics motion controllers. The drive unit of the milling module is operated via a Siemens frequency inverter. The digital input and output modules for evaluating the sensors and controlling the actuators are also integral parts of the machine stand. This allows cable lengths to be minimised and no separate location is required for a control cabinet. The assemblies in the machine stand communicate with the Siemens CPU in the control console.

Control console

The control console is the central element for operating the hardness testing system. All the control and signalling devices are integrated into the control console, together with the HMI for the hardness test module and the Siemens automation. A 3-colour signal column is attached to the hardness testing system to enable visual status monitoring. An industrial PC (IPC) running Windows 10 and ecos Workflow Touch is integrated into the console. A 12" industrial touch panel is installed for visualisation and operation of the hardness test module. Automation of the hardness testing system is controlled by a Siemens Simatic CPU.

Data connection

As standard, the hardness testing system is intended as an offline system, although the system is equipped for a future data connection. We would be happy to prepare an additional quotation for this.

Automation

The VR5C testing machine can be integrated into automated solutions.

Test cycle

Initial situation

The test specimen is positioned while the hardness testing system is in the park position. Park position means: rotary axis swung out (90°), boom vertical axis in uppermost position, horizontal axis of milling and hardness test modules in centre position, hardness test module vertical axis at upper end position, milling module vertical axis at upper end position

Positioning

Before measurement, the operator must enter the settings in the ecos Workflow Touch operating software. The laser pointer for test point definition must be switched on. The rotary axis is brought to the desired position with the button on the console. Using the joystick on the console, the horizontal axis is brought to the test point position. The test point is marked by the light spot of the laser pointer. Actuating the joystick in a vertical direction lowers the vertical axis of the boom until the test specimen is clamped. Shortly before reaching the clamping point, the speed of the boom vertical axis is reduced by means of a sensor system to ensure than the test specimen is clamped gently.

Once the clamping process is complete, the actual test procedure can be started.

Milling

The milling parameters for the test specimen can be loaded at the display using a programmed button. The defined miller type is stored in the milling parameters. If the miller needs to be changed, this is displayed to the operator. The test cycle must be started using a button on the control console. The test cycle starts with milling of the selected profile, and the surface is scanned for this purpose with the vertical axis of the hardness test module. After the scanning process, the milling swarf extractor is activated. The milling module axis is positioned automatically and the milling operation is performed. Depending on the total milling depth and depth per milling pass, the operation is repeated several times. The milling profile is created such that the miller is used as sparingly as possible. The coarse milling swarf is removed by the integrated suction system. At the end of the milling operation, the fine swarf is blown away with compressed air from a nozzle located close to the miller. The milling module is moved to the upper end position. The hardness test module is positioned over the milling point.

Hardness test

The hardness test module is clamped automatically at the milling point of the test specimen. The indenter is swung in automatically, then the hardness test indent is created. After measurement, the hardness value is visualised directly on the touchscreen display in ecos Workflow Touch and entered in a measurement table. For Brinell measurement, first the Brinell Smart Light Evo is swung in and ecos Workflow Touch uses automatic image evaluation to evaluate, visualise, and save the measurement. Then the hardness test module is moved to the upper end position. The operator can now set another test point or a substitute measuring point.

After completing the measurement(s) on the test specimen, the hardness testing system can be moved to the park position at the press of a button to make the test area freely accessible for unloading.

The entire test cycle can also be performed without a milling operation.

Cycle time

The entire cycle lasts approx. 150 seconds for a milling depth of (6 mm/300 HBW).

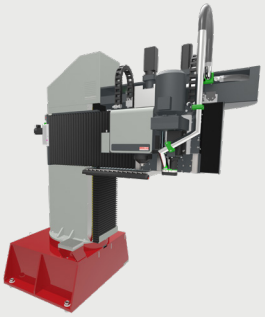
Components

Design and function of the individual parts

Machine base

Welded and painted steel construction, including test plate support, motorised rotary axis, pneumatic service unit and preparation for fastening to foundations using anchor bolts.

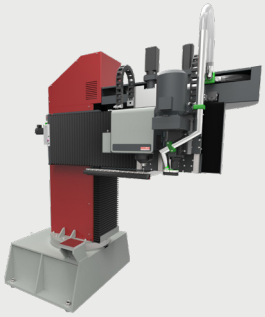
- Pivot range: Variable test position / -90° park position / +90° optional park position
- Pneumatics: Festo air conditioner with standard compressed air connection
- Dimensions: approx. 1100 mm x 1500 mm x 500 mm (LxWxH)
- Colour: RAL7038 (alternatively as per customer specification)



Machine stand

Welded and painted steel construction with integrated vertical axis, including sensor-controlled spindle breakage protection and mount for machine controller.

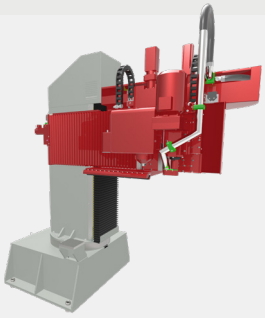
- Travel: 800 mm
- Test height: min. 700 mm / max. 1500 mm
- Travel speed: max. 50 mm/s
- Base dimensions: approx. 1450 mm x 1100 mm
- Colour: RAL7038 (alternatively as per customer specification)



Horizontal arm

Welded and painted steel construction, for vertical, horizontal and rotation movements for positioning the milling and hardness testing modules, incl. clamping device for fixing the workpiece during the testing process.

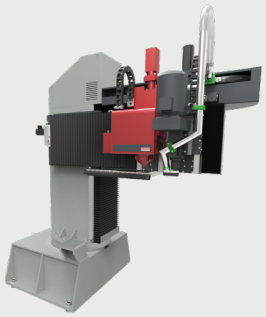
- Travel: 1100 mm
- Travel speed: max. 50 mm/s
- Clamping force: max. 35 kN (hold-down clamp)
- Test outreach: max. 600 mm (distance between machine stand and test point)
- Dimensions: approx. 2250 mm x 1050 mm x 900 mm (LxWxH)
- Colour: RAL7021 (alternatively as per customer specification)



Test axis

Vertical axis for clamping the hardness test module (nose cone) against the specimen, including scan function to determine milling height.

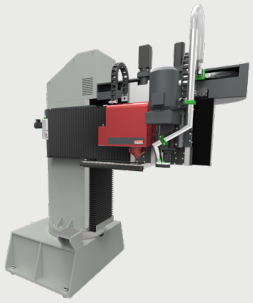
- Travel: 150 mm
- Travel speed: max. 50 mm/s
- Clamping force: max. 35 kN (nose cone)



Hardness test module

DuraPro 500 universal hardness test module with fully automatic, standard-compliant load application and image evaluation. Optimised Brinell evaluation using innovative Brinell SmartLight evo lens, brightness control and autofocus for precisely reproducible measurement results on the widest variety of materials. Including: Test point positioning by manually focusable diode laser for industrial use.

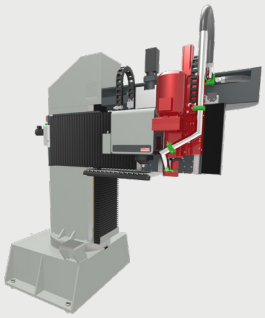
- Load application: Closed-loop control system
- Test load range: 10 kg – 3000 kg (Rockwell/Brinell/Vickers)
- Image evaluation: Brinell SmartLight evo lens in conjunction with ecos Workflow Touch
- Test point positioning: "Heavy duty" spot laser



Milling axis

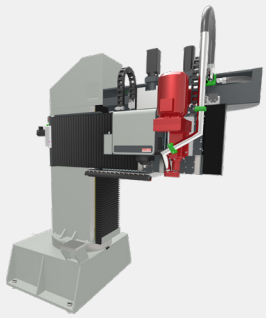
Vertical axis for delivery movement of the milling module with respect to specimen, including swarf suction system and swarf blower system

- Travel: 150 mm
- Travel speed: max. 50 mm/s
- Delivery force: max. 1.5 kN (milling module)



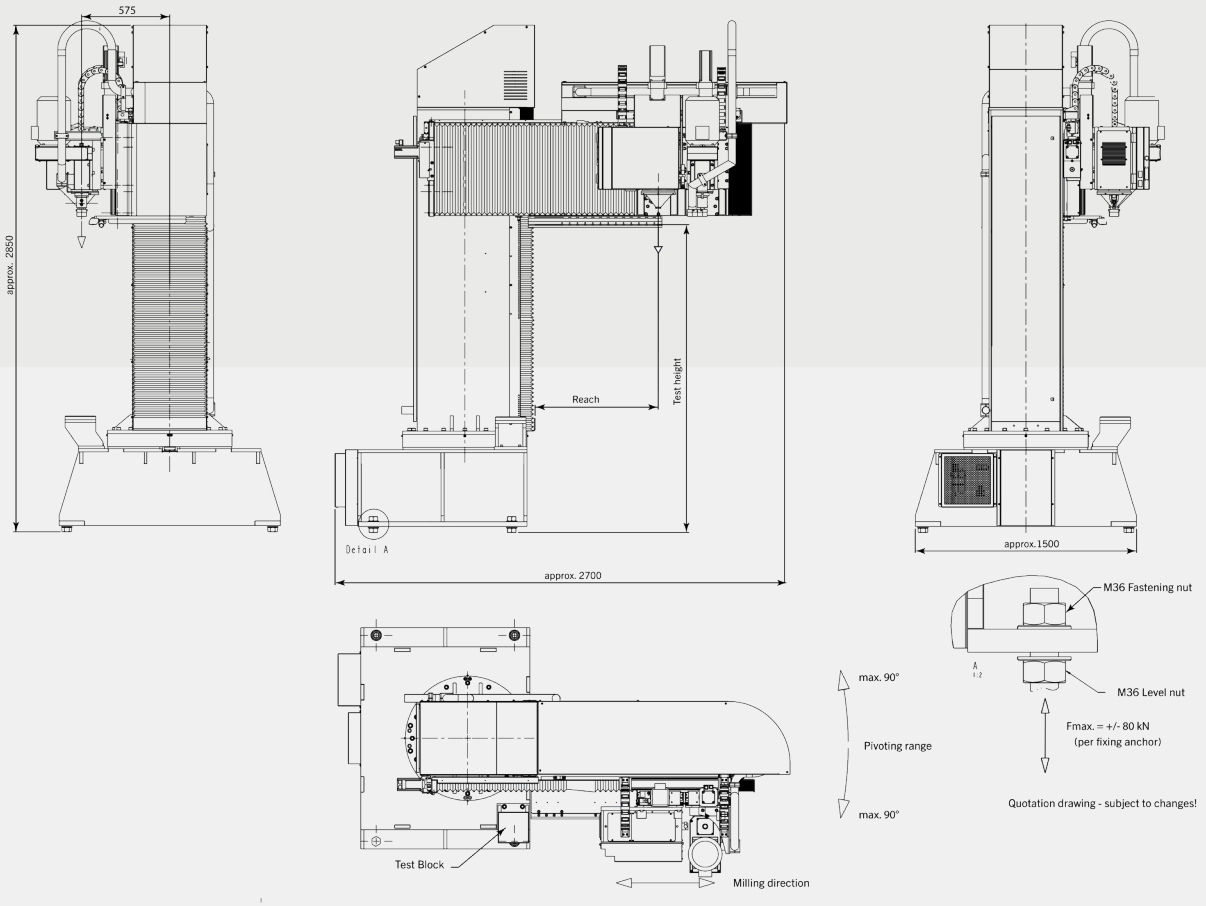
Milling module

- High-precision turning spindle for cutting test point preparation, including automatic swarf suction system.
- Output: 5.5 kW
- Speed: 1450 rpm
- Chuck: DIN2080-1
- End mill: Ø 40 mm with 6 exchangeable, indexable inserts and miller service life monitoring
- Suction system: 4 kW with 35-litre container volume, including fill level monitoring
- Blower system: approx. 4 bar / 0.5 litres per test point



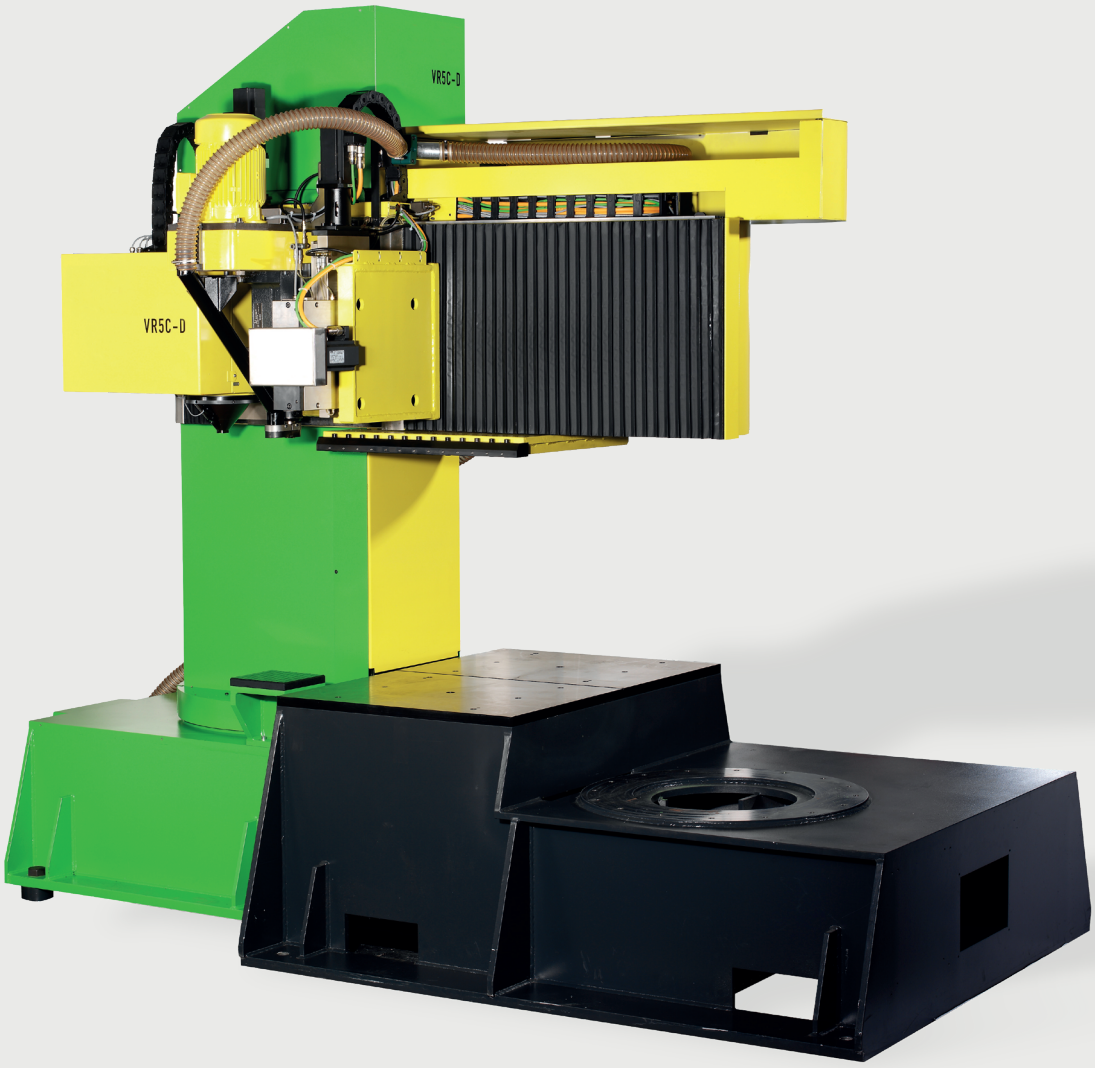
Technical data

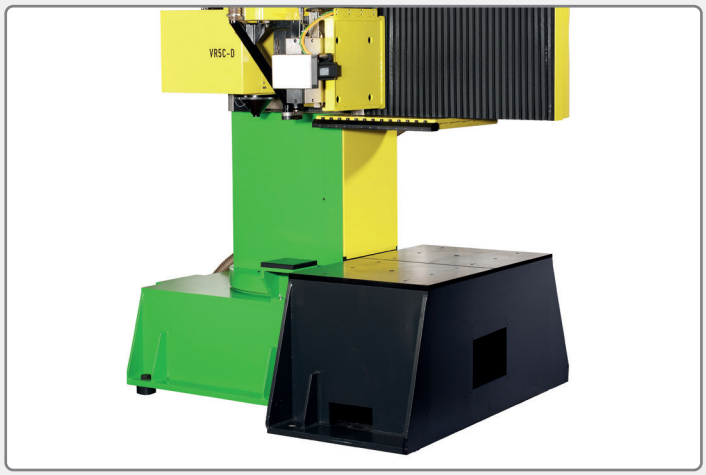
Dimensions	2700 mm x 1500 mm x 2850 mm (LxWxH)
Space requirement	3000 mm x 3000 mm x 3000 mm (LxWxH)
Total weight	approx. 4000 kg
Reach	600 mm
Minimum test height	700 mm
Maximum test height	1500 mm
Calibration plate	Integrated
Swarf suction system	Integrated with fill level monitoring
Milling program management	Integrated
Miller service life monitoring	Integrated
Test point positioning	"Heavy duty" spot laser
Power supply	3x 400 V 3L/N/PE AC 50 Hz
Power consumption	max. 15 kW
Compressed air supply	min. 4 bar (from customer side)
Pneumatics service unit	Integrated
Interfaces	
Hardness test module data interface / automation data interface	Ethernet (1x RJ45)
Hardness test module remote maintenance	TeamViewer
Hardness testing interface	ecos Workflow xChange
Equipment	
Swivel body	2x
Operating system	Windows 10 (64-bit)
Automation	Siemens S7
Test software	ecos Workflow Touch with CIS
ecos Workflow template function / ecos Workflow barcode function	Integrated
Hardness test module control panel	12" industrial touchscreen display
Autofocus	Integrated
Automatic brightness control and image evaluation	Integrated
Hardness test module test load range	10–3000 kg
Scan mode	Integrated

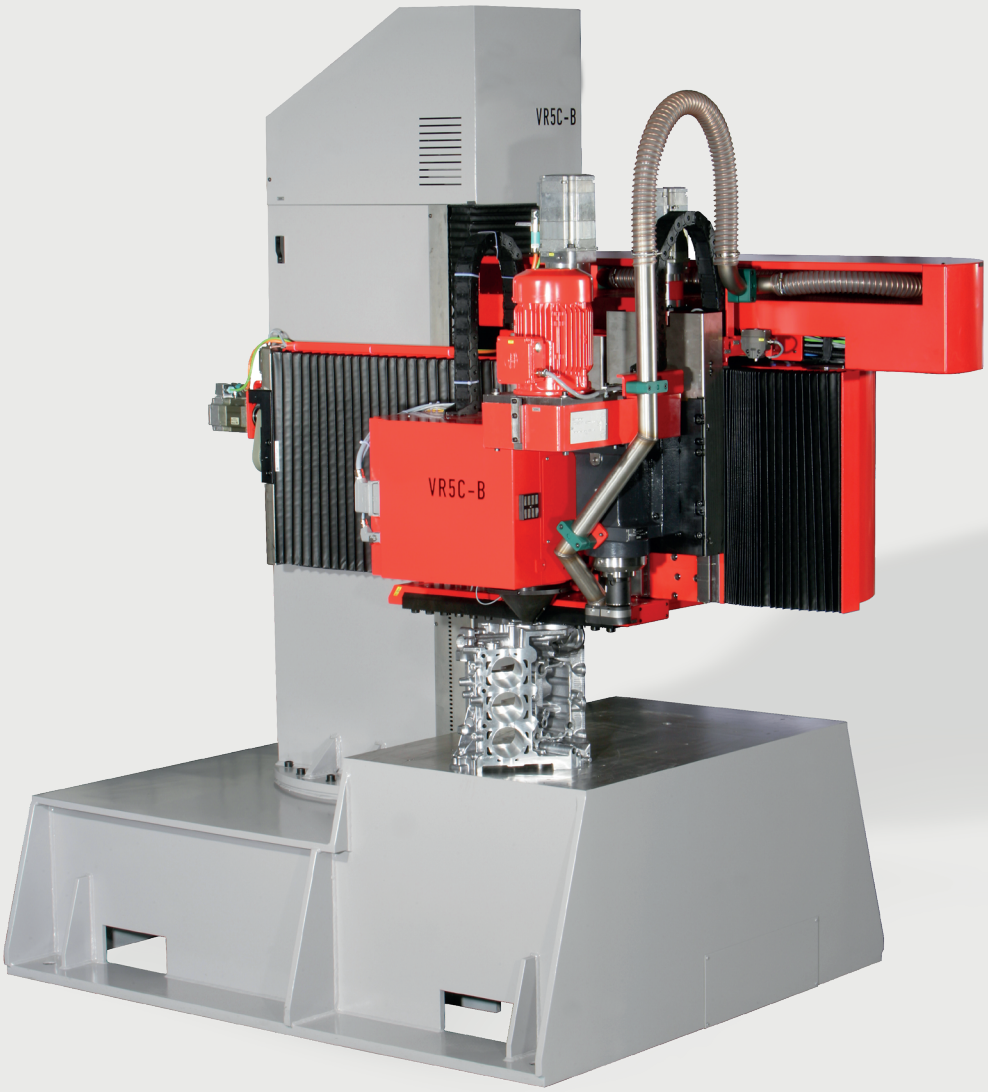


Applications

The VR5C hardness testing machine is used predominantly in steel production plants, rolling mills and large hardening plants for quality assurance.



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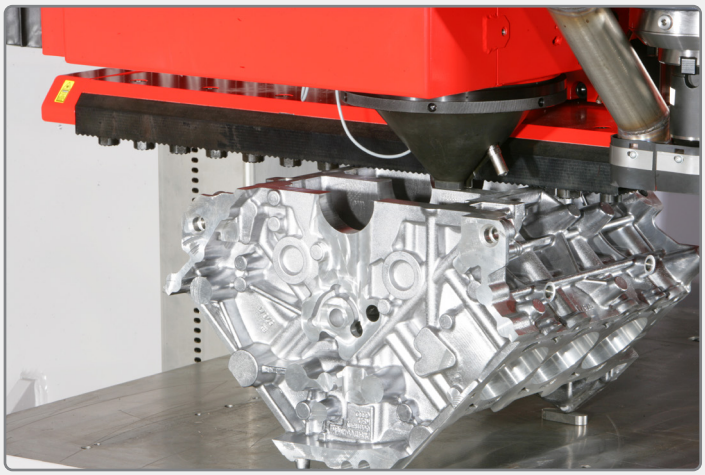
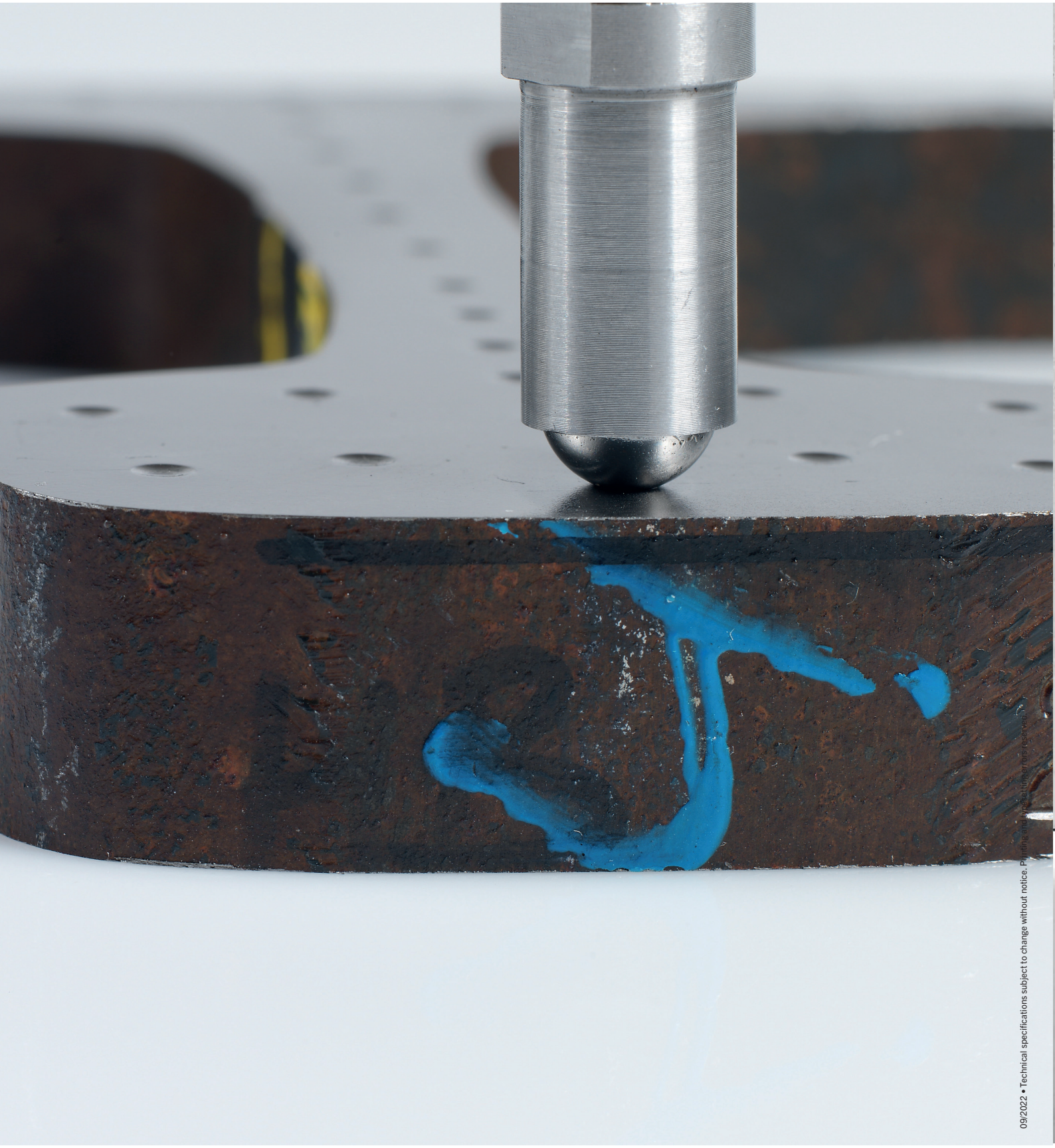


Together we can meet your future requirements



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