M4 Eht

Hardness testing machine

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Working principle of the hardness testing machine:

Manufacturers repeatedly demand high surface hardness together with a soft core for certain parts. Apart from the correct surface hardness, the depth of the hardening zone with sufficient accuracy and the case hardness profile are important.
The EMCO-TEST hardness testing machine M4-Eht determines exactly these three values – the surface hardness, the case hardening depth CHD (Eht) 0.2 to 1.6 mm and the case hardness profile – within approximately 1 minute.
As basic machine the EMCO-TEST Rockwell testing machine M4R 075, respectively M4R 750, is used with a special testing diamond in combination with a PC hardware as well as the respective software (ecos Basis and ecos Eht-R).

Advantages of the machine:

- All-electronic control of the test load through DC motor, load cell and the electronics within the closed-loop control circuit.
- The CHD (Eht) testing between 0.2 to 1.6 mm is completed in approximately 1 minute.
- The workpiece neither has to be destroyed anymore, nor has it to be prepared at the cut face.
- This enables the number of random samples to be increased in series tests.
- Multiple tests on one and the same workpiece can be completed in a very short time.
- Networking with a central computer via a serial, customer-specific interface is possible at any time (ecos 002) and enables to control the heat treatment process.
- In addition the M4-EHT hardness testing machine can be used for all standardized and traditional hardness testing processes HR / HBT / HVT as well.

Key features of the machine:

- Surface hardness – you can switch between HV or HRC.
- The case hardening depth CHD (Eht) is displayed in units of 0.01 mm.
- The case hardness profile in the surface area of 0.3 mm informs about possible surface decarburization, softness or a homogenous hardness profile in the surface area.
- A data recording curve referring to the increasingly used material 16MnCr5 is included in the basic machine.
- Extensive possibilities of saving special data recordings for other materials by means of sample test pieces.
- Data transfer (test results) via network card or COM interface.
- Statistics through multiple sample tests.
- Freely definable statistical limiting values as well as an extensive statistics tool are included in the software.
- Free design of the test protocol by means of the list & label report generator as well as the possibility of converting the test protocol into a PDF-file to be able to e-mail it.
- DIN A4 standard protocols are included in the software.
- Extensive export tool for processing of all program data in the common Windows programs (Word, Excel, ...).

System limitations:

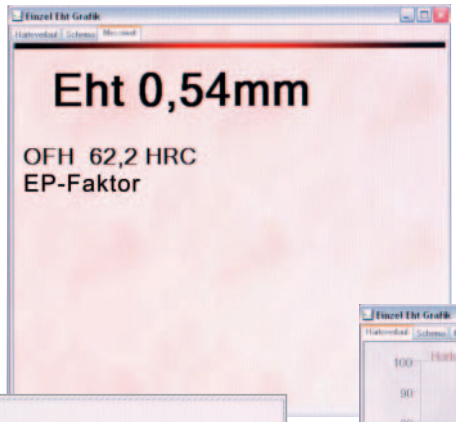
- Minimum sample thickness 4 mm, test point approximately 2 mm from the edge of the sample.
- Very low (below 0.2 mm) and very high (above 1.6 mm) hardness limiting values cannot be tested under all circumstances (general measurement range is set at 0.2 to 1.6 mm).
- Recording of special data using reduced test forces may enable the testing of workpieces in limiting dimensions; however, this requires sample workpieces to be provided.
- Convex or concave parts < Ø 8 mm cannot be tested.
- The clamping surface of the workpiece should have at least a diameter of 16 mm.
- Workpieces weighing more than 30 kg, respectively large dimensions, can be tested with the hardness tester V4-Eht-R.

Example for application of an EMCO-TEST M4 Eht hardness testing machine being in operation at ZF

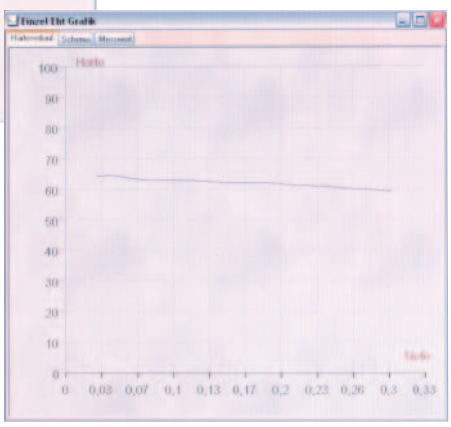
A suitable V-anvil takes up the part.

Measurement of the clamped part. Recording and calibration of the data curve.

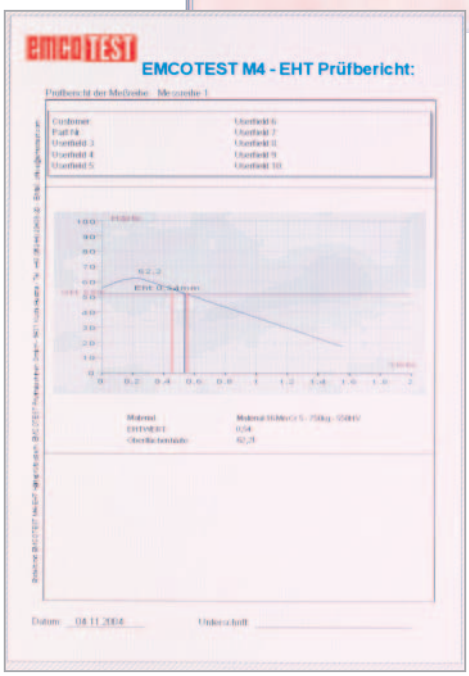
Essential information of the measurement
- case hardening depth
- surface hardness



- Case hardness profile



- Current costs for traditional CHD (Eht) testing amount to € 22,000/ year.
- The costs for testing with the M4 Eht hardness tester, concurrent with the manufacturing process, amount to € 6,000/ year.
- This corresponds to a saving of € 16,000/ year.



- Protocol

Technical data

- Height adjustment via handwheel M4R 075 – testing height 260 mm
- Test block with anvil surface Ø 90 mm
- Mount capacity 200 mm

- Height adjustment via electric motor M4R 750 – testing height 305 mm
- Test block with anvil surface 390 x 280 mm
- Mount capacity 200 mm

Testing force levels	3 – 750 kg (29 – 7357 N)
Dimensions of basic machine M4R	(width) 250 x (height) 1020 x (depth) 630 mm
Dimensions of M4R and machine pedestal	(width) 750 x (height) 1685 x (depth) 700 mm
Machine weight including pedestal	approximately 200 kg
Maximum workpiece weight	30 kg
Power supply	110/220 V · 50/60 Hz
Painting	RAL 1013 (other colours available on request)

- Special testing heads, indenters, special mounts for workpieces on request
- The working life of the indenter depends on the workpiece surface, the roughness, the material to be tested and on a possibly convex or concave shape.

Detailed view of the various clamping possibilities

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