



P 3123

Ultrasonic instrument
for non-destructive hardness depth testing
of heat-treated parts

Non-destructive testing of the hardness depth after surface hardening

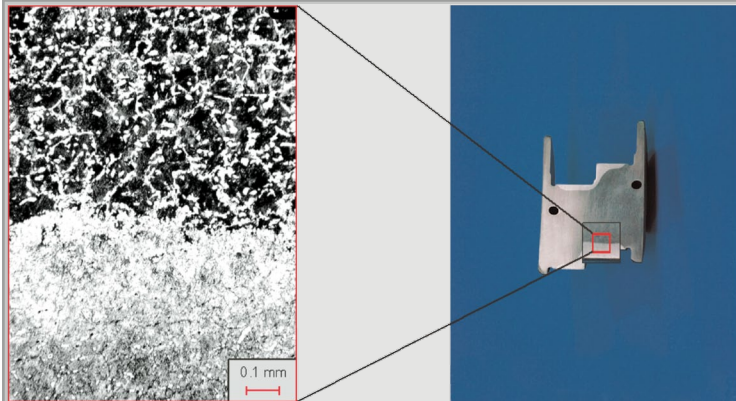


fig. 1

The Situation

Hardening improves the wear resistance and the fatigue limit of dynamically stressed parts. These mechanical properties are primarily determined by the surface hardness, the hardening depth and the residual stress depth profile. The case hardness depth (chd) - or the thickness of the hardened layer - is essential for the quality of the case hardening process. Up to now, using destructive methods on random samples was the only way to control the quality of the hardening processes. Needless to say, the method was very costly and time-consuming.

The Solution

In collaboration with the Fraunhofer Institute for Non-Destructive Testing (IZFP), Q NET has developed an ultrasonic method for fast and non-destructive case depth testing. We reduce the effort and the costs of testing and provide fast production control to ensure consistently high quality levels. The testing system is used for optimizing production parameters, reducing downtime after inductor changes, for fast production control and for quality management.

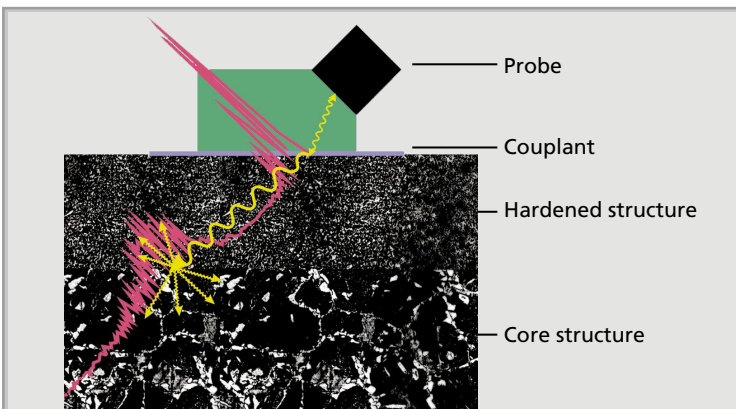


fig. 2, Testing

The System

The system is based on the effect that the hardened layer is almost transparent to the ultrasonic waves while the non-hardened material scatters them back (fig. 2). The backscattering signal is received by the testing probe system, it is processed with IZFP testing electronics and is evaluated in a fully automated way. The results that are shown indicate the depth of the hardened material (chd).

Comparisons show that the results very much comply with the results of traditional destructive methods. The method is suited for testing case depths of > 1.5 mm (fig. 3).

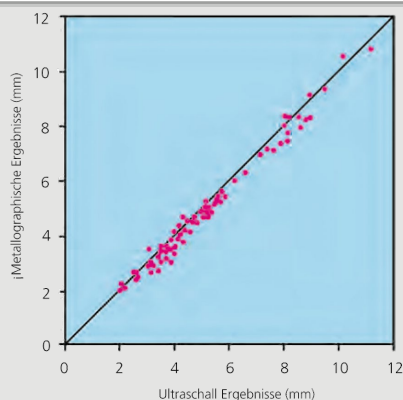


fig. 3, Operating interface of the case depth tester, result documentation, back-scattering graph



The Advantages

- Testing device can be integrated into the production process.
- High testing precision
- One testing process takes only seconds.
- Fast testing of large quantities is possible.
- With adequate sensor adjustment radiuses can also be tested.
- The device is portable (8kg) and suitable for mobile use.
- The device can easily be adjusted to the customer's needs.

Device Description

- Notebook for industrial use
- 4 measuring channels / multiparameter sensor technology
- Test frequency: 5-30 MHz, Battery- and mains-operated
- Software / operating system Windows 7 / XP
- Modular hardware build-up
- Modular software build-up: Planning, testing and data export. The use of databases throughout the whole process enables your company to access and organise the planning and testing data via a connected company network. With the help of the report generator that is implemented in the software, the client is able to interactively generate master copies.
- Additional types of devices: Stationary special testing machine; desktop version with scalable hardware

Our Portfolio

QS Services:

- We help you set up your QC organisation, we analyse your production process.
- We help you choose measuring and testing methods that fit your production processes or testing systems which – if necessary – will be tailored to your needs by us.
- We test your components or products.

Market Services:

- We help you improve your competitiveness by organising and conducting national and international development projects.
- We help you optimize your customer acquisition on the international market.

Manufacturing and Sales of Machines:

- We provide you with machines and support you with our implementation-, maintenance-, and repair service worldwide.

Our aim is the quality and safety improvement of technical products and services. We want to increase the competitiveness and profitability of your company by reducing the quality costs.

Our technological competence is based on the know-how of the Fraunhofer Institute for Non-Destructive Testing (IZFP) which can also be used by our partners and clients in joint projects on an international scale.

Q NET is creating an international network of contractual partners. Up to now, Q-NET has partners in: USA, Russia, China and India.



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