Barkhausen Noise Analysis

BN

Non-destructive (NDT) measurement solutions for grinding burn and heat treatment defect testing



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Measure for success

NOVA INSTRUMENTS

Barkhausen Noise Analysis

Optimize your manufacturing process and deliver the highest quality components by using Barkhausen noise analysis for detection of grinding burn damage and heat treatment defects.

Barkhausen noise analysis is a non-destructive method involving the measurement of a noise like signal induced in a ferromagnetic material by an applied magnetic field.

There are two main material characteristics that will directly affect the intensity of the Barkhausen noise signal:

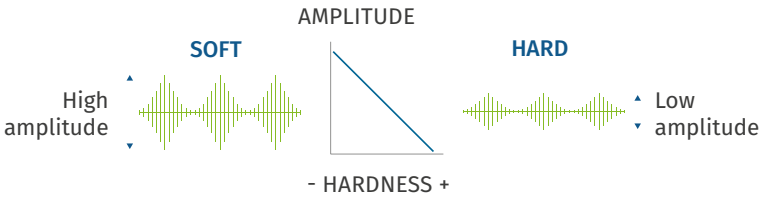
- ✓ The microstructure of the sample – this effect can be broadly described in terms of hardness: the noise intensity continuously decreases in microstructures characterized by increasing hardness.
- ✓ Presence and distribution of elastic stresses – compressive stresses will decrease the intensity of Barkhausen noise while tensile stresses increase the intensity.

Measurement principle

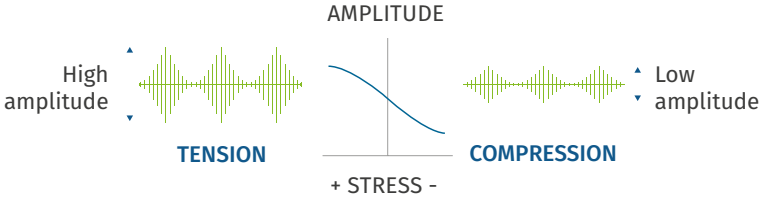
Barkhausen noise analysis requires the use of a Barkhausen noise signal analyzer (Rollscan) and a sensor. Additional data collection software can be utilized for data tracking and exporting, surface mapping, and automated measurement evaluation.

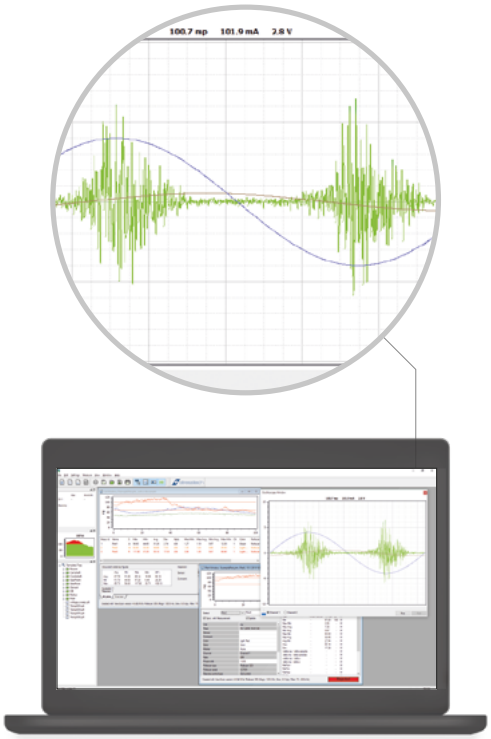
Performing Barkhausen noise measurements is a simple process:

1. Measurement area is magnetized with alternating magnetic field by the sensor.
2. During magnetization the sensor measures the Barkhausen noise signal and transfers it to Rollscan.
3. Real-time measured values are displayed on Rollscan and/or the ViewScan software.









Applications

Many manufacturing processes involve some modification of stress and/or microstructure that can be readily analyzed with Barkhausen noise.

Examples include:

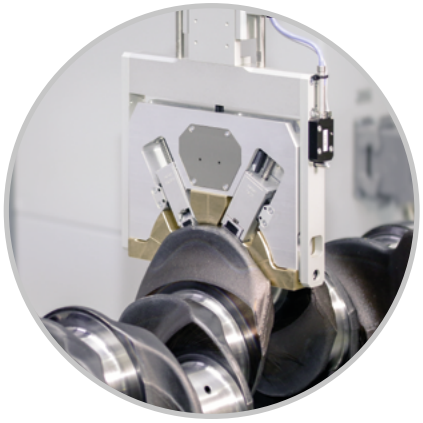
- ✓ Machining and grinding processes – detecting tempering or stress changes
- ✓ Cold working, shot peening, HFMI, forming – detecting stress changes
- ✓ Surface hardening – carburizing, induction hardening – detecting hardness

Various dynamic phenomena, including fatigue, stress corrosion, and creep, involve changes stress and microstructure and can be effectively monitored using Barkhausen noise analysis.

Camshafts



Crankshafts



Gears



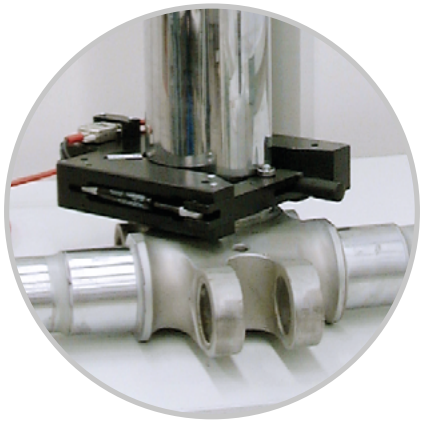
Grooves and shafts



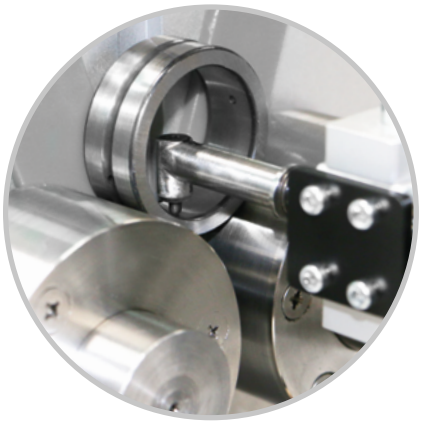
Grooves and holes



Landing gears



Bearings



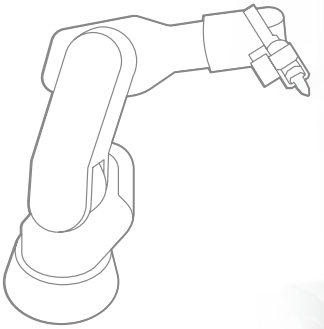
Barkhausen Noise Analysis Systems

Main features of Barkhausen noise measurement system are:

- ✓ Rollscan signal analyzer
- ✓ Barkhausen noise sensor(s)
- ✓ ViewScan or MicroScan software for data acquisition and analysis
- ✓ Component handling system / automation

Inline systems

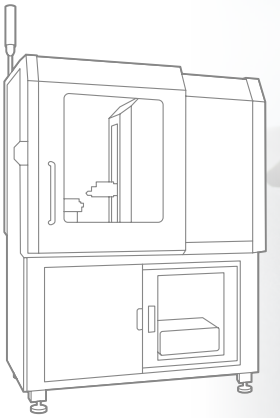
Inline systems can be integrated into the production line to ensure immediate reaction to process changes. Production data is collected automatically and can be analyzed and used for process optimization.

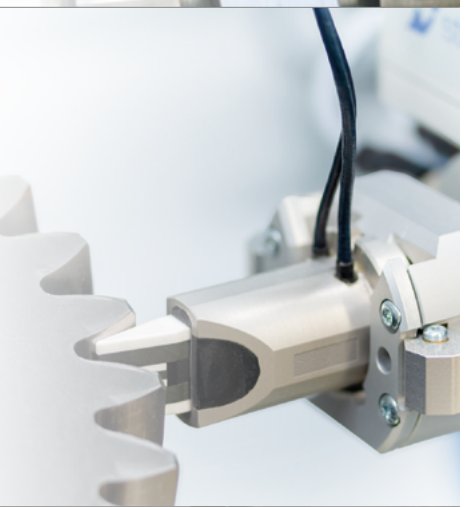




Automated systems

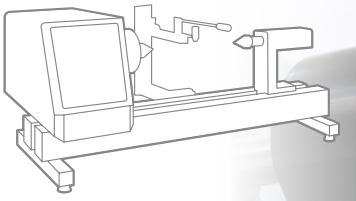
Automated systems for quality inspection are tailored for offline use. Easy to use software makes inspections intuitive and systems can adapt to various component types.

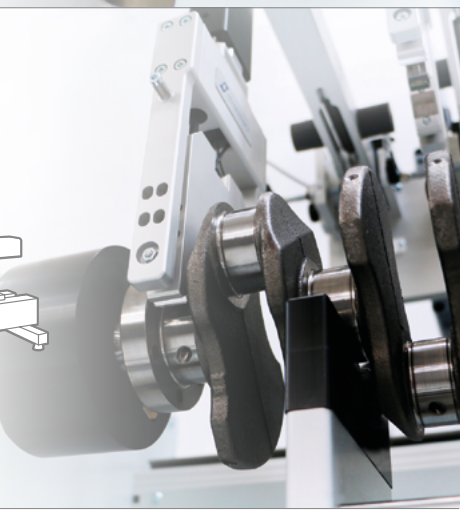


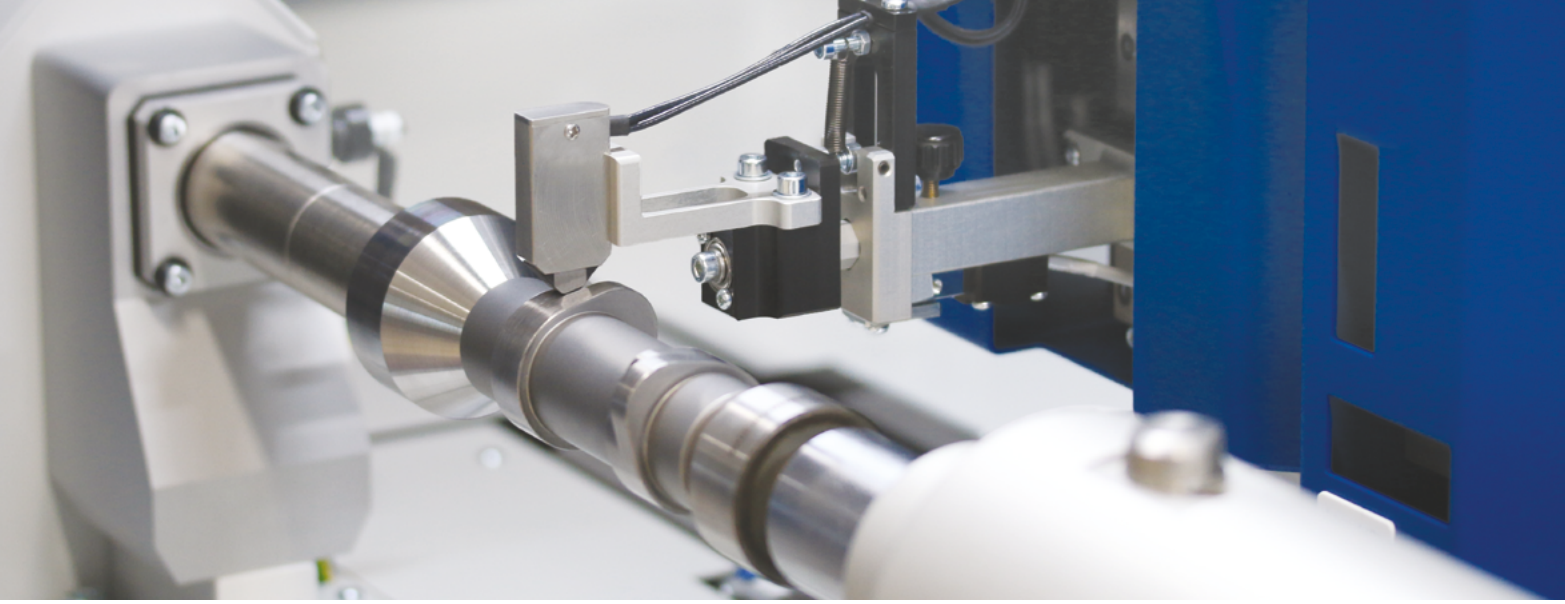


Semi-automated systems

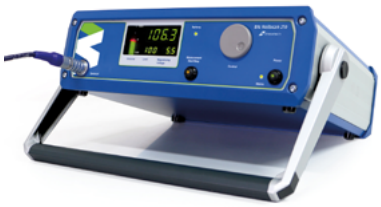
Semi-automated and manual Barkhausen noise analysis systems are suitable for low volume measurements. The most simple Barkhausen noise measurements can be performed handheld with only a sensor and an analyzer.







Barkhausen noise signal analyzers



BN Rollscan 210 for basic setups and manual systems



BN Rollscan 350 with graphical display for manual and automated systems

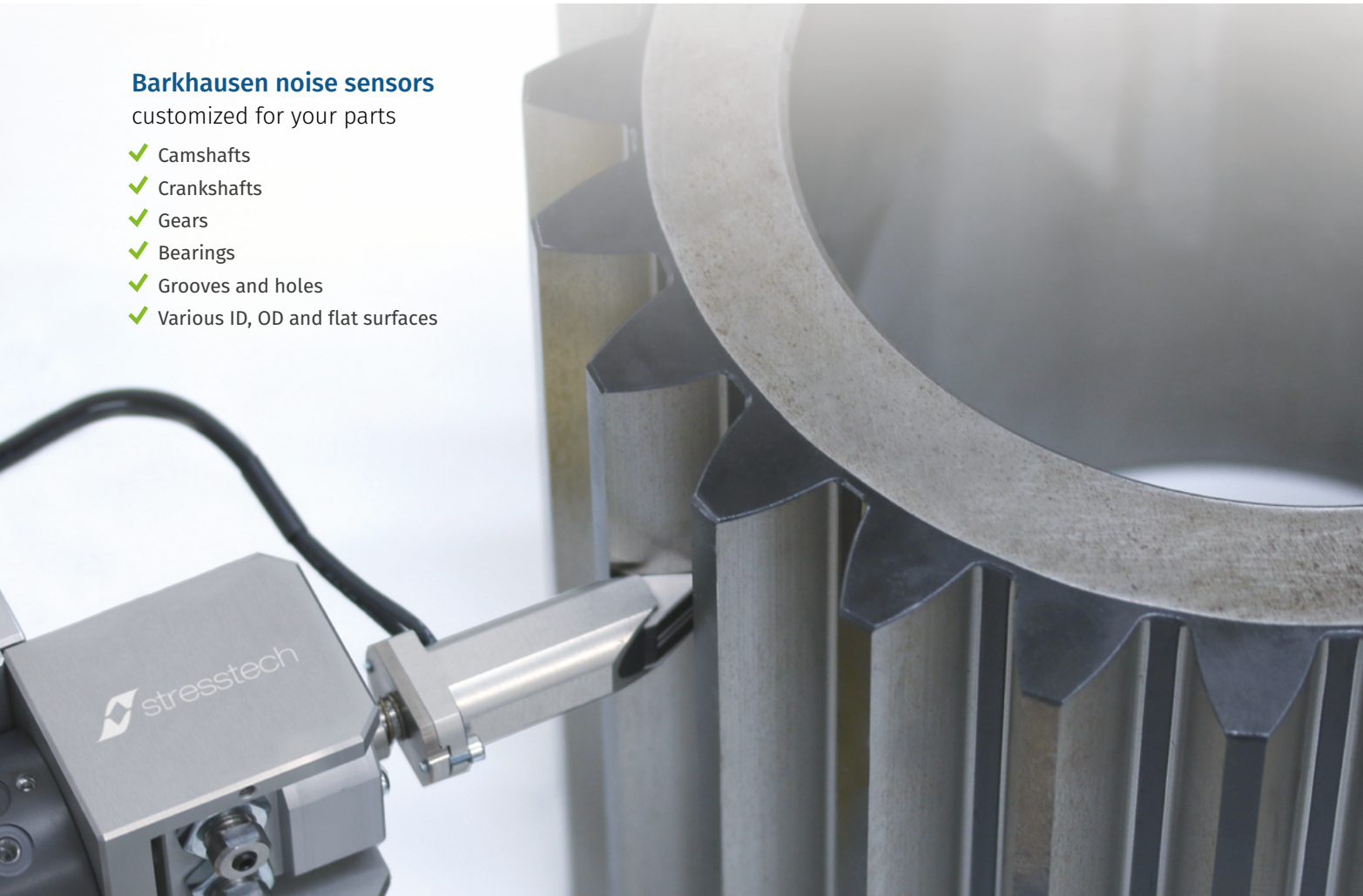


BN Rollscan 320 for multi-channel systems

Barkhausen noise sensors

customized for your parts

- Camshafts
- Crankshafts
- Gears
- Bearings
- Grooves and holes
- Various ID, OD and flat surfaces





Measurement services

Stresstech offers measurement services in any of our laboratories, or on-site for customer convenience. Measurement services are ideal for:

- ✓ jump-starting your application study or testing needs,
- ✓ required data validation,
- ✓ supporting your current laboratory.

Comprehensive data is delivered in an easy to understand report.
For more information on measurement services, or to schedule a consultation, please visit our website.

About Stresstech

For over 40 years, Stresstech has pioneered advanced non-destructive testing (NDT) solutions for residual stress measurement, heat treatment verification, retained austenite analysis, and grinding burn detection. Our product range covers manual systems up to fully automated in-line solutions. From laboratory research to production environments, we provide expertise and turnkey solutions to the manufacturing industry, research institutes, and universities worldwide. With our solutions, customers improve their components and manufacturing processes, ensuring that every manufactured product is reliable, safe, and sustainable. Stresstech is headquartered in Finland, with offices in Germany and the United States, supported by a global network of sales and service distributors.
To learn more about all our testing methods: X-ray diffraction, Barkhausen noise analysis, and ESPI hole drilling, please visit our website.

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