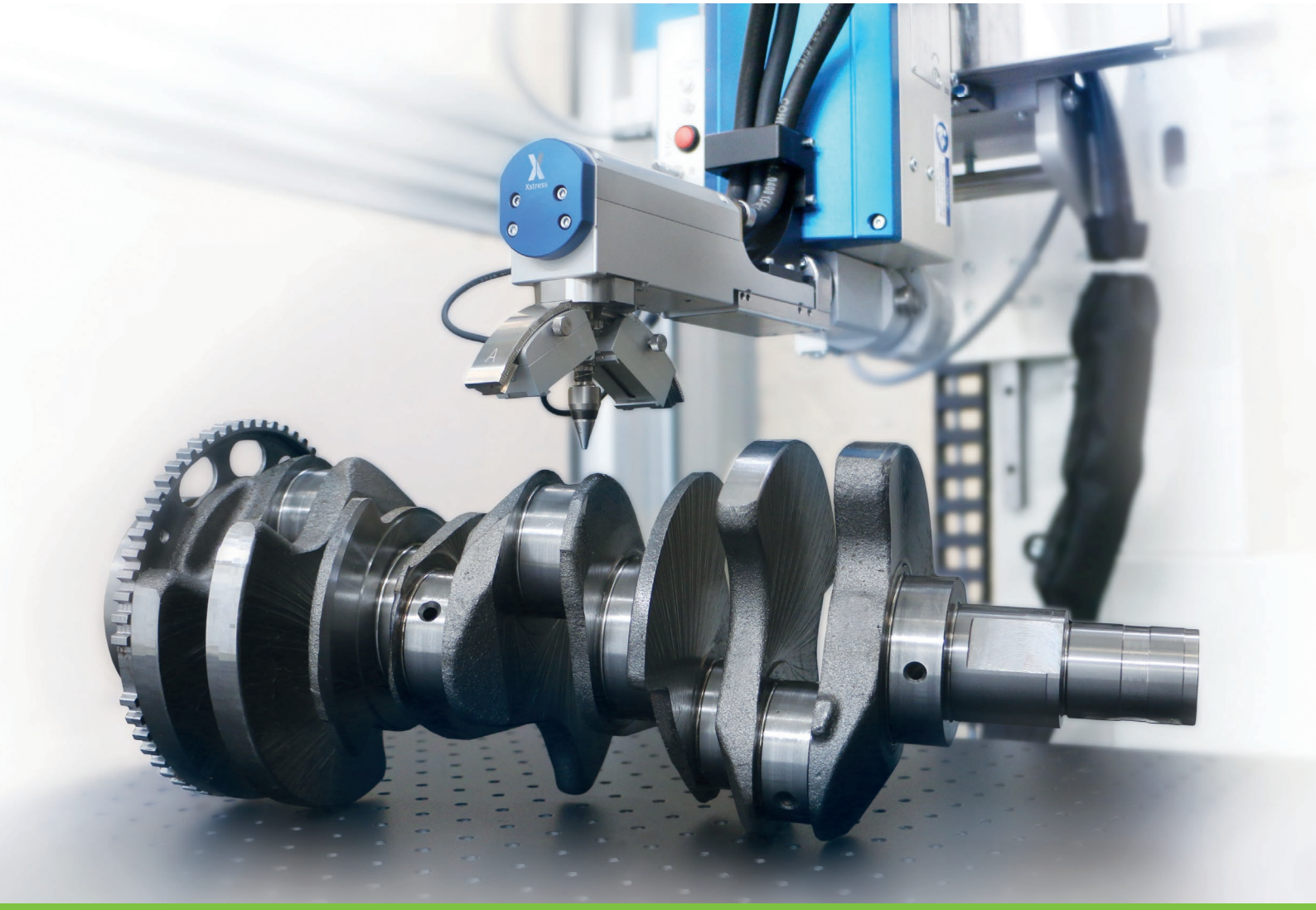
Xstress

X-ray diffractometers for residual stress and retained austenite measurements



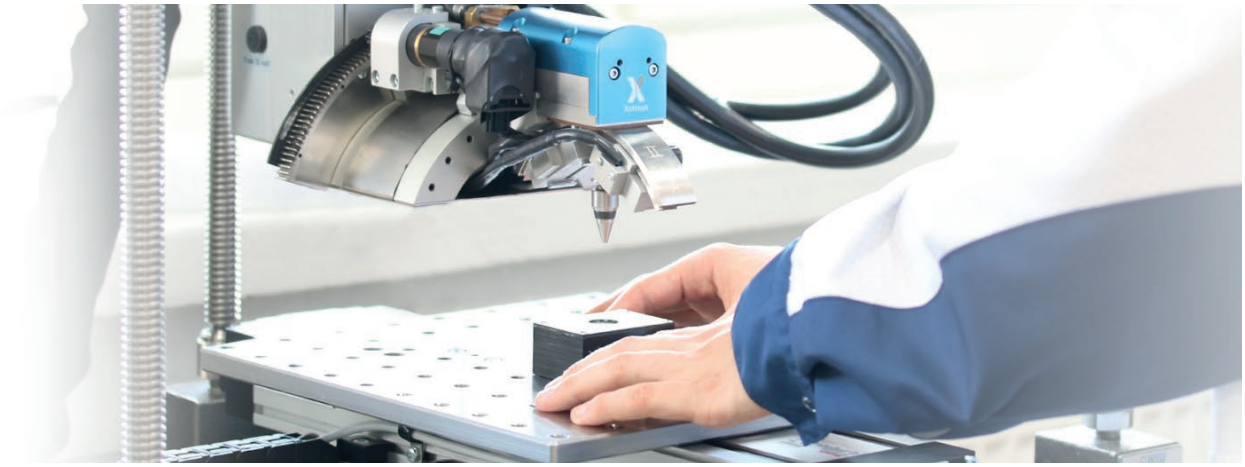
stresstech

Measure for success

NOVA INSTRUMENTS

Xstress

Xstress diffractometers are designed for residual stress and retained austenite measurements. This non-destructive technology can provide you with reliable, unmatched data for quality control assessment.



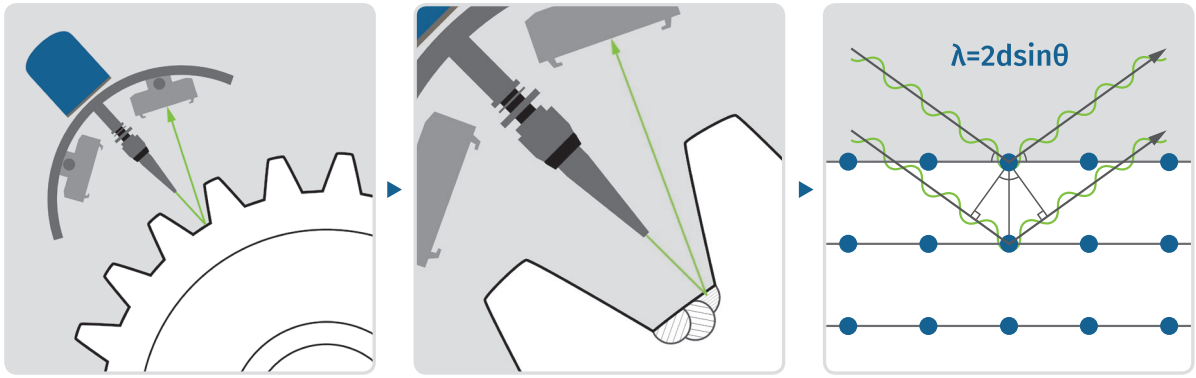
The Xstress product line of diffractometers is suitable for use in the field, factory, and laboratory settings. From system setup to post measurement analysis, easy to understand data is delivered quickly so that no time is wasted in improving your quality inspection process.

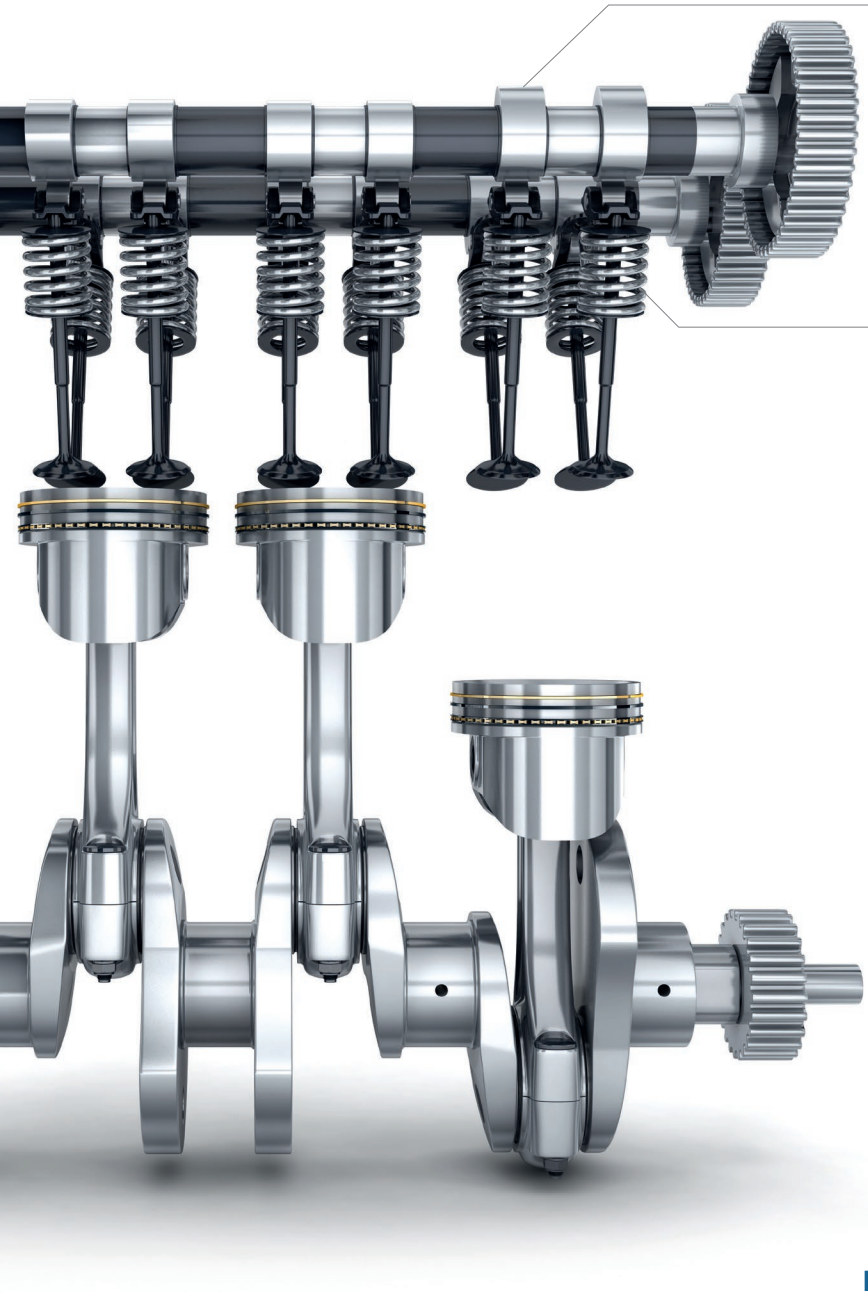
Xstress products measure residual stresses and retained austenite contents by using X-rays based on phenomenon known as Bragg's law ($\lambda=2d\sin\theta$). This technique is applicable to all crystalline materials including ceramics. All systems are equipped with robust operator safety features.

Measurement principle

After setting up the Xstress system, the measurement process involves four main steps:

1. Measurement area is irradiated with X-rays
2. Diffracted X-rays are detected
3. Shift of diffraction peak is converted to residual stress
4. XTronic software calculates and visualizes the data





Grinding

Shot peening

Heat treatment

Welding

Retained austenite

Forming
Machining

Applications

Manufacturing processes such as heat treatment, machining, welding, shot peening, and grinding generate residual stresses. These stresses can be beneficial (compressive) or harmful (tensile). X-ray diffraction is the standard method for measuring surface stress non-destructively. Additionally, a stress versus depth profile can be obtained via electropolishing. Xstress diffractometers can be useful tools during the product or production development phase and in quality control.

Xstress Systems

Xstress systems consist of a gioniometer or robot, main unit, X-ray tube, and computer with XTronic software. All systems can be equipped with optional features such as a safety enclosure with electropolishing station.

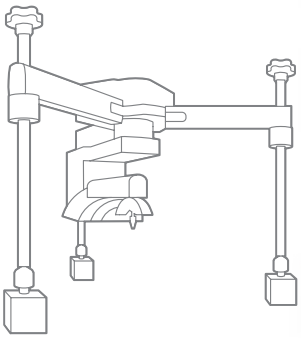
Main features of Xstress systems are:

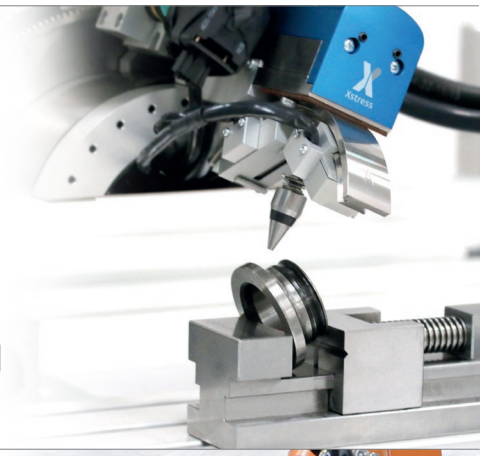
- ✓ High voltage power supply: Max output 30 kV/10 mA/300 W
- ✓ X-ray tube: Cr, Cu, Co, Fe, V, Ti, Mn. Cr-tube provided as a standard
- ✓ Two symmetrically positioned NMOS position sensitive detectors. Angular resolution: 0.03°–0.06°/pixel 2θ-angle
- ✓ Replaceable collimators in different shapes and sizes
- ✓ Electrical: 90 to 260 V AC, 48 to 62 Hz, 600 VA
- ✓ Main unit weight 25 kg/55 lbs

Xstress Goniometers

for most applications

- ✓ Multidirectional measurements without turning the part
- ✓ ψ-tilt range up to +-60°
- ✓ Weight 16 kg/35 lbs
- ✓ Delivered in carry packages

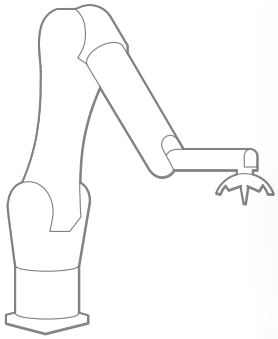


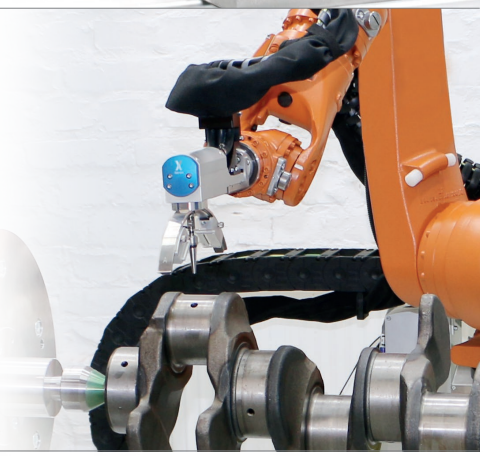


Xstress Robot

for hard to reach surfaces

- ✓ Accurate 6-axis industrial robot
- ✓ Automatic mapping on complicated parts, such as turbine blade is possible
- ✓ Movable or fixed installation with safety enclosure

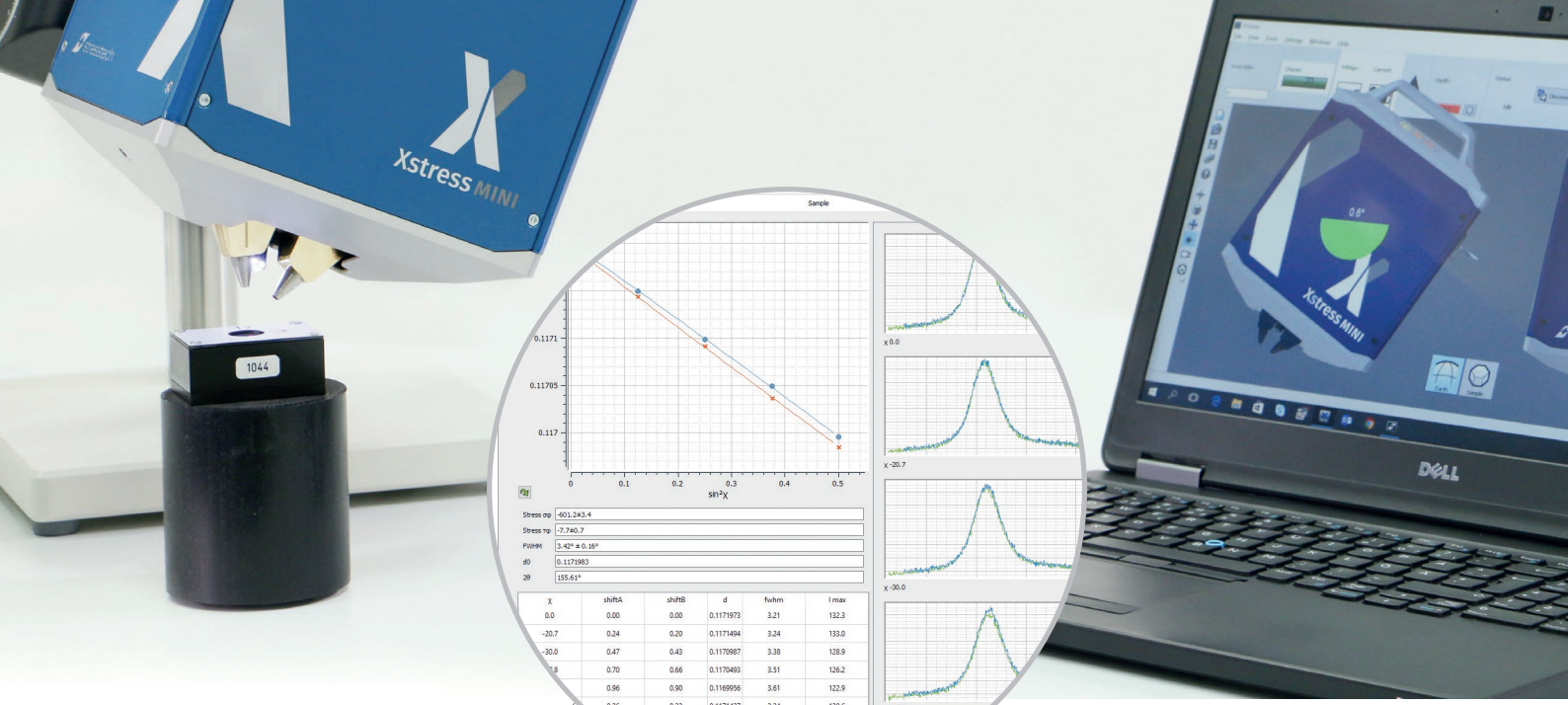


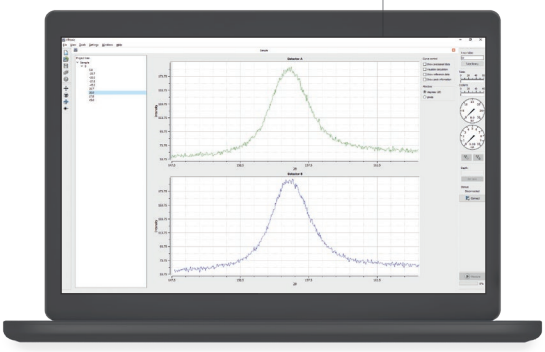


Xstress Mini

for steel and aluminium parts

- ✓ Single unit system with X-ray tube and high voltage generator
- ✓ Collects 2 simultaneous tilts
- ✓ From package to residual stress data in less than 5 minutes
- ✓ 6,5 kg/14.3 lbs
- ✓ 168 mm x 188 mm x 268 mm/6.61 in x 7.4 in x 10.55 in





XTronic

As the Xstress equipment is conducting a measurement, the XTronic software is calculating the residual stress or retained austenite values. XTronic software works with the entire Xstress product line and also other hardware such as X-ray elastic constant determination system and X-Y system.

Xstress accessories

- MYTHEN2 high performance detectors
- Special collimators
- Sample rotation unit
- X-Y system
- Goniometer alignment system
- Elastic constant determination system
- Safety enclosures
- Electropolishing system for depth profiles
- Manipulator/Floorstand

Standards

EN 15305:2008 "Non-destructive Testing. Test Method for Residual Stress analysis by X-ray Diffraction".

ASTM E2860 - 12 "Standard Test Method for Residual Stress Measurement by X-Ray Diffraction for Bearing Steels".

ASTM E1426 - 14 "Standard Test Method for Determining the X-Ray Elastic Constants for Use in the Measurement of Residual Stress Using X-Ray Diffraction Techniques".

ASTM E975 – 03 "Standard Practice for X-Ray Determination of Retained Austenite in Steel with Near Random Crystallographic Orientation"

Devices and software have the capability to provide measurements according to these application standards.

Measurement Services

Stresstech offers measurement services in any of our ISO/IEC 17025 accredited laboratories, or on-site for customer convenience.

Measurement services are ideal for:

- ✓ jump-starting your 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 www.stresstech.com/services

About Stresstech

Stresstech is headquartered in Finland and has offices in Germany, the United States, and India, as well as sales and service representatives around the world. For more than 30 years, Stresstech has been providing non-destructive and destructive testing solutions for process control and quality inspection. The inspection equipment and turn-key solutions serve the automotive, aerospace and other manufacturing industries as well as universities and research institutes.

To learn more about all of Stresstech's testing methods: X-ray Diffraction, Barkhausen Noise Analysis, and ESPI Hole Drilling, please visit www.stresstech.com.

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Stresstech Oy
Tikkutehtaantie 1
FI-40800 Vaajakoski, Finland
+358 14 333 000
info@stresstech.com
www.stresstech.com

Stresstech USA
540 Alpha Drive
Pittsburgh, PA 15238-2912, USA
+1 412 784 8400
info@astresstech.com
www.stresstech.com

Stresstech GmbH
Konnwiese 18
D-56477 Rennerod, Germany
+49 2664 99731-0
info@stresstech.de
www.stresstech.de

Stresstech Bharat Pvt. Ltd
Office No. 1309, Plot. no A-1, Sector - 1,
Rupa Solitaire bldg, MBP Mahape,
Navi Mumbai 400 710, India
Tel: +91 222 778 2011
info@stresstechbharat.in
www.stresstechbharat.in