

NEW

RESIDUAL STRESS X-RAY
PORTABLE DIFFRACTOMETER

STRESS X 3000

ITAL  STRUCTURES

SOLUTIONS FOR YOUR ANALYTICAL PROBLEMS
SINCE 1966



In-situ X-ray stress and retained austenite analysis...
Ease of use, speed, flexibility and portability...

STRESS X 3000 is the latest portable X-ray diffraction system designed for the analysis of residual stress and the calculation of the percentage of retained austenite

Residual stress is due to thermal treatments, mechanical processes, welding and surface treatments that the pieces undergo during the manufacturing processes. This type of stress permanently influences the piece's resistance, especially under strain, and often it is the cause of breaks that have no metallurgical justification.

The importance of residual stress analysis is growing. Welded structures, gears, shot- or sandblasted parts, thermal and many other treatments can be controlled and monitored with the help of X-Ray diffractometer. Reducing the data collection time is the next step, which this instrument is capable to offer.

Measurements of stresses in metals are made by using the distance between the atoms plans, as a stress gauge. The distance is measured with the help of the diffraction of an X-ray beam on the analysed part.

Even a small percentage of residual austenite (5%) can cause deformations that make the piece unusable. An example can be given with ball bearing tracks and injector pins for diesel motors. Detection of their presence can optimise thermal treatment.

STRESS X 3000 allows to measure residual stress and retained austenite, providing a thorough non-destructive analysis of samples of any dimension, so detection can be made directly.

STRESS X 3000 is fully controlled by software: it includes the goniometer, with interchangeable omega and psi geometries, a linear position sensitive detector, the X-ray generator with X-ray tube and the portable computer.

STRESS X 3000 can drastically improve the quality control of your iron-based products adding speed and precision to your stress analysis, even in the case of big samples.

Applications

- definition of the quantity of retained austenite on bearings and parts of diesel motor injectors
- detection of residual stress on sprocket wheels
- detection of residual stress on car motor parts (cam axles, connecting rods, engine shafts, equalisers)
- detection of residual stress induced by deep drawing (household appliances, structural parts)
- detection of existing operational stress on gas conducts
- detection of operational stress on large tensioned structures
- measurement of efficiency of shot-peening and rolling of components subjected to stress
- detection of residual stress in castings (cast iron parts of tool machines and aluminium automotive components)
- detection of stress induced by (laser and electron) welding
- search for a correlation between residual stress and stress resistance of aluminium alloy car rims
- optimisation of working parameters for swarf removal to improve the stress resistance of mechanical components
- detection of residual stress on helicoidal and leaf springs
- search for critical zones after applying work loads (arms and aeronautics)

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STRESS X 3000

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STRESS X 3000 is designed for ease of use, speed, flexibility and portability

This compact system includes a central unit, a goniometer and a portable computer

CENTRAL UNIT

High voltage X-ray generator
Controls PSD detector and step-motor
All interlocks required for complete safety



CENTRAL UNIT

GONIOMETER

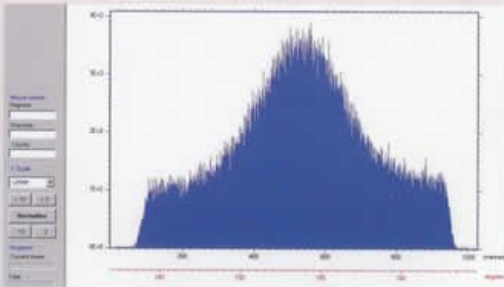
Mounted on a tripod
(magnetic anchoring as option)
Selection of Ψ or Ω geometry, Ψ tilt
Computer controlled step-motors
for all movements
Easy sample alignment system



X-RAY TUBE AND PSD DETECTOR

DATA ACQUISITION SOFTWARE

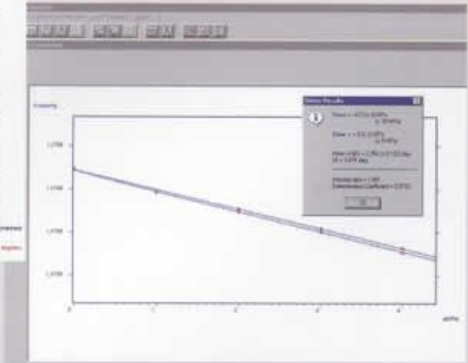
Running under any Microsoft Windows
Operative System
Complete control of the hardware
Wide selection of measuring points
Allow modification of the measurement
parameters
Displays in real-time the growth of the
peaks
Retained Austenite measurement and
calculation



DATA ACQUISITION SOFTWARE

ANALYSIS SOFTWARE

Running under any Microsoft Windows Operative
System
Peak treatment: LPA correction, background
subtraction
Peak analysis: fast methods, Marquardt fit,
top 15% parabola fit
Stress analysis: linear and elliptic
Contains material libraries
Tools: creation of reports, 3D graphs



ANALYSIS SOFTWARE

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STRESS X 3000

TECHNICAL DATA – STANDARD CONFIGURATION

ELECTRICAL SYSTEM

30 kV, 10 mA continuously variable. Compact design

X-RAY TUBE

30 kV, 6.5 mA, Cr anode as standard
Cu, Co, Fe, V, Ti and Mn can be supplied as option

COLLIMATOR

1, 2, 3 mm diameter as standard. Other sizes available

GONIOMETER: mounted on a tripod

Angular range	from -40° to +40° Ψ
Diffraction angle and range	155° $2\theta \pm 10^\circ$
Oscillation	$\pm 1^\circ, \pm 2^\circ, \pm 3^\circ \Psi$

DETECTOR:

It can be turned 90 degrees to enable measurements in either the Ψ (Psi) or ω (Omega) orientation

- Position Sensitive Detector: 5 cm window, corresponding to 20 deg; 0.022 deg/channel
- Analogic ratemeter

COOLING SYSTEM: water cooling with heat exchanger for X-ray tube

Power	250 W
Capacity of tank	5 liters

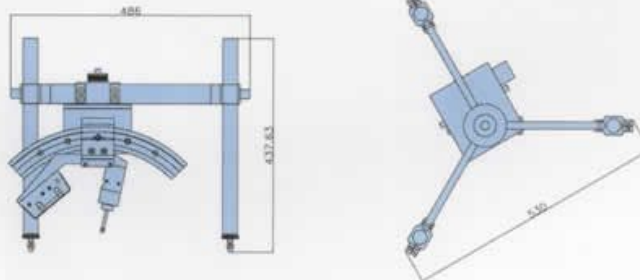
ACCESSORIES

Retained austenite	128° hanger for PSD
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WEIGHTS

Goniometer	12 Kg
Central Unit	22 Kg

Dimensions:



Local Agent



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In relation to the process of continuous development, Ital Structures reserves the right to change the specification of the instrument without previous notice at any time.

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