X-ray Diffraction Systems

X-calibre RTXDS

Low-cost, real-time, side-reflection, Laué system

X-calibre RTXDB

World's-first, real-time, true-back-reflection, Laué system

X-calibre RTXDB-HD

Heavy duty version of RTXDB for use with heavy castings

jacksonelectronics

X-calibre RTXDS is a low-cost version, employing a single detector with maximised active faceplate area. This allows the detector to be positioned close to the collimator, at a reduced angle to optimise component clearances. This version gives the best image quality with freedom from obscured area at the centre. It is ideal for shooting small components and seeds. Working distance and R-value shots are set up using a mechanical pointer, which can be viewed by an optional CCTV system.

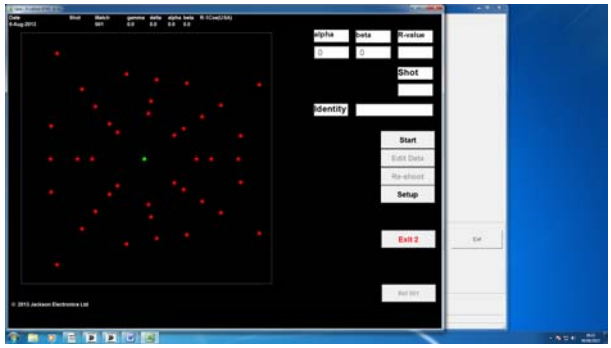
X-calibre RTXDB employs a butted array of four detectors, assembled around the collimator to form a compact, large-area imager. This enables the X-ray beam to pass through a small hole, at the centre of the scintillator, to give a true-back-reflection configuration. Geometry-correction is applied, to remove distortions and assemble the four images as one. The larger area allows increased working distances, with minimal dead-space at the centre. This configuration gives excellent component clearances and flexibility of working distance.

X-calibre RTXDB-HD Heavy duty version of RTXDB true-back-reflection system, for use with heavy and deeply recessed castings. A heavy-duty lift column provides vertical travel whilst horizontal travel is achieved by moving the tube tower/detector assembly. Heavy parts and fixtures can be easily manipulated using an airlift base fed by a low pressure air supply. Safe handling is ensured by release of air pressure when the edge of the table is reached. Essential for platform boundary and general R-value shots on large castings.

All systems employ a labyrinth-constructed, radiation-safety enclosure with sliding-door, equipped with cross-monitored safety switches and solenoid locking. HV Power Supply operation and monitoring of safety circuits Is via a separate Shutter-control/Interlock unit. X-rays on, shutter operation and door opening are restricted, subject to status of protective interlocks. Internal and external emergency stops are also provided.

Image acquisition and processing

Images can be captured using a fast, multi-core computer operating in a Windows 7 environment. This is equipped with single or quad image-acquisition hardware, allowing real-time viewing with recursive averaging and geometry corrections. The image can be integrated, enhanced and background-cancelled prior to pattern matching. A computer-generated overlay is centred on a selected major pole and rotated to achieve a pattern match.

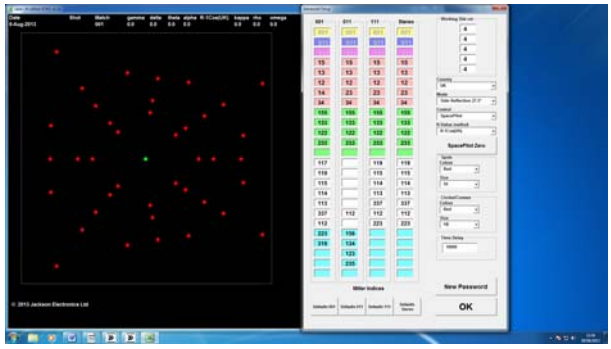


Pattern matching

The matching operation is executed, using a unique SpacePilot 3D-CAD controller, by small movements of the thumb and forefinger. Selection of three overlays and all other functions associated with pattern properties and matching are controlled by push buttons. Facilities are provided for adjustment of SpacePilot sensitivities and other parameters

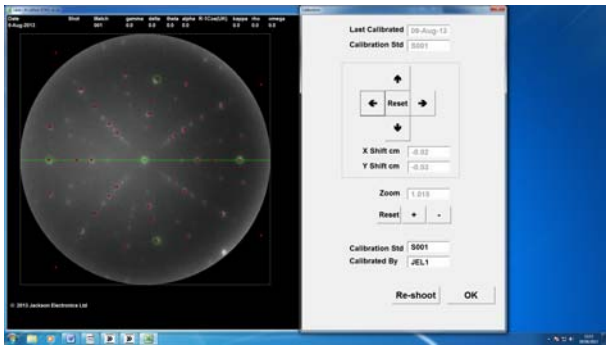
Calculations and data-processing

Crystallographic orientation angles relative to the component reference plane and reference direction are derived by calculation, using either European or USA conventions. All measurements are automatically made within the unit triangle containing the reference direction. Relative orientations may also be calculated. Results can be transferred via a network connection to database or production-control system.



System setup and calibration

Groups of spots may be added to, or deleted from, the overlay by editing tables of Miller indices. Working distance, system geometry, country/convention, calculation methods, passwords and pattern parameters can be set up as required. The overlay can be scaled and centred to match a reference pattern obtained from a silicon standard test block. Calibration data is automatically saved to a Cal.dat file.



Specification

Side-reflection Detector

- Single detector. Active area 80mm dia
- No obscured area at centre
- Maximised active area at faceplate
- Less susceptible to background fluorescence
- Reduced system cost
- Ideal for small parts and seeds

Back-reflection Detector

- Quad detector array. Active area 104mm sq
- Excellent component clearances
- Total flexibility of working distance
- Minimal obscured area at centre
- Essential for R-value shots on large castings

X-ray Source

- 3kW HV Power Supply with virtual control from PC.
- Shutter Control/Interlock Unit with over-temp/flow-rate protection
- X-rays on, shutter operation and door opening, restricted subject to status of protective interlocks.
- Tungsten or molybdenum-anode, fine-focus, tube
- 0.64mm single-pinhole collimator with beam scraper
- Air-cooled water chiller (water cooling optional)

Positioning System

- Motorised, heavy-duty, XY drives with 160mm horiz travel X 200mm vertical (400mm on HD version), set by limit switches
- Variable speed control by joystick
- Manual, heavy-duty, Z positioning stage
- Load capacity 20 kg (100kg on HD version)

Cabinet

- Labyrinth-constructed, radiation-safety enclosure
- Leaded-acrylic front window.
- Sliding door with cross-monitored safety switches and solenoid locking
- Fluorescent and low-voltage-halogen work lamps
- Fork-lift and pallet-truck compatible

Hardware

- Industrial, high-speed, multi-core, Windows-7 machine
- Single or quad frame-grabber/s
- DVD-RW and SATA III drives
- 1920 X 1080 flat-panel 23" display
- Network connection to database/production-control system
- Keyboard/Optical Mouse/SpacePilot control

Software

- Windows-7-Professional operating system
- Single or quad image-acquisition and processing with geometry correction, flat-field correction, recursive averaging, integration, background extraction and cancellation with variable gain/offset
- Fast Laué pattern selection/matching/analysis by SpacePilot or alternative mouse-operated, on-screen, controls
- Back-reflection or variable-angle, side-reflection, modes
- Pattern generated from user-defined Miller Indices, working distances and display colours
- Three overlays in gnomonic or stereographic projections
- USA mode:- gamma/delta/alpha/beta/R-value
- European mode:- gamma/delta/theta/alpha/R-value/kappa/rho/omega
- Menu selection of Primary/R-value modes
- Customised interface with user database/production-control system

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