



# PRODUCT PORTFOLIO

# Nordson MATRIX

## The market leader in AXI

**Nordson MATRIX**, founded in 2004 and headquartered in Munich (Germany), is a market leading global supplier of high speed **Automated X-ray Inspection systems (AXI)** to ensure the quality of critical electronic devices/components, electronic printed circuit boards and fully assembled devices manufactured by its customers. The product portfolio ranges from offline configurations for high quality analysis up to fully automated high speed inspection solutions integrated into the production line.

Nordson MATRIX is part of the Nordson Corporation (NASDAQ: NDSN) which includes the Nordson DAGE, Nordson YESTECH and Nordson SONOSCAN families of test and inspection products.



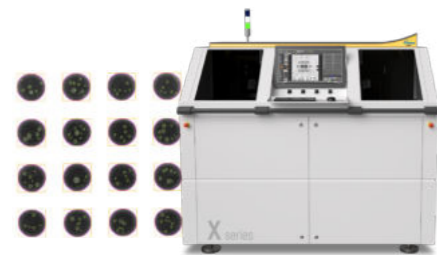
the Nordson MATRIX AXI series systems

# Product Portfolio

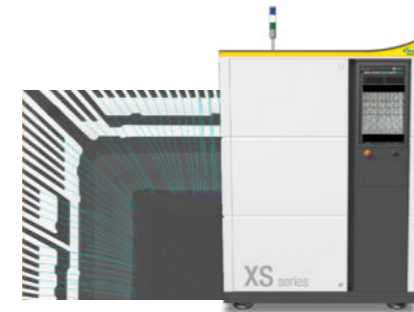
Solder Joints Inspections

Final assembly test

IGBT modules



**X-series**  
High Speed AXI



**XS-series**  
High Resolution AXI with minimal footprint



**X#-series**  
Linescan Setup



**XCT-series**  
High Resolution AXI with CT technology



**X#-series**  
High power setup

Semi backend

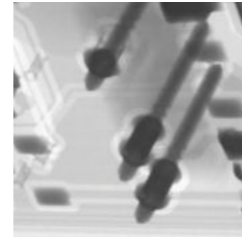
Battery inspection

# AXI systems at one glance

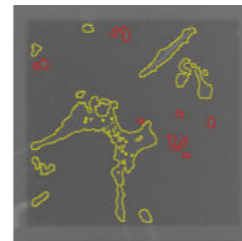
	Semi AXI		AXI		Automated CT	
	XT-3	XT-6	X-series	X#-series	XS-series	XCT-1000
SMT & Selective Solder	•	••	•••	••	••	
Power Hybrid & IGBT				•••	••	
Semiconductor & Wirebond		•			•••	
Final Assembly & Packaging	•	•		•••		
Batteries & Components						•••
Inline			✓	✓	✓	
Island of Automation		✓		✓	✓	
Manual	✓	✓				✓
Transmission (2D)	✓	✓	✓	✓	✓	✓
Oblique (2.5D)		✓	✓	✓	✓	✓
3D slice			✓	✓	✓	
CT						✓
Linescan				✓		

# X#-series

Flexible automated X-ray inspection platform



PTH inspection



Multi layer void inspection (IGBT)



Final product inspection

The X#-platform series is an inline automated X-ray system which covers a wide range of AXI applications. It is a flexible platform with very versatile fields of use depending on the application requirements. The inspectable applications range from large SMT boards and high-power electronic modules up to fully assembled modules.

## Characteristics

- Flexible AXI system for inline and island of automation configurations
- Microfocus X-ray tube (sealed tube / maintenance free)
- Multiple programmable motion system with servo drives
- Digital CMOS flatpanel detector
- Automatic grey-scale and geometrical calibration
- Barcode scanner for serial number and product type selection
- Full product traceability via customized MES-Interface

## Additional options

- Flexible setup for inline pass through or same-side in/out configuration
- Combination with line scan camera for high throughput
- Auto BCR scanning station (x-y gantry)
- Low dose radiation filter

## Standard configurations

- **SMT setup** for component and solder-joint inspection on PCB
- **Final Assembly and Test (FATP) setup** for complete modules and consumer products
- **High Power setup** for power hybrid/IGBT devices and battery

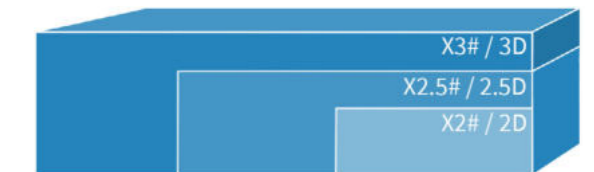
## Technologies

- Transmission X-ray imaging (2D) with patented Slice-Filter-Technique™
- Off-axis technology (2.5D)
- 3D SART (Simultaneous Algebraic Reconstruction Technique)

## Available configurations

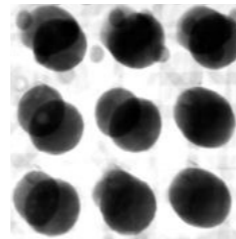
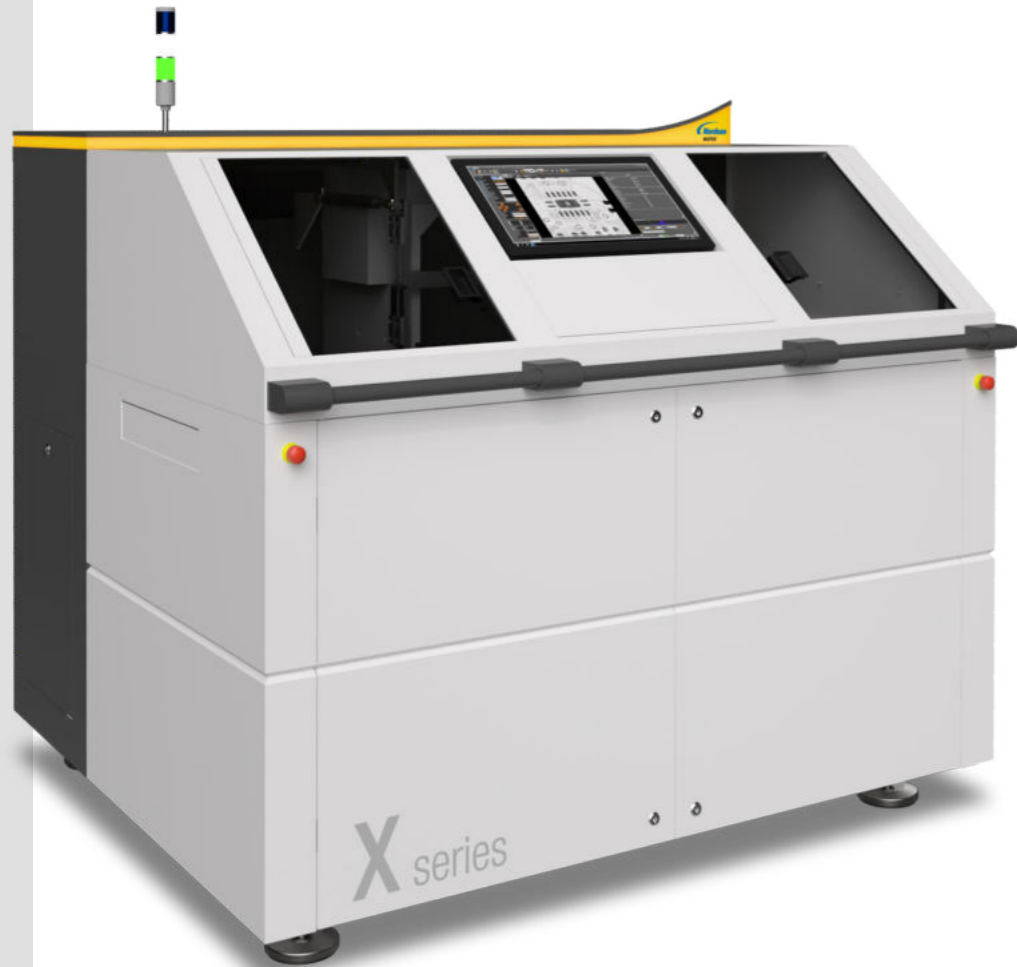
depending on the type of product & inspection task

- X2#** Transmission (2D) + SFT™
- X2.5#** Transmission (2D) + SFT™ + Off-axis (2.5D)
- X3#** Transmission (2D) + SFT™ + Off-axis (2.5D) + 3D SART



# X-series

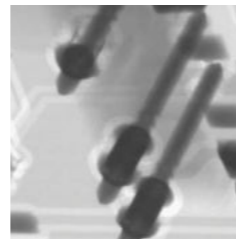
High speed automated X-ray inspection platform



BGA HiP in 2.5D



QFN inspection



PTH inspection

The X-platform series is a dedicated high speed inline automated X-ray inspection system for the inspection of PCB-assembly boards for single/ multipanel or samples in trays. The system offers market leading inspection speed and is ideal for low-mix high-volume production environment.

## Characteristics

- High speed AXI system for inline configurations
- Microfocus X-ray tube (sealed tube / maintenance free)
- Multiple programmable motion system with servo drives
- Digital CMOS flatpanel detector
- Automatic grey-scale and geometrical calibration
- Barcode scanner for serial number and product type selection
- Full product traceability via customized MES-Interface

## Highlights

- Hardware setup dedicated to PCB inspection
- High speed setup for inline pass through configuration
- High oblique angle

## Additional options

- Barcode scanner for serial number and product type selection
- Auto BCR scanning station (x-y gantry)
- Low dose radiation filter

## Standard configurations

- **SMT setup** for component and solder-joint inspection on PCB, hybrid or chip level assembly processes

## Technologies

- Transmission X-ray imaging (2D) with patented Slice-Filter-Technique™
- Off-axis technology (2.5D)
- 3D SART (Simultaneous Algebraic Reconstruction Technique)

## Available configurations

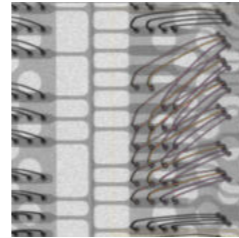
depending on the type of product & inspection task

- X2** Transmission (2D) + SFT™
- X2.5** Transmission (2D) + SFT™ + Off-axis (2.5D)
- X3** Transmission (2D) + SFT™ + Off-axis (2.5D) + 3D SART

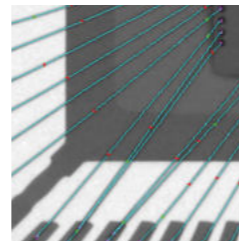


# XS-series

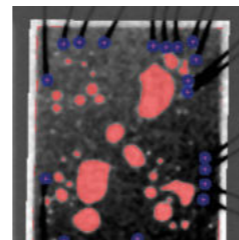
High resolution automated X-Ray inspection platform



Overlapping wires in 2D



Wire tracing



Voiding under bonding ball

The XS-series is a small-footprint high-resolution automated X-ray inspection system concept designed for sophisticated high-speed inspection of semiconductor samples, wire bonds and PCB-assembly boards for single/ multipanel or samples in trays. The inspectable applications range from component level inspection to mid-sized SMT boards.

## Characteristics

- High speed AXI system with minimum footprint for inline setups
- Microfocus / submicron X-ray tube (sealed tube / maintenance free)
- Resolution down to  $<2 \mu\text{m}$
- Programmable motion system with servo drives
- Digital CMOS flatpanel detector
- Automatic grey-scale and geometrical calibration
- Full product traceability via customized MES-Interface

## Additional options

- Same-side load/unload configuration
- Barcode scanner for serial number and product type selection
- Auto BCR scanning station (x-y gantry)
- Low dose radiation filter

## Standard configurations

- **Semi-Backend setup** for semiconductor applications, wire bond test (pre & post) and flex circuits in strips or JEDEC trays
- **SMT setup** for component and solder-joint inspection on PCB, hybrid or chip level assembly processes

## Technologies

- Transmission X-ray imaging (2D) with patented Slice-Filter-Technique™
- Off-axis technology (2.5D)
- 3D SART (Simultaneous Algebraic Reconstruction Technique)

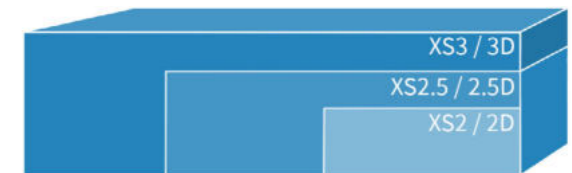
## Available configurations

depending on the type of product & inspection task

**XS-2** Transmission (2D) + SFT™

**XS-2.5** Transmission (2D) + SFT™ + Off-axis (2.5D)

**XS-3** Transmission (2D) + SFT™ + Off-axis (2.5D) + 3D SART



# XCT-series

High resolution automated X-ray inspection platform with CT-technology



Batteries



Sensors



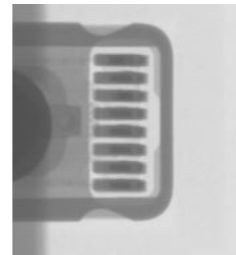
Subassemblies  
(automotive)



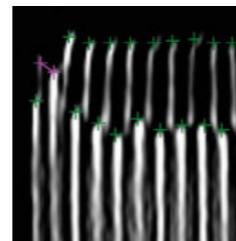
Casting /  
Advanced Materials



Medical Implants



Analyzing the form of fillets on vertical slices



Stacked battery



Jelly roll battery

The XCT-series systems are manually loaded, automated X-ray CT systems which offer a solution for a variety of CT applications. These systems provide the highest possible flexibility in order to satisfy individual customer needs. Depending on the application, they can be equipped with different types of tubes and detectors to offer high-resolution or high-power solutions.

Unlike most CT systems, the XCT-1000 features both volume analyzing and automatic processing of the slices. It is especially suitable for the inspection of small to medium production volumes or for the use in laboratory environments, production sampling or failure analysis. The applications range from consumer electronics and automotive li-ion batteries, component level inspection for wire bonds, micro-solder-joints on PCB's, casting parts and semiconductors.

## Characteristics

- Offline inspection System
- Micro- or nanofocus X-ray tube (sealed tube/ maintenance free)
- Digital flatpanel detector
- Multiple programmable motion system
- Automatic grey-scale and geometrical calibration
- Barcode scanner for serial number and product type selection
- Full product traceability via customized MES-Interface

## Highlights

- Full volume reconstruction
- Automatic slice analyzing
- Generation of report files after each inspection
- Customized part holders

## Standard configurations

- High Power setup for battery inspection
- High Resolution setup for electronics and semiconductor applications

## Technologies

- Transmission X-ray imaging (2D) with patented Slice-Filter-Technique™
- Off-axis technology (2.5D)
- CT-Technology

## Available configurations

depending on the type of product & inspection task

**XCT-1000** Transmission (2D) + SFT™ + Off-axis (2.5D) + CT  
**XCT-1000L** for large size electronic power devices (multilayer void inspection) to lithium-ion battery inspection (CT-AXI) for the automotive market

# XT-series

Universal automated X-ray inspection platform



Solder Joint Inspection



Power devices Cooling plates



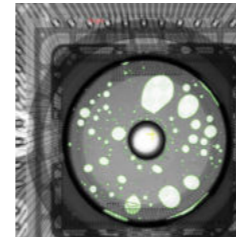
PTH



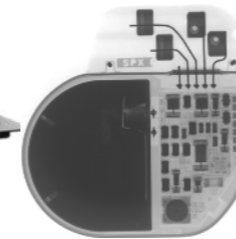
Subassemblies (automotive)



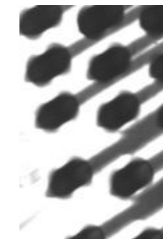
Final Assembly Test (Consumer)



Void detection



Medical devices



PTH inspection

The XT-series provides the advanced inspection capability of Nordson MATRIX's inline system in a smaller footprint manual load/island of automation system. The platforms are designed for flexibility and ease of use for a wide variety of products requiring 2D and 2.5D automated X-ray inspection.

The **XT-6** platform is a highly flexible automated X-ray inspection system with minimum footprint and a parallel-kinematic Hexaglide manipulation unit for extreme-angle off-axis image acquisition with high resolution. It is suitable for high-quality X-ray analysis of electronic assemblies and material analysis of parts that require flexible part manipulation with multiple inspection angles. For batch modes and volume inspection the XT-6 can be equipped with a left-to-left magazine load/unload station.

## Characteristics

- Flexible AXI system for manual load and island of automation configurations
- Microfocus X-ray tube (sealed tube / maintenance free)
- Extreme angle shot capability (up to 65 deg)
- Multiple programmable motion system with servo drives
- Digital CMOS flatpanel detector
- Automatic grey-scale and geometrical calibration
- Barcode scanner for serial number and product type selection
- Full product traceability via customized MES-Interface

## Additional options

- Barcodereader
- Heavy duty transport system
- Hybrid or chip level assembly setup
- Low dose radiation filter
- Left-to-left magazine loader for automated setup

## Standard configurations

- **SMT setup** for component and solder-joint inspection on PCB

## Technologies

- Transmission X-ray imaging (2D) with patented Slice-Filter-Technique™
- Off-axis technology (2.5D)

## Available configurations

depending on the type of product & inspection task

- **XT-6(A)** Transmission (2D) + SFT™ + Off-axis (2.5D)



# MIPS Suite

MATRIX Inspection and Process Control Software Suite

## Quality Management

MES / Communication standards / Data analysis / SPC

Smart factory integration through industry standard (Hermes, CFX, SECS/GEM) and customized traceability implementation

## Verification

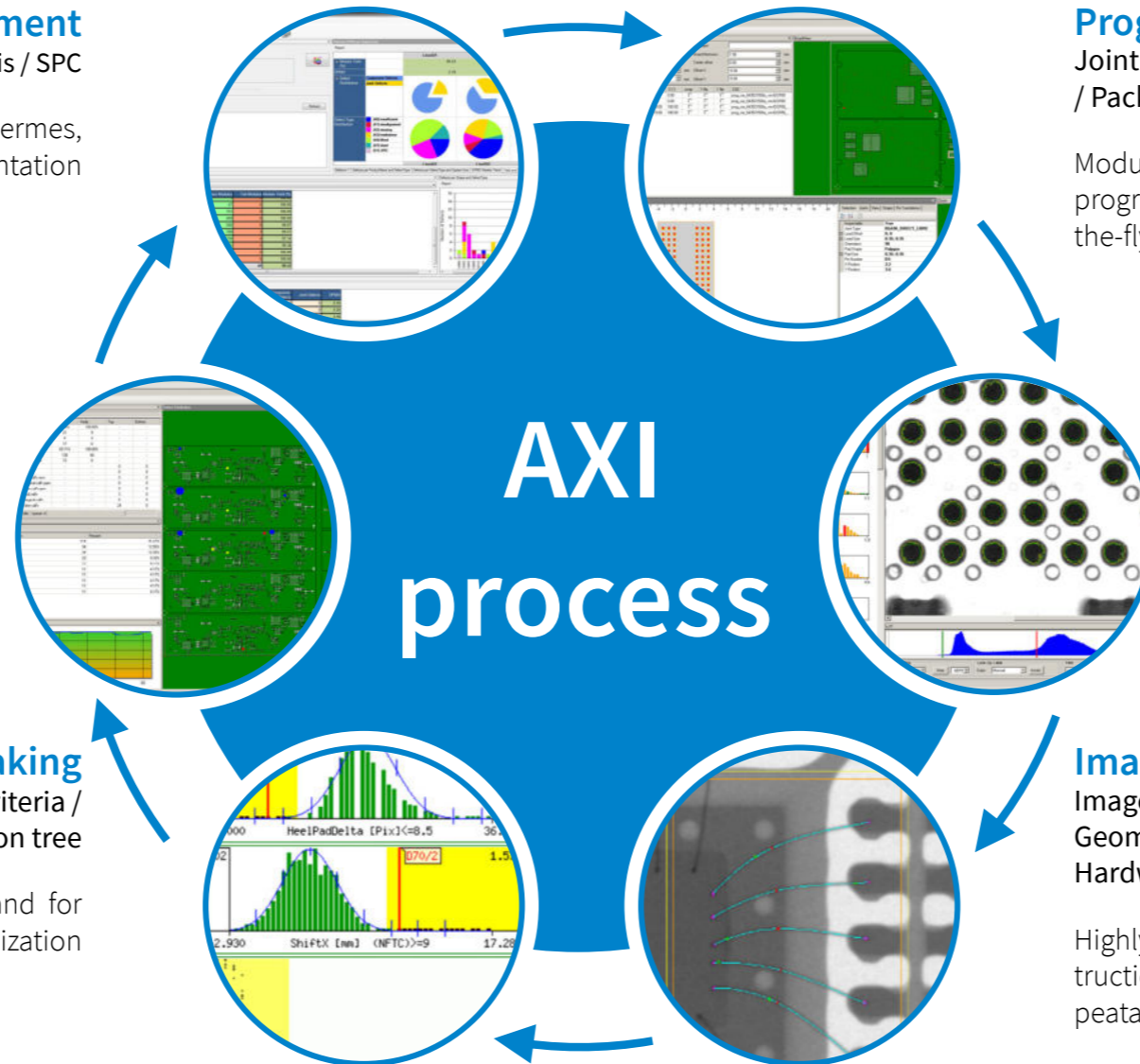
Alerts / Lockouts / Defect map / filters

Closed loop communication between inspection, verification, repair and fine-tuning process

## Autonomous Decision Making

Six-sigma smart rules / Industry standard threshold criteria / Automatic threshold refinement / Decision tree

Comprehensive statistical tools for process control and for good/bad sorting optimization



## Program generation

Joint level analysis / View definition / CAD import, teach&go / Package library

Modular and easy-to-handle software environment for quick program generation and new product introduction both on-the-fly and offline

## Measurements

Reconstruction / Comprehensive algorithms / Fine tuning / Repeatability analysis

Unique and automated calibration procedures ensuring machine-to-machine program portability and a working global library structure

## Imaging

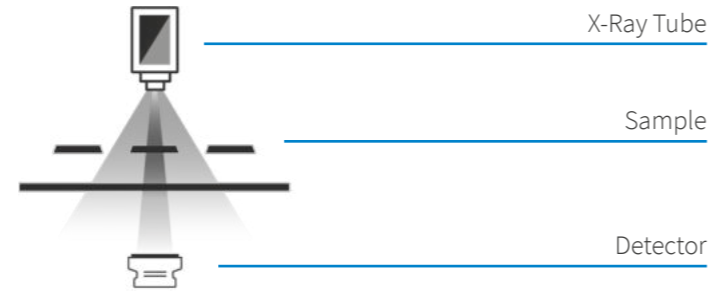
Image chain optimization / Throughput maximization / Geometrical calibration automated grey-scale calibration / Hardware settings optimization

Highly customizable algorithm library for reliable 3D reconstruction, full defect coverage, minimal false calls rate and repeatable measurements

# X-ray inspection technologies

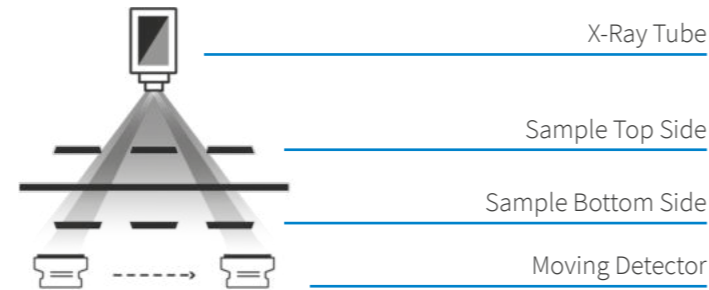
2D - Transmission

- Transmissional (top-down) imaging technique with a fixed detector position
- High-speed X-Y movable sample tray
- Tube height adjustment for various field of view sizes



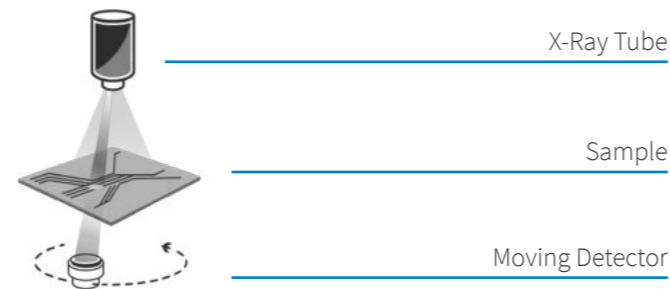
2.5D - Off-axis

- Angle imaging possibility up to 60 deg
- Detector placed on a high-speed movable sample tray for maximum flexibility and speed



3D - SART

- Tomosynthesis as a solution to dense double sided boards
- Flexible angle a projection count for optimum speed-performance ratio
- Laser and/or software warpage compensation



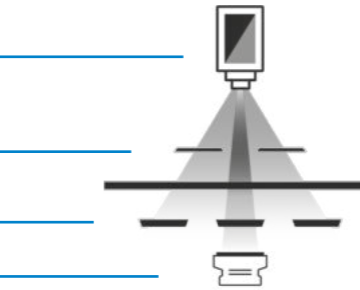
SFT™ Slice Filter Technique

X-Ray Tube

Sample Top Side

Sample Bottom Side

Detector



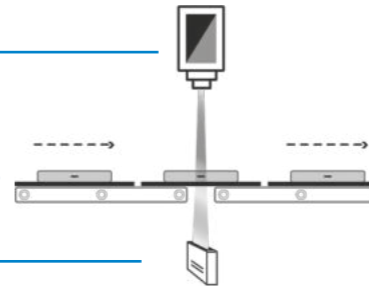
- MATRIX's patented technique for background and shield removal, solder ball detection
- Real time golden master comparison for foreign and/or missing object detection

Line Scan

X-Ray Tube

Sample on conveyor belt

Detector



- stationary time delay integration detector stitching images from a sample that is constantly moved over the detector
- image created from the whole product and stitched without distortions
- the aim is to check correct assembly and check for foreign objects

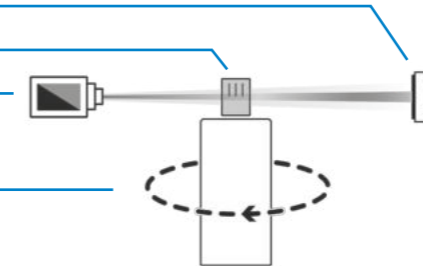
Computer Tomography(CT)

X-Ray Tube

Sample

Sensor

Roating Manipulator



- Creating equitangular projections by rotating the sample 360 dgr and reconstructing a volume model
- Automated slice selection and good/bad decision

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