STRATUS INREMA

PHOTOMASK & RETICLE INSPECTION – PRECISION MEETS SIMPLICITY

STRATUS VISION

Areascan Camera

Manual Loading

Aftermarket Automation

Multiple Lighting Scenarios

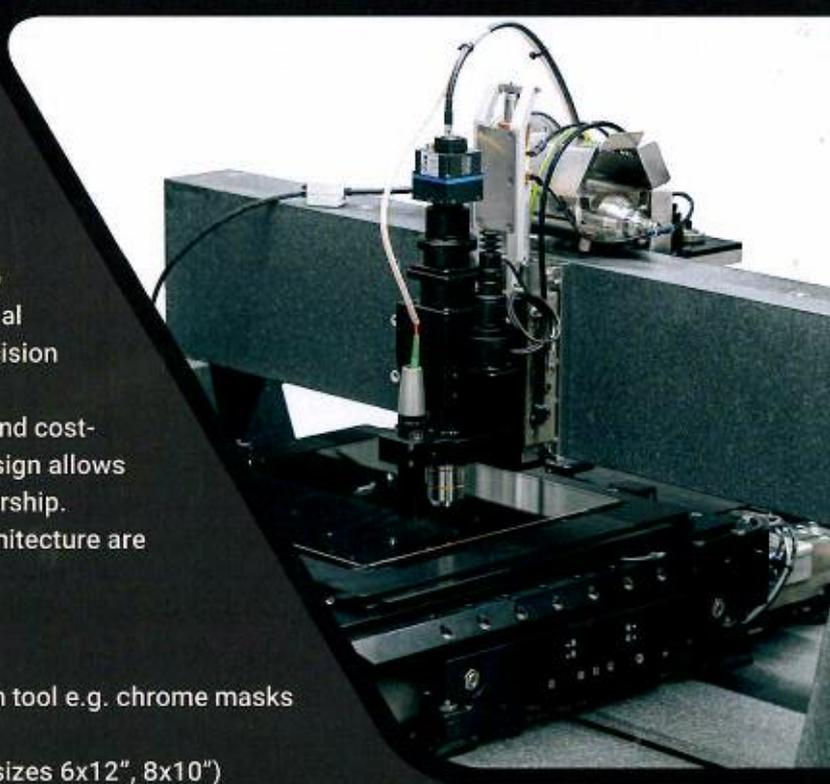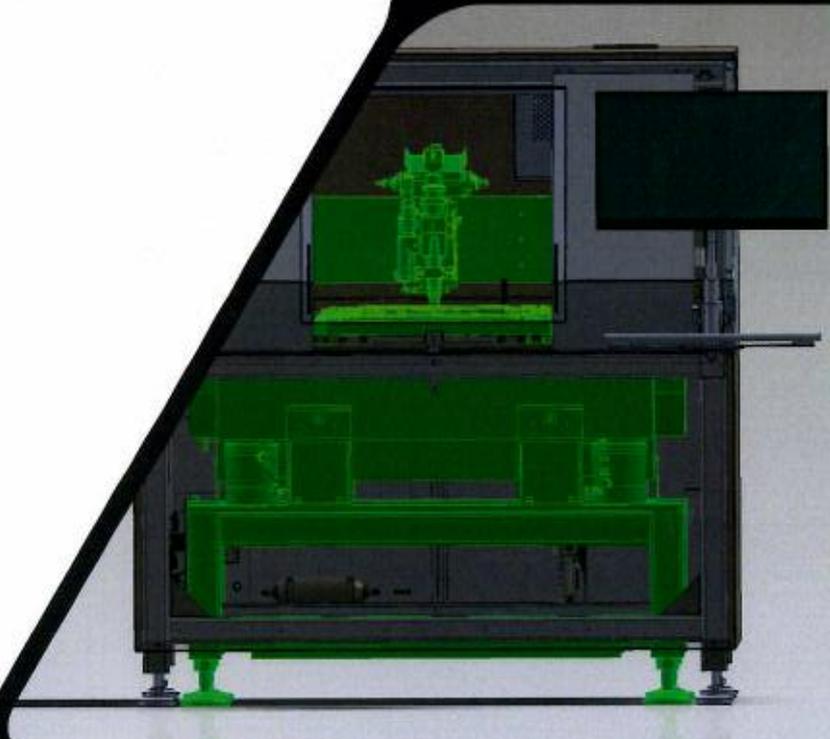**AI Defect Classification**

Resolution < 1μm

Engineered for the Highest Standards in Photomask Inspection

The STRATUS INREMA was designed to meet current and future mature photomask inspection requirements with full Die-to-Database (D2DB) and particle inspection capabilities. Supporting transmissive and reflective (T/R) lighting and mask sizes from 4" up to 14", including special formats (e.g., 6×12", 8×10"), INREMA combines high precision with unmatched simplicity.

Perfectly matched for high-throughput, fast turnaround and cost-sensitive mask production, INREMA's no-consumable design allows for continuous 24/7 operation with minimal cost of ownership. INREMA's air-bearing motion and contamination-free architecture are optimized for ISO Class 3 and better cleanrooms.

Key Features & Capabilities

- Manually or automatically loaded photomask inspection tool e.g. chrome masks and reticles
- Supports reticle sizes from 4" to 14" (including special sizes 6x12", 8x10")
- Quick nest exchange in < 30 seconds without recalibration
- Designed for cleanroom use (ISO class 3 and higher)
- Compact footprint and robust, low-cost design
- Defect detection down to 100nm
- STRATUSLight combined top and bottom light inspection for finding particles and surface defects on photomasks

Photomask Inspection with SPIN & SPINDLE

The Stratus SPIN software integrates seamlessly into production and supports direct CAD file imports (OASIS, GDSII) without conversion, delivering repeatable, verifiable defect detection with transmissive and reflective illumination for maximum contrast.
Setup requires less than 5 minutes, including data preparation and alignment, even for large data sets (>50 GB).

- Automated defect categorization via software
- Quick exchange nests: mask size changes < 30 seconds with automatic software alignment and no recalibration
- Defect spec: 0.25 µm on 6" mask in 36 minutes total cycle time
- Very low false call rate

Metrology & Review Integration

During inspection, INREMA automatically records absolute height values and detects surface variations or damage, while also measuring critical dimensions (CDs) across multiple plate areas in one automated step.

During review, the operator can overlay defects with CAD data for fast classification and perform post-repair verification immediately without additional setup.
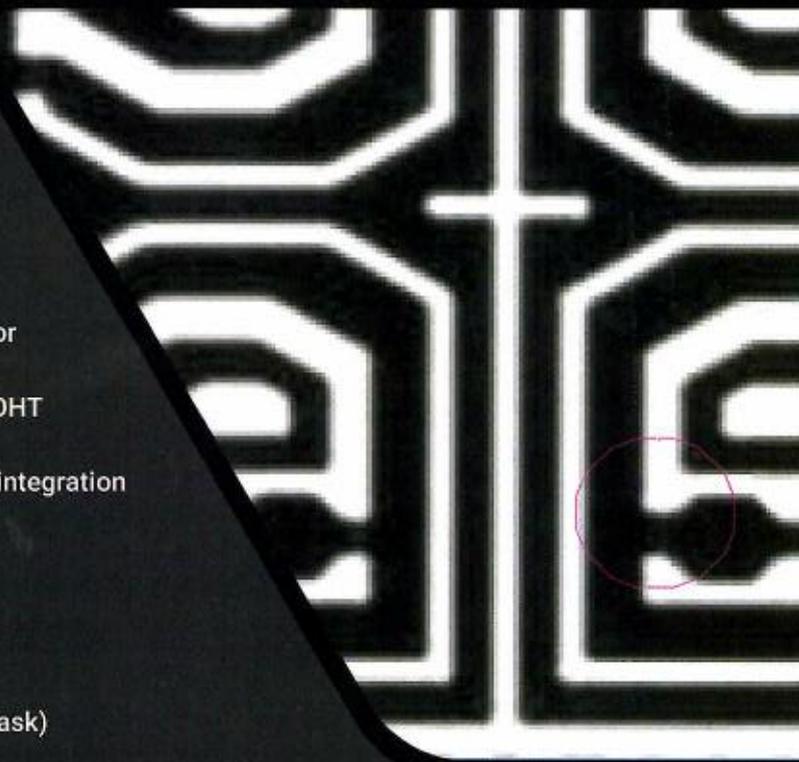
STRATUS VISION
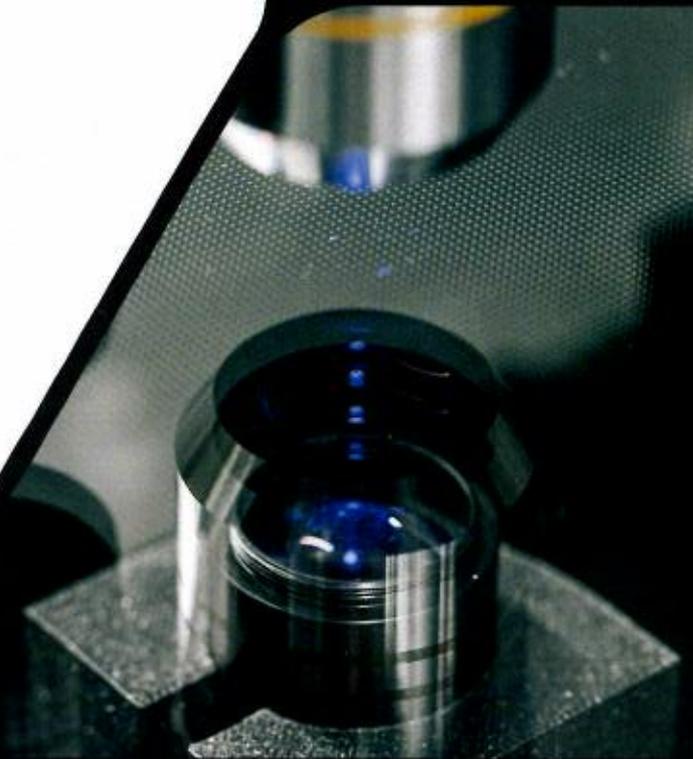
Operational Highlights:

- >95% system availability
- Low maintenance cost
- No consumables or recurring parts

Connectivity & Automation

- Connection to repair tools via Stratus RepairLink Server for automated feedback
- Manual or fully automatic loading with optional EFEM or OHT SMIF interface
- SECS/GEM & OPC-UA communication protocols for MES integration
- Automated job scheduling and recipe management

Performance at a Glance

- 4"–14" reticle support
- < 5 min total setup (data + alignment)
- 0.25 µm defect detection capability (36 min cycle @ 6" mask)
- CAD overlay with automated categorization
- Fully automatable with optional EFEM/OHT
- Inspection with and without pellicle incl. particle inspection via StratusLight
- AI-assisted defect classification (optional)
- Traceability: Automatic logging of UID, lot, operator ID, and inspection parameters for MES traceability.

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more
here!
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STRATUS OFFLINE FLEX

STRATUS VISION

SEMI-AUTOMATIC OPTICAL INSPECTION MACHINE

Areascan Camera	Linescan Camera	Manual Loading	Aftermarket Automation
Multiple Lighting Scenarios	AI Defect Classification	Resolution < 1µm	High Measurement Accuracy
Via Inspection	2D/3D Inspection	Wirebond Inspection	

The **STRATUS OFFLINE FLEX** is a semi-automatic inspection and metrology system designed for flexible, rigid, and transparent materials such as green tapes, ceramic thin films, wafers, glass, PCBs, and AMB/DCB substrates.

Its high-precision motion system is mounted on a granite base for superior vibration isolation and thermal & movement stability. The modular design allows maximum flexibility in imaging, lighting, and sensor configuration, including optional confocal sensors for precise height and thickness measurement. A porous-stone vacuum nest ensures flatness and repeatable precision even for ultra-thin substrates down to 10 µm, while an optional nest adapter for glass products supports sizes up to 515 × 510 mm for TGV applications. The system is ideal for process qualification, quality assurance, and R&D environments.

High precision meets flexibility – for any substrate, any challenge.

Key Features & Capabilities

- Semi-automatic operation for lab and pilot-line environments with easy automation integration
- High measurement accuracy and repeatability
- Flexible imaging and lighting setup
- Porous-stone nest for ultra-thin substrates or custom nest design
- Top- & backlight illumination for optimal material contrast
- High resolution applications

SPIN Software Engine & SPINDLE AI

At its core, the SPIN Software Engine provides proven CAD-based inspection with advanced tooling and analytics. It is optimized for complex requirements with easy to adjust settings to capture production variance and parallel high speed inspection scenarios:

- Fast setup & CAD alignment
- Specialized inspections, e.g., laser trim, scribe-line and layer thickness
- Comprehensive reporting & data export
- User control
- Customizable camera and light control
- Optional SPINDLE AI module for automated defect categorization

Comprehensive Defect Detection

Detectable defects are any type of deviation of the design and include:
Excess or missing paste, smearing, narrowing, holes, via covering, contamination, bleeding, print shifts, shrinkage or size requirements.

With robotic loading (optional), the system identifies random and serial defects, enabling scalable automation.

High-Performance 2D & 3D Metrology

Delivers automated, high-density metrology with hundreds of thousands of points captured in seconds during the inspection run.

- Example: 8" × 8" substrate (~500k vias) fully verified in < 1 min
- Provides 100 % metrology (not just sampling)
- Measures features down to submicron resolution (~0.2 µm)
- Ideal for precise process control in modern electronics manufacturing
- Simple metrology setup based on CAD data with quick setup
- Repeatable measurements over the entire batch variation
- Easy results export and data management

Performance at a Glance

- Semi-automatic precision inspection
- 10" × 10" inspection in < 30 s
- Reliable defect detection on fine-line structures < 10µm
- 100 % metrology capability
- CAD-based analysis with AI option
- Ideal for R&D and production QA

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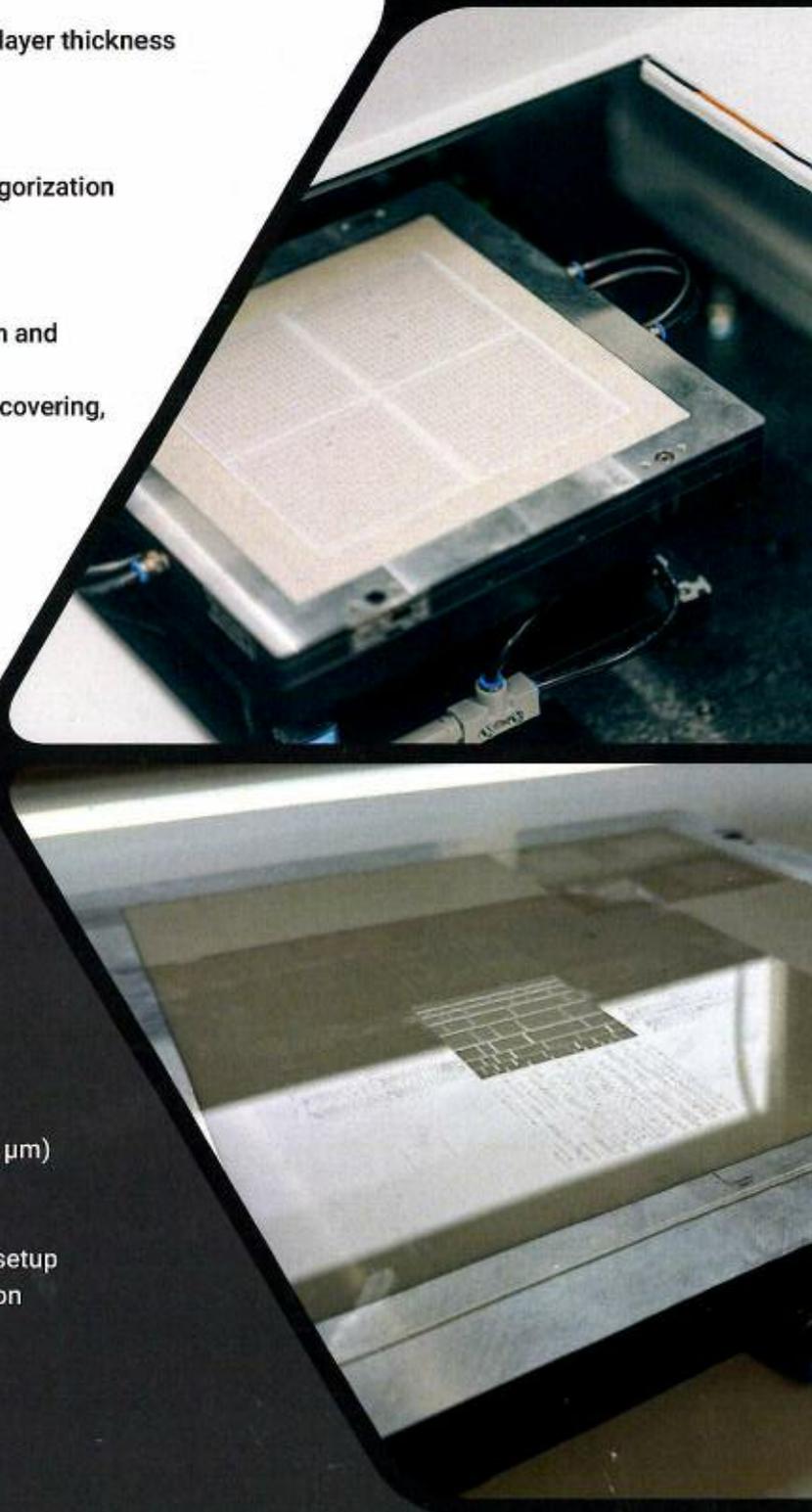
STRATUS INLINE FLEX

AUTOMATIC INLINE INSPECTION & METROLOGY FOR THIN, RIGID AND FLEXIBLE SUBSTRATES

STRATUS VISION

Carrier Transport	Areascsan Camera	Linescan Camera	2D/3D Inspection

Fully Automated	Resolution < 1µm	Aftermarket Automation	AI Defect Classification

Via Inspection	Multiple Lighting Scenarios	High Measurement Accuracy

High-Speed Inline Inspection for Electronic Substrates and Electronic Packaging

Solving thin, flexible, and rigid substrates automatic handling, the STRATUS INLINE FLEX is a fully automatic, conveyor-based inspection and metrology solution that can also handle multiple sizes.

Sensitive products requiring full-surface active area inspections such as glass foils, green tapes, and ceramics can be processed with this solution. The specialized INLINE FLEX handling, illumination, and processing solutions allows reliable processing also if they have high aspect ratio structures.

Direct physical and closed loop integration is available with laser machines, screen printers, and other process systems.

With high throughput, fast setup, and robust substrate guidance, the INLINE FLEX delivers exceptional inspection reliability.

Automation meets precision – continuous inspection without compromise.

Key Features & Capabilities

- Automatic handling of (ultra-thin) foils on carriers or in boxes and rigid circuit boards
- Seamlessly integrates into production lines and MES environments with full traceability
- Various top- and backlight illumination for maximum contrast and versatility
- Automatic substrate size adjustment option

Complete Surface Inspection and Verification with SPIN

Using the proven STRATUS SPIN inspection software, our AOIs perform CAD-based comparison of actual and intended design data, identifying even the smallest deviations with high repeatability. Each additive layer or process step can be tracked referencing the Unique Identifier (UID), enabling layer-by-layer traceability after final inspection.
Typical defect classes include:

- Excess or missing paste and structure for reflective or wet materials such as silver, silver-palladium, silver-platinum, gold, copper, overglaze, adhesives
- Mouse bites, holes, via covering from e.g. material variances, smearing, narrowing, bleeding and other process defects
- Deposition irregularities and contamination
- Print shifts, substrate shrinking and screen aging

Perfect for LTCC, HTCC, GLASS and multilayer ceramics, as well as advanced PCB or thin-film applications.
The system distinguishes random and serial defects, supporting both process optimization and quality tracking across batches.

Advanced Imaging

- Optimized for fine-line structures < 10 µm
- Standard 1 µm pixel-size, measures features down to submicron resolution (~0.2 µm)
- Full 10" × 10" substrate inspection in less than 10 seconds

High-Performance 2D & 3D Metrology

The INLINE FLEX offers 2D and 3D metrology for geometric measurement and dimensional verification and inspection. It supports statistical process control and provides data export to MES or SPC systems for advanced quality analytics of measurements.

- 100 % measurement inspection (no sampling required)
- Dimension & alignment checks for vias, pads, and printed features
- Provides metrology output data (e.g. CSV, TXT) for process feedback and optimization.

Connectivity & Automation

- File input: DXF, DWG, Gerber, GDSII, Oasis
- Fully inline-capable, with SECS/GEM and MES connectivity and custom communication protocols (e.g. SMEMA)
- Optional automation e.g. loading, flipping, transport and cleaning modules

Performance at a Glance

- Fully automated inline AOI & metrology
- For transport of trays, carriers, and rigid substrates
- Handles ultra-thin materials from ≈10 µm
- Various Top- & backlight illumination for maximum flexibility
- Inline integration with MES & factory automation
- Measures features down to submicron resolution (~0.2 µm)

STRATUS VISION

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STRATUS III (INLINE)

FAST, RELIABLE AND ACCURATE INSPECTION OF RIGID SUBSTRATES

STRATUS VISION

Carrier Transport

Areascsan Camera

Linescan Camera

2D/3D Inspection

Fully Automated

Resolution > 1µm

Aftermarket Automation

AI Defect Classification

Via Inspection

Multiple Lighting Scenarios

Accelerating Quality – High-Speed Inspection for Modern Electronics Manufacturing

The STRATUS III is our versatile AOI model which offers a drawer for manual loading or conveyor-based loading to become an automated inspection and metrology solution – either offline or inline.
The various direct physical and logical integration options allow optimizing use of existing equipment and production lines with lasers, screen printers, and other process systems.

The SPIN software enables reliable inspection of challenging products such as screen-printed, plated, or multilayer substrates, ensuring high throughput, fast setup, and stable substrate handling. Using a Unique Identifier (UID), all inspection layers and process steps can be fully tracked for layer-by-layer traceability and seamless data transfer to downstream equipment. The system supports front and backside inspection for transparent materials or with a flipping station, and can inspect thick substrates up to 40 mm, including cavities or stacked die-on-die structures, in a single automatic program.

Key Features & Capabilities

- Handles carriers, trays, and rigid circuit boards
- Designed for stable inline transport and accurate positioning
- Often used for glass, ceramic and other fragile materials
- Seamlessly integrates into production lines and MES environments and full traceability

Comprehensive Defect Inspection

Using the proven STRATUS SPIN inspection software, our AOIs perform CAD-based comparison of actual and intended design data, identifying even the smallest deviations with high repeatability.
Typical defect classes include:

- Excess or missing paste
- Smearing, narrowing, bleeding
- Mouse bites, holes, via covering
- Irregularities and contamination
- Print shifts, substrate shrinking, screen aging

The system distinguishes random vs. serial defects, supporting both process optimization and quality tracking across batches.

Advanced Imaging & Illumination

- Various top- and backlight illumination for maximum contrast and versatility
- Optimized for fine-line screen-printed structures < 20 µm
- Resolution down to 1 µm pixel-size
- Up to 500 × 500mm substrate inspection
- For thick substrates up to 20mm and automatic multilevel inspection

Versatility at its finest paired with speed and accuracy.

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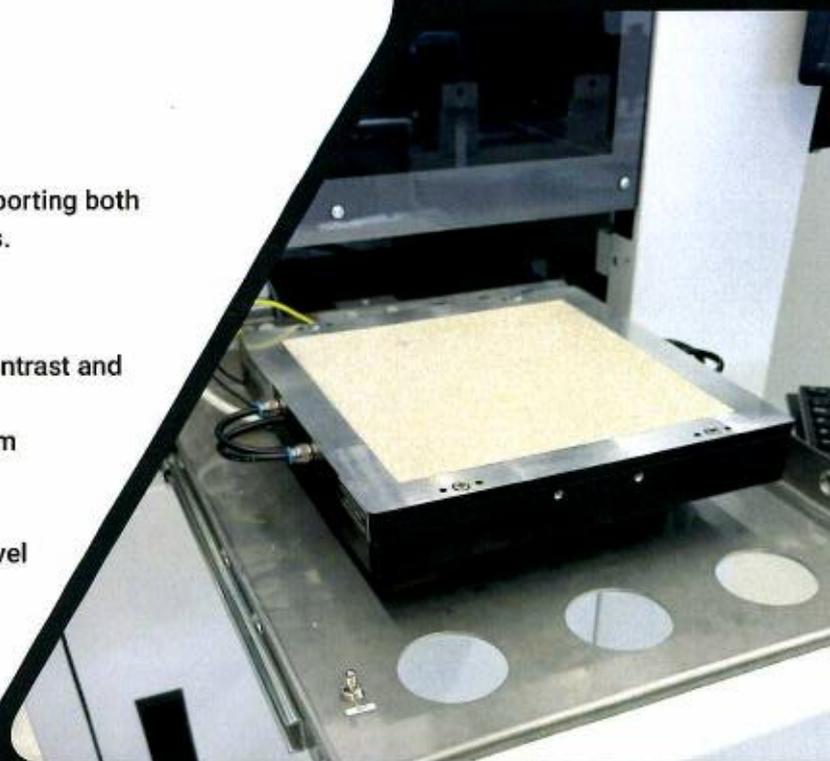
Material & Process Versatility

- Conductive materials: silver, silver-palladium, silver-platinum, gold, copper
- Resistive materials: various resistor pastes
- Protective and structural layers: adhesives, cover glass, glass passivation, dielectrics

Perfect for sintered LTCC, HTCC, and multilayer ceramics, as well as advanced PCB or thin-film applications.

Connectivity & Automation

- Fully inline-capable, with SECS/GEM and MES connectivity
- Compatible with SMEMA and custom communication protocols
- Optional flipping and cleaning modules for advanced process integration
- Designed for continuous 24/7 operation with minimal operator interaction

Performance at a Glance

- Fully automated inline AOI or flexible tray loaded AOI
- For carriers and rigid substrates
- Inspection for 500 × 500mm substrates
- Resolution down to 1 µm pixel-size
- Handles thin materials in some cases <300 µm
- Various Top- & backlight illumination for maximum flexibility and optimal illumination
- Inline integration with MES & factory automation
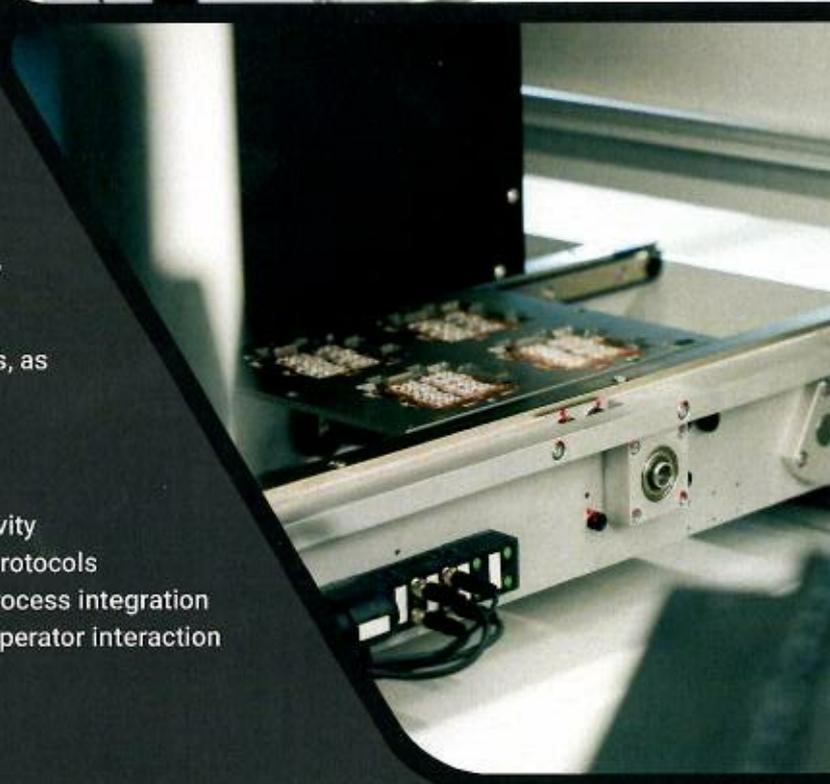
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STRATUS III INLINE WB

AUTOMATED WIREBOND & SURFACE INSPECTION – HIGH PRECISION IN MOTION

STRATUS VISION

Carrier Transport	Areascsan Camera	Linescan Camera	2D/3D Inspection

Fully Automated	Resolution > 1µm	Wirebond Inspection	AI Defect Classification

High-Throughput Inline Inspection for Ceramics, PCB, LTCC & HTCC

To address challenges resulting from long setup times, high false positive rates, slow inspection cycles, and labor-intensive review of already inspected substrates the STRATUS III INLINE WB system was developed in close collaboration with industry-leading productions.

STRATUS III INLINE WB is a fully automated, conveyor-based inspection system designed for high-volume substrate production such as leadframes, ceramics, PCBs, LTCC, HTCC, and multilayer materials featuring complex multilayer wirebond structures. Combining fast setup, speed, flexibility, and cost efficiency in a compact footprint while supporting substrates up to 20" × 20" (500 × 500 mm) makes this machine a class of its own in manufacturing environments.

From CAD data to process control – all in one system.

Key Features & Capabilities

- Fully automated inline system for continuous production
- Adaptive illumination for diverse materials and finishes
- Fast inspection & setup for minimal downtime
- Compact, modular design for easy integration

Wirebond Inspection with SPIN & SPINDLE

Powered by SPIN defect detection and the AI-driven SPINDLE module, the STRATUS III INLINE WB ensures precise, CAD-based inspection for complex wirebond applications.

- Minimal setup effort and time requiring only few reference parts
- Ultra-low false call rate through adaptive algorithms and AI
- Wire range: 15 μm – 600 μm
- Resolutions down to 1 μm
- Handles crossing, multilayer, and mixed-material bonds (Au, Cu, Al)
- Can inspect deep packages e.g. die on die, in housing and multi-step substrates
- Ultrasonic and wedge bonds inspection
- Detects various defects such as missing, misaligned, damaged, or connected wires

Surface Defect Detection

The SPIN software inspects simultaneously for surface defects such as:
Excess or missing materials, contamination, smearing, holes, print/ part shifts, cracks or scratches.
Optimized for difficult and reflective materials like DBC/ AMB, silver, palladium, adhesives, resistor pastes, cover glass, and electroplated gold.

STRATUS VISION

High-Performance 2D & 3D Metrology

Beyond inspection, the STRATUS III INLINE WB delivers full 2D and 3D metrology for process verification and component alignment.

- 2D: bond-foot dimensions, X/Y/Theta deviation, layer offsets
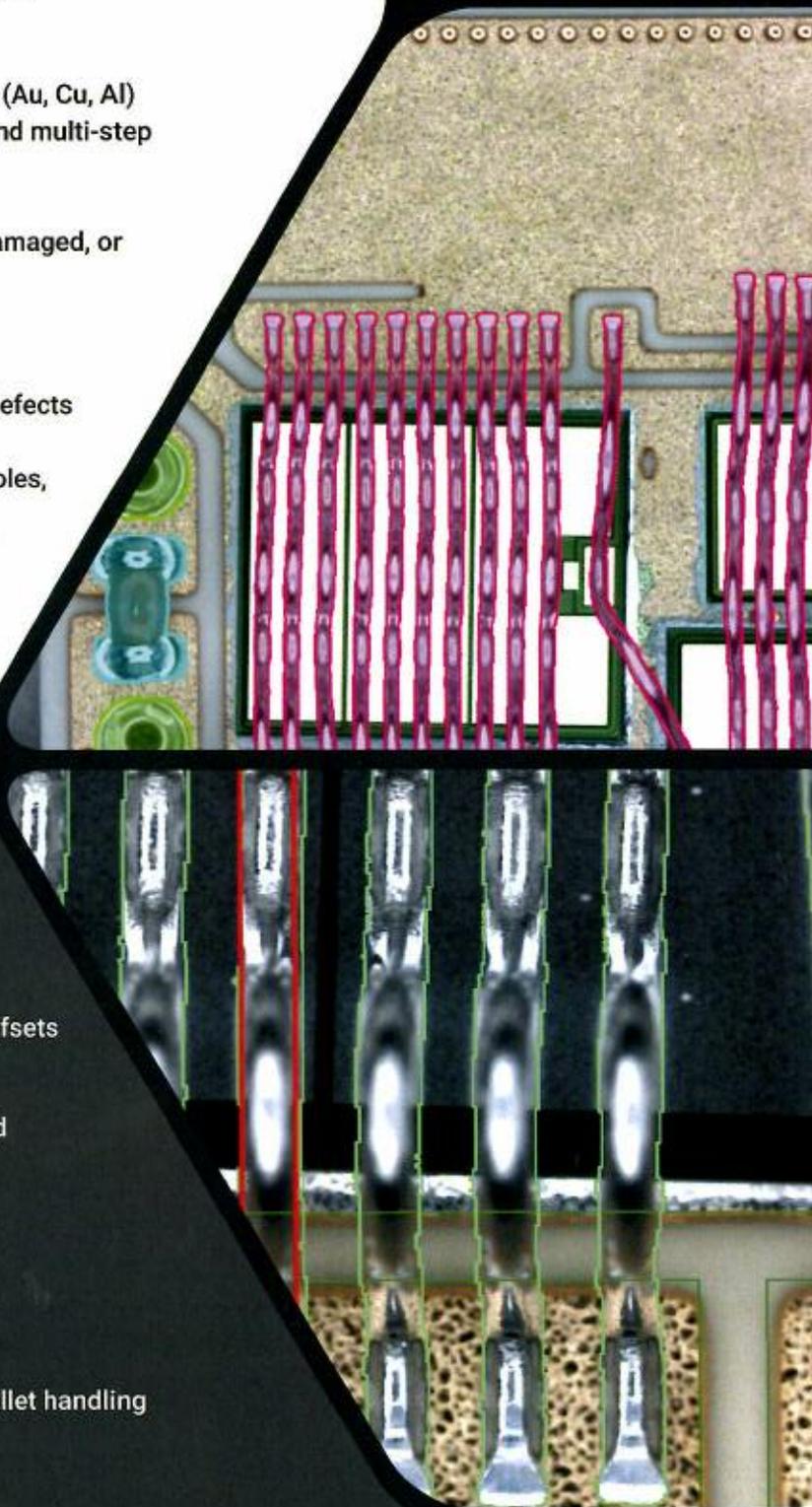- 3D (optional): warpage, BLT, loop height

Provides metrology output data for process feedback and optimization.

Connectivity & Automation

- File input: DXF, DWG, Gerber, GDSII, Oasis
- Output: TXT, CSV, custom formats
- Integration: SECS/GEM & MES ready
- Automation: flipping units, cleaning modules, carrier/pallet handling

Performance at a Glance

- Inline automation for maximum throughput
- Complete inspection: wirebond + surfaces
- AI-based software for ultra-low false calls
- Suitable for ceramics, PCB, LTCC/HTCC
- Optional 2D/3D metrology
- Factory automation ready

Learn more here!
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