TR7500 SIII

S E R I E S

TRI
innovation

AUTOMATED
OPTICAL INSPECTION

TR7500 SIII AOI with Total Inspection Coverage

The TR7500 SIII AOI employs cutting edge multi-camera technology and new generation software to inspect every detail of components, solder joints and the entire PCB surface with maximum precision.

Complete Coverage at Full Speed

Combination of five multi-angle color cameras eliminates blind spots even on complex automotive and smartphone assemblies. TR7500 SIII inspection range covers everything from basic SMT components to complex connectors and hidden joints, and new imaging system helps identify challenging defects using multiple lighting phases without slowing down.
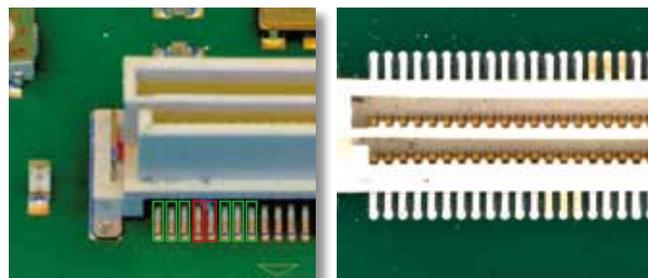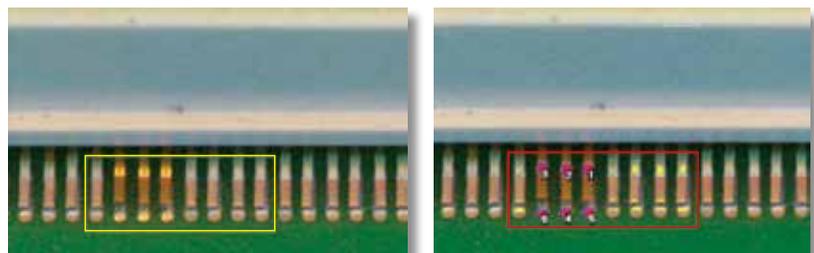
Multi Angle Color Cameras

New generation color angle view cameras make side view inspection a breeze. Finding complex solder joint defects hidden from top view has never been easier, and new color space processing algorithms ensure reliable defect detection.
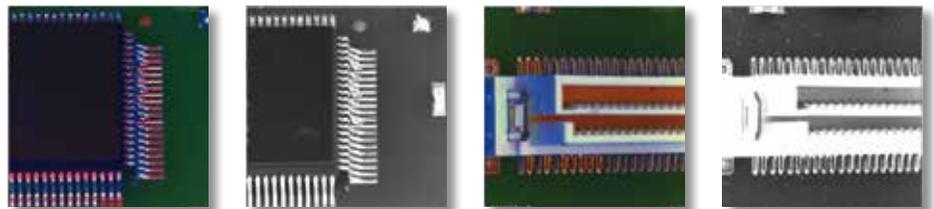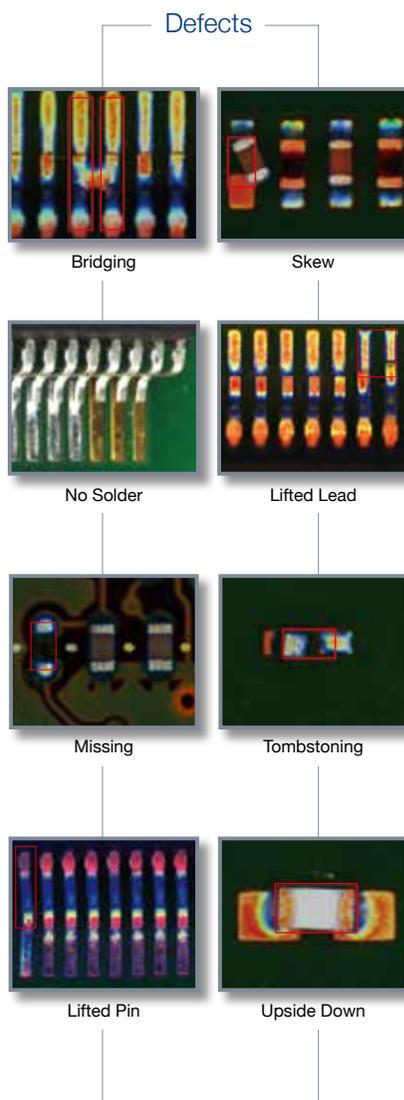
Color Angle View Cameras Easily Reveal Solder Joint Defects

Hidden bridge defect on connector joints can only be revealed by angle view camera.

Lifted leads clearly identified using angle view camera.

Defects

Bridging

Skew

No Solder

Lifted Lead

Missing

Tombstoning

Lifted Pin

Upside Down

Intelligent Easy Programming Interface

New intelligent programming process significantly reduces programming time using smart component library and integrated board warp compensation.

Programming Flowchart

Step 1	Step 2	Step 3	Step 4
Load CAD	Scan Map + Alignment	Fiducial Mark + Library	Inspect/ Fine Tune
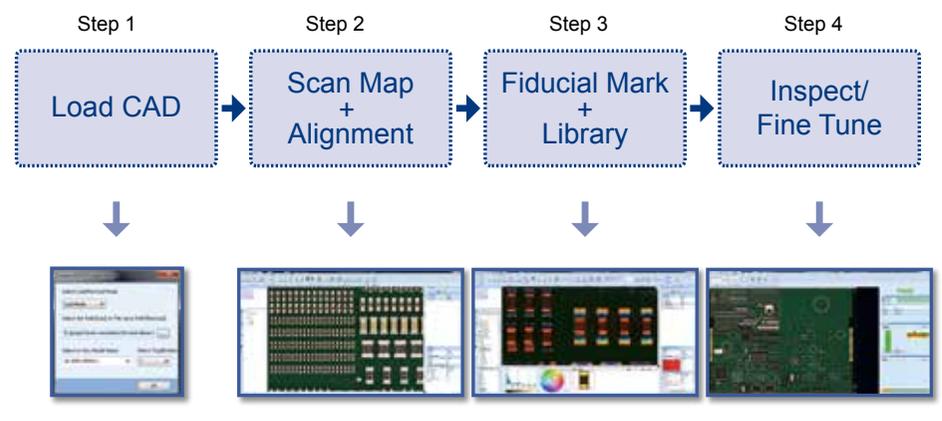
Smart Library + Model Library

Smart Library speeds up programming by automatically allocating inspection windows for IC leads.

Auto Locate Pins   Model Library   Component Programming Complete
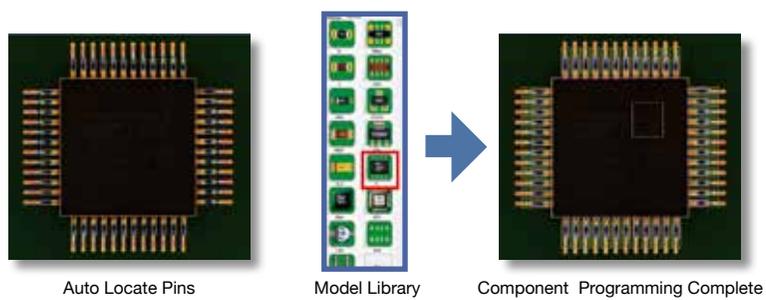
New Color Space Algorithms

TRI's new adaptive algorithms use color space processing to increase inspection accuracy, reduce false calls and improve inspection results while reducing time necessary for inspection fine tuning and the number of alternative images required.
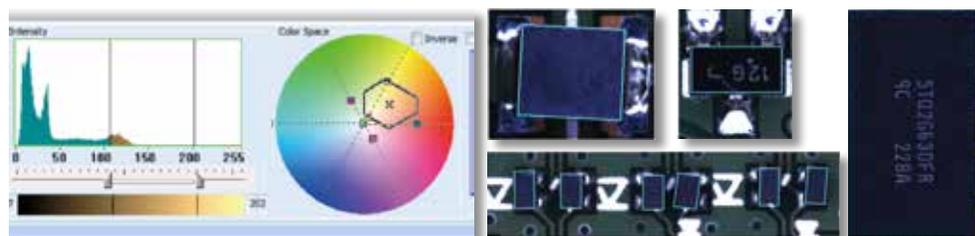
Color Differentiation Analysis for Black Resin Parts
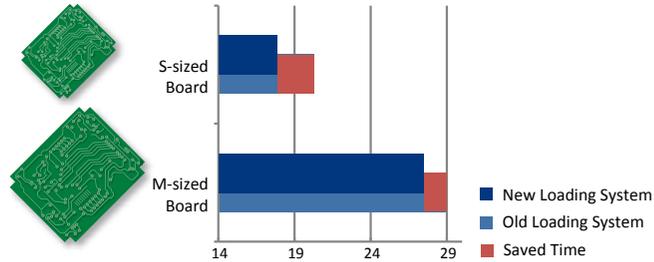
Multi-phase Lighting

Four individual lighting phases improve inspection of individual defect types using specialized lighting conditions. High speed camera allows inspection at constant speed even with multiple lighting phases.

Uniform Light   Solder Light   Marking Light   Component Light
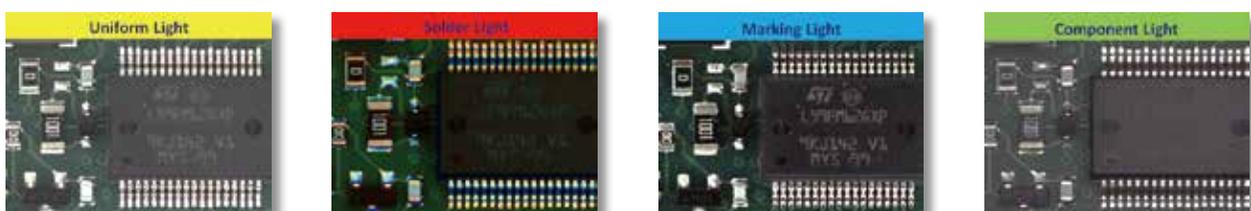
Intelligent Auto Conveyor System

IACS automatically optimizes board stopping position in the conveyor, reducing load and unload time by up to 2.5 seconds, depending on board size.

• Reduced load & unload time (saves 0.5-2.5 sec. per board.)

S-sized Board
M-sized Board

■ New Loading System
■ Old Loading System
■ Saved Time

14   19   24   29

• Automatic adjustment of conveyor speed based on board size & weight saves time for manual adjustment and training.

• Automatic conveyor width adjustment (Optical direct adjustment system without returning to default position).

Automated Warp Compensation

Board warping reduces automated inspection stability and requires additional fine tuning. TR7500 SIII automatically compensates for any deformation and keeps inspection windows fully aligned.
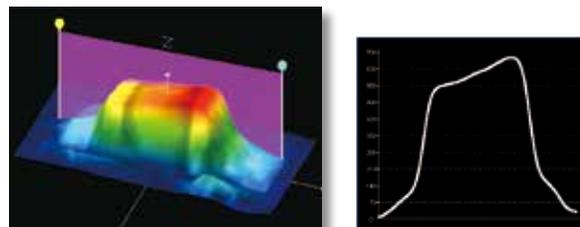

Board Warping
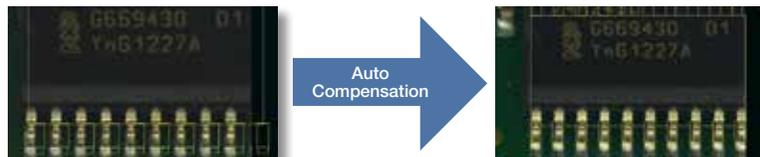
Auto Compensation

Automated Board Warping Compensation Effectively Realigns Inspection Window Position

TR7500 SIII 3D Inspection Option

Most of the TR7500 SIII Series can combine the best of 2D and 3D technologies with new generation software to revolutionize PCB assembly inspection.

3D Inspection Reveals Defects on Both Small and Oversized Components

3D Inspection Upgrade for Unlimited Coverage (Option)

Combination of five multi-angle color cameras and true 3D profile measurement eliminates blind spots even on complex automotive and smartphone assemblies. TR7500 SIII 3D inspection range extends coverage from basic SMT components to large thru-hole capacitors, switches, connectors and hidden joints.

Laser 3D Technology Option

Accurate laser sensor goes beyond other 3D technology boundaries. Its high measurement range ensures that components up to 20 mm high can be inspected with maximum precision. Working with laser light also eliminates problems with black or mirror-like components on low contrast background. (The maximum PCB size of some of the models may be affected. Please see the TR7500 SIII 3D brochure)

Interactive 3D models help operators quickly review found defects, such as lifted BGA components, IC leads, connectors, switches and other mounted devices for enhanced post-reflow inspection.
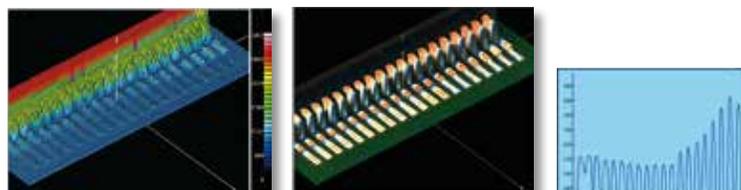
IC Lead Inspection Using 2D + 3D Technologies Efficiently Reveals Lifted Leads

SMT Line Integration

Centralized production line management increases operator productivity and response time. TRI's integrated solution includes the following four components.

• Offline Editor

This application allows for centralized independent adjustment and fine tuning of inspection algorithms on previously scanned images while providing immediate feedback. The completed program can then be uploaded to the in-line inspection machines to improve inspection stability and accuracy.
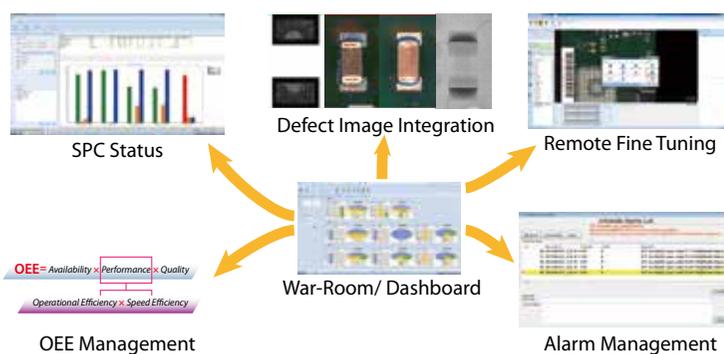
• Control Center

The core component at the heart of a production facility, the control center allows real-time monitoring and operation of multiple inspection machines across production lines.

Offline editor / Control center

AOI_1   AOI_2   AOI_N
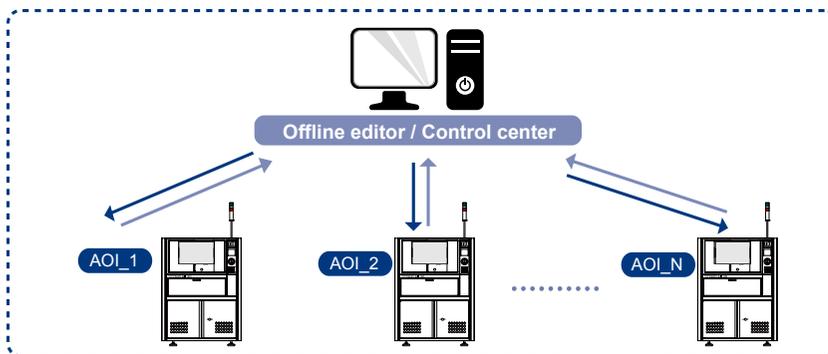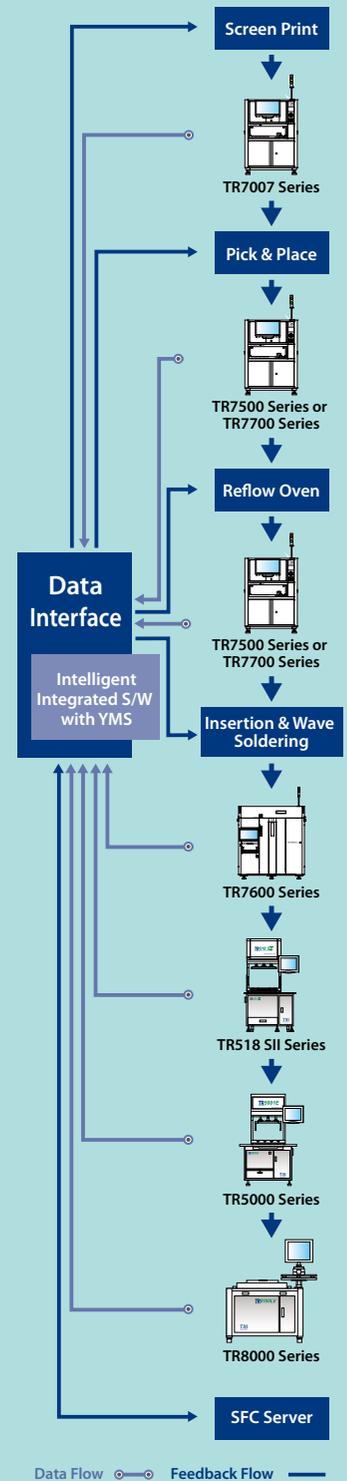
• Yield Management System 4.0

YMS 4.0 provides real-time inspection status across SPI, AOI and AXI systems and monitors SPC and Alarm status, and supports remote fine-tune throughout the SMT line. The centralized inspection management provides top 5 to 10 defects and defective images, OEE review and management, issue and root cause drill down line by line, by station and by process, which improves quality and productivity analysis. YMS 4.0 supports Industry 4.0 initiative.

SPC Status

Defect Image Integration

Remote Fine Tuning

$OEE = Availability \times Performance \times Quality$

$Operational\ Efficiency \times Speed\ Efficiency$

OEE Management

War-Room/ Dashboard

Alarm Management

• Quality Validation

Fully automated collection of good/failed images from a complete production run allows testing, tuning and verification of adjusted program parameters without reloading tested boards. This allows engineers to save inspection time when fine tuning and significantly speeds up New Product Introduction (NPI)

Yield Management System*

Screen Print

TR7007 Series

Pick & Place

TR7500 Series or TR7700 Series

Reflow Oven

TR7500 Series or TR7700 Series

Data Interface

Intelligent Integrated S/W with YMS

Insertion & Wave Soldering

TR7600 Series

TR518 SII Series

TR5000 Series

TR8000 Series

SFC Server

Data Flow ●—●   Feedback Flow ━━━

• Inspection results and data integration
• Real time SPC and production yield management
• Quality reports and closed loop tracking
• Support defect component analysis and improvements
• Knowledge Management (KM)
• Productivity and Quality Management
  * Optional

SPECIFICATIONS

Optical & Imaging System

Top View Camera	4 Mpix high speed color camera
4 Angled View Cameras	1.3 or 6.5 Mpix (factory setting)
3D Laser Sensor	Dual 3D Laser sensers (optional)
Lighting	Multi-phase RGB+W LED
Optical Resolution	10 or 15 µm (factory setting)
Imaging Method	Dynamic Imaging

Imaging/Inspection Speed

15 µm (cm²/sec)	120
10 µm (cm²/sec)	60

Pre-/Post-Reflow Inspection Functions

Component	Missing, Tombstoning, Billboarding, Polarity, Rotation, Shift, Wrong Marking (OCV), Defective, Upside Down, Lifted Component, Extra Component
Solder Joint	Excess Solder, Insufficient Solder, Bridging, Through-hole Pins, Lifted Lead, Golden Finger Scratch/Contamination

X-Y Table & Control

Ballscrew + AC servo with motion controller	
X-Y Axis Resolution	1 µm

PCB & Conveyor System

	TR7500 SIII	TR7500L SIII	TR7500 SIII DL
Min. PCB Size	50 x 50 mm (1.97 x 1.97 in.)		
Max. PCB SIze	510 x 460 mm (20.1 x 18.1 in.)	660 x 610 mm (26.0 x 24.0 in.)	510 x 310 mm x 2 lanes (20.1 x 12.2 in. x 2 lanes) 510 x 590 mm x 1 lane (20.1 x 23.2 in. x 1 lane)
PCB Thickness	0.6 - 5 mm		
PCB Transport Height	880 - 920 mm (34.6 - 36.2 in.)		
Max. PCB Weight	3 kg (6.61 lbs)		
PCB Carrier/Fixing	Step motor driven & pneumatic clamping		
Clearance			
Top	25 mm (0.98 in.) [48 mm (1.9 in.) optional]		
Bottom	40 mm (1.58 in.)		
Edge	3 mm (0.12 in.) [5 mm (0.2 in.) optional]		

Dimensions

	TR7500 SIII	TR7500L SIII	TR7500 SIII DL
Dimensions (W x D x H)	1100 x 1670 x 1550 mm (43.3 x 65.7 x 61.0 in.) (not including signal tower, height: 520 mm)	1300 x 1630 x 1655 mm (51.2 x 64.2 x 65.2 in.) (not including signal tower, height: 520 mm)	1100 x 1770 x 1550 mm (43.3 x 69.7 x 61.0 in.) (not including signal tower, height: 520 mm)
Weight	1030 kg (2270 lbs)	1255 kg (2767 lbs)	1150 kg (2535 lbs)
Power Requirement	200 – 240 V, single phase, 50/60 Hz 3 kVA		
Air Requirement	72 psi – 87 psi (5 – 6 Bar)		

Options

Barcode Scanner, Offline Editor, OCR & Yield Management System (YMS 4.0), YMS Lite, 3D Upgrade Package

TRI 德律 **TRI INNOVATION**