



# V510*i* Optimus<sup>3D</sup>

**Advanced 3D Optical Inspection (AOI) Series**  
A One Stop Solution for SMT Line.



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# 2D + 3D Inspection Concept

## 2D +3D Lighting



### 2D Lighting

Structured lighting with multiple colour LEDs provides the richest image options in the market.

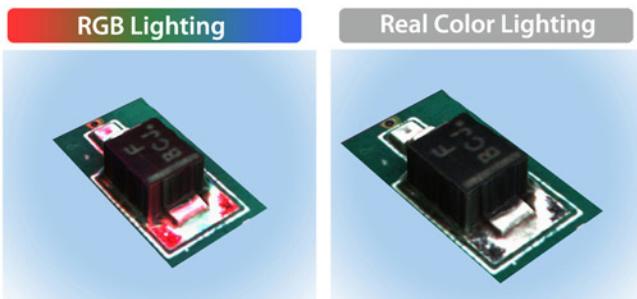
Matured algorithm database with more than 15 years in the market.

### 3D Lighting

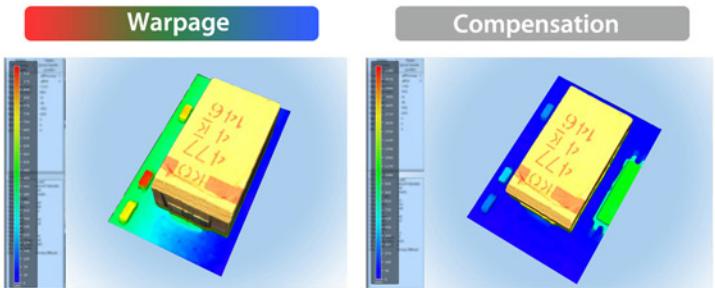
This is an in-house development of high speed, high resolution miniature projector with telecentric lens. Multiple projectors installed in the 3D module to illuminate the fringe pattern lighting from different directions to minimize occlusion. The V510 Optimus 3D AOI is using high speed multi frequency Phase Shift Profilometry's (PSP) methodology.

The system is using 2D + 3D Inspection concurrently to achieve high productivity and high detectability.

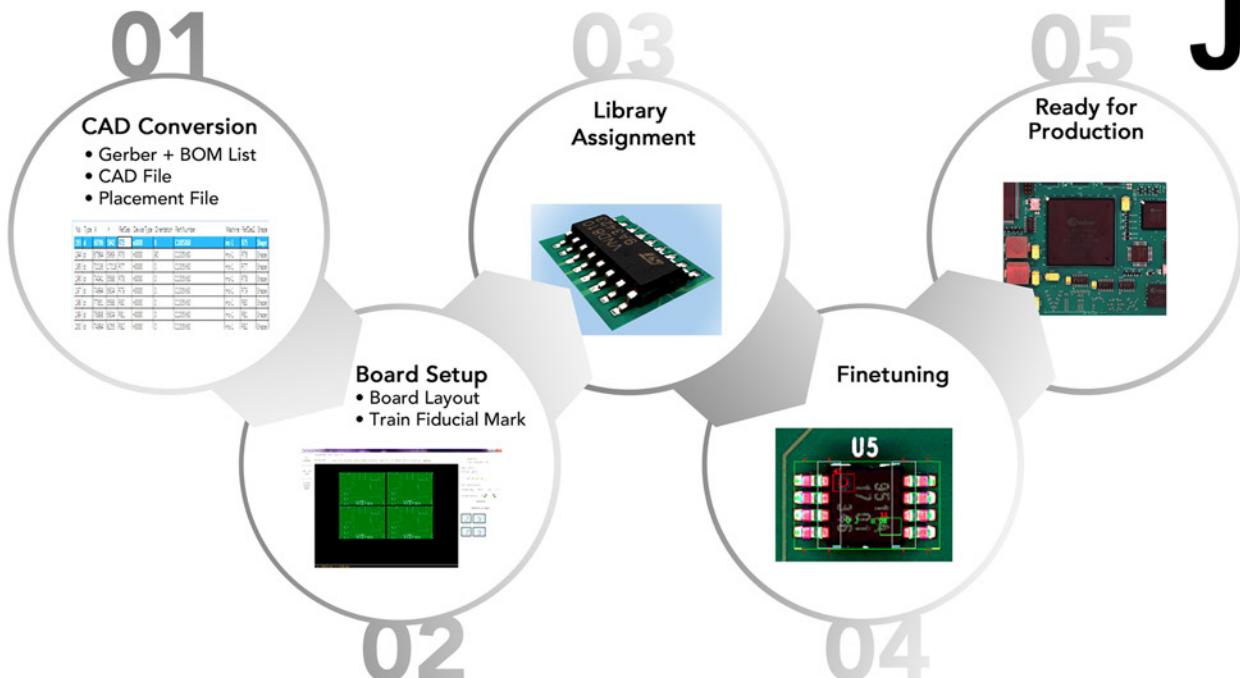
## Concurrent RGB Lighting



## Warpage Compensation



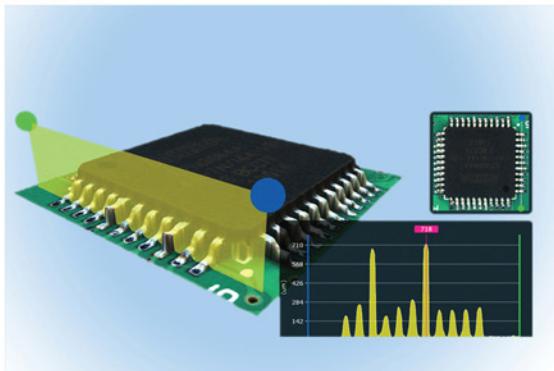
## Ease Of Programming Flow Chart



V510 Optimus 3D AOI supports multiple input formats, for example, NDF import, SMT file import and others. The new board visualizer allows user to view the actual vector board graphic with physical dimension. Besides, the Advance Multiple Board Generation of 3D AOI allows users to create any orientations of board as well.

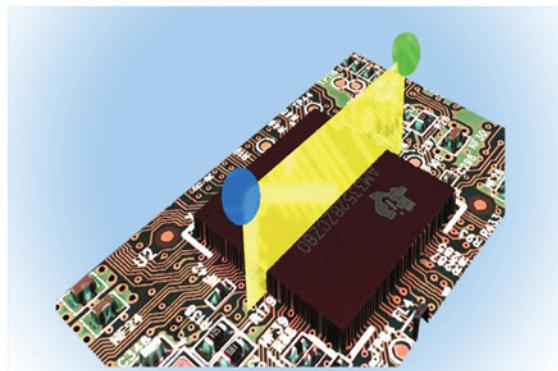
## New Frontiers

### Lifted Lead



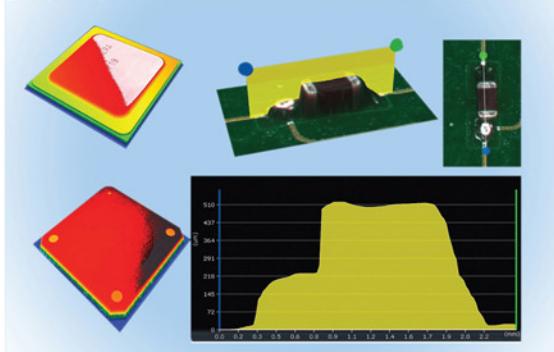
- Lifted lead detection is based on ViTrox's proprietary smart fitting algorithm concept.
- It is invariant to board surface colour and board warpage.
- All the lifted lead value ( $\mu\text{m}$ ) is calculated from the virtual plane formed by ViTrox's proprietary smart fitting algorithm.

### Universal Cross Section



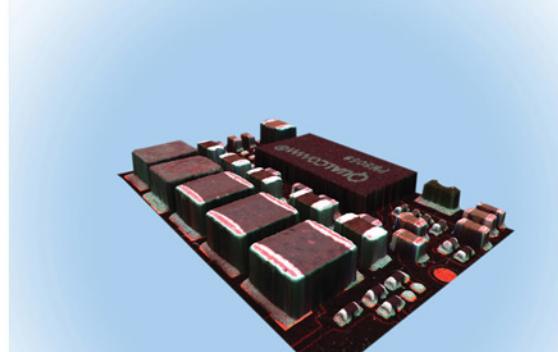
- This algorithm serves as an on demand, generic inspection tool.
- User can freely locate the tool to perform any height related inspection.
- Error name can be defined by user.
- An inverse logic option is available for greater flexibility.

### Coplanarity



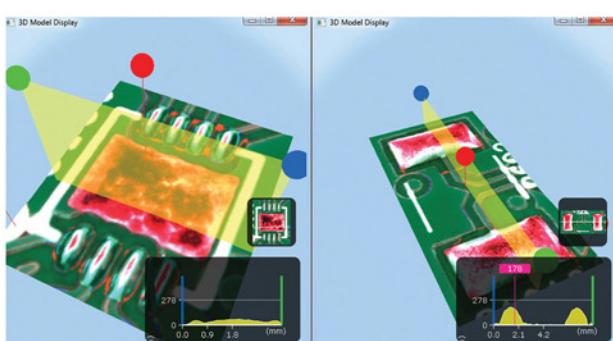
- Coplanarity calculates the parallelism between component surface and the board surface using 3D data.
- Non-wetting solder detectability proven by resolution @20um height measurement.

### Black Colour PCB + Multicolour PCB



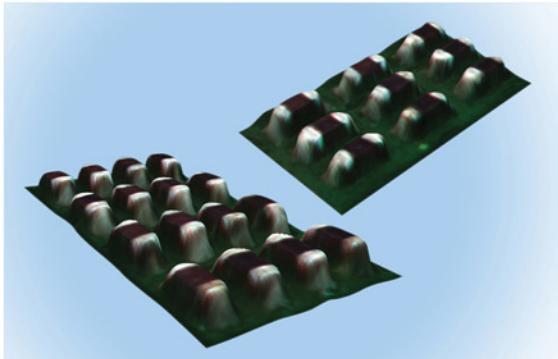
- 3D measurement is performing well even for black PCB. The missing part inspection of black component on the black PCB can be done much easier.

### Presence / Absence



- This algorithm is using height map to detect missing component easily.
- No parameter tuning is required.
- Algorithm is invariant to board surface colour.

### 01005



- 3D AOI is capable of inspecting the height, chip lifted, and presence/absence of current smallest 01005 (0402) chip accurately.

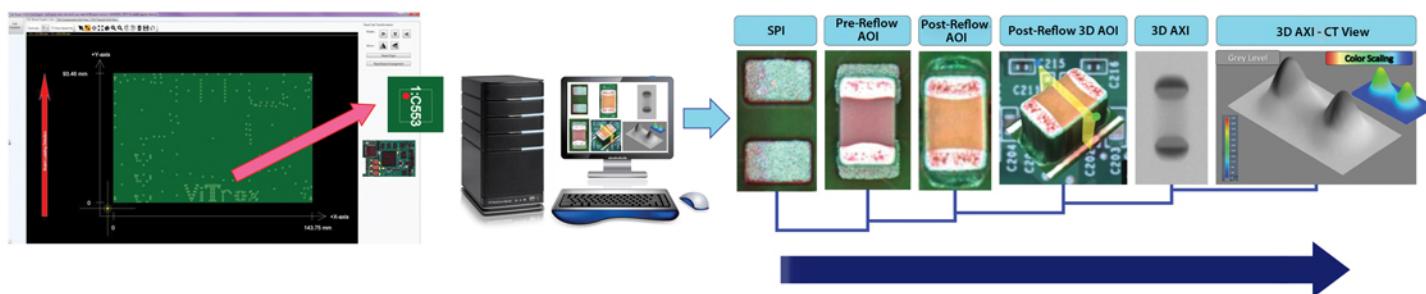
# Closed Loop Feedback & Monitoring

The illustrated centralized management method allows more effective defect images collections, centralized programming, as well as fine-tuning. Moreover, one operator is now possible to manage multiple production lines, and in return bring great cost-saving for the company.

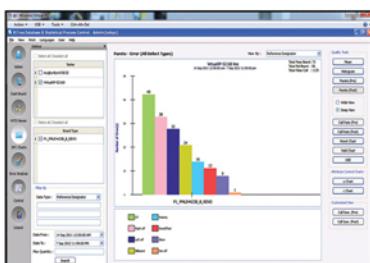


## i Series | Intelligent Link

i Series incorporated Intelligent System which introduces new features on statistics, self-learning algorithms and advanced Graphic Interface via intelligent link.

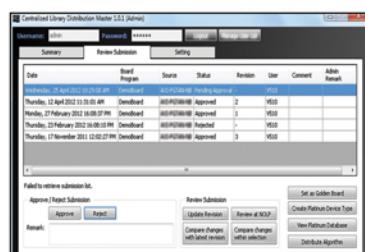


### • ViTrox Database SPC (VDSPC)



A tool for acquiring data from multiple ViTrox optical inspection systems and processing the data collected into meaningful statistical process control (SPC) information and charts from a centralized location, for the use of various management functions.

### • Centralized Library Distribution (CLD)



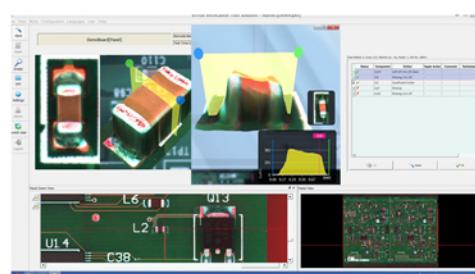
This new feature allows program downloading and uploading on the fly. In addition, it allows user to manage databases in a very efficient fashion.

### • Network Offline Programming (NOLP)



An advanced network offline programming technique where images can be collected from various test programs inspected by various databases. This creates an easy, flexible and effective offline fine tuning than ever!

### • 3D ViTrox Verification Tool Solution (VVTS)



A clear and user friendly defect verification tool allows the operator to review inspection result easily and accurately with SPC capability. Colour scaling is used to illustrate the component height measurement.

## Specifications

### System Performances

Inspection Functions	Missing, Offset, Skew, Polarity, Billboard, Tombstone, Lifted/Bent Leads, Excess/Insufficient Solder, Overturn, Bridging, Wrong Part (OCV Marking), Coplanarity, Foreign Material Detection, Pin Through Hole (Solderability & Pin Detection) and Polarity Dimple Measurement
Height Accuracy (Based on ViTrox Calibration Jig)	± 2um
Board & Component Level Traceability	Camera-Read Barcodes; External Barcode Reader Configures; OCR Capability with Batch Code Logging

### System Hardware

Operating System	Windows 7 Pro 64 bit
Camera & Inspection Speed	4MP Camera Link Camera: Approx 37cm <sup>2</sup> /sec @ 20um resolution 12MP CoaXPress Camera: Approx 60cm <sup>2</sup> /sec @ 15um resolution
Camera FOV	4MP : 40x40 mm @ 20um resolution 12MP : 60x45 mm @ 15um resolution
Optical Resolution	20um, 15um, 13um or 11um telecentric lens*
3D Technologies	Phase Shift Profilometry's (PSP) Methodology with 4-way projectors
Lighting Module	Concurrent Lighting Module
X-Y Gantry System	Gantry Robot Systems with Linear Motor and Linear Magnetic Encoders
X-Y Axis Repeatability	< 8um
X-Y Axis Resolution	1um
Conveyor Width Adjustment	Auto Width Adjustment; Bottom-Up Clamping; In-line SMEMA

PCB Dimension	Standard	FDL
Minimum PCB Size (L x W)	50x50mm (2"x2")	50x50mm (2"x2")
Maximum PCB Size (L x W)	510x510mm (20"x20")	DL Equal - 510x235mm (20"x9.25") Single Lane - 510x420mm (20"x16.5")
Upgradable PCB Length Option (L x W)	610x510mm (24"x20")	DL Equal - 610x235mm (24"x9.25") Single Lane - 610x420mm (24"x16.5")
PCB Thickness	0.5mm-4mm (0.02"-0.16")	0.5mm-4mm (0.02"-0.16")
Maximum PCB Weight	3kg	3kg
<b>Clearance</b>		
Top Side of PCB	50mm (2")	50mm (2")
Bottom Side of PCB	70mm (2.76")	70mm (2.76")
Panel Edge	3.5mm (0.14")	3.5mm (0.14")
Maximum PCB Warpage Compensation	±5mm (0.2")	±5mm (0.2")
PCB Transport Height	856mm - 965mm (33.7"x38")	856mm - 965mm (33.7"x38")

### Installation Specification

#### Footprint

Width	1060mm (3.5ft)
Depth	1352mm (4.4 ft)
Height	2028mm (6.7ft)
Weight	~750 kgs
Electrical Supplies	100-120 V, 16A/200-240V, 8A Single Phase

### Software Options

Network Offline Programming (NOLP), 3D ViTrox Verification Tool Solution (3D VVTS), ViTrox Database Statistical Process Control (VDSPC), V-Tune, V-ONE

\* Based on system configuration.

## Specifications

### System Performance

2D Inspection Functions	Missing, Offset, Skew, Polarity, Billboard, Tombstone, Lifted/Bent Leads, Excess/Insufficient Solder, Bridging, Wrong Part (OCV Marking), Pin Through Hole (Solderability & Pin Detection)	
3D Inspection Functions	Package Coplanarity, Lifted Lead (Height Measurement), Foreign Material, Polarity Dimple Measurement	
3D Height Accuracy (Based on ViTrox Adjustment Jig)	$\pm 2\mu m$	
Board & Component Level Traceability	Camera-Read Barcodes; External Barcode Reader Configures; OCR Capability with Batch Code Logging	

### System Hardware

	2D	3D
Operating System	Windows 7 Pro 64 bit	Windows 7 Pro 64 bit
Camera & Inspection Speed	4MP Camera Link Camera: Approx 26cm <sup>2</sup> /sec @ 20um resolution 12MP CoaXPress Camera: Approx 78cm <sup>2</sup> /sec @ 15um resolution	4MP Camera Link Camera: Approx 37cm <sup>2</sup> /sec @ 20um resolution 12MP CoaXPress Camera: Approx 60cm <sup>2</sup> /sec @ 15um resolution
Camera FOV	4MP : 40x40 mm @ 20um 12MP : 60x45 mm @ 15um	4MP : 40x40 mm @ 20um resolution 12MP : 60x45 mm @ 15um resolution
Optical Resolution	20um, 15um, 13um or 11um telecentric lens*	20um, 15um, 13um or 11um telecentric lens*
3D Technologies	-	Phase Shift Profilometry's (PSP) Methodology with 4-way projectors
Lighting Module	Multiple Color, Multiple Angle, Multiple Segment LED Lighting Head	Concurrent Lighting Module
X-Y Gantry System	Gantry Robot Systems with Linear Motor and Linear Magnetic Encoders	Gantry Robot Systems with Linear Motor and Linear Magnetic Encoders
X-Y Axis Repeatability	< 8um	< 8um
X-Y Axis Resolution	1um	1um
Conveyor Width Adjustment	Auto Width Adjustment; Bottom-Up Clamping; In-line SMEMA	Auto Width Adjustment; Bottom-Up Clamping; In-line SMEMA
PCB Dimension	XXL	XXL FDL
Minimum PCB Size (L x W)	50x50mm (2"x2")	50x50mm (2"x2")
Maximum PCB Size (L x W)	620x690mm (24.4"x27.2")	DL Equal: 620x325mm (24.4"x12.8") Single Lane: 620x600mm (24.4"x23.6")
Upgradable PCB Length Option (L x W)	960x690mm (37.8"x27.2")	DL Equal: 690x325mm (27.2"x12.8") Single Lane: 690x600mm (27.2"x23.6")
PCB Thickness	0.5mm - 15mm (0.02"- 0.6")	0.5mm - 8mm (0.02"- 0.3")
Maximum PCB Weight	7kg	7kg
Upgradable PCB Weight Option	15kg	N/A
Clearance		
Top Side of PCB	50mm (2")	50mm (2")
Bottom Side of PCB	70mm (2.76")	70mm (2.76")
Panel Edge	3.5mm (0.14")	3.5mm (0.14")
Maximum PCB Warpage Compensation	$\pm 5\text{mm}$ (0.2")	$\pm 5\text{mm}$ (0.2")
PCB Transport Height	856mm - 965mm (33.7"- 38")	856mm - 965mm (33.7"- 38")

### Installation Specification

#### Footprint

Width	1410mm (4.6ft)
Depth	1500mm (4.9ft)
Height	2015mm (6.6ft)
Weight	$\sim 1500\text{kgs}$
Electrical Supplies	100-120 V, 16A/200-240V, 8A Single Phase
Air requirement	0.6 Mpa/85 psi

### Software Options

Network Offline Programming (NOLP), 3D ViTrox Verification Tool Solution (3DVVTS), ViTrox Database Statistical Process (VDSPC), V-Tune, V-ONE

\* Based on system configuration.

Disclaimer: ViTrox keeps on improving this product with continuous efforts in research, development and reengineering. Please contact us for the latest version of this specification sheet.