

# SpectorBOX

JTAz JTz JDAz JDz JWAz JWz



because inspection matters

## Mek SpectorBOX Bottom-Up and Top-Down Modular AOI System

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>√ Now featuring the new generation J-series Camera Head</li> </ul>                           | <p><i>2x field of view for main camera for up to 50% reduction of inspection cycle time, and Selective 3D for JTAz models</i></p>   |
| <ul style="list-style-type: none"> <li>√ Optimized for THT Components- and Post Wave and Selective Soldering Inspections</li> </ul> | <p><i>AOI Solution for Wave &amp; Selective Soldering of Through-Hole Components</i></p>  |
| <ul style="list-style-type: none"> <li>√ Bottom-up and/or Top-down Inspection</li> </ul>  | <p><i>Inspects PCBs from below a Conveyor Belt or Chain and from above</i></p>  |
| <ul style="list-style-type: none"> <li>√ Solder Fixture Compatible</li> </ul>   | <p><i>Designed to Inspect PCBs inside Soldering Fixtures directly from the conveyor</i></p>   |
| <ul style="list-style-type: none"> <li>√ Second generation mechanical design</li> </ul>   | <p><i>Improving on the success of the SpectorBOX with optional 80mm Z-axis and accompanying drive systems</i></p>                   |
| <ul style="list-style-type: none"> <li>√ Modular Inspection Possibilities: Bottom, Top or Top + Bottom</li> </ul>                   | <p><i>Possibility to combine 2 SpectorBOX systems for simultaneous Top+Bottom AOI (optional)</i></p>                                |
| <ul style="list-style-type: none"> <li>√ Simple compatibility with integrators</li> </ul>   | <p><i>Multiple 3rd party Turn-key Solutions readily available. SpectorBOX Systems fit conveniently inside these main frames</i></p> |
| <ul style="list-style-type: none"> <li>√ Supports up to 18 Cameras (J series head)</li> </ul>                                       | <p><i>Choose between 1 or 9 camera's per inspection side (up to 18 cameras in Top+Bottom configuration)</i></p>                     |
| <ul style="list-style-type: none"> <li>√ Z-Axis Moving Optical Head(s)</li> </ul>   | <p><i>Focus and Position optimally for varying PCB &amp; Component distances or warpage</i></p>                                     |
| <ul style="list-style-type: none"> <li>√ General Purpose I/O</li> </ul>   | <p><i>Contact closing I/O for Module control by existing PCB handling systems or PLC's</i></p>                                      |
| <ul style="list-style-type: none"> <li>√ Post Defect Classification and Reporting Scenarios</li> </ul>                              | <p><i>Inspect your PCBs Inline &amp; Classify/Report/Analyze Defects later whenever convenient with our Catch system</i></p>        |

# Bottom Up/Top Down Features

The Mek SpectorBOX is a modular AOI system that can be used in two separate ways: Bottom-Up and Top-Down:

**Bottom Up:** AOI is optimized for the inspection of THT solder joints and detection of *solder bridges* and *solder balls*. The Bottom Up SpectorBOX is configurable with one of three different optical units: *JTz*, *JTAz* and *JDz*.

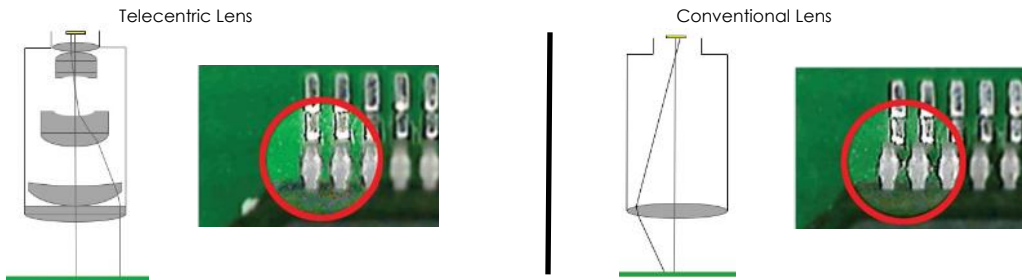
**Top Down:** AOI is optimized for the inspection of THT components to find any visual defect like *presence/absence*, *wrong polarity*, *colour*, *type*, *bent pins* etc. It has a top clearance of 130mm (5.12") so inspection can be done even when the tallest components are placed. The Top Down SpectorBOX is configurable with five different optical units: *JWz*, *JWaz*, *JDAz*, and *JDaz*.

The Mek SpectorBOX is designed to inspect PCB's inside solder frames directly from the conveyor system. With it's totally newly developed mechanical platform, it is the only modular AOI in the market that can be equipped with 9 cameras: 1 top and 8 side cameras.

Optical units	Z-Axis	8x Angular Camera's
<b>Bottom Up</b>		
<i>JTz</i>	YES	NO
<i>JTAz</i>	YES	YES
<i>JDz</i>	YES	NO
<b>Top Down</b>		
<i>JWz</i>	YES	NO
<i>JWaz</i>	YES	YES
<i>JDAz</i>	YES	YES
<i>JDz</i>	YES	NO

## High-Grade Telecentric Lens :

Parallel image over the whole sensor/lens Field of View — No parallax defect as seen in convention lenses



## New Generation 90fps Large pixel image capturing sensor:

15 $\mu$ <sup>2</sup> pixel size — 2x field of view over previous generation smooth and detailed image with great dynamic range — New Lightbridge fibre optic thunderbolt interface no capture card required.

## In Height Adjustable Optical Head (Z-Axis):

In Z-Axis moving Top Camera, Light and Side View cameras for adaption to any PCB thickness & PCB warp compensation. Inspection of "Sandwich" assemblies without need of jigs and multiple inspections.

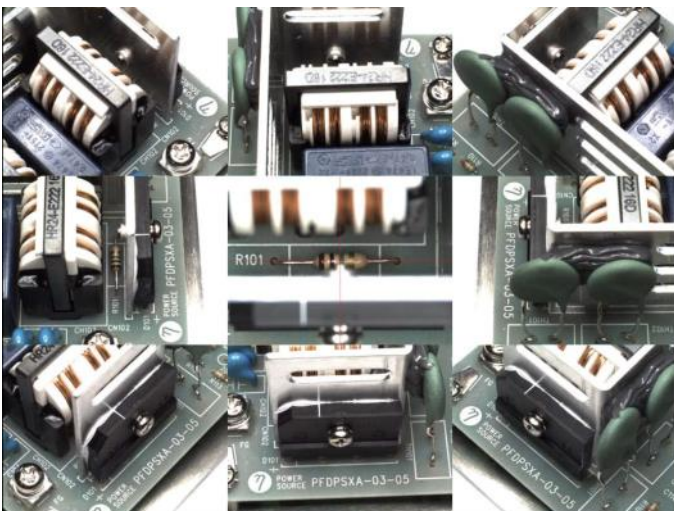
The Z-axis in the **Top Down** configuration can especially be used for reliable text and/or polarity inspection on tall components.



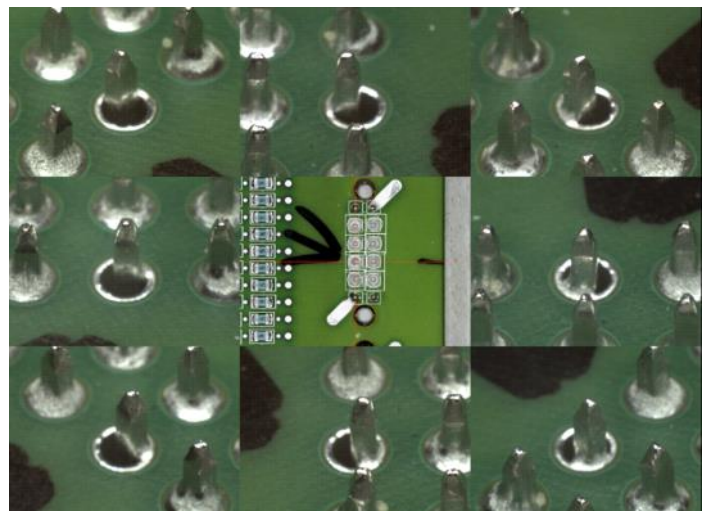
The Z-axis of the Bottom Up and Top Down systems has a default stroke length of 80mm.

## 8x Angular Side Sensors and Selective 3D for components:

Simultaneously operating, multiplexed side view sensors with USB3 vision interface — 45/45 arrangement — Triple use: Active automatic inspection, classification and repair — clear 9 angles defect review — high magnification 50x (10 $\mu$ m/pixel) — Full Color — Auto highlight — Large sensor pixels — Additional side camera lighting— 9 view images also in backup database



9 Separate Views of Defects (1 Top & 8 Side Cameras)

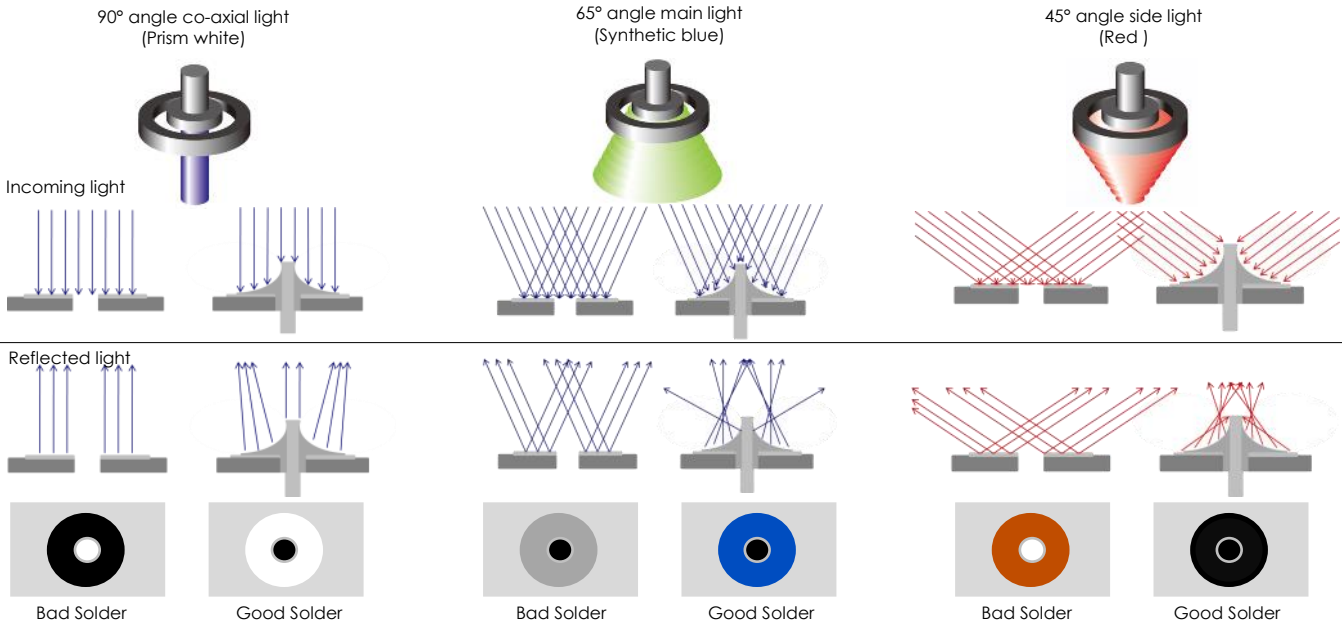


Large Side Camera Field of View

**Omnidirectional multi angle DOAL lighting, multi color LED lighting:**

3D color profile of solder meniscus — accurate defect decision by the software algorithms. The multi-angle DOAL lighting, multi-color LED lighting exists out of three different Omnidirectional Quad LED rings:

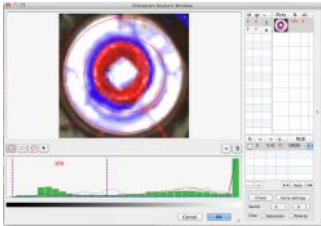
- Line Sourced DOAL (Diffused On Axis Light (Coaxial))
- Main Camera
- Side Camera



The combination of these three lights result in the fact that it can detect visual defects of THT solder joints and detect bridges and solder balls.

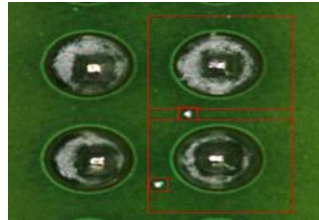


**Histogram Analysis Algorithms:**

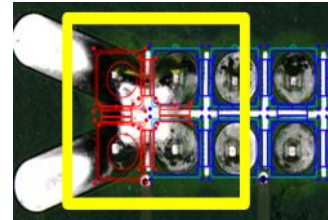


- Condition based decision making
- Tolerances can be set tightly
- Minimized false alarms (calls)

**Algorithms for Solder Balls Detection:**



**Algorithms for Solder Bridge Detection:**



**SpectorBOX Bottom-Up Camera**



**SpectorBOX Top-Down Camera**



# Specifications SpectorBOX

Bottom Up	JTAz	JDz
Maximum PCB Size	550x460mm (21.7" x 18.1")	
Product type	Automatic Optical Inspector	
Camera movement	X+Y+Z Direction	
PCB movement	Stationary during inspection, Transport designed by system integrator	
Parts inspection	Soldering, Bridges, Solder Balls, Components	
Imaging principle	Synthetic Imaging, Spectral Analysis, Greyscale limits	
Imaging parameters	Brightness, Contrast, Hue, Saturation via Filters	

Specifications		
Main Camera type	4.8 MP CCD Digital with USB 3 Vision	
Main Camera FoV/Resolution	36x30mm/15µm	36.0 x 30 (1.42" x 1.18") 15µm
Lens	Telecentric lens with built in prism for DOAL Lighting	
Side cameras	8 side cameras CL/USB3 Vision with Tilt-Shift custom lenses in 45/45 degree configuration	N/A
Lighting system	Omnidirectional Quad LED rings: Side, Main, Line Sourced DOAL, Side Camera White	
Optical head sealing	Glass plate / dust cover (option)	
Minimum inspection object size	60µ (2.3 mils)	
Positioning accuracy	Pixel related Feedback Loop	
Component clearance	30mm (1.2")	+40-60mm (1.6"-2.4")
Z-Axis movement range	80mm (3.1")	
Movement speed	720mm/s	
Inspection capacity typical	2500cps/min	

Interfacing		
Control PC type (not included)	Apple Mac mini (or higher) with Mac OSX	
PC Control & Imaging interface	USB3 Vision interfacing	
Programming interface	CSV Centroid file (Placement file)	
Repair/Monitor/SPC System/MES-interface	Mek Catch System (option) (Windows 7/8/10 based)	
3rd party Interfacing (MES-if) & Data Storage	Enterprise SQL DB/XML Files/Socket (by optional Mek Catch System)	
External Control ; External Bar Code interfacing	Contact Closure General Purpose I/O ; RS232/USB/XML	

General		
Mains Voltage	100-240 Vac / 150W	
Operating temperature	15-30 degr C (59-86 degr F)	
Operating humidity	<80 % RH	
Min. Construction Height (Distance Module bottom to PCB surface, incl focus range)	347-427mm (13.7-16.6") @Z=0-80mm (0-3.1")	
External size	W900 x D1080 x H316 (35.5" x 42.5" x 12.4")	
Weight	100kg (220lbs)	

Top down	JWz	JWaz	JDAz	JDz
Maximum PCB Size	550x520mm (21.7" x 20.5")		520x460 mm (20.5" x 18.1")	
Product type	Automatic Optical Inspector			
Camera movement	X+Y+Z Direction			
PCB movement	Stationary during inspection, Transport designed by system integrator			
Parts inspection	Presence/Absence, Type, Polarity, Colour, Text, Offset			
Imaging principle	Synthetic Imaging, Spectral Analysis, Greyscale limits			
Imaging parameters	Brightness, Contrast, Hue, Saturation via Filters			
<b>Specifications</b>				
Main Camera type	4.8 MP CCD Digital with USB 3 Vision			
Main Camera FoV/Resolution	36x30mm/15µm		36x30mm/15µm	36x30mm/15µm
Lens	Focal & Aperture Adjustable Macro Lens			
Side cameras	N/A	8 side cameras CL/USB3 Vision with Tilt-Shift custom lenses in 45/45 degree configuration	8 side cameras CL/USB3 Vision with Tilt-Shift custom lenses in 45/45 degree configuration	N/A
Side cameras FoV/Resolution	N/A			
Lighting system	Omnidirectional White Ring Light			
Minimum inspection object size	60µ (2.3 mils)			
Positioning accuracy	Pixel related Feedback Loop			
Component clearance	130mm (5.1")	130mm (5.1")	60mm (2.3")	60mm (2.3")
Z-Axis movement range	80mm (3.1")			
Movement speed	720mm/s			
Inspection capacity typical	2500cps/min			

<b>Interfacing</b>	
Control PC type (not included)	Apple Mac mini (or higher) with Mac OSX
PC Control & Imaging interface	USB3 Vision Interfacing
Programming interface	CSV Centroid file (Placement file)
Repair/Monitor/SPC System/MES-interface	Mek Catch System (option) (Windows 7/8/10 based)
3rd party Interfacing (MES-if) & Data Storage	Enterprise SQL DB/XML Files/Socket (by optional Mek Catch System)
External Control; External Bar Code interfacing	Contact Closure General Purpose I/O ; RS232/USB/XML

<b>General</b>	
Mains Voltage	100-240 Vac / 150W
Operating temperature	15-30 degr C (59-86 degr F)
Operating humidity	<80 % RH
Min. Construction Height (Distance Module bottom to PCB surface, incl focus range)	469-549mm (18.5-21.6") @Z=0-80mm (0-3.1")
External size	W900 x D1080 x H316 (35.5" x 42.5" x 12.4")
Weight	100kg (220lbs)



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