# SpectorBOX



# Mek SpectorBOX Bottom Up and Top Down Modular AOI System

| | | |
|---|---|---|
| √ | Optimized for THT Components- and Post Wave and Selective Soldering Inspections | *AOI Solution For Wave & Selective Soldering Of THT & SMT Components* |
| √ | Bottom-up and/or Top-down Inspection | *Inspects PCB's From Below a Conveyer Belt or Chain* |
| √ | Solder Frame Compatible | Designed to Inspect PCB's Inside Solder Frames Directly From The Conveyer |
| √ | Ultra Slim Design Inspects Down To 280mm Above Factory Floor | *Save Production Space! Fits Below Existing Return and/or Feed Conveyers* |
| √ | Modular Inspection Possibilities: Bottom, Top or Top + Bottom | *Possibility to Combine Two SpectorBOX Systems For Simultaneous Top+Bottom AOI* |
| √ | Main Frame Compatibility | *Multiple 3rd Party Turn Key Solutions Readily Available. SpectorBOX Systems Fit Conveniently Inside these Main Frames* |
| √ | Up to 18 Cameras | *Choose between 1 or 9 camera's per inspection side (up to 18 cameras in Top+Bottom configuration)* |
| √ | In Z-Axis Moving Optical Head(s) | *Focus and Position Optimally For Varying PCB Distances Or Warpage (Applicable To Certain Models With Z-Axis)* |
| √ | General Purpose I/O | *Configurable I/O to Be Controlled By Existing PCB Handling Systems* |
| √ | Post Defect Classification and Reporting Scenarios | *Inspect your PCB's Automatically Now, Classify/Report Defects Later Whenever Convenient* |

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# *SpectorBOX*

## 1. Bottom Up Features:

The Mek SpectorBOX bottom up modular AOI is optimized for the inspection of THT solder joints and detection of solder bridges and solder balls. It 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. The bottom up SpectorBOX is configurable with one of two different optical units: FDLz and FDAz.

| | Angular Camera's | Z-Axis |
|---|---|---|
| **FDLz** | NO | YES |
| **FDAz** | YES | YES |

Telecentric Lens        Conventiional Lens
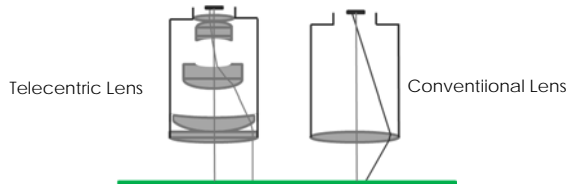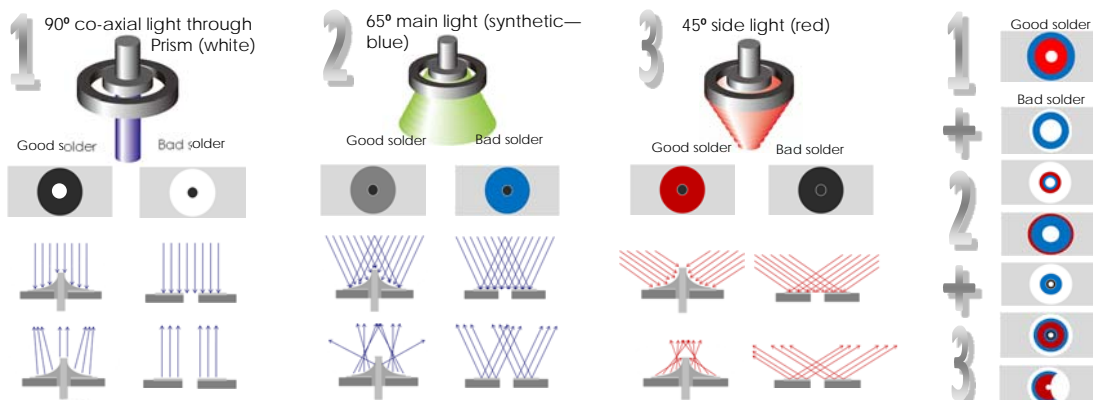
**High grade Telecentric Lens**
Parallel image over the whole sensor/lens Field of View — No parallax effect

**Large pixel image capturing sensor**
18,8µ$^2$ pixel size — smooth and detailed image with great dynamic range — Japanese built

**Omnidirectional multi angle, multi color LED lighting**
3D color profile of solder meniscus — accurate defect decision by the software algorithms — Detect all visual defects of THT solder joints and easily detect bridges and solder balls

1  90º co-axial light through Prism (white)
Good solder    Bad solder

2  65º main light (synthetic— blue)
Good solder    Bad solder

3  45º side light (red)
Good solder    Bad solder

1  Good solder
Bad solder
1 + 2 + 3

**In Height Adjustable Optical Head**
In Z-Axis moving Top Camera, Light and Side View cameras — Adaption to any PCB Thickness — PCB Warp Compensation — Inspection of "Sandwich" assemblies without need of jigs and multiple inspections

**8x Angular Side Sensors (Only available for FDA and FDAz models)**
Simultaneously operating, multiplexed side view sensors with CameraLink interface — 45/45 arrangement — Triple use: Active automatic inspection, classification and repair — clear 9 angles defect review — high magnification 50x (10µm/pixel) — Full Color — Auto highlight — Large sensor pixels — 9 view images also in backup database
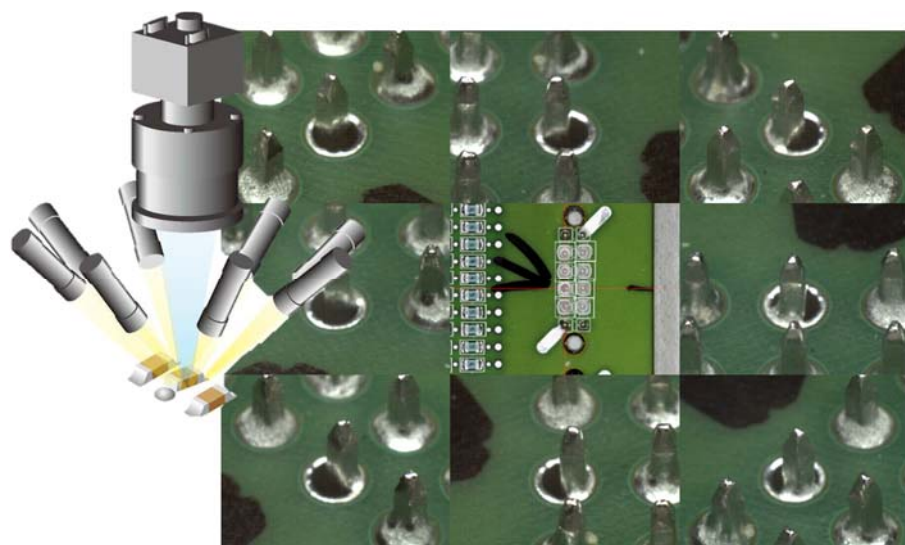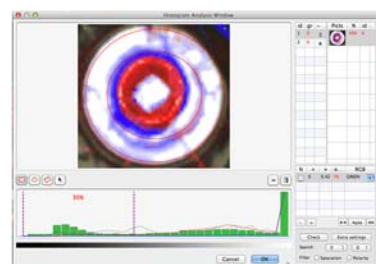
**Powerful algorithms for solder bridge detection**
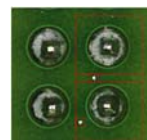
**Dedicated algorithms for solder balls detection**

**Histogram Analysis algorithms**
Condition based decision — Tolerances can be set tightly — Close to zero false alarms

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## 2. Top Down Features:

The Mek SpectorBOX Top Down modular AOI is optimized for the inspection of THT components to find any visual defect like prsence/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. It is designed to inspect PCB's inside solder frames directly from the conveyor system. The SpectorBOX Top Down module can be equipped with one top camera and 8 wide field of view side camera's. Available optical units are FWz and FWAz.

| | Angular Camera's | Z-Axis |
|---|---|---|
| FWz | NO | YES |
| FWAz | YES | YES |

**Large pixel image capturing sensor**
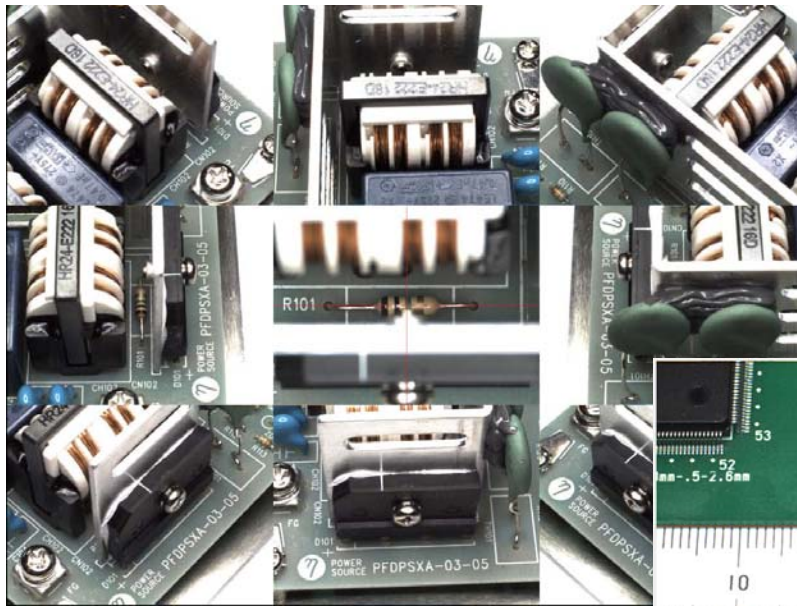18,8µ² pixel size — smooth and detailed image with great dynamic range — Japanese built
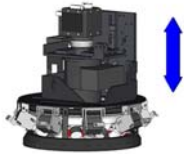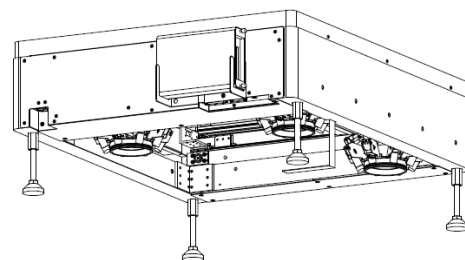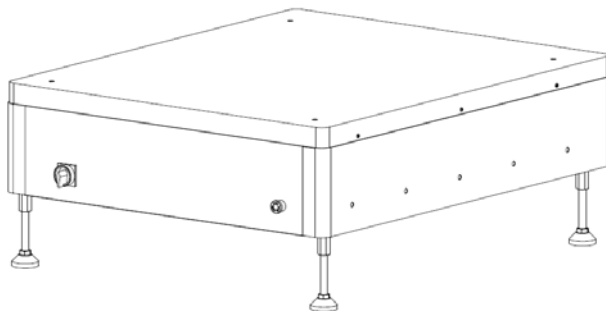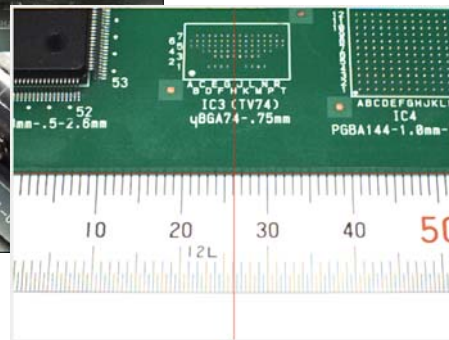
**In Height Adjustable Optical Head**
In Z-Axis moving Top Camera, Light and Side View cameras — Adaption to any PCB Thickness — PCB Warp Compensation — Reliable text and/or polarity inspection on tall components — Inspection of "Sandwich" assemblies without need of jigs and multiple inspections

**8x Angular Side Sensors (Only available for the FWAz model)**
Simultaneously operating, multiplexed side view sensors with CameraLink interface — 45/45 arrangement — Triple use: Active automatic inspection, classification and repair — clear 9 angles defect review — Full Color — Auto highlight — Large sensor pixels — 9 view images also in backup database

Large Side Camera Field of View

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# SpectorBOX

# Bottom Up                    FDL

| | SpectorBOX FDLz 550 | |
|---|---|---|
| **Maximum PCB Size** | 550x520mm (21.7" x 20.5") | |
| *Characteristics* | | |
| **Product type** | Automatic Optical Inspector | |
| **Camera movement** | X+Y Direction | |
| **PCB movement** | Stationary | |
| **Parts inspection** | Soldering, Bridges, Solder Balls | |
| **Imaging principle** | Synthetic Imaging, Spectral  Analysis, Greyscale limits | |
| **Imaging parameters** | Brightness, Hue, Saturation via Filters | |
| *Specifications* | | |
| **Main Camera type** | Digital with CameraLink | |
| **Main Camera Field Of View/ Resolution** | 36x20mm/18.75µm or 19.2x10.8mm/10µ | |
| **Lens** | Telecentric lens with built in prism for DOAL Lighting | |
| **Lighting system** | Omnidirectional Triple LED rings: Side, Main, Line Sourced DOAL Diffused On Axis Lighting (Coaxial)) | |
| **Minimum inspection object size** | 80µ (3.15 mils) | |
| **Positioning accuracy** | Pixel related Feedback Loop | |
| **Component clearance** | +40mm (1.57") | |
| **Side Cameras** | No side cameras | |
| **Z-Axis movement range** | 60mm (2.4") | |
| **Movement speed** | 720mm/s | |
| **Inspection capacity typical** | 1500cps/min | |
| **Mains** | 100-240 Vac / 150W | |
| *Interfacing* | | |
| **Control PC type** | Apple MacMini (or higher) with Mac OSX and Thunderbolt interface | |
| **Control interface** | USB | |
| **Data interface** | CameraLink | |
| **Communication** | General Purpose I/O, RS232 | |
| *General* | | |
| **Operating temperature** | 15-30 degr C (59-86 degr F) | |
| **Operating humidity** | 15-80 % RH | |
| **External size** | W750 x D842 x H256 (29.5" x 33.2" x 10.1") | W900 x D1056 x H251 (35.5" x 41.6" x 9.9") |
| **Weight** | 50kg (110lbs) | 100kg (220lbs) |

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# SpectorBOX

# Bottom Up             FDA

| | SpectorBOX FDAz 550 |
|---|---|
| **Maximum PCB Size** | 550x520mm (21.7" x 20.5") |
| *Characteristics* | |
| **Product type** | Automatic Optical Inspector |
| **Camera movement** | X+Y Direction |
| **PCB movement** | Stationary |
| **Parts inspection** | Soldering, Bridges, Solder Balls |
| **Imaging principle** | Synthetic Imaging, Spectral Analysis, Greyscale limits |
| **Imaging parameters** | Brightness, Hue, Saturation via Filters |
| *Specifications* | |
| **Main Camera type** | Digital with CameraLink |
| **Main Camera Field Of View/ Resolution** | 36x20mm/18.75µm or 19.2x10.8mm/10µ |
| **Lens** | Telecentric lens with built in prism for DOAL Lighting |
| **Lighting system** | Omnidirectional Triple LED rings: Side, Main, Line Sourced DOAL Diffused On Axis Light (Coaxial)) |
| **Minimum inspection object size** | 80µ (3.15 mils) |
| **Positioning accuracy** | Pixel related Feedback Loop |
| **Component clearance** | +30mm (1.2") |
| **Side Cameras** | 8x Digital with CameraLink in 45/45 orientation |
| **Z-Axis movement range** | 60mm (2.4") |
| **Movement speed** | 720mm/s |
| **Inspection capacity typical** | 1500cps/min |
| **Mains** | 100-240 Vac / 150W |
| *Interfacing* | |
| **Control PC type** | Apple MacMini (or higher) with Mac OSX and Thunderbolt interface |
| **Control interface** | USB |
| **Data interface** | CameraLink |
| **Communication** | General Purpose I/O, RS232 |
| *General* | |
| **Operating temperature** | 15-30 degr C (59-86 degr F) |
| **Operating humidity** | 15-80 % RH |
| **External size** | W750 x D842 x H256 (29.5" x 33.2" x 10.1") / W900 x D1056 x H251 (35.5" x 41.6" x 9.9") |
| **Weight** | 50kg (110lbs) / 100kg (220lbs) |

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## Top Down            FWz

| | SpectorBOX FDLz 550 | |
|---|---|---|
| **Maximum PCB Size** | 550x520mm (21.7" x 20.5") | |
| *Characteristics* | | |
| **Product type** | Automatic Optical Inspector | |
| **Camera movement** | X+Y Direction | |
| **PCB movement** | Stationary | |
| **Parts inspection** | Presence/Absence, Type, Polarity, Colour, Text, Offset | |
| **Imaging principle** | Synthetic Imaging, Spectral Analysis, Greyscale limits | |
| **Imaging parameters** | Brightness, Hue, Saturation via Filters | |
| *Specifications* | | |
| **Main Camera type** | Digital with CameraLink | |
| **Main Camera Field Of View/** | 36x20mm/18.75µm or 19.2x10.8mm/10µ | |
| **Lighting system** | Omnidirectional Single Source White Light | |
| **Minimum inspection object size** | 80µ (3.15 mils) | |
| **Positioning accuracy** | Pixel related Feedback Loop | |
| **Component clearance** | +130mm (5.12") | |
| **Side Cameras** | No side cameras | |
| **Side Cameras Field of View** | N/A | |
| **Z-Axis movement range** | 60mm (2.4") | |
| **Movement speed** | 720mm/s | |
| **Inspection capacity typical** | 1500cps/min | |
| **Mains** | 100-240 Vac / 150W | |
| *Interfacing* | | |
| **Control PC type** | Apple MacMini (or higher) with Mac OSX and Thunderbolt interface | |
| **Control interface** | USB | |
| **Data interface** | CameraLink | |
| **Communication** | General Purpose I/O, RS232 | |
| *General* | | |
| **Operating temperature** | 15-30 degr C (59-86 degr F) | |
| **Operating humidity** | 15-80 % RH | |
| **External size** | W750 x D842 x H256 (29.5" x 33.2" x 10.1") | W900 x D1056 x H251 (35.5" x 41.6" x 9.9") |
| **Weight** | 50kg (110lbs) | 100kg (220lbs) |

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# Top Down          FWA

| | SpectorBOX FDAz 550 | |
|---|---|---|
| **Maximum PCB Size** | 550x520mm (21.7" x 20.5") | |
| *Characteristics* | | |
| **Product type** | Automatic Optical Inspector | |
| **Camera movement** | X+Y Direction | |
| **PCB movement** | Stationary | |
| **Parts inspection** | Presence/Absence, Type, Polarity, Colour, Text, Offset | |
| **Imaging principle** | Synthetic Imaging, Spectral Analysis, Greyscale limits | |
| **Imaging parameters** | Brightness, Hue, Saturation via Filters | |
| *Specifications* | | |
| **Main Camera type** | Digital with CameraLink | |
| **Main Camera Field Of View/ Resolution** | 36x20mm/18.75µm or 19.2x10.8mm/10µ | |
| **Lighting system** | Omnidirectional Single Source White Light | |
| **Minimum inspection object size** | 80µ (3.15 mils) | |
| **Positioning accuracy** | Pixel related Feedback Loop | |
| **Component clearance** | +130mm (5.12") | |
| **Side Cameras** | 8x Digital with CameraLink in 45/45 orientation | |
| **Side Cameras Field of View** | 50x39mm (1.96x1.54″) | |
| **Z-Axis movement range** | 60mm (2.4") | |
| **Movement speed** | 720mm/s | |
| **Inspection capacity typical** | 1500cps/min | |
| **Mains** | 100-240 Vac / 150W | |
| *Interfacing* | | |
| **Control PC type** | Apple MacMini (or higher) with Mac OSX and Thunderbolt interface | |
| **Control interface** | USB | |
| **Data interface** | CameraLink | |
| **Communication** | General Purpose I/O, RS232 | |
| *General* | | |
| **Operating temperature** | 15-30 degr C (59-86 degr F) | |
| **Operating humidity** | 15-80 % RH | |
| **External size** | W750 x D842 x H256 (29.5" x 33.2" x 10.1") | W900 x D1056 x H251 (35.5" x 41.6" x 9.9") |
| **Weight** | 50kg (110lbs) | 100kg (220lbs) |

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# Bottom Up  FDLz/FDAz

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