



Mek SpectorBOX Bottom Up and Top Down Modular AOI System

✓ Now featuring the G series and J series Head	2x field of view for main camera for up to 50% reduction of inspection cycle time, and Selective 3D for GTaz models
✓ 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 Conveyor Belt or Chain
✓ Solder Frame Compatible	Designed to Inspect PCB's inside Solder Frames Directly from the Conveyor
✓ Second generation mechanical design	Improving on the success of the SpectorBOX with 80mm Z-axis and accompanying drive systems
✓ Modular Inspection Possibilities: Bottom, Top or Top + Bottom	Possibility to combine 2 SpectorBOX systems for simultaneous Top+Bottom AOI (optional)
✓ Main Frame Compatibility	Multiple 3rd party Turn-key Solutions readily available. SpectorBOX Systems fit conveniently inside these main frames
✓ Up to 18 Cameras (G series head)	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 & Component distances or warpage
✓ General Purpose I/O	Contact closing I/O for Module control by existing PCB handling systems or PLC's
✓ Post Defect Classification and Reporting Scenarios	Inspect your PCB's In-Line, Classify/Report/Analyze Defects later whenever convenient

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:

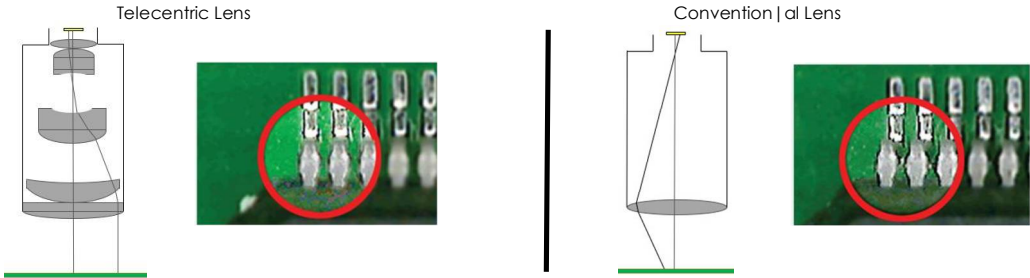
Bottom Up: AOI is optimized for the inspection of THT solder joints and detection of *solder bridges* and *solder balls*. The Bottom Up SpectorBOX is configurable with one of three different optical units: GTz, GTAz and JDz.

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: GWz, GWAz, GDz, GDAz and JDz.

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
Bottom Up		
GTz	YES	NO
GTAz	YES	YES
JDz	YES	NO
Top Down		
GWz	YES	NO
GWAz	YES	YES
GDAz	YES	YES
GDz	YES	NO
JDz	YES	NO

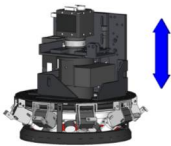
High grade Telecentric Lens :
Parallel image over the whole sensor/lens Field of View — No parallax defect



New Generation 90fps Large pixel image capturing sensor:
18,8µ² 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.

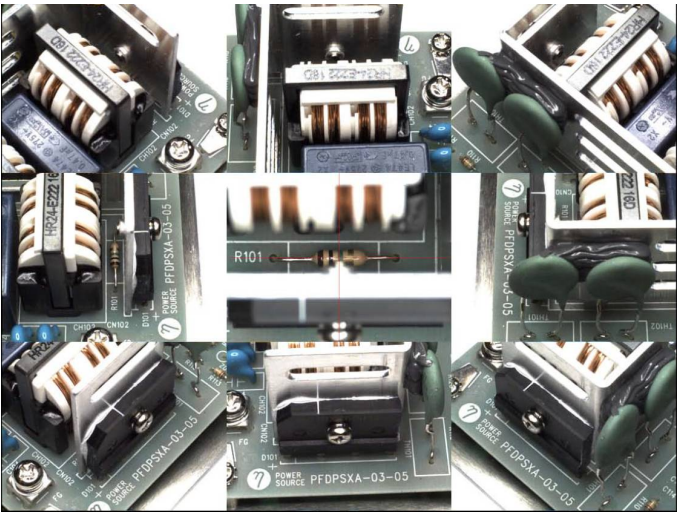
In Height Adjustable Optical Head (Z-Axis):
In Z-Axis moving Top Camera, Light and Side View cameras for adaption to any PCB thickness & PCB warp compensation. Inspection of "Sandwich" assemblies without need of jigs and multiple inspections.

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

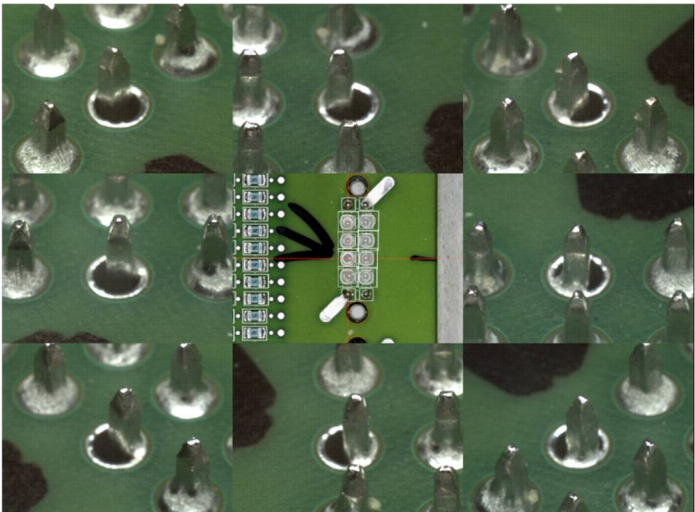


The Z-axis of the Bottom Up and Top Down systems has a default stroke length of 80mm.

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 (10µm/pixel) — Full Color — Auto highlight — Large sensor pixels — Additional side camera lighting—— 9 view images also in backup database



9 view images Top Down (1 top & 8 side cameras)

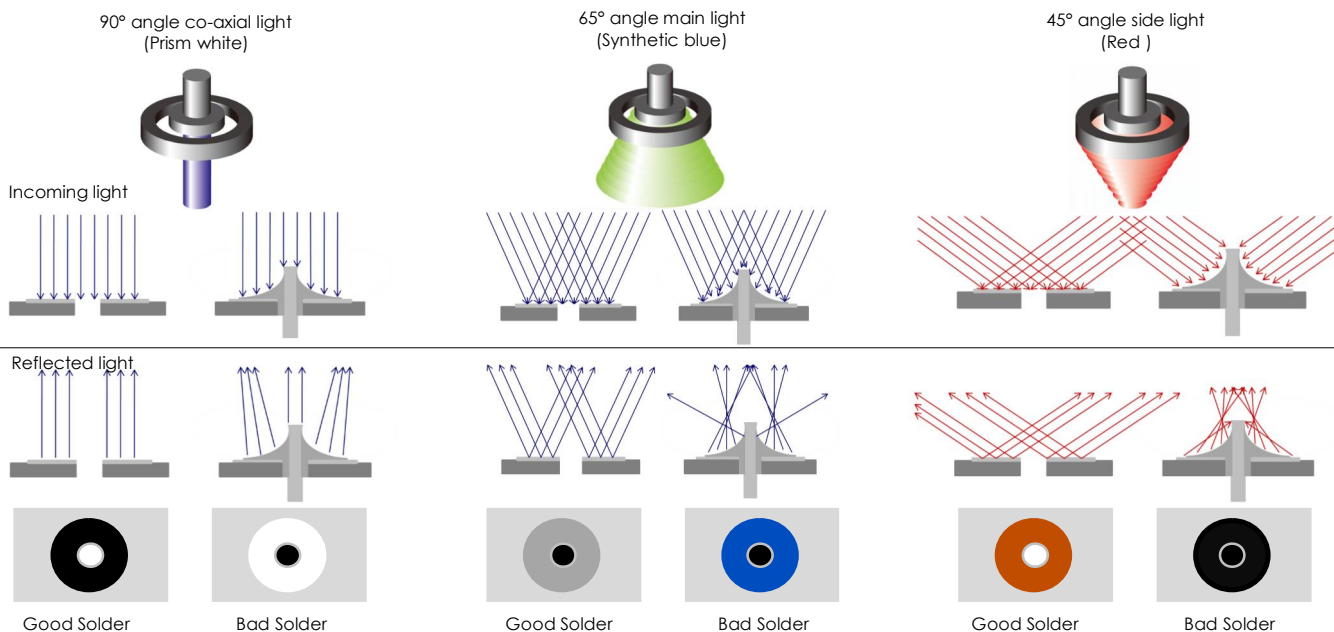


Large Side Camera Field of View

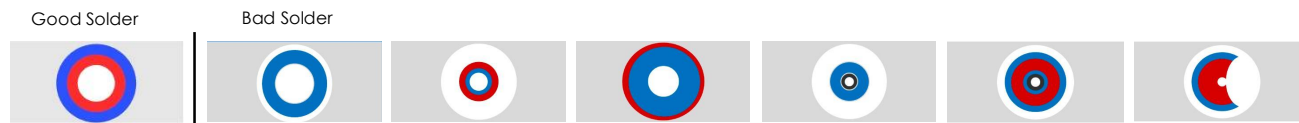
Omnidirectional multi angle DOAL lighting, multi color LED lighting:

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:

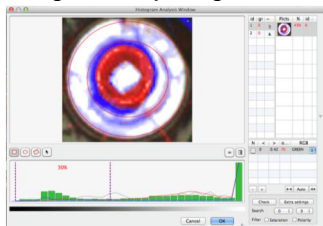
- Line Sourced DOAL (Diffused On Axis Light (Coaxial))
- Main Camera
- Side Camera



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.

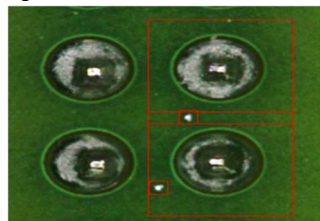


Histogram Analysis algorithms:

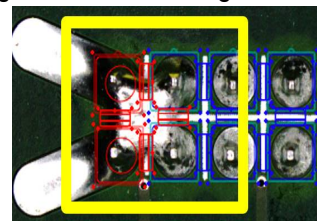


- Condition based decision
- Tolerances can be set tightly
- Close to zero false alarms

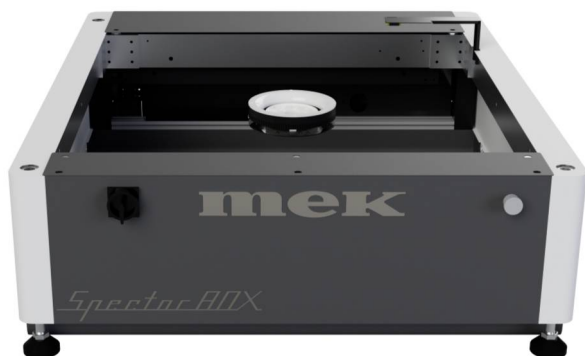
Algorithms for solder balls detection:



Algorithms for solder bridge detection:



SpectorBOX Bottom Up

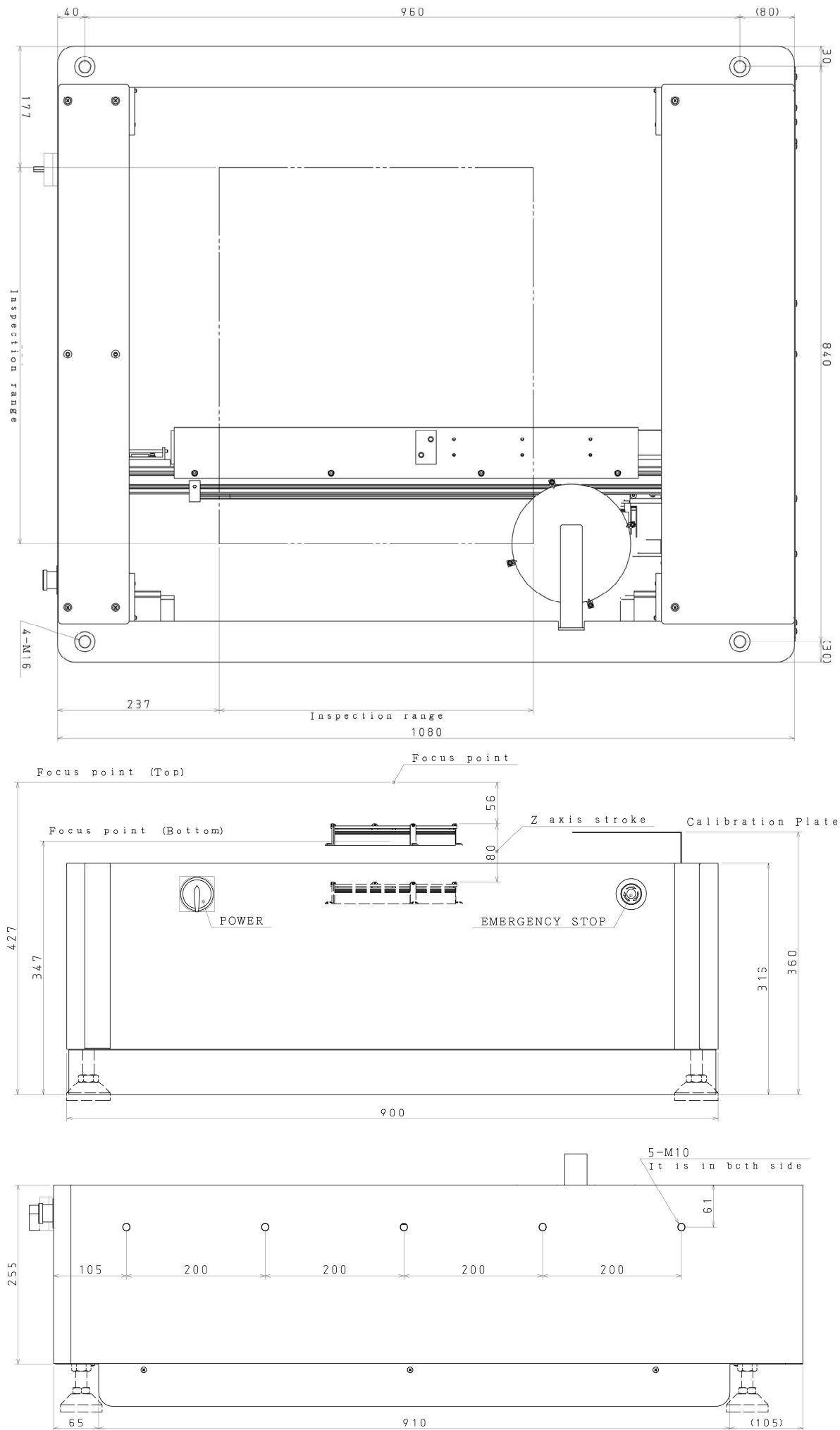


SpectorBOX Bottom Up

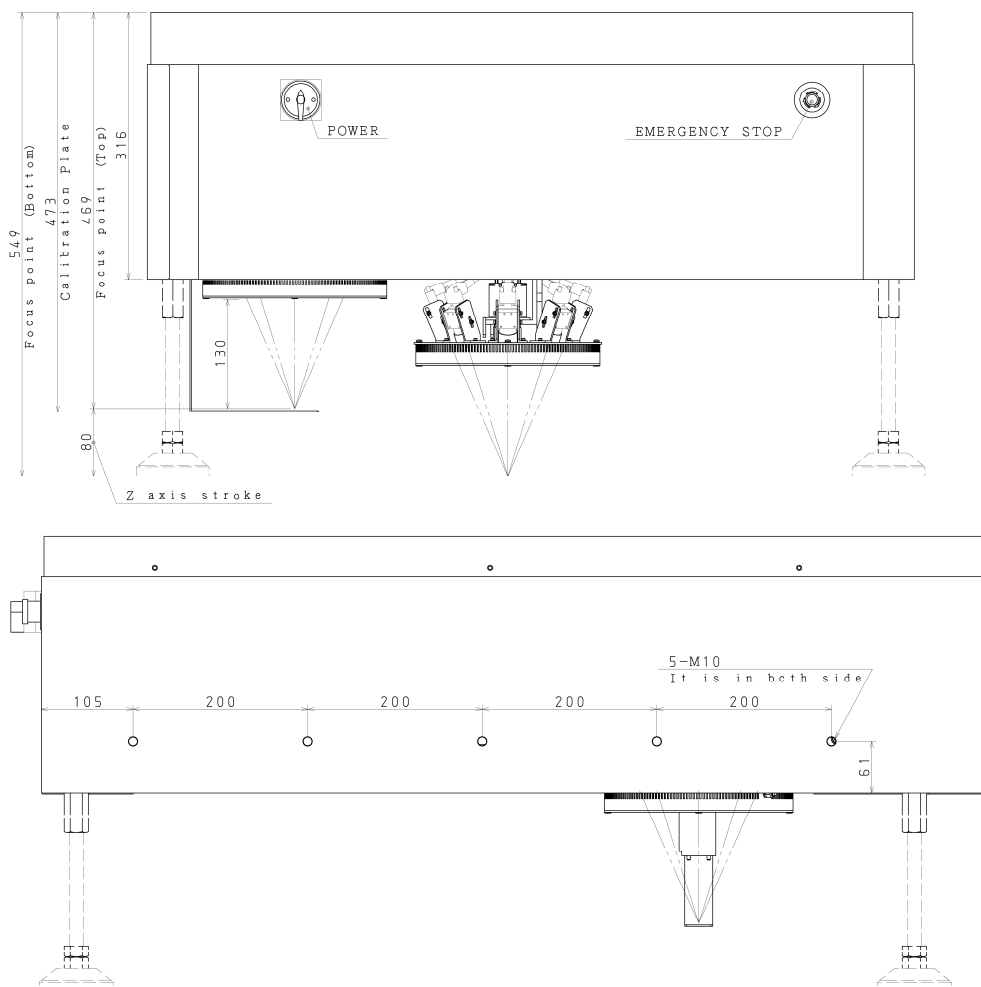


because inspection matters

Dimensions SpectorBOX Bottom Up



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Specifications SpectorBOX

Bottom Up	GTz	GTAz	JDz
Maximum PCB Size	550x520mm (21.7" x 20.5")		
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	Digital CL with Lightbridge Thunderbolt		CCD digital with USB 3 vision
Main Camera FoV/Resolution	38.5x38.5mm/18.75µm or 19.5x19.5mm/10µm		36.0 x 30 (1.42" x 1.18") 15µm
Lens	Telecentric lens with built in prism for DOAL Lighting		
Side cameras	n.a.	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	80µ (3.15 mils)		
Positioning accuracy	Pixel related Feedback Loop		
Component clearance	30-65mm (1.2"-2.6")	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 and Thunderbolt interface		
PC Control & Imaging interface	Thunderbolt	Thunderbolt	USB3Vison 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	GWz	GWAz	GDAz	GDz	JDz
Maximum PCB Size	550x520mm (21.7" x 20.5")				
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				

Specifications					
Main Camera type	Digital CL with Lightbridge Thunderbolt				
Main Camera FoV/Resolution	38.5x38.5mm/18.75µm		38.5x38.5mm/18.75µm	38.5x38.5mm/18.75µm	36.0 x 30 (1.42" x 1.18") 15µm
Lens	Focal & Aperature 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.	n.a.
Side cameras FoV/Resolution	n.a.				
Lighting system	Omnidirectional White Ring Light				
Minimum inspection object size	80µ (3.15 mils)				
Positioning accuracy	Pixel related Feedback Loop				
Component clearance	130mm (5.1") 130mm (5.1")	130mm (5.1") 130mm (5.1")	50mm (2")	60mm (2.3")	+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 and Thunderbolt interface				
PC Control & Imaging interface	Thunderbolt	Thunderbolt	Thunderbolt	Thunderbolt	USB3Vison interfacing
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Operating temperature	15-30 degr C (59-86 degr F)				
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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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