The Most Accurate In-line 3D AOI

Xceed
New Generation 3D AOI
3D Automatic Optical Inspection
Company Introduction
3D INSPECTION SOLUTION PARTNER for PCBA and packaging industry

PARMI provides 3D inspection solutions for PCB, SMT assembly, semiconductor packaging fields
1998  
PARMI Co. founded in Daejeon, Republic of Korea  
Spin off from the National Research Center.

2000  
Launches Offline SPI 2000 Machine  
World’s First 3D Solder Paste Scanning machine

2001  
ISO 9001 Certified

2002  
Establishes the PARMi R&D Center

2005  
Launches Inline SPI HS30 System  
CE Certified for SPI HS30 Series System

2006  
Launches Inline SPI HS70 System  
CE certified for SPI HS70 Series System

2007  
Launches Bench-Top SPI 2500 & SPI 50T System  
CE Certified for SPI 2500 & SPI 50T system

2010  
Establishes PARMi China in Dong Guan

2011  
Establishes PARMi America in Boston, U.S.A.

2013  
Launches Inline SPI SigmaX

2014  
Launches Inline SPI HS60 System  
CE certified for SPI HS60 Series System

2015  
Launches Inline 3D AOI Xceed

2016  
Establishes PARMi Europe in Frankfurt, Germany

2017  
Establishes PARMi Office in San Diego, U.S.A.

2017  
Establishes PARMi Office in Vietnam

2017  
Establishes PARMi Office in Taiwan

2017  
Establishes PARMi Office in Vietnam

2017  
Establishes PARMi Office in San Diego, U.S.A.

2017  
Establishes PARMi Office in San Diego, U.S.A.
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Major Customers of Each Industry

**Automotive**
- DENSO
- Valeo
- Zolier
- MOONS
- SIEMENS
- HYUNDAI Auto.
- Continental
- ALPS
- Hyundai Auto.
- Johnson Controls
- fabri
- DELPHI
- Magneti Marelli
- Dorman
- GETRON
- brose
- IMI
- SVI
- fabri
- HELLA
- Wagner
- MEAT
- Indus
- MOBILE
- MOTION
- Compaq
- Stoneridge
- BYD

**Mobile**
- FLEXTRONICS
- SanDisk
- Foxconn
- MobiWire
- Foxconn
- Benchmark
- INNOCOM
- AMPAK
- COMPEQ
- Phoenix
- MoDe
- MELFAS

**Display**
- JMI
- LOEWE
- Hansol
- Samsung
- PANASONIC
- YOUTY
- Panasonic
- JMT
- Skyworth
- LG
- SOFT-TECH

Leading companies in each industry are our major customers

**Package, Memory**
- Samsung
- Amkor Technology
- NXP
- NAMUGA
- Phoenix
- Apacer
- uni
- QPL GROUP

**Consumable**
- Benchmark
- COMPAQ
- IMI
- BenQ
- Foxconn
- Fujitsu
- PCI L.

**Others**
- WILCO
- Phoenix
- Shindengen
- GPV group
- Flextronics
- Diehl
- Inventec
Global sales & service network

24 hours 7 days
AOI Key-features
Simultaneous scan of 2D & 3D images

Real 3D image with 2D & 3D Inspection

- At a single path scan, color textured 3D images are acquired simultaneously
- High speed CMOS Camera applied (15,000 Frame/Sec)
Stable 3D data over various components

3D High Dynamic Range Ability

- Xceed achieves high quality 3D image over various components

SOP-14 (Gull-wing shaped) (Dark, Shadowed Component)

Crystal (Bright, reflective component)
Stable 3D data over various panels

3D High Dynamic Range Ability

- Xceed achieves high quality 3D image over various panels
Simple, but powerful

Intelligent 3D Sensor Head (TRSC)

- **TRSC**: Color Textured Range Scan Camera

- Compact & Extremely light weight (3.5kg)
- No moving parts in the sensor: Cal. Free
- Simple Interface Provision
- Powerful Real 3D Image
Very small shadow effect of 3D data

Very small laser beam projection angle

\[ \theta < 14.5^\circ \]
MPC, and real 3D data

Innovative centroid finding: MPC (Multiple profile correlation)

- To get a clean profile, neighboring various profiles are analyzed
Display of whole panel image

Realistic Full 3D textured Image for whole board inspection

- In real-time basis, users can observe easily
Display of whole panel image

Inspection & Measuring for one whole panel in 3D color textured images
Wide depth coverage

Xceed AOI can cover up to 40 mm height component with wide depth
Panel warp tracking

‘Real time warp tracking’ technology

- Well focused image secures reliable inspection result
Focused text image on tall component

To get exact focused image by Z axis control

- OCR/OCV and matching can be recognized from customized font library
Textured 3D image for matching

Multiple images are supported for Text verification

- OCR/OCV and matching can be recognized from customized font library

Various image channels (R, G, B, etc.)
Exact positioning of component

Accurate component positioning using high quality 3D data

- Position from CAD file (White)
- Current recognized position (Red)

Method 1
(Center of component referencing)

Method 2
(Edge of terminal referencing)
Exact recognition of component pose

3D pose recognition by 3D image analysis

- Exact recognition of component carries exact inspections

Exceed can detect below defects by 3D Pose Recognition

- Missing or presence
- Misalignment($\Delta X$, $\Delta Y$, $\Delta \theta$)
- Polarity
- Tombstone
- Side mount
- Upside down
- Body lift, lead lift
3D inspection: polarity

Clearly detects all the colors and odd shapes on 3D

- Exact recognition of component carries exact inspections
3D inspection: lift

Lift ROIs’ are automatically generated for components and leads.

Component Lift

Lead lift
Foreign material inspection

Foreign material and contamination inspection

- to check foreign material and contamination function is available without additional programming
Barcode, bad mark inspection

Barcode & bad marks are scanned without additional cycle time

- Big benefit for multi-arrayed panel
- No additional scan time is needed
Vibration free

Vibration problem at production line?

- Moire: 0.2 ~ 0.3 sec for multi FOVs
- PARMi lasers: 0.05 ~ 0.1 sec for a single component

Moire: 3~4 image is needed for the single component

Vibrating panel

PARMi Scanning speed is around 210 mm/sec

Needed time for a single component
= component width / 210mm

0.05 sec for a 10mm width component
Simple computing system

- Raw Data
- Excessive Overstrain
- Processing Result
- 3D Image

Others

- Overwork
- Slow

Xceed

- Simple & Fast

Processing Result

Appropriate Process

3D Image
Easy access for maintenance

Easy Maintenance Management hardware system

- Sharing Fundamental layout with SIGMAX (SPI) Platform
- No additional training with High Spare Parts compatibility

Robust and Simple Hardware Design

Easy access from Front Panel
Seamless 3d image of big components

Realistic 3D textured image due to a combination of 2D & 3D image
Defect reporting is accurate

Accurate defect type is reported for exact defect analysis

- Appropriate reaction to improve the process

Text Defects

Others

PARMI Xceed

Misalignment

Text

Tombstone

Side mount
3D inspection : solder joint

Clearly detects all the colors and odd shapes on 3D

- Exact recognition of component carries exact inspections
Long life time

- No moveable parts
- Long-lasting Laser and LEDs
- Durable casting & conveyor
- Easy Maintenance
- High Quality parts
Veriworks – One-stop Total Control System

**SPI Scanned Image** (Compatible exclusively with SIGMA X)

**AOI Scanned Image** (Compatible exclusively with Xceed)

List of Defective Panels & Components
Semiconductor specific products & applications

- Xceed Micron
- Xceed WI
Major specification

- Sensor: Laser optical triangulation
- X-Y Resolution: 10x10 μm, 7x7 μm
- Inspection speed: 30cm²/sec, 15cm²/sec
- Dimension (Standard): 850 x 1205 x 1525 mm
- Panel transportation: SMEMA
Specification

- Sensor: Laser optical triangulation
- X-Y resolution: 7x7 um, 4.6x4.6 um
- Dimension: 878 x 1390 x 1825 mm
- Wafer Size: 4”/6”/8”/12”
- Weight: 750kg
- Wafer Chunk Height: 907mm
- Wafer Transfer Method: Vacuum Chuck + Shuttle
The best solution for SIP

Laser 3D sensor is highly adaptable to
- Silicon Die, IPD
- 0201, 0402 chips
Applications

3D data adaptable to highly specular Die
Capable of 0201, 0402 chip inspection
Capable of IPD (integrated passive device) inspection

[Color textured 3D image] [3D image]
Solder paste inspection at same platform and software
- Area, height, volume, offset, bridge, etc.
Solder ball inspection

- Ball size, height, missing, bridge, co-planarity, foreign material,
Substrate warp measuring
Dispensed under-fill inspection

- coverage quality (height, length, etc.), continuity, unwanted drops
Lead frame inspection

- Missing, Lift, Particle(solder) Splatter, X-Y offset, Rotation, Fillet joint & height, Bridge, Gate Lead Lift, Chipping
Lead frame inspection: Defect images

- Missing
- Splatter
- Offset
- Fillet Joint
- Fillet Height
- Chipping
Bump on wafer inspection

- height: over 20um
- Dia.: over 50um
Key features

Fastest UPH at same resolution
- 15 cm² at 7 um special resolution

Augmented inspection objects
- component, solder paste, under-fill epoxy or bond, lead frame, etc.

High inspection adaptability to objects
- Material, color, surface roughness invariant
What we want to provide to customer

Enhanced quality control
- low false call (over kill)
- low escape (under kill)

Defect prevention
- process diagnosis
- data feed-back & feed-forward

Right tool to realize Industry 4.0
- reliable & accurate data is essential for process control