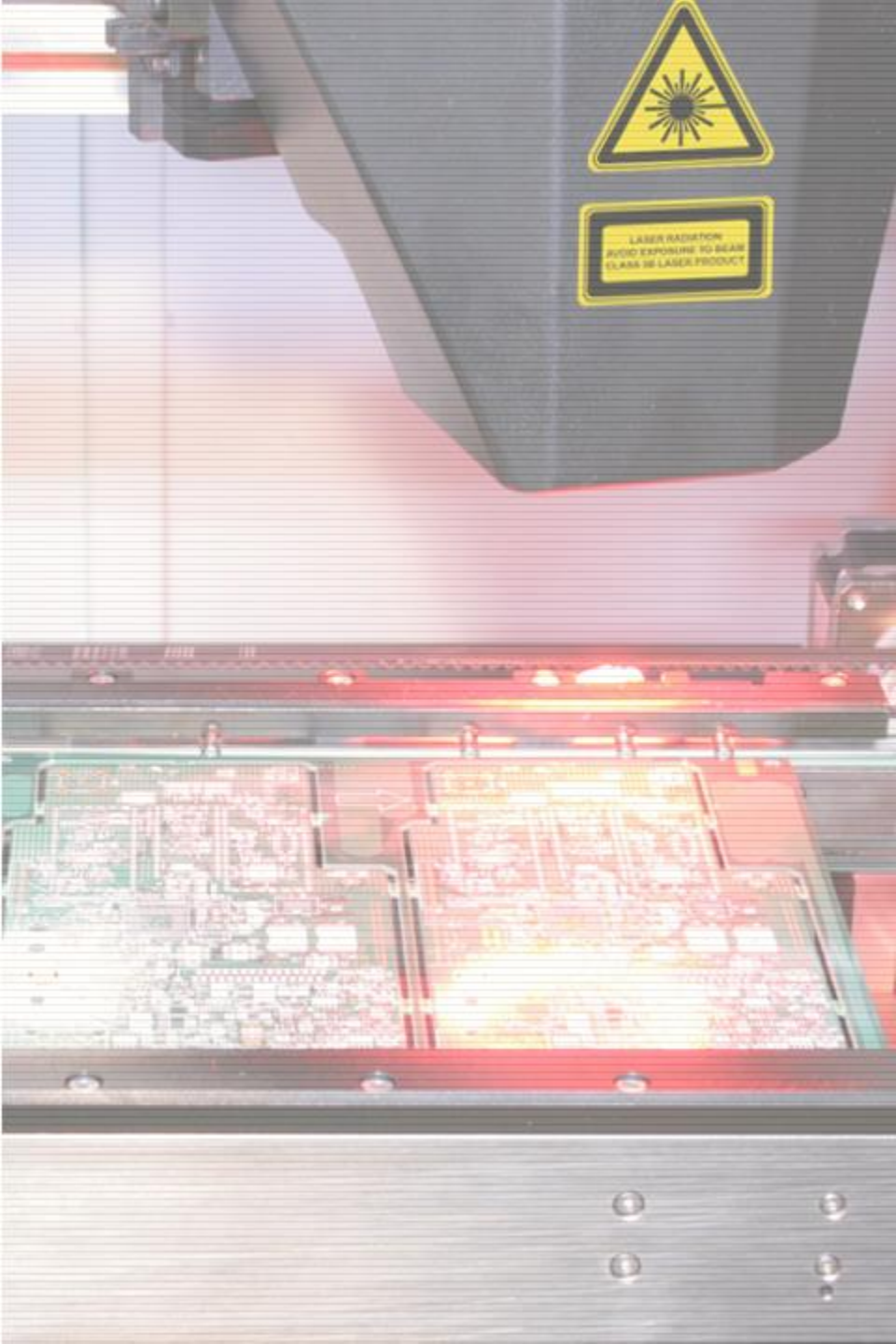# OVERVIEW

SPI 50T

Feb. 2009

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INTRODUCTION

SPI 50T System

The major roles of the system

Customer's benefits

SPI 50T System

- The genius table top 3D SPI machine
- Detect Every kind of Defects
- Excellent Repeatability
- High Performance
  - The most actual and accurate
  - Utmost fast : 100 % inspection
  - The most reliable

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Major Roles

Detecting faulty solder paste locations with "zero" false calls
− Volume, Height, Area, Positional Offset, Bridge, Shape

Monitoring the current printing process
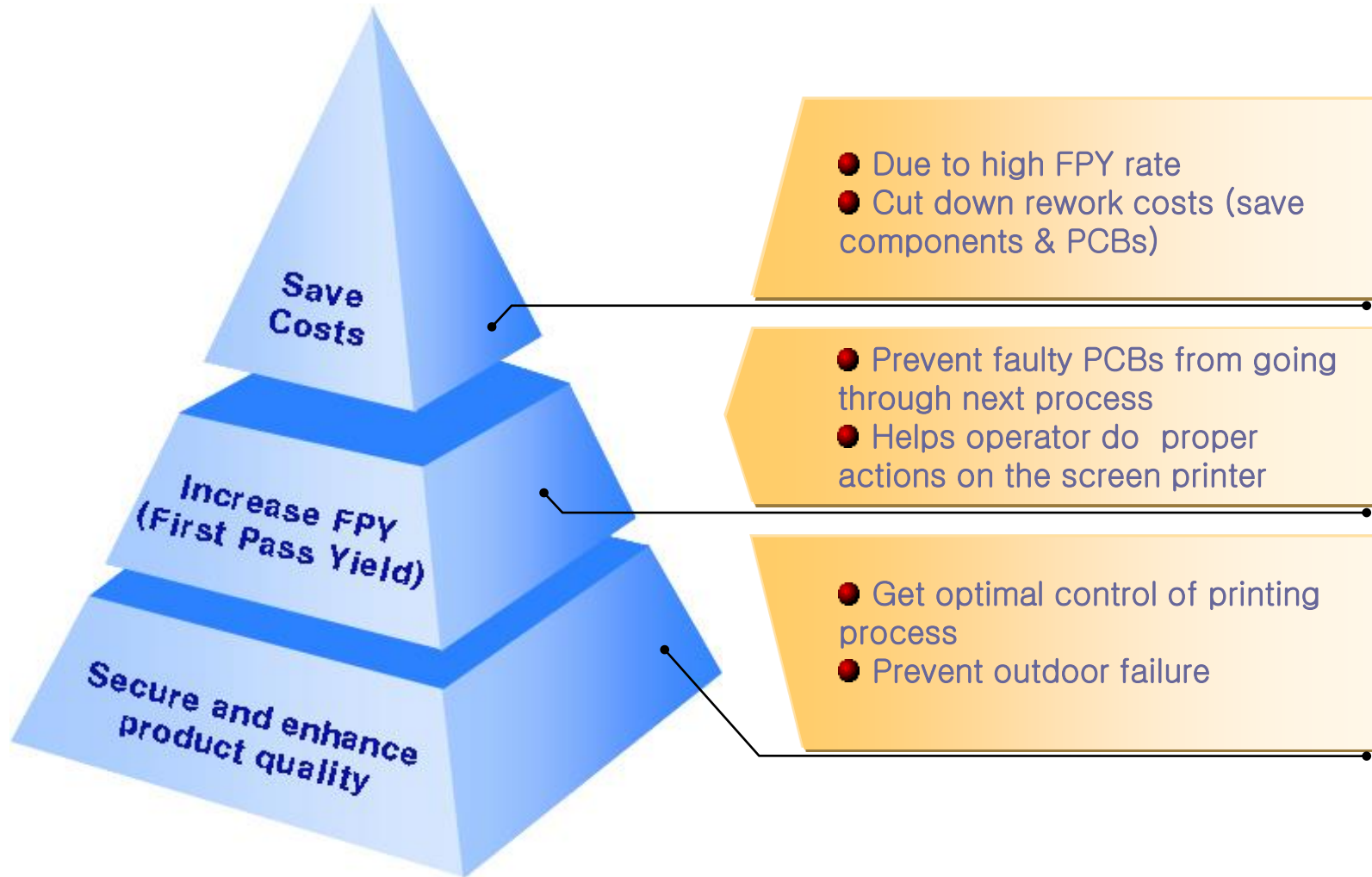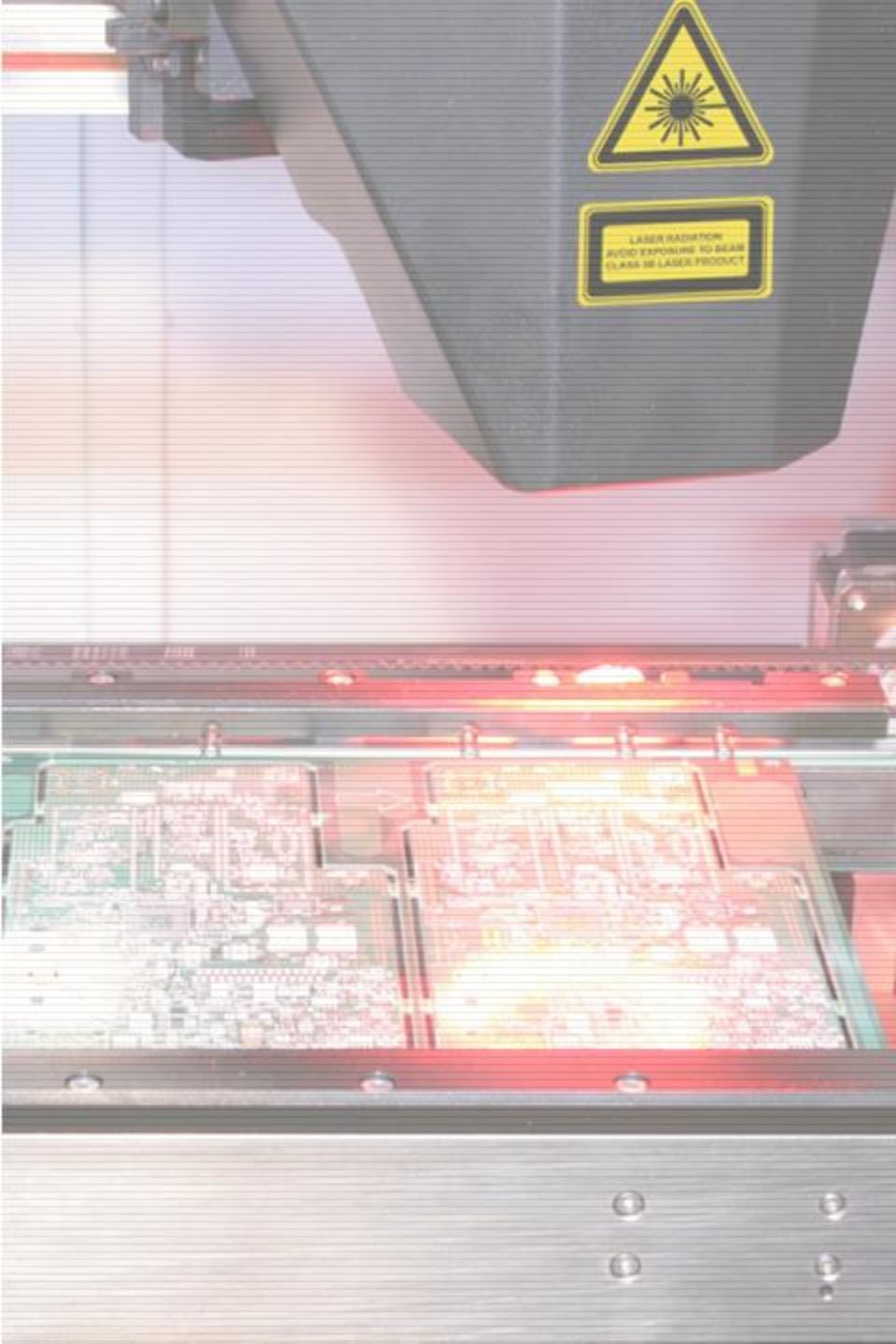− Helps operator to know printing status quickly at production lines

SPC (Statistical process control)
− Classical printing process monitoring & control functions
− Anyone can have network connection to a machine DB for SPC
− Real time monitoring & analysis

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Customer's Benefits

Save Costs

- Due to high FPY rate
- Cut down rework costs (save components & PCBs)

Increase FPY (First Pass Yield)

- Prevent faulty PCBs from going through next process
- Helps operator do proper actions on the screen printer

Secure and enhance product quality

- Get optimal control of printing process
- Prevent outdoor failure

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HARDWARE

Dimension

FRONT

SIDE

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Hardware Schematics

Control Parts

X-Axis (Linear Motor)

Sensor Head (RSC-IV)

Y-Axis (Linear Motor)

PCB Guide

Base Plate

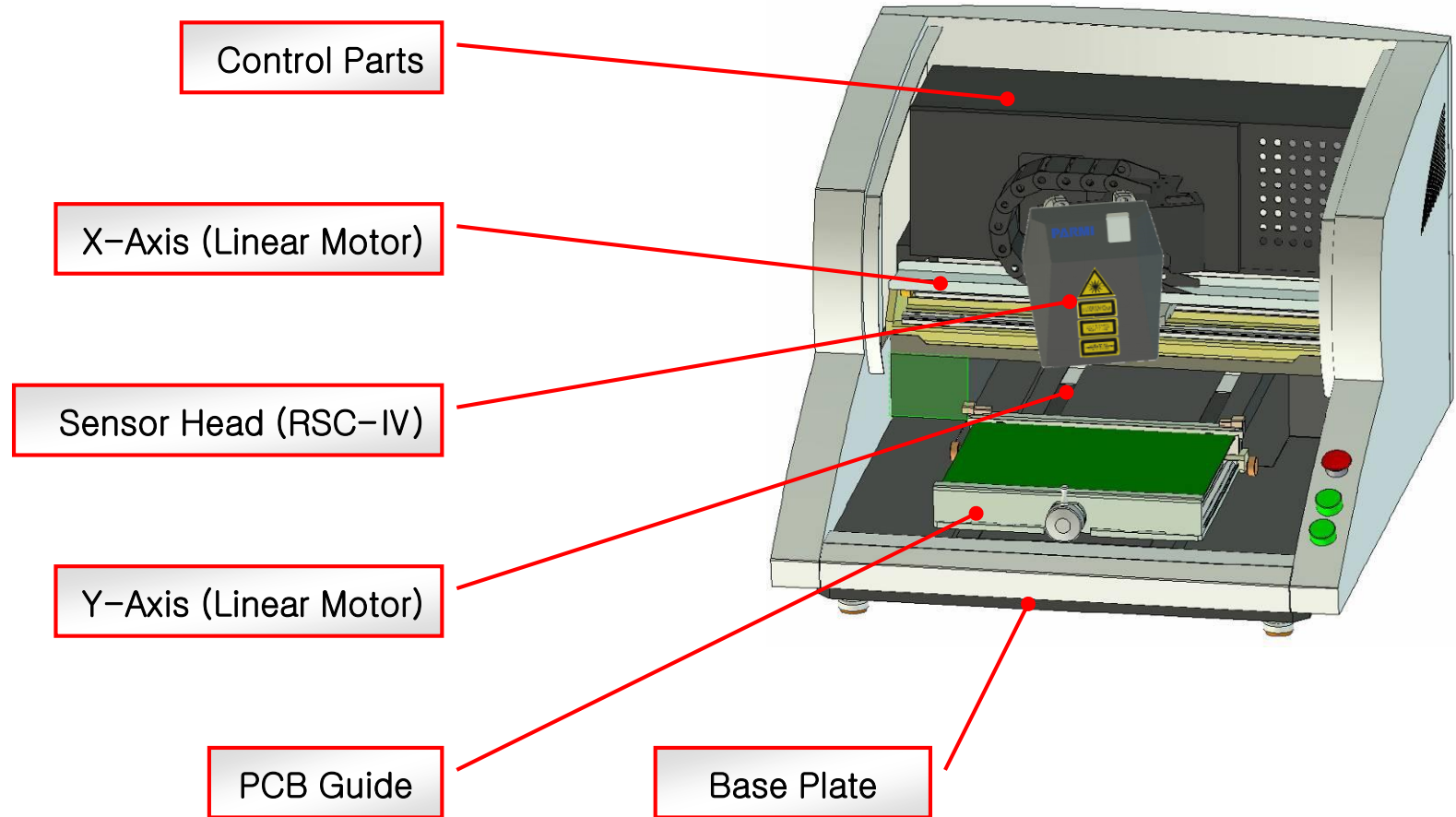**PARMI**

Hardware Configuration

- Base Frame

  - Made of aluminum casting, Rigid and vibration resistant

- X-Y robot

  - Linear Motor ensure stable measuring

- PCB Guide Unit

  - Easy Operation for board handling

- Control System

  - Controls all the actuators and 3D data process

- Interface

  - Connecting the machine and control system(PC)

- 3D Sensor

  - Get 3D image for measurement, 2D image for fiducial mark

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X-Y Robot

- X & Y stages driven by linear motors
- High positional accuracy and repeatability
- X-stage moves the 3D sensor to obtain 3D & 2D images
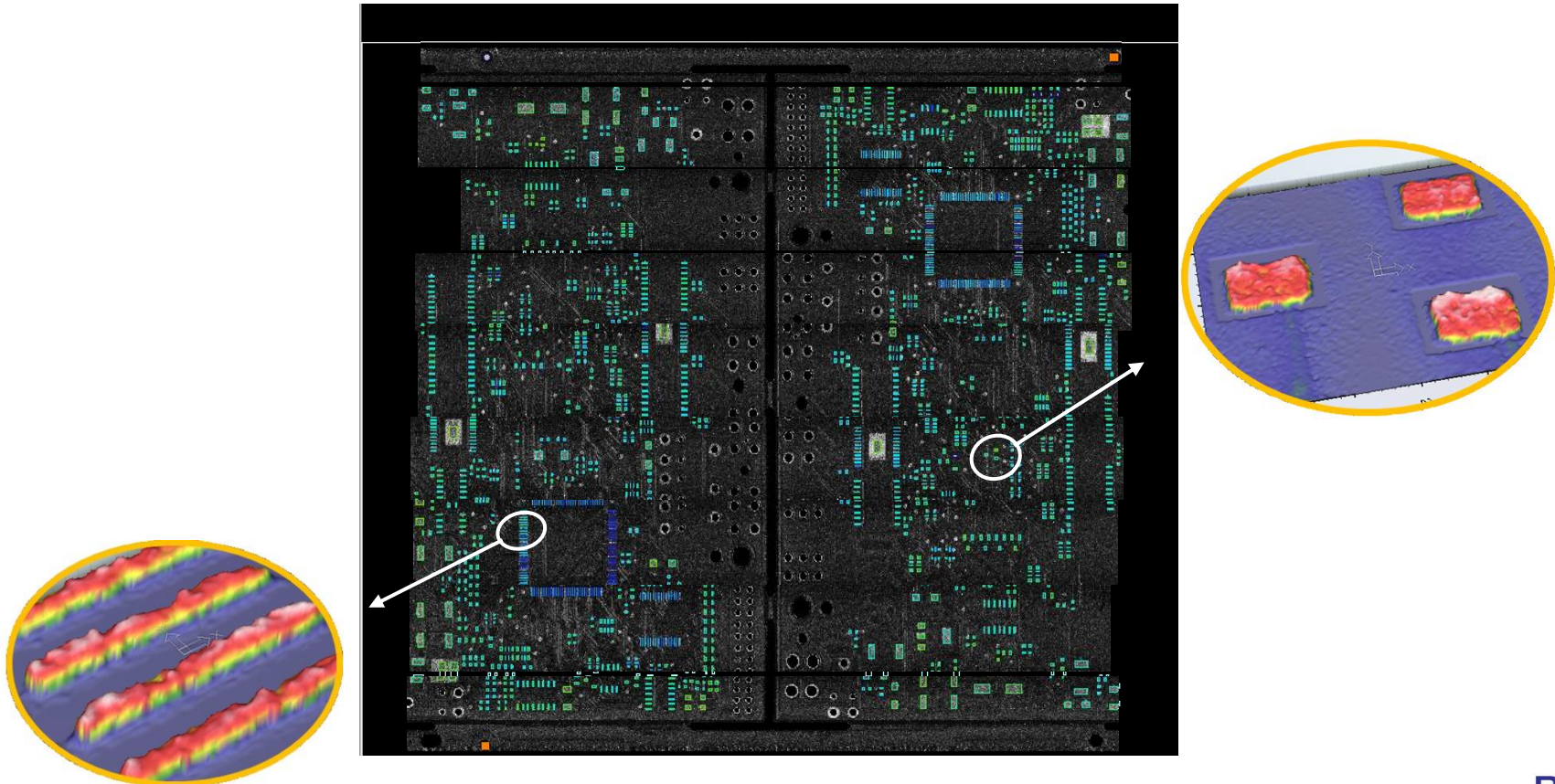- Y-stage moves the panel
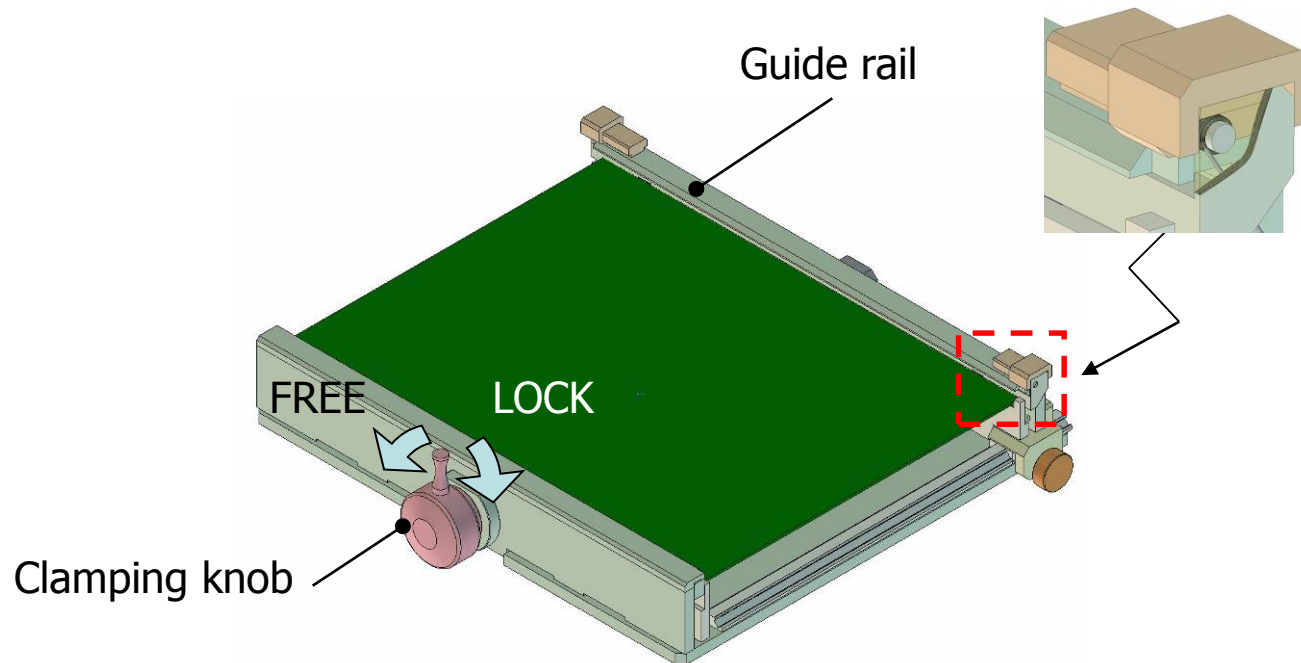
X axis

Y axis

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X-Y Robot

- Zigzag scanning panels
  - Smooth operation with a constant speed
  - More stable than other machines or methods requesting abrupt several go & stop movements every second

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PCB Guide Unit

- Mounting PCBs Manually
- Adjusting width
- Clamping PCBs by turning the knob

Guide rail

FREE   LOCK

Clamping knob

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Control System

- PC system controls entire machine operation
- Controls X-Y robot
- Sensor signal input and image processing
- Measuring, defect detection, and data save
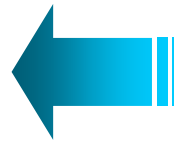- User Interface : Buttons, Keyboard, mouse, 17" monitor
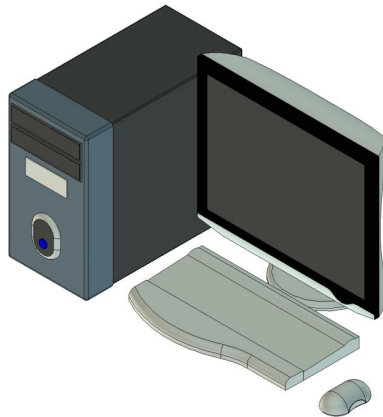
Specification

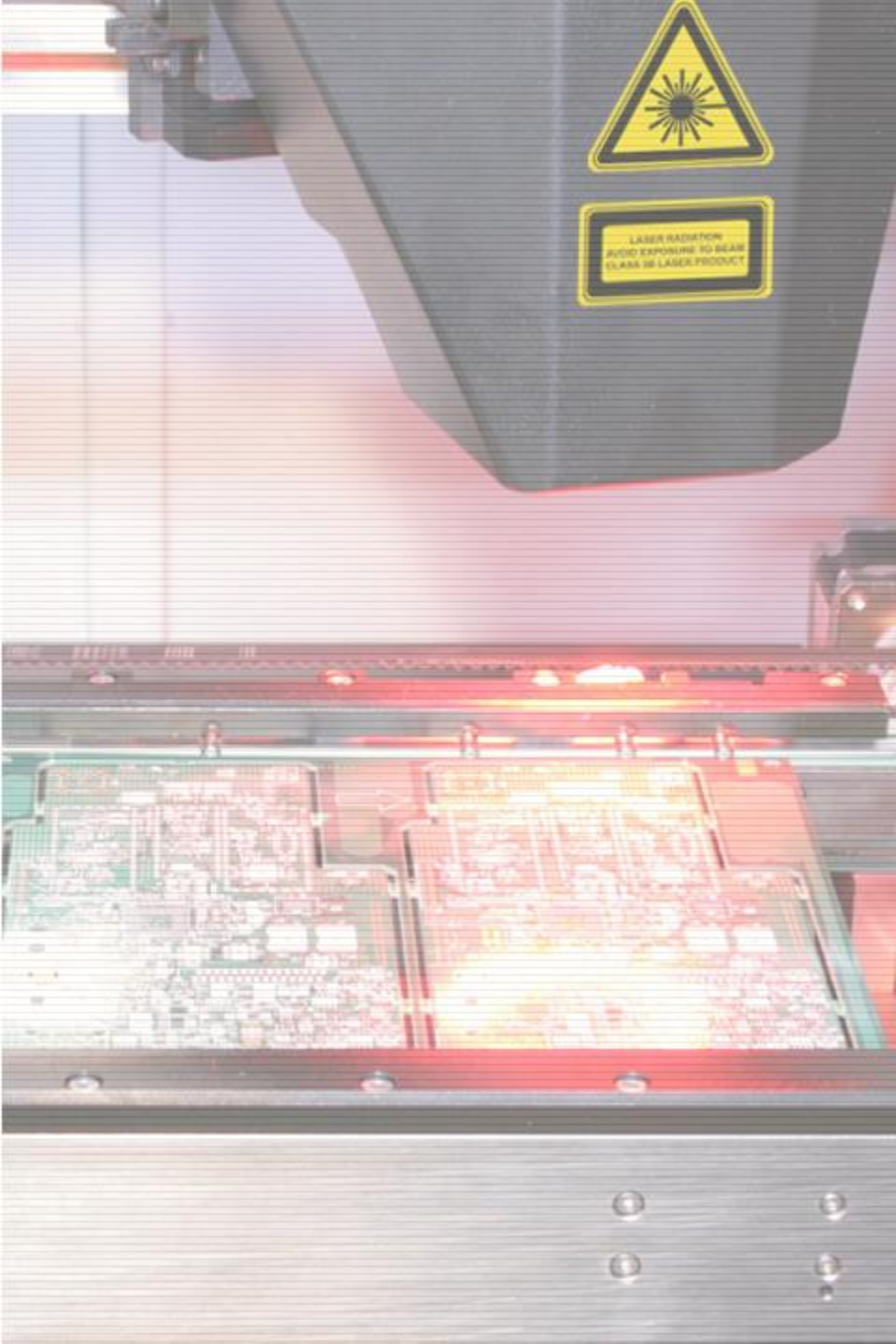|	
CPU	Pentium Core II Duo Processor
RAM	4 GB
HDD	160 GB
VGA	64MB or 128MB
O/S	Windows XP Professional
DISPLAY	17" LCD

PARMI
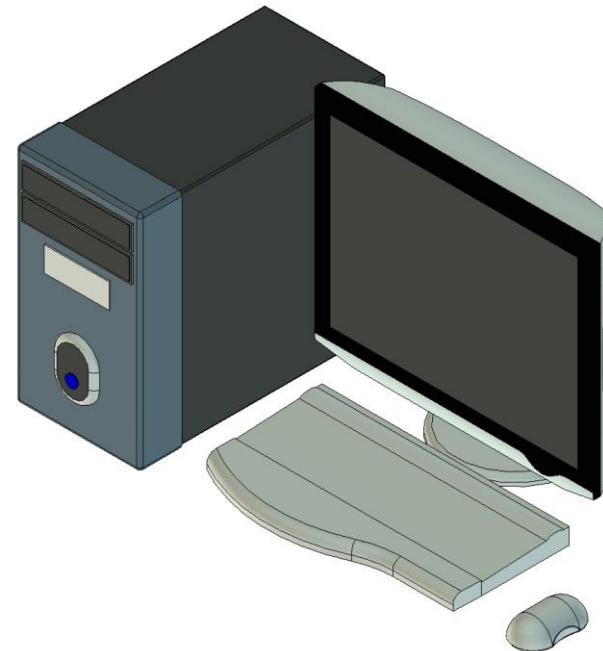
Interface

- Motion Control Cable
- I/O Control Cable
- Camera Link Cable
- Trigger Cable

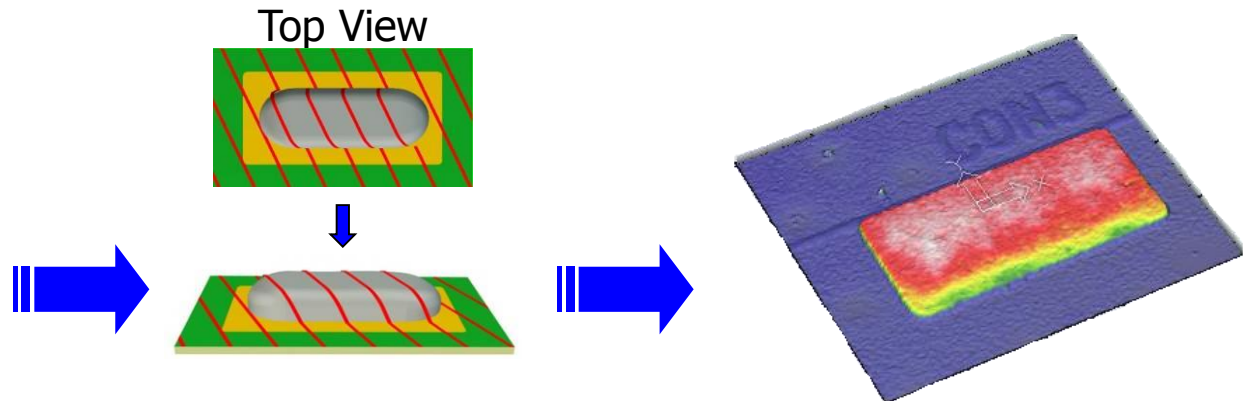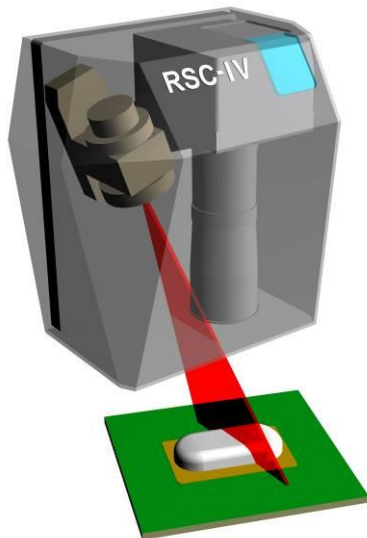**PARMI**

3D SENSOR

RSC IV

Outstanding Performance

3D Images of Components

3D Images of Panels

RSC IV

- Support 2D & 3D image mode
  - 2D mode : get fiducial mark image
  - 3D mode : get 3D data (height map) for inspection

- Measuring principle
  - Optical triangulation
  - Light source : Laser sheet beam
  - Detector : Ultra high speed camera
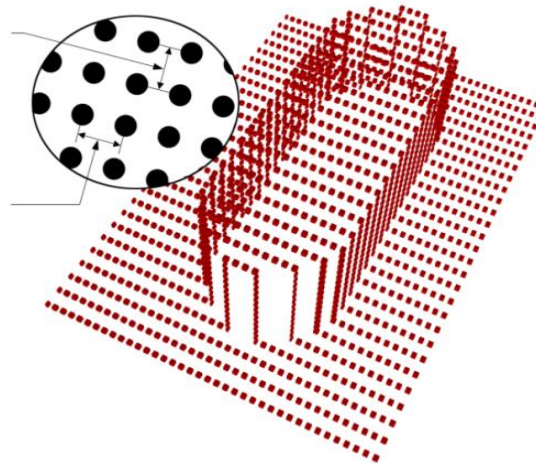
Top View

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Outstanding Performance

- **High accuracy** - reliable laser beam centroid finding algorithm
- **Most robust** - immune to color, surface finishing variation, and ambient noise
- **Sheet beam not perpendicular to scan direction** - better accuracy
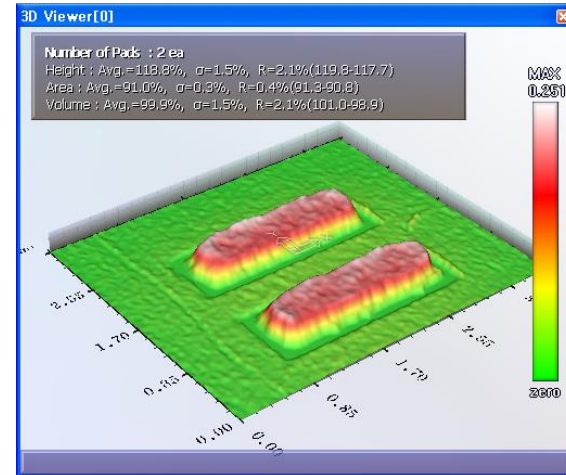- **Utmost speed**   30 cm²/sec

Scan interval

Spatial resolution

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3D Images of Components

PARMI
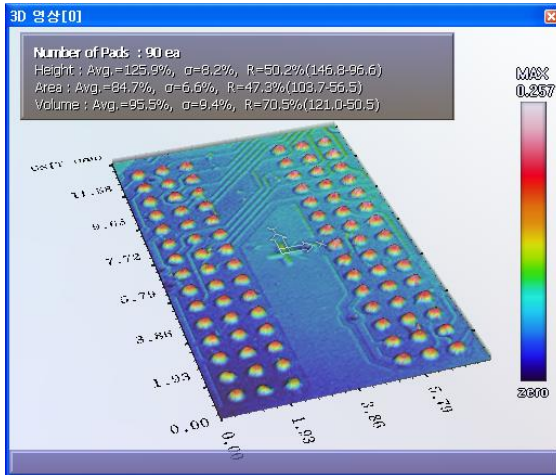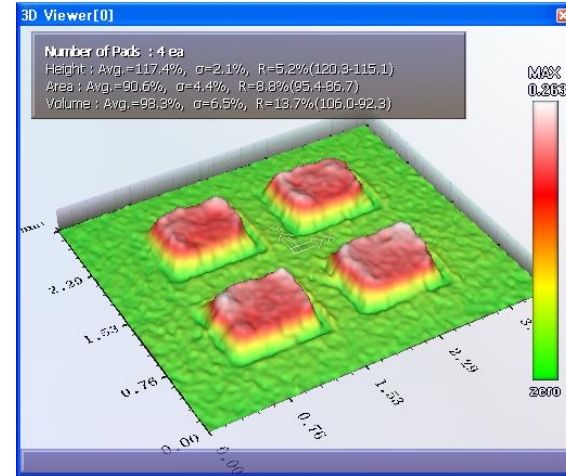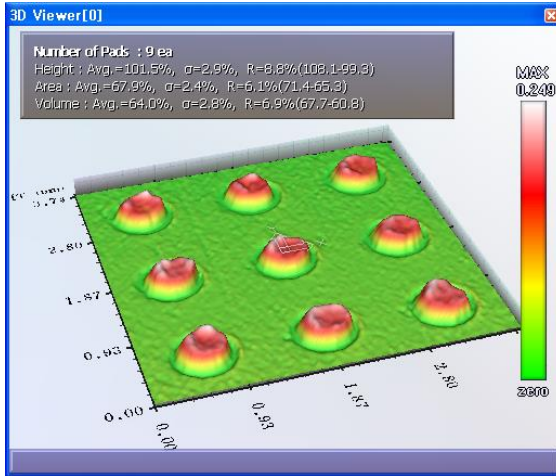
3D Images of Panels

Green Board
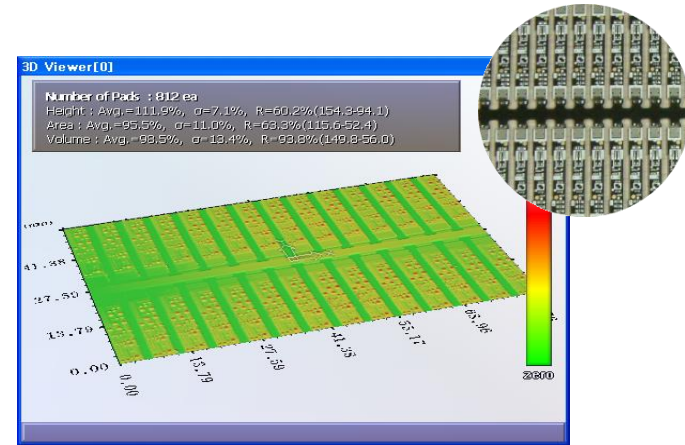
Black Board (Flexible 0.7t)
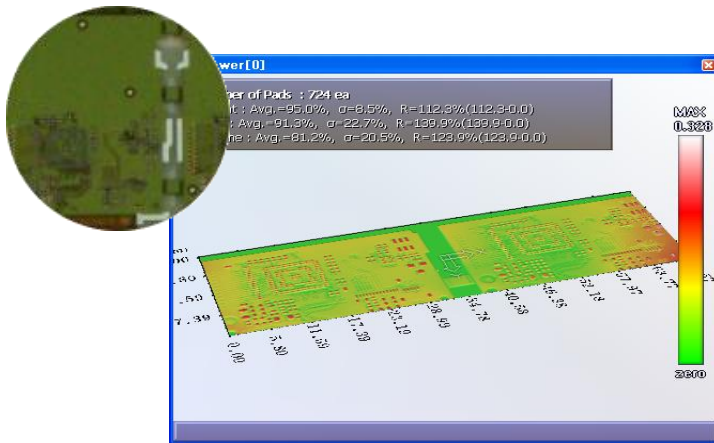
Dark Green Board (Flexible 0.4t)
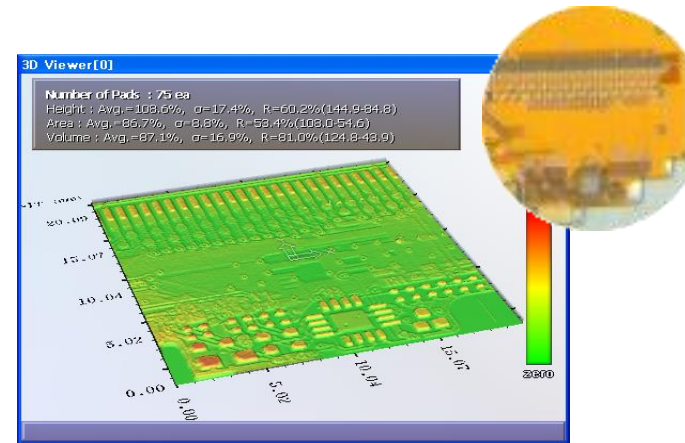
Light Yellow Board (Flexible 0.4t)

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Operation Software

Software for panel inspection

Summary of SPIworks

Summary of ePm-SPI

Summary of SPCworks

Software for panel inspection

SPIworks
Inspection program

SPCworks
SPC program

ePm-SPI
Teaching program

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Summary of SPIworks

- **Machine control & Operator interface**

- **3D Measuring and defect detection**

- **Data save and administration**

- **Process monitoring & control functions**
  - Printing status display by value, sigma, fault frequency coloring
  - 3D shape viewer
  - Measured data viewer
  - Defect viewer for current PCB
  - Defect reviewer for the past NG PCBs
  - X-bar & variance chart

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Summary of ePm-SPI

- **Generates output file used by Inspection program (SPIworks)**

- **Output file contains inspection specific info and parameters**

- **Supporting the multi Gerber teaching(Layer Concept)**

- **Inputs : Stencil gerber, CAD X-Y, Mentor Neutral, ECAD Design, FABmaster Pin Cad, ODB++(Optional), BOM files**

- **Supporting the Polygon type of pads & rotated pads**

- **Off-line or on-line programming available**

- **Easy and fast teaching : 10 ~ 20 minutes**

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Summary of SPCworks™

- **Statistical process control for solder paste printing process**
  - Monitoring printing process in real time
  - Guide to secure better quality of printed paste

- **Access the SQL data base**
  - Networked application
  - Huge DB with backup function

- **Data analysis**
  - Height, Area, Volume, Offset
  - Control charts and process capability analysis
  - Reporting

PARMI
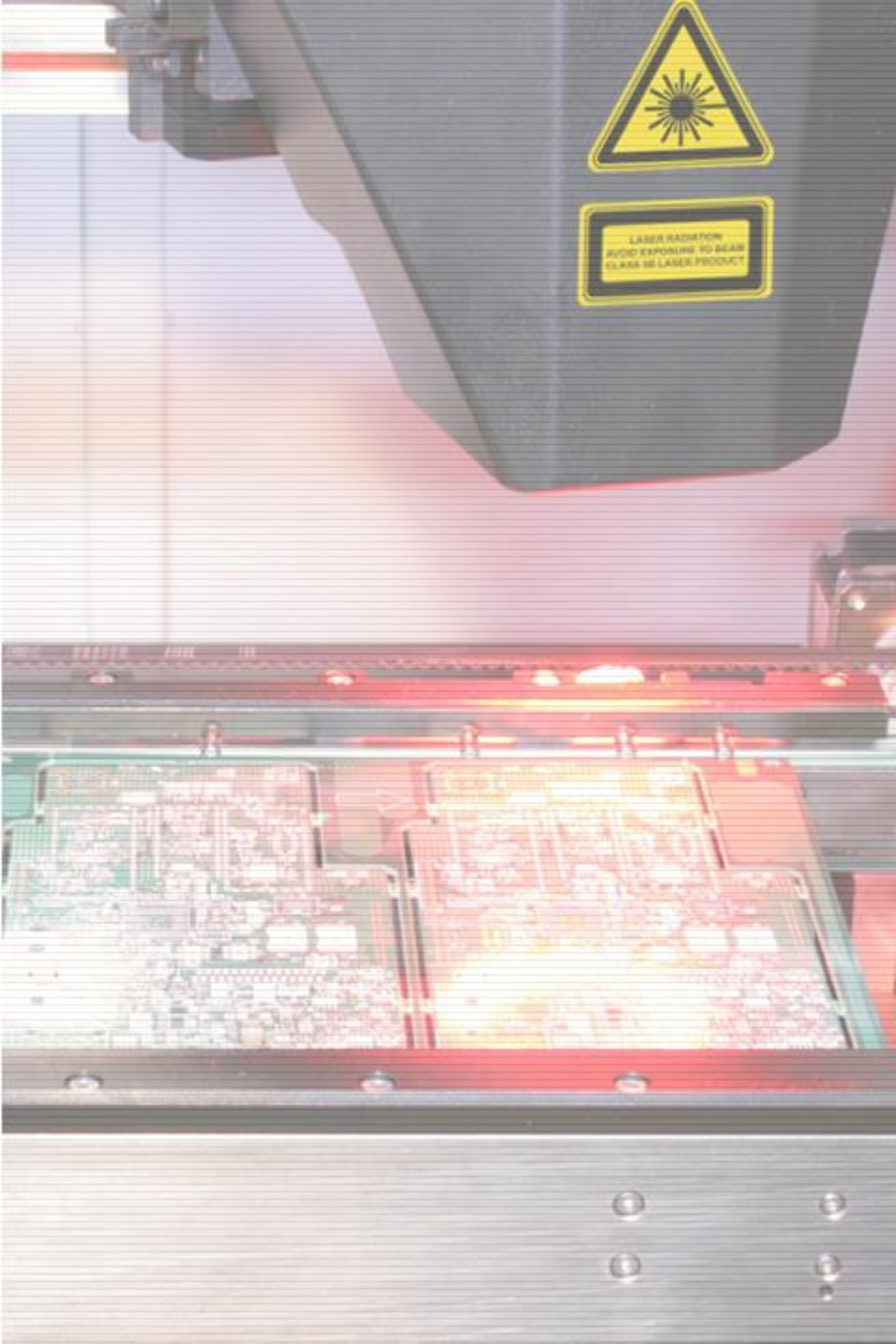
SPECIFICATIONS

Functionality & Measurement

Inspection Performance

Board Specification

Hardware System & Interface

Functionality & Measurement

Functionality

Measuring Principal	**Laser Optical Triangulation**
Paste Type Supported	**All (Pb or Pb Free)**
Board Type Supported	**All colors and All pad finishes**
Offline Teaching	**ePm-SPI & GerberWorks**
SPC & Process Monitoring	**SPCworks & RMCworks**
System Diagnosis	**SPImanager**

Measurement

Camera system	**High frame rate sensor, 18x18 μm pixel resolution**
Scan Resolution	**20 μm**
Lateral Resolution	**18 μm**
Optical Layout	**Laser with 18° angle**
Height Resolution	**0.2 μm**
Max. Paste Height	**1,000 μm**
Max. Paste Size	**20 x 20 mm**

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Inspection Performance

Inspection Performance

Inspection Type	Height, Area, Volume, Offset, Bridge
Inspection Speed	30 ㎠ /sec
Height Repeatability	3 Sigma < 1.0 ㎛, on a certification target
Area Repeatability	3 Sigma < 1%, on a certification target
Volume Repeatability	3 Sigma < 1%, on a certification target
Height Accuracy	3 ㎛, on a certification target
Gage R&R	Less than 10 %

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Board Specification

Board

Maximum Board Size	**370 x 250 mm**
Minimum Board Size	**50 x 50 mm**
Maximum Board Weight	**0.7 Kg**
Maximum Board Warp	**± 3 mm**
Board Thickness	**0.4 to 4 mm**
Board Edge Clearance (Top/Bottom)	**4.0 / 4.0 mm**
Underside Clearance	**16 mm**
Topside Clearance	**20 mm**

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Hardware System & Interface

Hardware System

Dimension (W X **D** X **H)**	**760** X **927** X **578 mm**
Weight	**110Kg**
X-Y robot	**Linear motor driven X,Y-stages**
Computer	**Pentium Core II Duo Processor 4GB Memory**
Operating System	**Windows XP Professional**
Display	**17" LCD**
Input	**Mouse, Keyboard**
Supplies	**AC 220/230V$\pm$10%, 50/60Hz**

Interface

Data Input Type	**Gerber (RS-274X, RS-274D)**
Barcode (option)	**1D, 2D**

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