

The Challenge

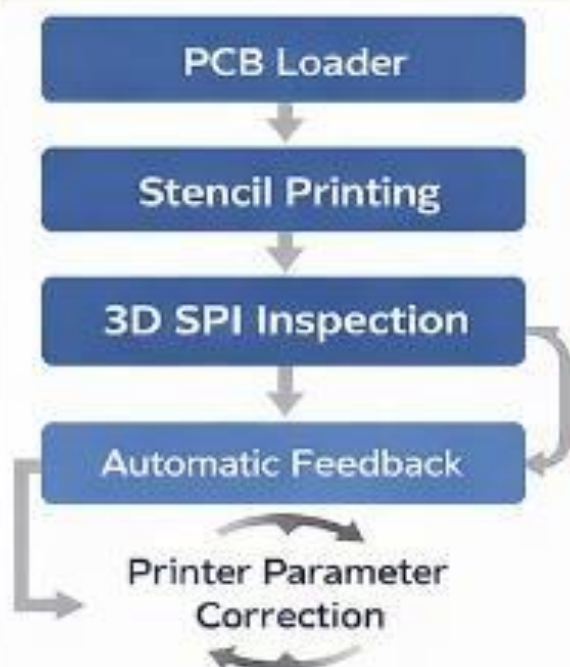
- 60–80% SMT defects originate in solder paste printing:
- Process instability causes:
- Insufficient / excess paste
- bridging between pads
- paste misalignment
- Traditional 2D inspection is insufficient for fine-pitch components



Solution Architecture – 3D SPI Closed Loop

- True 3D measurement of paste volume, height and shape
- Detection of insufficient, excess, bridging defects
- Compensation of PCB warpage (Z-referencing)
- High accuracy for fine-pitch (0402, BGA, CSP) components
- Trend monitoring and statistical process control (SPC)

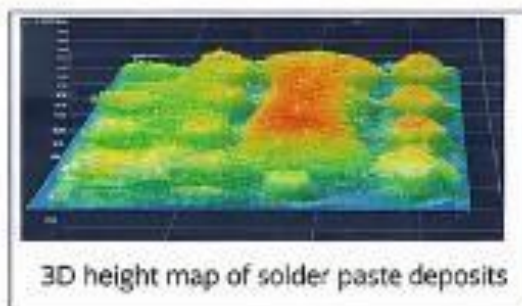
Key Features



Industrial Use in Marelli SMT Line

- Implemented on Marelli SMT production line.
- 3D SPI placed directly after stencil printer.
- Real-time evaluation of each PCB panel
- Automatic printer feedback (closed-loop control)
- Operator supervision and MES data logging

Solution Architecture – 3D SPI Closed Loop



Detected bridging defect by SPI system

Results and Benefits

- Early defect detection before component placement
- Reduction of paste-related defects by > 50 %
- Improved process stability and yield
- Lower rework and scrap rate
- Higher reliability for automotive electronics