



SOLAR CELL AND WAFER BOW MEASUREMENT SYSTEM

The Bow Measurement System uses 3D measurement techniques to measure the bow of solar cells and wafers as they pass along a production line.

The system is a standard instrument and easy to interface to any production line system.

The system is built on Scorpion Vision Software® for user friendliness, configurability, reliability, flexibility and ease of maintenance.

Off-the-shelf world class hardware components including area- and line-scan camera technology are used.

BOW MEASUREMENTS

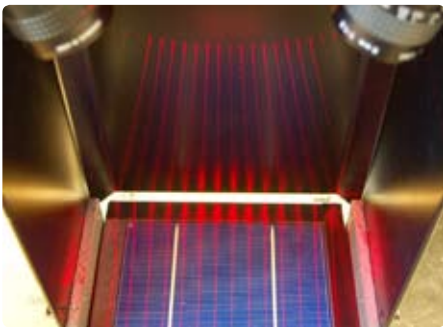
The system employs a 3D imaging technique to measure the uniformity of the wafer. A structured laser projects an array of fine laser lines onto the wafer. To image these projected lines, two FireWire cameras capture images of the projection lines.

To produce a 3D image of the wafer, height points are calculated along the laser lines in each of the two images (top left and right below). From this a 3D point cloud is generated that provides the x, y and height positions across the wafer. The wafer bow is displayed as a gradient height map (bottom left).

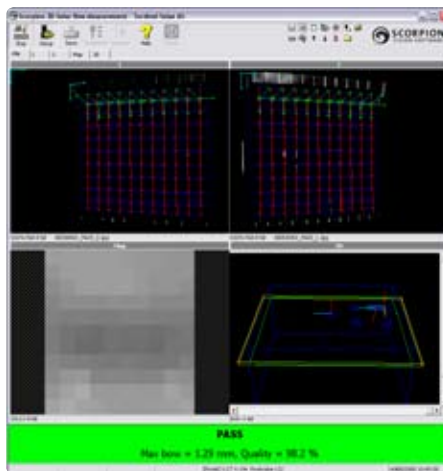
These measurements are done to find the solar cell and wafer bowing:

- Minimum position – x,y,z [mm] (maximum deviation from fitted plane)
- Maximum position – x,y,z [mm] (minimum deviation from fitted plane)
- Bow – [mm] (equals Zmax – Zmin)
- Bow distance [mm]
- 2D distance between min and max position
- Bow direction [degrees]
- Average height of object – [mm]
- Number of valid points in 3D model
- Quality - % of valid points

See our System Measurement Specification for more details on measurement values and accuracy.



Laser lines projected on solar cell



User interface illustrating the bowing measurements and presenting a 3D wafer model

TO BE MEASURED

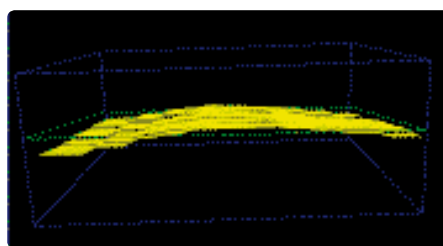
- Solar Cell and Wafer bowing

ENVIRONMENT

- Wafer sizes 125, 150, and 156 mm square
- Typical inspection cycle 1.0 s
- Wafer speed typical 200-300 mm/second
- Continuous or stopped wafers

APPLICATION AREA

Solar Cell and Wafer Quality control



3D model of the wafer

TECHNICAL DATA

Hardware

- One Topology Measurement Unit
- Two cameras
- One 15 lines laser
- Industrial PC
- Laser power supply
- Camera cables to IPC

Software

- Windows XP SP2
- Scorpion Vision Software® with Solar 3D Bow Measurement module

FOR MORE INFORMATION:

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