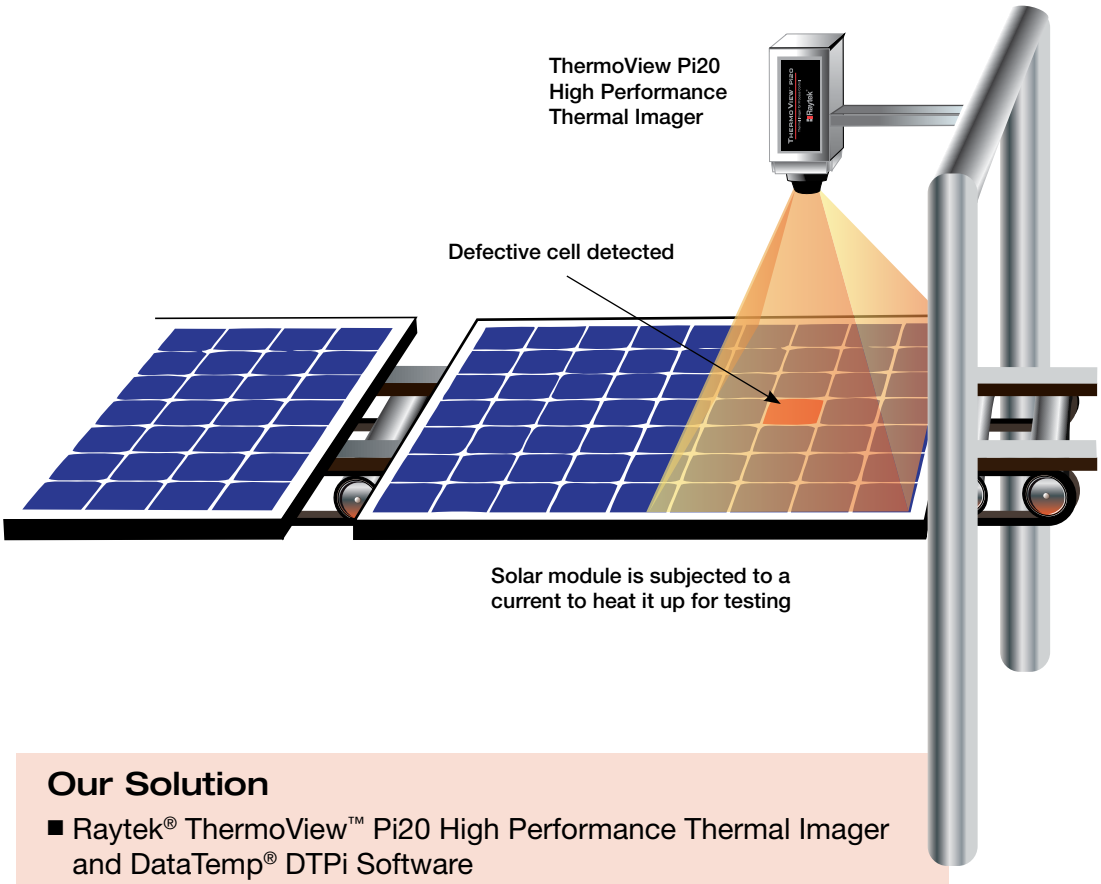
ThermoView™ Pi20

Solar Module Testing

Thermal Imaging for Industrial Applications



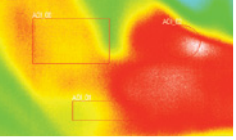
Our Solution

- Raytek® ThermoView™ Pi20 High Performance Thermal Imager and DataTemp® DTPi Software

Benefits

- Reduced waste from early detection of cracked or broken solar cells
- Improved productivity and energy generation through detection of improper solder connectors on solar cells
- Improved product quality for solar modules
- Labor savings with fixed, automated thermal imaging
- Paperless recording and data storage

Raytek®
A Fluke Company



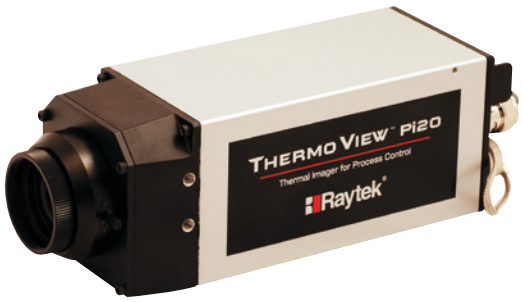
Solar modules for the production of electricity come in panels as large as 1.2 m x 2.4 m (4 x 8 feet) with individual cells approximately 150 mm x 150 mm (6 x 6 inches) in size. The individual cell is produced by laminating layers of mono crystalline silicon onto a glass plate 3 mm thick. The individual cells are connected and wired in series within the module or panel. Several modules are then wired together in a string or group.

During production and assembly, it is possible to crack one or more of the cells. The silicon layer is very brittle and sensitive to shock, so bending it can easily crack the cell. A cracked cell will produce less electrical current than an intact cell. The cells are wired in series within the panel, so just one cracked cell can affect the output of the entire panel. And since the panels are wired in series, the entire string of panels can be affected by this defective cell.

To detect the defective cell, the entire module is subjected to a current input and a thermal imager views the panels as they heat up. Defects can show up in two ways. The cell is wired so that if a crack occurs across the entire cell, it will continue to produce electricity. However, it does so at a reduced rate. This first defect will show up on the thermal imager as the cell being just slightly hotter or cooler than the normal cells. A temperature difference of 0.25ºC (32ºF) is an indication of a failure. If the crack occurs near the edge where the electrical connection is made, then the entire cell may not produce energy and it will appear cooler then the other normal cells. The thermal imager is usually placed close enough so that it measures the temperature of a small number of cells. For an overall picture, the camera can be positioned as far back as 3 meters (10 feet) to see a 1.6 x 1.2 meter (5.2 x 4 feet) area. All of the testing is done on a manual basis to insure accurate temperature detection.

The second defect can be seen in the electrical connections to the cell. Connections are made via a ribbon cable which is soldered to the cell. To test for good connections, the power is cycled up and down and the connections are viewed by the thermal imager. If there is a connection failure caused by a poor solder joint or an open circuit, the temperature will rise as much as 10ºC (50ºF) with a spot size approximately 12 x 3 mm (0.5 x .125 inches) in size.

The Raytek® ThermoView™ Pi20 thermal imager has the potential of detecting not only the defective cells quickly and accurately, but also determining the failure of electrical connections.



The Worldwide Leader in Noncontact Temperature Measurement

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