## Solar Photovoltaic Industry

PV Cell Tester

The Situation

One of the critical parameters of photovoltaic (PV) cells is the cell efficiency. Testing the cells efficiency is critical to control the manufacturing process, but it is also critical information required in the following steps to assemble the cells into panels. The client, a startup solar PV manufacturer, had developed a unique, low cost method of manufacturing PV cells. The efficiency test was conducted with a flash tester that generates an I-V performance curve. Due to the unique form factor of their cells, one of the leading equipment suppliers had customized their flash tester to the clients needs. The modified equipment did not meet their throughput or reliability requirements. The client needed a solution that made the necessary measurement and met their throughput and reliability requirements.
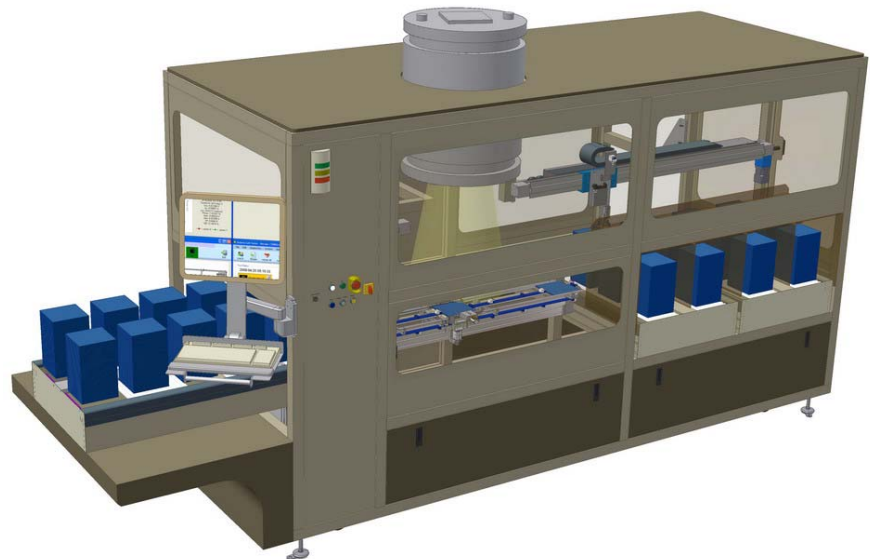
This PV Cell Tester Integrated an Off-the-Shelf Test Head with Innovative Automation

The Challenge

In developing a solution for the client, it was critical that the measurement performance of the test not be compromised. The efficiency measurement is an industry standard with exacting requirements for spectrum, intensity, and uniformity. The automation needed to accommodate multiple cell form factors with eight output lanes for sorting.

The ideal solution would be to integrate a flash test head from a known manufacturer with custom, high throughput automation that met the needs of their factory.
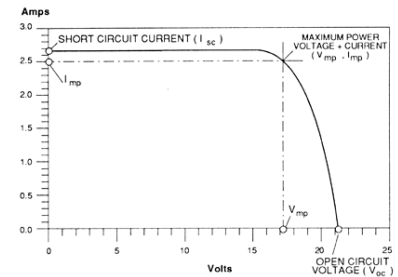
PV Cell Tester (Cont'd)

■ The Solution

Working closely with the client, Owens Design was able to develop a system that integrated an industry standard I-V flash test head with custom automation that met the high throughput and reliability the client needed. Two input lanes and multiple output lanes were used to handle and sort the cell carriers. Custom handling automation was developed to expose the cell to the I-V test head, make electrical contact to the cell, and off load to the sorting mechanisms. System software was developed to test, qualify, and sort the cells.

Typical I-V Test Plot

Process Module Integration

Safety & Regulatory
[UL, NFPA, NEC, CE …]

User Interface
Recipe Management

Cell Handling Automation

Standard Input &
Output Modules

Custom Handling
Mechanisms

Standard &
Custom Carriers

System Frame &
Electronics Packaging