



**SOLAR PHOTOVOLTAIC INDUSTRY**

**CIGS MANUFACTURING PROCESS AUTOMATION RELIABILITY**

**The Situation**

A leading thin film solar photovoltaic startup was having many reliability problems with the automation to transfer their product from the carriers used for deposition into carriers used for general transport. They were experiencing machine jams, damaged carriers, and yield loss. The carrier transfer systems were used in multiple locations on the line, multiplying the impact of system reliability issues.

**The Challenge**

Transferring the product between carriers required registering and aligning 48 tubes of glass while accommodating rapid changes in temperature, product variation, and carrier tolerances. The transfer systems were interfaced to fixed conveyors. The carrier design was simultaneously undergoing changes to improve process yield. There was immense schedule pressure to resolve the issues in an expedited manner as it was impacting the client's ability to meet their manufacturing ramp targets.

**The Solution**

Owens Design worked collaboratively with the client to identify the thermal, mechanical, and alignment issues. Over several design cycles scheduled to coincide with the client's manufacturing line upgrades, all of the critical mechanisms were redesigned. The carrier design was modified to improve alignment references. Extensive training was conducted to improve system calibration and maintenance operations. The overall result was that the system reliability increased by 50 times.



*Photovoltaic Processing Line Utilized Many Carrier Transfer Systems Multiplying the Impact Of Tool Reliability Issues*



*Closeup of Mechanism for Transferring CIGS Glass Substrates*