



**SOLAR PHOTOVOLTAIC INDUSTRY**

**FLEXIBLE SUBSTRATE HANDLING FOR THIN FILM PV PROCESS**

**The Situation**

Thin film solar photovoltaic processes are often implemented on flexible substrates. While these substrates are chosen for their extremely low cost, the handling of them requires special techniques. A leading thin film PV startup required an extremely high speed, precise assembly system that could reliably handle and place flexible substrates.

**The Challenge**

As with most thin film processes, the client's manufacturing method was proprietary and evolving as they improved the efficiency and reproducibility of the deposition process. The assembly automation must address this variability while meeting the high throughput requirements. Precise placement

of the substrates was required to maximize efficiency while also maintaining aesthetic appeal.

**The Solution**

Owens Design worked collaboratively with the client to analyze multiple concepts. Tradeoffs between configuration, factory integration, throughput, and cost were considered. An innovative mechanism was developed to rapidly singulate the substrates and align them to the required dimensions.



*CIGS Flexible Substrate*

Placement accuracy of 25 um on 1.5 x 2.0 meter glass substrates was achieved and throughputs in excess of 3,500 parts per hour were obtained. Owens Design completed the system by developing the software and controls including the HMI and factory interface. The resulting system delivered outstanding results for the client.



*Placement Accuracy of 25 um Achieved in Fully Automated System*