

HIGH BRIGHTNESS LED INDUSTRY

LED DEPOSITION SYSTEM CARRIER LOADER

■ The Situation

As the technology for high brightness LEDs (HBLEDs) has improved, the market applications have exploded driving an exponential increase in manufacturing demand. The industry is quickly moving from small (2 and 4 inch) wafer substrates to the larger sizes common in the semiconductor industry. To meet the wafer size transition and increasing throughput, the leader in MoCVD deposition equipment decided to automate substrate loading into the MoCVD carrier which had historically been done manually.

■ The Challenge

The MoCVD deposition process is one of the most critical process steps in HBLED manufacturing. The exact process is a closely guarded secret and the substrate carrier design is an essential element. The pockets to hold the wafers are very close tolerance requiring nearly perfect placement of the substrates. The critical role the carrier plays in the process also meant the loading would need to be automated without making any changes to the carrier. In addition, given the wafers were

being loaded for deposition, no front side or backside contact was allowed. A method that would achieve perfect alignment and not touch the wafer surfaces was required.

■ The Solution

Owens Design was able to leverage extensive experience with semiconductor automation to develop the cassette loading and wafer transfer system. The critical loading into the carrier was solved with an innovative precision mechanism utilizing a custom designed Bernoulli end effector, machine vision, and precise mechanics.



Automated Wafer and MoCVD Carrier Loader



Precision Loading of Wafers into Blind Pockets on Carrier Required