SEMICONDUCTOR INDUSTRY

CO_2 Precision Wafer Cleaning Automation

The Situation

Eco-Snow® 's precision cleaning technology is a revolutionary advancement for removing micron and submicron particulate and organic contamination using carbon dioxide ($CO2$). Liquid $CO2$ is expanded through specially designed nozzles to generate a fast-moving stream of solid $CO2$ "snow" particles and $CO2$ gas. Eco-Snow has proven to be effective in removing particles smaller than 0.1 microns.

Eco-Snow's technology could potentially address significant new cleaning challenges in the semiconductor market, however for a leading edge fab to evaluate the technology, it must first be implemented on a fully automated 300 mm wafer platform.

The Challenge

Developing a fully automated 300 mm platform for Eco-Snow's technology required extensive air flow modeling to achieve the necessary particulate cleanliness. Cleaning chamber design was impacted by precise $CO2$ control and particulate removal concerns.

The Solution

Owens Design developed the multi-axis stage mechanism, $CO2$ controls, and nozzle control. The cleaning chamber was designed in close collaboration with Eco-Snow's computational fluids modeling engineers. Once the cleaning

Fully Automated 300 mm System

chamber design was optimized, Owens Design detailed the system layout, frame and enclosure, and power systems. Owens Design integrated an industry standard EFEM with the custom wafer staging. Integration of the system required extensive testing and balancing of the $CO2$ pressures while maintaining the highest possible particulate removal rate.

Cleaning Chamber was Optimized for Particulate Removal