



SEMICONDUCTOR INDUSTRY

CHEMICAL MECHANICAL PLANARIZATION WAFER AUTOMATION

The Situation

The dominant equipment manufacturer for CMP cleaning wanted to extend their market by introducing a CMP polishing machine. Due to the magnitude of the program, they collaborated with several companies to develop the wafer handling automation while they focused on the wafer polishing process. Owens Design was selected to provide the wafer load station whose function was to load the wafer to the transport head and then clean gross contamination from the wafer and head after the polishing process.



Upper Mechanism Rotates for Wafer Cleaning

The Challenge

Unfortunately, the first company the manufacturer had contracted with for the design effort failed to deliver and used nearly all of the development schedule. Worse yet, the design they had come up with was unusable. Owens Design was confronted with the challenge to develop the first unit from concept to completion in ten weeks to meet demonstrations already scheduled for Semicon. The technical challenge included developing a compliant handoff that would reliably transfer the wafer to the head while maintaining close alignment. The transfer head also needed to rotate over 360 degrees while high pressure cleaning fluids washed the slurry compounds after polishing.

The Solution

Owens Design delivered working units in time for the Semicon demo. The units were then life tested and declared "the most reliable mechanism in the system" by the test manager. We achieved the excellent results by developing a clear understanding of the mechanical alignment challenges that had sabotaged prior efforts. The key innovation was the use of a compliant lower chuck to provide both alignment to the transfer head and allowance for inevitable production misalignments.



*Innovative Compliant Chuck
Provided High Reliability*

The mechanisms were controlled through AC brushless servo motors. Ultra pure fluids were delivered to the lower compliant chuck for washing of the wafer and head during the process. Materials used in the process chamber include 316L SS and PET.