Particles on lithography tool chucks can cause “Hot Spots” – areas on the wafer that are not flat against the chuck because of the particles under the wafer. These particles are typically carried into the tool on the backside of wafers. The normal procedure to remove these hot spots is to shut down the machine and either open it to clean the chuck, or to “stone” the chuck with a tool to break down or remove the particles. Both procedures interrupt critical tool availability for up to two hours.

The most advanced lithography tools, such as those manufactured by ASML and Nikon, have automated measurement capability that will identify “Hot Spots” and shut down the tool until the problem is fixed. Stage Clean was developed to remove and trap the loose debris that accumulates on the wafer chuck. Stage Clean is a highly cross-linked low tack polymeric material that is mounted on wafers and the wafer is run polymer-side down through the tool. This unique material does not have any outgassing as measured against ASTM E595 standard, nor is it observed to transfer any metallic or organic material as tested by TXRF and XPS analytical methods. The Stage Clean product can be used at temperatures up to 300°C.

The defect removal effect of the polymer occurs when the wafer is clamped onto the vacuum chuck. The compliant polymer not only removes defects from the top surface of the chuck, but also from crevices in the chuck, preventing those defects from getting on the backside of wafers. The example below shows how a particle can cause a hot spot and how running a Stage Clean wafer through the tool removes it. The process to transfer the wafer through the tool typically takes 5 minutes or less.

LOW COST OF OWNERSHIP

The Stage Clean product can typically be used up to 100 times before it becomes saturated with particles. ITS does not recommend the use of any organic solvents - including alcohol - for cleaning the Stage Clean wafers. Use of alcohol or other organic solvents may shorten the Stage Clean product life. For more details on the recommended procedure for cleaning, please contact International Test Solutions.
CUSTOMER DATA

A customer evaluated Stage Clean on multiple ASML Twinscan tools. These tools have an automated height error measurement with resolutions up to 120 nm (0.12 microns). Stage Clean was run after an error over 120 nm was observed. As summarized below, this test was done 25 times. The red bars show the height error prior to Stage Clean and the green bars are post Stage Clean. On greater than 70% of the tests, the error was reduced and the tool went back into production. Previously, these errors would have resulted in tool maintenance which would likely take at least one hour.

STAGE CLEAN - SCANNER DEFECT REMOVAL

- Integrated defect measurement used to identify hot spots on multiple systems.
- Stage Clean was run through the tool when defects > 120 nm were detected.
- Stage Clean eliminated defects > 70% of the time; including small defects.

To attain the maximum benefit from Stage Clean, International Test Solutions recommends that the wafer is cycled regularly as a preventative maintenance procedure. This can be scheduled during other qualification tests such as flatness or contamination checks.

Stage Clean is available on wafer substrates with 100mm, 125mm, 150mm, 200mm, and 300mm diameters.

Contact International Test Solutions (ITS) directly at +1 775-284-9220, or contact a local ITS distributor with your requirements to evaluate this product for your specific lithography applications.