



PARTICULATE MONITORING FACILITY

Purpose:

To quantitatively measure surface particulate contamination.

Particulate contamination on sensitive surfaces such as optics may produce reductions in performance of these surfaces. This is especially important in ground processing of space-based telescopes where cleaning surfaces directly may introduce contamination or may be too complicated to be allowed. Use of witness mirrors provides a way to monitor particulate contamination buildup without the risk of contamination to the actual surface.



The Materials Department has developed a system to monitor and measure particulate contamination through the use of optical witness mirrors or silicon wafers. Optical samples with various coatings depending on project requirements are placed in the orientation of the surface to be witnessed and exposed to the same environment and processes as the witnessed surface would be.

After exposure the mirror is placed on a robotic microscope stage. Computer controlled movement under the microscope/video imaging system allows images to be taken of the mirror. These images are enhanced to allow sizing and counting of particles. Obscuration changes are calculated and recovered for the mirror. This method is an improvement over manual counting and sizing of particles that are both unreliable and unrepeatable due to the inspector's vision considering lighting conditions and fatigue. This system counts and sizes particles at the 5 micron level and up.

Additional data may be recorded through use of different instruments to provide molecular contamination build-up. Through ellipsometry or other means, the mirror or wafer may be analyzed to determine if the witnessed surface may have been contaminated with molecular contamination.

POINT-OF-CONTACT:

DeWitt Burns / ED31
(256) 544-2529
dewitt.burns@msfc.nasa.gov