CASE STUDY FOR THE HUBBLE TELESCOPE CLEANROOM

PURAFIL®

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PURAFIL SAFEGUARDS TESTING FOR THE HUBBLE SPACE TELESCOPE CLEANROOM

ABOUT THE HUBBLE SPACE TELESCOPE

The Hubble Space Telescope orbits 375 miles above Earth's atmosphere and provides views of Earth that cannot be achieved from a satellite or earth-based telescope.

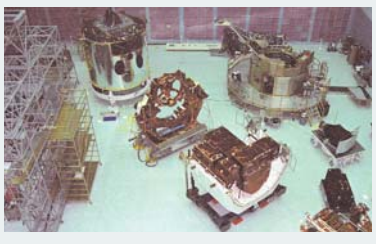
Designed in the 1970's and launched into space in 1990, the Hubble Space Telescope is the first scientific apparatus that is specifically designed for routine repairs and additions by astronauts in orbit. The Hubble Space Telescope Cleanroom is home to the Shuttle platform that is used to anchor the Hubble in space when repairs are being made.

PRODUCT APPLICATION

The Hubble Space Telescope Cleanroom at Goddard Space Center in Greenbelt, Maryland use OnGuard® 2000 Atmospheric Corrosion Monitors, Environmental Reactivity Coupons (ERC), and the Purafilter® to shield against airborne contaminants and gauge air quality within the protected space. This ten-story cleanroom, the largest of its kind anywhere in the world, houses a replica of the actual Hubble Space Telescope, which orbits above Earth. It is here where scientists prepare and test hardware that will be sent into space and added to the Telescope. To accurately test the hardware, the cleanroom must simulate the environment of the Hubble Space Telescope where no chemical contamination exists. The control of airborne contaminants is also critical to protect against irreparable damage to cleanroom instrumentation.

THE PROBLEM

Prior to undertaking a roofing repair project, NASA contacted Purafil to ensure the project would not jeopardize the air quality within the cleanroom. Roofing repairs involve the use of tar, which is applied in a hot liquid form that cools into a semi-solid covering. Tar is produced by distillation of coal, oil, lignite, peat, or wood and emits various chemical contaminants, including sulfur, ammonia and hydrocarbons.



THE HUBBLE SPACE TELESCOPE CLEANROOM AT GODDARD SPACE CENTER IN GREENBELT, MD

CLEANROOM TECHNICIANS WORKING ON THE HUBBLE'S MAIN MIRROR

If brought into the cleanroom by way of makeup air intakes located on the roof of the facility, these contaminants could have potentially corroded electronic cleanroom instrumentation. The facility's existing High Efficiency Particulate Air (HEPA) filters provided protection against particulates ranging in size from 0.003-100 microns, but did not provide protection against the chemical contaminants of concern, ranging in size from 0.0003-0.0007 microns.

PURAFIL PROVIDES THE SOLUTION

NASA was faced with two challenges: First, to eliminate the chemical contaminants that could potentially cause irreparable damage to the cleanroom instrumentation and second, due to space limitations, to find a solution that would retrofit the existing HEPA filter housing.

Purafil provided a solution that solved both challenges: the Purafilter. A combination chemical and particulate pleated filter, the Purafilter removes airborne molecular contamination without the need for additional filter housing. NASA saved time and money, using the Purafilter to solve both challenges.

PURAFILTERS®

The Purafilter is the only chemical filter available that contains an oxidizing air-cleaning media. This oxidizing media, Purafil® SP, contains the active ingredient sodium permanganate, which removes contaminants through a chemical process known as chemisorption and transforms the chemical contaminants into harmless solids, permanently removing them from the airstream. The media of choice in NASA's Purafilters, Purafil's SP Blend media, consists of a blend of Purafil SP and Purakol® activated carbon media.

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QUALITY MANAGEMENT SYSTEM CERTIFIED BY DNV

ISO 9001:2008

Because both acid gases and hydrocarbons were present in the airstream, a traditional carbon filter would have been ineffective. Purafil® SP demonstrates a high capacity for acid gases, such as sulfur dioxide, while activated carbon prefers heavier contaminants, such as hydrocarbons. Using a blended media like SP Blend was the most effective way to protect against the broad range of contaminant gases present during the roofing project.

Also important to NASA, was the ability to monitor air quality. NASA uses Purafil's OnGuard® 2000 Atmospheric Corrosion Monitors to identify real-time environmental conditions that are destructive to sensitive electronic equipment. With the OnGuard, environmental corrosion is detected immediately, allowing the user to take action before problems develop. NASA uses the OnGuard to evaluate fluctuating atmospheric conditions inside the cleanroom.

Most computer manufacturers cite the Instrument Society of America (ISA) standards for acceptable levels of airborne contaminants. OnGuard's measurements correlate directly to these standards. The OnGuard is used as a diagnostic tool that witnesses corrosion on a continuous basis to provide a snapshot of the protected space. Every 15 minutes the OnGuard updates the corrosion build-up over the previous 24-hour period and projects the corresponding 30-day ISA severity level. Results can be viewed directly from the monitor's graphic liquid crystal display (LCD) or uploaded to a personal computer for graphing and archiving. OnGuard calculates both cumulative and incremental corrosion on a continuous, real-time basis, enabling NASA to more accurately predict when corrosion-causing events might occur, so corrective actions can be taken.

While OnGuard monitors were being used to verify air quality, NASA also used Purafil's Environmental Reactivity Coupons (ERC) to verify filter performance. A passive monitoring technique, ERCs use copper and silver strips to measure the oxidation film resulting from their exposure to chemical contaminants.

NASA placed ERCs upstream and at the discharge of the Purafilters®. Following a period of 30 days, the ERCs were gathered and sent to Purafil's laboratory for analysis. A comprehensive report prepared by Purafil provided the following:

- The ISA severity level
- Types of contaminants present
- The likelihood that gas breakthrough had occured

By utilizing monitors and ERCs simultaneously, NASA was better equipped to take preventative action should air quality drop below the acceptable levels.

THE ONGUARD® 2000

Ultimately, the roofing project was completed and NASA, with the help of Purafil, maintained the cleanroom's air quality to above acceptable levels for the duration of the project.

ABOUT PURAFIL

Purafil, Inc. is a single-source solution for controlling indoor air quality in cleanroom environments. We offer a comprehensive selection of gas-phase and particulate air filtration systems designed to remove pollutants permanently from indoor, outdoor, and recirculated air. Call Purafil at (770) 662-8545 or (800) 222-6367 for assistance with your air quality concerns.