



CONTAMINATION CONTROL

One of the largest pharmaceutical producers in the United States, The Upjohn Company, Kalamazoo, Michigan includes among its product lines a variety of sterile injectable drugs. These drugs must be as free of particulate matter—such as dust and pollen—as it is possible to make them. Minimizing contamination is accomplished by controlling air, steam and water services involved in manufacturing operations and by use of air filtration systems in the processing clean rooms (above) where the final product containers are washed before sterilization and filling. Known as High Efficiency Particulate Air (HEPA) filters, these systems remove 99.97 percent of all particles greater than or equal to three-tenths of a micron, an infinitesimal measurement. HEPA systems also produce a laminar—smooth—flow of air over the work area; plastic curtains that hang from the HEPA framework direct the airflow.

In periods of low humidity, company personnel noted that a great deal of static electricity built up and caused dust particles, attracted by the electrical charge, to cling to the curtains. This posed a problem of potential particulate contamination of the final product containers. Seeking a solution, Upjohn found guidance in a *NASA Tech Brief* (see page 137). The *Tech Brief* outlined work performed for Johnson Space Center by Rockwell International Corporation on protecting electronic components of aerospace systems that are highly susceptible to damage by static

electricity. Upjohn obtained a Technical Support Package, "Safe Handling Practices for Electrostatic Sensitive Devices," which provided detailed information on the Johnson/Rockwell work, including more than 50 procedures for reducing static electricity, guidelines for setting up static-free work stations, materials and equipment needed to maintain antistatic protection.

Upjohn found that use of antistatic polyethylene in the curtains surrounding the HEPA filter greatly reduced buildup of static electricity and similarly reduced the adherence of particles. The company also learned of a method of grounding stainless steel work tables used in HEPA filtered air environments; this technique, which allows static charge to leak off before it builds up to high levels, further reduced particle adherence in Upjohn's processing areas.