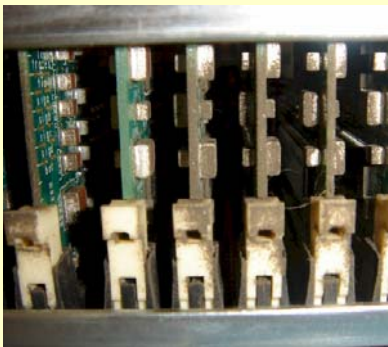


*The WES Hardware Decontamination (HDCON) project is a unique service designed in conjunction with leading hardware manufacturers to safely and effectively address contaminated hardware.*



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***The Worldwide Environmental Services (WES) Hardware Decontamination (HDCON) project is designed to remove loose deposits of building materials or construction dust from within hardware.***

These deposits may be the result of long-term building material degradation, be associated with specific renovation or construction activities or be a result of a disaster. Dust produced by construction or through damage to building structures can contain a wide variety of contaminants. Hard particles can damage component surfaces through grinding or embedding. Soft particles can coat surfaces and attract other contaminants. Heavy contaminant deposits on board surfaces or clogged filters and intakes can contribute to high temperatures and thermal alarms or failures. If hygroscopic, the deposits can absorb moisture, resulting in voltage creepage and intermittent failures. Voltage variances and shorts can also be caused by conductive particles. Salts and other aggressive contaminants in the deposits can contribute to corrosive damage.

Addressing these contaminants can typically be achieved through appropriate implementation of filtered compressed air, brush, swab and vacuum techniques employed on the disassembled components. It is essential that only appropriate products, equipment and procedures are utilized so as to avoid any inappropriate impact on the hardware. All actions must be designed with appropriate consideration to the type of contamination and contaminant levels. This service is typically designed as a joint program with the hardware supplier or maintainer.

The following are key elements of the WES HDCON project. While every project is customized based on hardware types, room logistics, schedule restrictions and other factors, these major work elements are consistent throughout all projects.

- 1. Project Planning:** The HDCON is a complex undertaking that requires a thorough understanding of not only the decontamination process, but also of the computer hardware and data center design. Worldwide Environmental Services has unique technical and management experience developed through the decontamination of thousands of units of critical computer hardware. This international, multi-vendor, interdisciplinary experience is critical to both the development and management of a successful project. The WES project team works with the customer, hardware manufacturers/maintainers, subcontractors and other involved parties to help develop the most appropriate action plan and ensure a safe and effective project. This is not a project that should be attempted by inexperienced individuals or organizations.
- 2. Room Decontamination:** The HDCON is applied to treat hardware that has been inappropriately exposed to excessive contamination. It is essential that the source of the contamination be addressed, and that the area where the hardware will be re-installed is cleaned prior to the hardware decontamination. Failure to do so will allow for the risk of re-contaminating the hardware; thus, rendering the efforts of the HDCON project ineffective. In a scenario where the hardware is being reinstalled within the same space that it was originally contaminated, all room surfaces must be decontaminated before the HDCON project begins. This must address all room surfaces, including the subfloor air distribution void, the access floor system, exterior cabinet surfaces, furniture and fixtures. Inclusive of any area where the HDCON activities, including staging and storage, must be verified to have an acceptable level of cleanliness.



- Hardware Disassembly:** In a typical HDCON, the hardware is disassembled by the relevant hardware manufacturer or maintenance company that is responsible for its warranty. In some projects, this will be a single organization; in others multiple parties may be involved. WES will work with all parties to ensure that expectations and requirements are fully understood, and will include in the project plans adequate space for equipment disassembly and staging. This will typically include grounded workstations and a means to safely transport the hardware components to the decontamination areas.
- Hardware Decontamination:** While the primary goal of the HDCON project is to decontaminate the affected hardware, this must be done in a fashion that is both safe for the hardware, and minimizes any potential for cross-contamination. In order to provide a controlled zone for the decontamination activities, a temporary decontamination booth is constructed. The size and configuration will vary based on site logistics and project size, but will include a core of critical characteristics. The booth is designed with negative pressurization and specific airflow patterns designed to ensure that contaminants dislodged from the hardware being cleaned are not reintroduced into the room or allowed to re-settle on hardware. High-volume fans equipped with HEPA (High Efficiency Particulate Air) filtration are strategically employed to achieve this. The booth is equipped with grounded workstations for disassembled parts staging, decontamination, inspections and packaging. Decontamination is achieved through careful implementation of specially designed clean-room techniques and equipment specifically designed for use with circuit boards and other computer components. Inspection of the decontaminated parts typically includes the use of magnified inspection lights, field microscopes and other visual enhancement aids. All design features, such as grounding and airflow, are tested and verified and key environmental factors are monitored throughout the project.
- Hardware Re-Assembly:** As with the hardware disassembly, this phase is performed by the hardware manufacturer or service provider responsible for the maintenance and warranty of the equipment. The same workstations previously used for disassembly are used in this phase, and special accommodation for staging, storage or shipping are addressed in this phase. This is particularly important in circumstances where hardware must pass through uncontrolled areas in order to return to the computer areas.

The WES HDCON is designed to address extreme circumstances of contaminant migration to hardware interior surfaces. It is a complex project utilizing multiple specialized resources. The processes, procedures and equipment utilized have been designed and chosen by WES, and have been tested with the cooperation of leading computer hardware manufacturers on thousands of pieces of critical computer hardware worldwide.

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