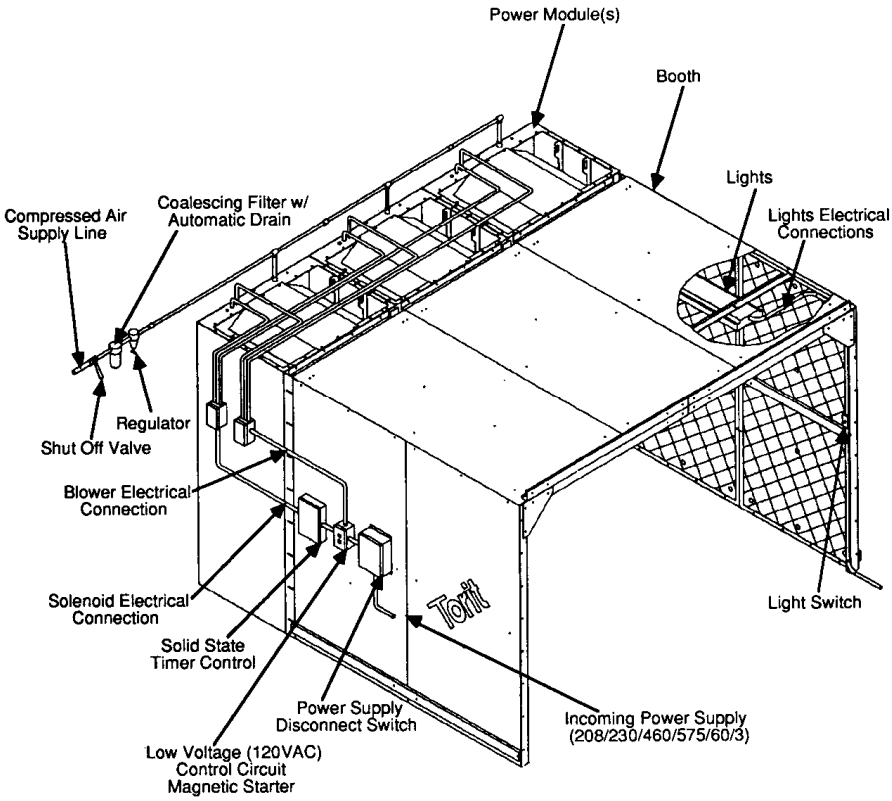
Environmental Control Booths™

Product Overview

The Torit® Environmental Control Booth (ECB) is a self-contained workstation incorporating dust control, sound attenuation, and lighting in a modular booth design. Introduced in 1982, the ECB utilizes the original TD pulse filter concept for unducted workspace ventilation. The ECB removes dust-laden air from the workspace, without restricting worker movement, for improved vision and productivity.

The ECB power module is 34.5" deep x 45" wide x 90" high (876 mm x 1,143 mm x 2,286 mm). It contains a 3 or 5 hp fan, six (6) filter cartridges, two (2) dust drawers, a compressed air manifold, and an air inlet. It does not include wall panels, ceiling panels, or lighting. In most cases, an enclosure is used with the power module to create a horizontal airflow in front of the module. Booth walls, ceiling panels, and lights are available from Torit Products.



The ECB is typically sold in two (ECB-2), three (ECB-3) or four (ECB-4) module configurations, and is equipped with soundproof walls and ceiling panels. The standard booth is 90" high and 90" deep (2,286 x 2,286 mm), with an overall depth, including the power module, of 129" (3,277 mm). One overhead light is provided with each module. Larger units can be assembled using additional filter modules, and the booth depth can be increased by 45-inch (1,143 mm) increments. Unit widths of more than four modules and booth depths greater than 90 inches (2,286 mm) require custom booth supports. Individual modules can also be used for special applications such as ventilating rooms and other custom booth designs.

Dust control for all configurations is provided by a fan and filter system which pulls air through each module. The filter section of the power module removes the dust and clean air is exhausted back into the plant.

Noise control is provided by heavy-duty acoustical panels attached to the walls and ceiling of the booth.

Operation Explanation

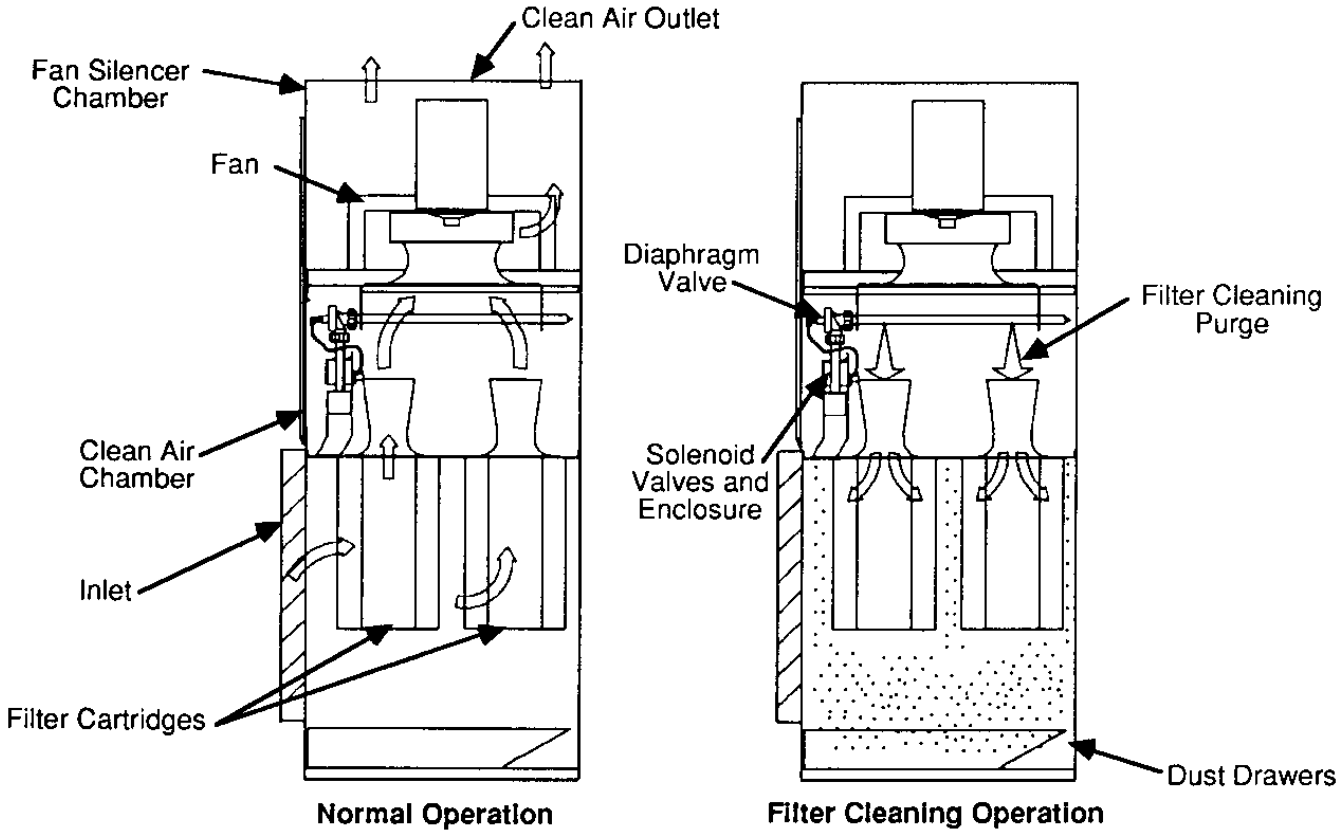
Normal Operation: Each ECB power module contains a 3 or 5 hp fan which pulls the contaminated air through the workspace and into the filter cartridge plenum.

Dust is collected on the outside surface of the filter cartridges. Filtered air flows up through the center of the filter elements, through the clean air chamber into the fan silencer chamber, and exits through the top of the cabinet.

Filter Cleaning: During the filter cartridge cleaning purge, the solid-state timer energizes a solenoid valve, causing the corresponding diaphragm valve to send a pulse of compressed air through the filter cartridge (from the inside outward) removing the collected contaminants from the outside surface of the filter cartridges. Two (2) filter cartridges are cleaned per pulse. The dust falls into the dust drawers for subsequent removal. At the end of the 100 millisecond pulse, the diaphragm valve closes and the filter cartridges resume normal operation. Every ten seconds the factory-set timer sequentially fires each diaphragm valve in the system. This cycle will continue until power to the control board is turned OFF.

The pulse cleaning cycle can be controlled by an optional IEC control panel with programmable logic control (PLC) and a color-coded Magnehelic®* gauge. The PLC offers aftershift pulse-cleaning, keeping dust within the booth, eliminating worker exposure to pulse-cleaning noise. The green and red color-coded Magnehelic gauge provides a quick and easy indicator for needed filter service.

* Magnelic gauge is a registered trademark of Dwyer Instruments, Inc.



Application Summary

The ECB is well-suited to applications where the containment of dust and control of noise from a specific operation are desired. Typical applications include metal grinding, grinding and sanding composite material, fiberglass or wool, and weighing materials in batch processes.

Fine particulate carried with the airflow into the power module is filtered by the Torit filter cartridge dust collector at efficiencies that allow the air to be recirculated. Heavier particulate drops to the floor of the booth area. Due to the very light dust loading, air-to-media ratios of the ECB can exceed 3:1 without impeding filter life.

While the ECB effectively contains dust and controls much of the noise generated within the work area, it must be recognized that it does not provide source capture of dust, and noise will be emitted from the booth. The 160 fpm (0.8 m/s) indraft velocity across the face of the 5 hp booth is sufficient to prevent dust from escaping the work area. The 100 fpm (0.5 m/s) indraft velocity across the face of the 3 hp booth is ideal for powder coating applications. Workers are free to move while dust produced in the booth is kept in the booth.

Abrasive Blasting: An ECB power module is ideal for removing dust from a blasting booth. The alternative of installing a ducted collector outside the booth uses up valuable floor space (if inside the plant) or requires extensive ductwork (if outside the plant). Fibra-Web® filters are required for abrasion resistance and to provide high filtration efficiency on fine dusts. Other abrasion resistant options include an open louver inlet and smooth wall booth. Recommended options include a control panel for reduced installation expense, flush lights for increased headroom, and ASHRAE or HEPA afterfilters for an added measure of safety on hazardous dusts.

Batch Mixing: Dumping and mixing operations often produce significant amounts of nuisance or toxic dust. Hooded dust collecting systems may interfere with the movement of the raw materials. The ECB provides effective dust control and complete freedom of movement.

Composite Grinding: The ECB is ideal for collecting dust from large and oddly-shaped composite parts. The booth design gives the worker complete freedom of movement while grinding or moving around the part. Open-pleat Fibra-Web or Ultra-Tek filters are required because of the fibrous nature of composite dusts. An open louver inlet is also required for improved dust capture. Recommended options include an acoustical booth for a quiet work environment, control panel for reduced installation expense, flush lights for increased headroom, and HEPA afterfilters for an added measure of safety on hazardous composite dusts.

Metal Grinding: The ECB is ideal for collecting dust from metal grinding operations involving large or oddly shaped parts. Open-pleat Fibra-Web filters are required for the fibrous and/or fine dust products when grinding and buffing. The spark trap door is recommended to control the sparks generated by grinding. Recommended options include an acoustical booth for a quiet work environment, a control panel for reduced installation expense, flush lights for increased headroom, and ASHRAE or HEPA afterfilters for an added measure of safety on hazardous dusts such as chromium, cadmium, or zinc.

Metal Welding: The ECB can be used for collecting weld fume from metal welding operations involving large or oddly-shaped parts. Ultra-Web II filters are required for the capture efficiency needed to control weld fume. The spark trap inlet door is recommended to control the sparks generated by welding and grinding. The low flow 3 hp fan is required to operate the recommended air-to-media ratio on weld fume to provide optimum filter life. Recommended options include an acoustical booth for a quiet work environment, a control panel for reduced installation expense, flush lights for increased headroom, and ASHRAE or HEPA afterfilters for an added measure of safety on hazardous dusts such as chromium, cadmium, or zinc.

Powder Paint: Powder paint applications require a dust collector that captures the overspray without restricting worker movement around the part. Ultra-Web II filters are required for excellent filtration performance on fine powders. No inlet door should be used so there are fewer surfaces on which dust can settle, decreasing the time required to clean the booth. The low flow 3 hp fan is needed to meet OSHA requirements. Lower velocities also mean more powder coats the part and less powder is wasted, since excessive velocities pull powder away from the part. A smooth wall booth is required for a smooth working area without ledges, making the booth easy to clean. ASHRAE afterfilters are required by OSHA on powder coating applications. Recommended options include a control panel for reduced installation expense and external light fixtures for improved lighting.

Sizing and Selecting Criteria

Sizing of the ECB does not follow any of the sizing parameters used in normal source capture dust collection. In fact, because of the modular design of both the booth and the filter/power modules, an ECB can be configured to meet a multitude of customer needs.

There are certain limitations that should be understood in configuring a unit:

- The 5 hp fan is sized to provide 160 fpm (0.8 m/s) across a 45” x 90” (1,143 x 2,286 mm) opening, allowing 4,000 cfm (6,840 m^3/h). The low flow 3 hp fan is sized to provide 100 fpm (0.5 m/s) across the same opening, allowing 2,812 (4,808 m^3/h). Airflow depends on pressure drop, and as the filters become loaded, the airflow is reduced.

Clean Filter Airflow Per Module

Fan hp	Cycle (Hz)	Airflow (cfm)	Airflow (m^3/h)
3	60	3,100	5,267
3	50	3,420	5,862
5	60	4,500	7,646
5	50	4,000	6,796

- Numerous filter options are available, including: Ultra-Web II®, Fibra-Web®, Ultra-Tek®, and Torit-Tex™. Selection is based on the application and characteristics of the generated dust.

- Although there is no limit to the number of power modules that can be connected together, the standard booth packages are limited to four (4) modules in width and 90” (2,286 mm) in depth. Additional lighting requirements and control panel options are needed for any non-standard booth packages.

Features/Advantages/Benefits

Features	Benefits
Booth-type dust control	• No need to keep the workpiece close to conventional dust extraction hooding. This provides freedom of movement and fewer interruptions while working in a bright, clean, work environment, increasing productivity.
Modular design	• Design flexibility and easy installation
Sound absorbing, flame retardant booth liner	• Sound is contained within the booth, providing a quiet plant area • Acoustical pads are washable and tear-resistant, requiring minimum maintenance
Cartridge choice	• Highest available filtration efficiency, lowest pressure drop, and longest filter life • Filters are replaced less often, minimizing maintenance expense
Pulse cleaning of filters	• Unit operates continuously • No down time required to clean filters
Choice of 3 or 5 hp fan for 100 or 160 fpm air velocity (5 hp standard)	• Dust or powder paint is controlled at the ideal velocity for a wide variety of applications
Acoustically-lined clean air plenum	• Reduces fan noise for quiet operation
Aluminum, airfoil fan wheel	• High-efficiency, quiet, non-sparking design reduces operation noise and expense
Power module with smooth front	• No dust buildup on ledges • Easier to clean surfaces of power module
Power module with front access panels	• Inside access to power module allows booth to be placed against a wall, maximizing available production space
Flush mounted lights with hinged lenses	• Increased headroom • Easier lamp replacement
IEC control panel with programmable logic controller (PLC)	• Quiet, effective filter cleaning • Easier installation and reduced energy consumption at start-up • Aftershift cleaning mode keeps dust within the booth and eliminates worker exposure to pulse-cleaning noise • All electrical controls are mounted in a single enclosure, reducing installation expense • Staggered starting reduces the inrush of electrical current, reducing the risk of power failure at start-up
Optional color-coded Magnehelic gauge	• Quick and easy indicator for needed filter

Features	Benefits
	service • Green indicates filters are performing well while red shows the need to clean or replace filters • Reduced maintenance expense
Improved spark trap door	• Compact design provides excellent spark control, reducing fire risk • Small size increases booth work space
HEPA and 95% ASHRAE afterfilters	• Added worker safety • Easier compliance with OSHA regulations
Improved dust drawer design	• Cleaner and easier dust disposal