

Application of Modular, Rapidly Deployable CBR Filtration and Environmental Conditioning Systems for Building Collective Protection

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Modular / Rapidly Deployable

Why is there a need for modular, rapidly deployable collective protection systems?

- ✓ Minimal Impact on Mission Critical Facility/Shelter
- ✓ Reduce Engineering Design and Installation Requirements
- ✓ Reduce Overall Cost and Lead Times
- ✓ Logistics Support (Manuals, Spare Parts, Training, etc.)

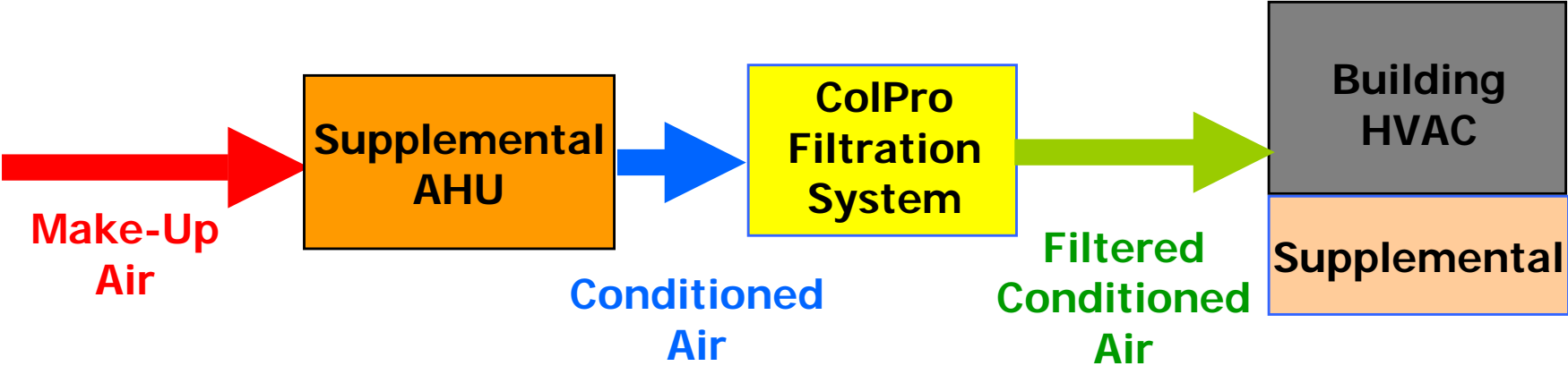


Topics

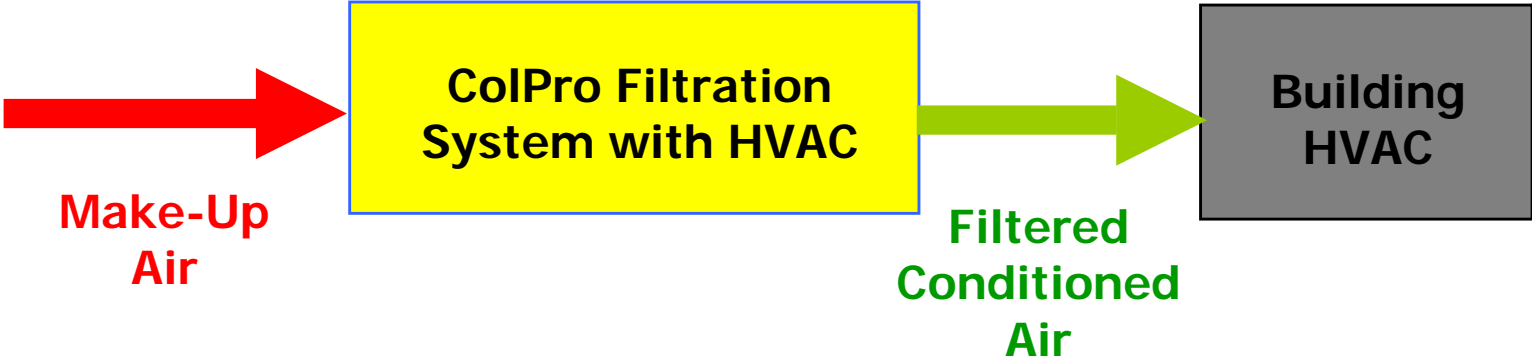
- ✓ What is a Modular CBR Filtration System ?
- ✓ Why combine HVAC and ColPro Filtration?
- ✓ Why Modular and Rapidly Deployable?
- ✓ Schedule and Cost Impact
- ✓ System Features and Options
- ✓ Modular CBR Filtration System Applications



ColPro Filtration Systems



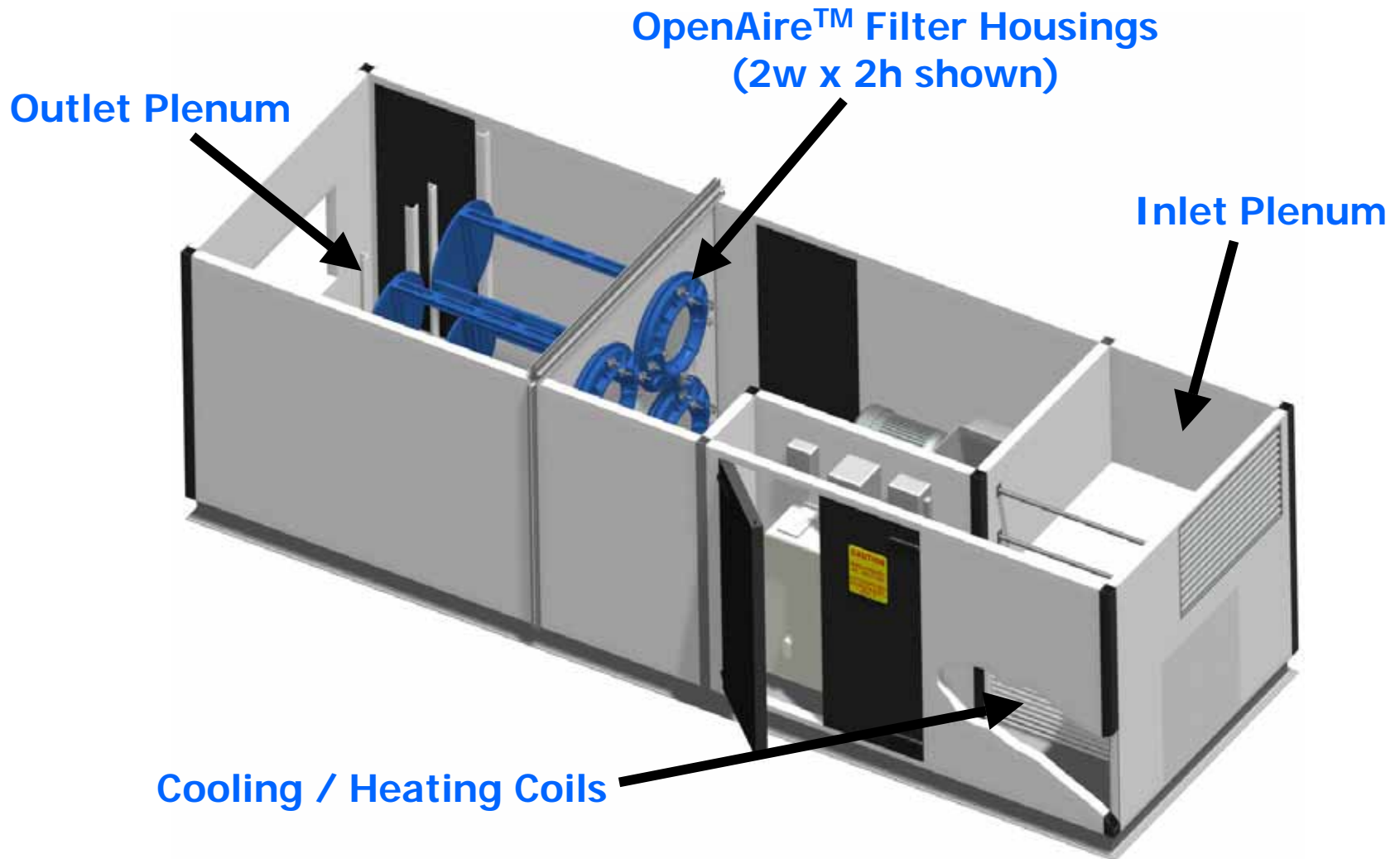
TRADITIONAL COLPRO FILTRATION SYSTEM



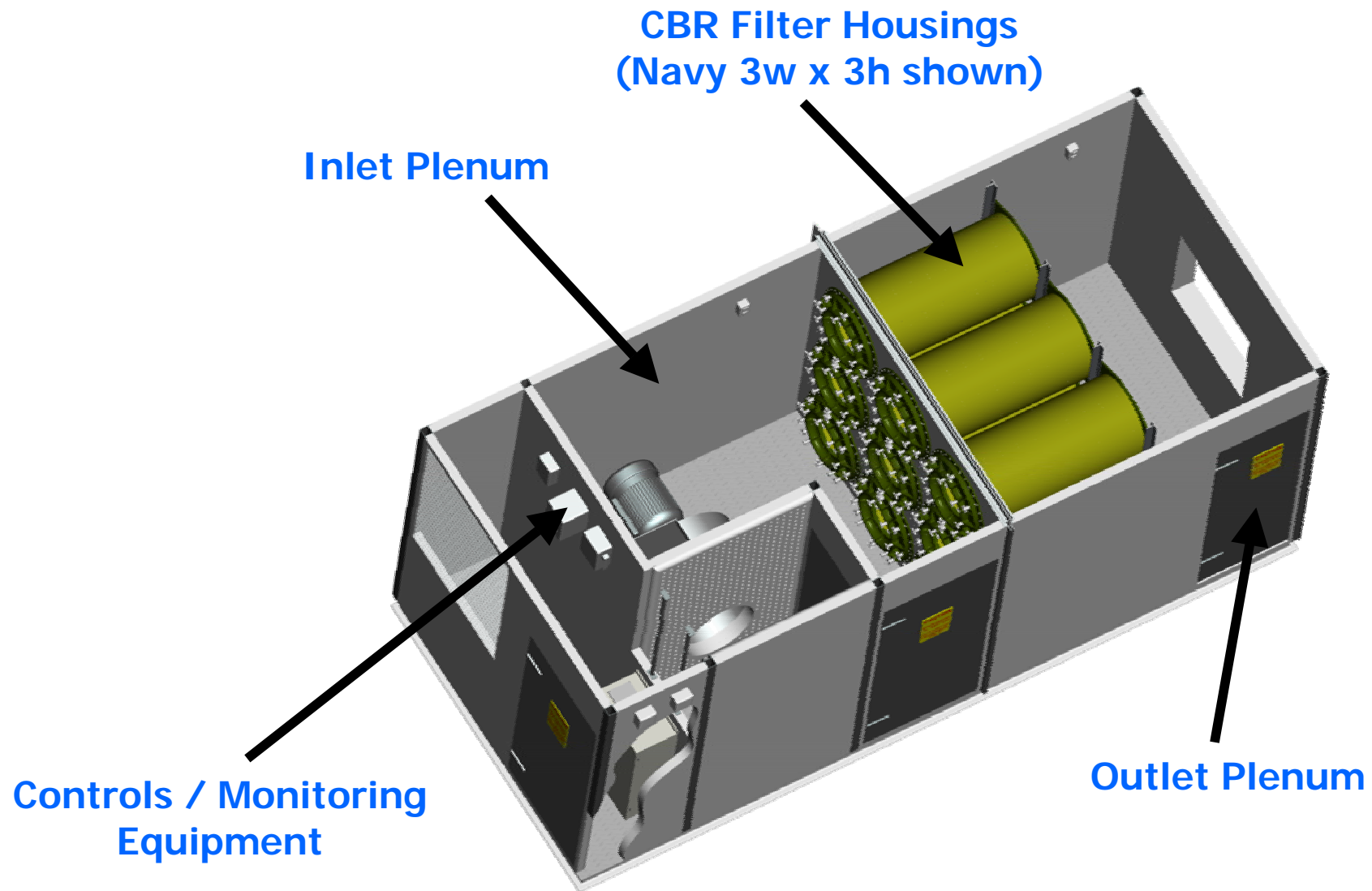
CBR MODULAR FILTRATION SYSTEM



2x2 Modular CBR Filter System With Heating / Cooling Coils (4,000 cfm)



3x3 Modular CBR Filter System With No Cooling/Heating (9,000 cfm)



Why Combine HVAC and ColPro Filtration?

- ColPro requires significant increases in make-up air and typically the facility HVAC systems can not handle the additional cooling/heating loads.
- Standard HVAC systems are not designed for higher pressures. Systems have significant leaks.
- Elimination of redundant components
 - ✓ HVAC blower fan
 - ✓ HVAC housing
 - ✓ Prefilter housing
 - ✓ Concrete pad size, electrical wiring, monitor / controls



Why Modular Construction?

- Uses pre-designed modules
- Reduces NRE engineering and design requirements

- Promotes Product Standardization
 - ✓ Maintenance and Repair Parts
 - ✓ Manual Creation and Support
 - ✓ Standard Monitor/Control Equipment
 - ✓ Standard Integration with Building Control Systems
 - ✓ Training
 - ✓ Testing and Certification



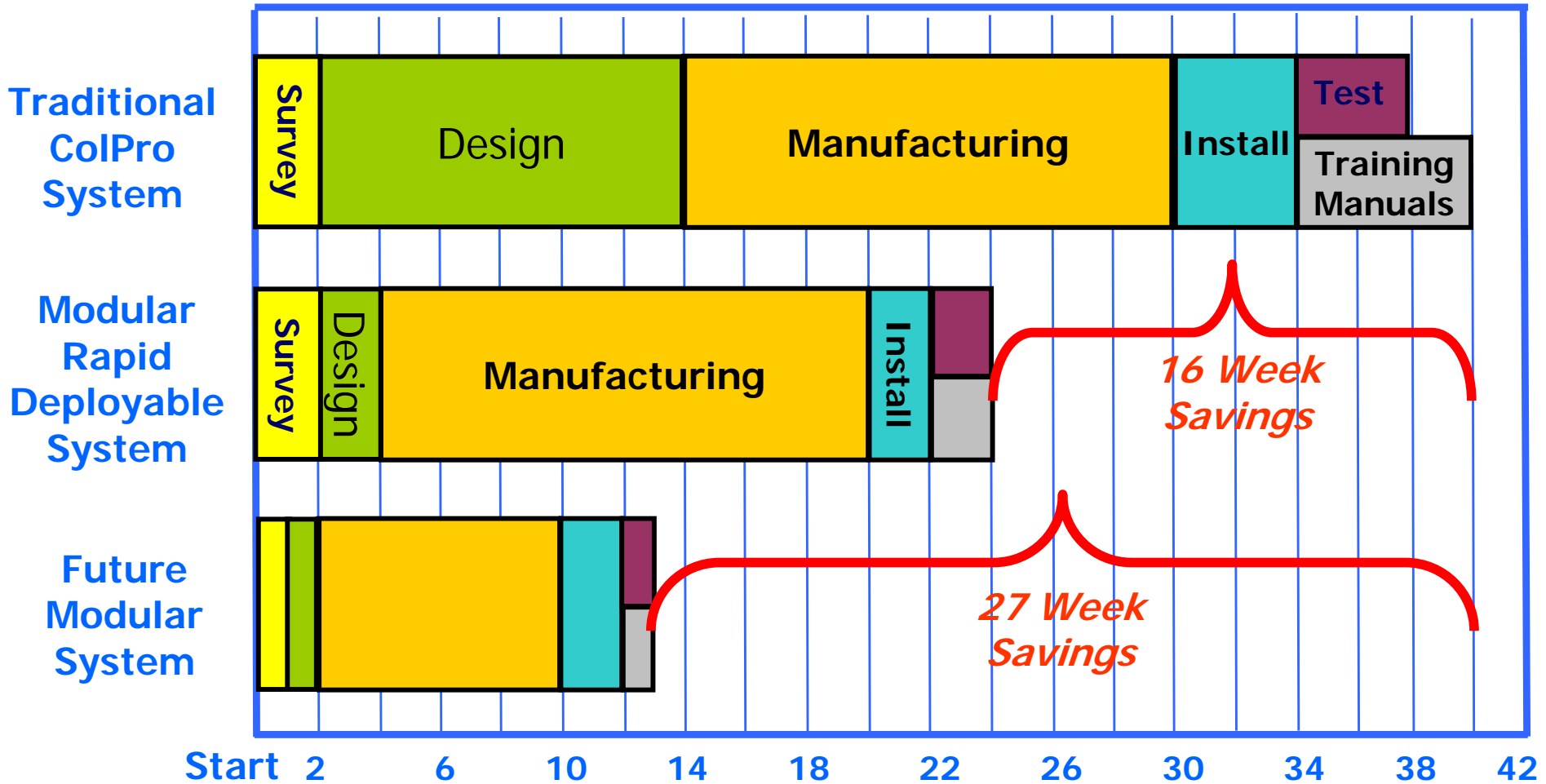
- Allows assembly in confined spaces (Mechanical Rooms, etc.)

Why Rapidly Deployable?

- Minimizes Impact on the Mission Critical Facility / Shelter
- Reduces Installation Cost
 - ✓ Requires only electrical power connection, remote signal connections, and outlet duct connection
 - ✓ Versatile Placement (pad, ground, parking lot, trailer mount)
- Reduces Installation Schedule
 - ✓ Hardware can be installed in 24 – 48 hours
- Shipping Requirements
 - ✓ Sized to allow standard truck transport with no oversize limits exceeded.
 - ✓ Allows 2 systems per truck

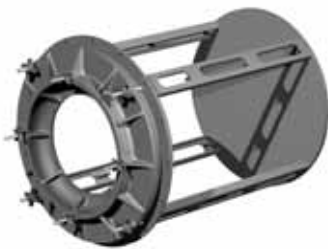


Schedule Impact

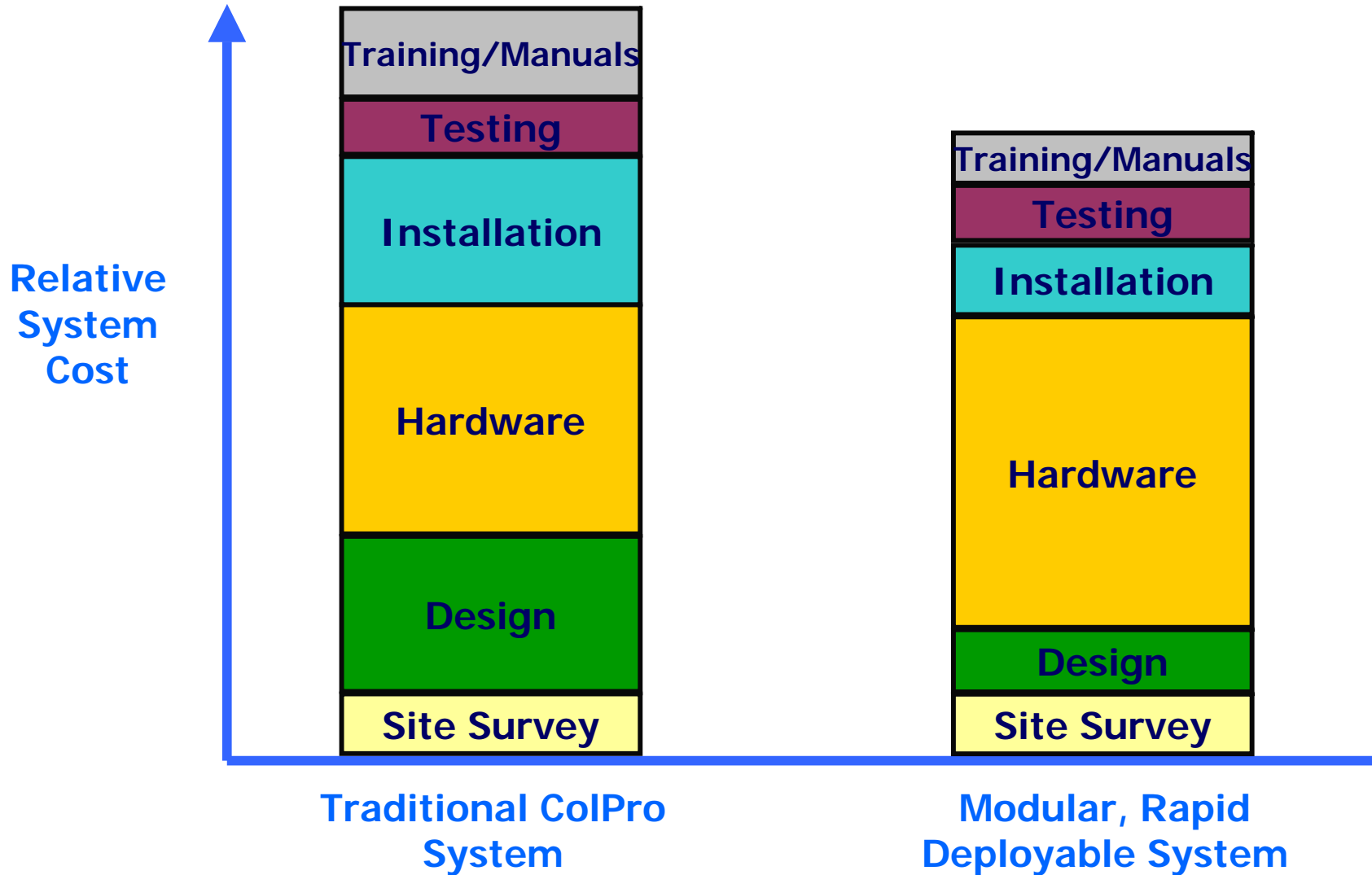


Schedule Impact (Future CBR System)

- ✓ Survey – System specification, minimize facility/shelter investigation
- ✓ Design – Reduce scope to system configuration options
- ✓ Manufacturing
 - **Inventory long lead items (fan, housings, VFD, etc.)**
 - **Eliminate long lead items (design features)**
- ✓ Procurement Strategy – Quantity buy options
- ✓ Testing – Perform testing at the factory & minimize in-field testing

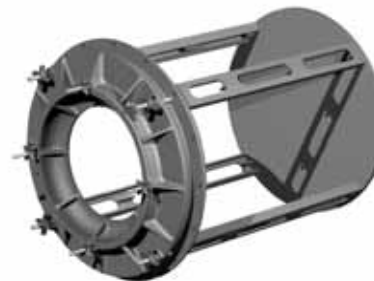
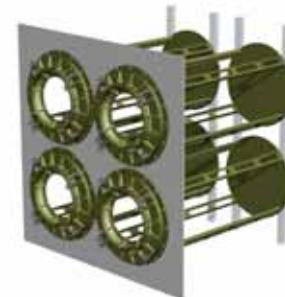


Lower Total Cost *and* Shorter Time



Modular CBR Filtration System Features

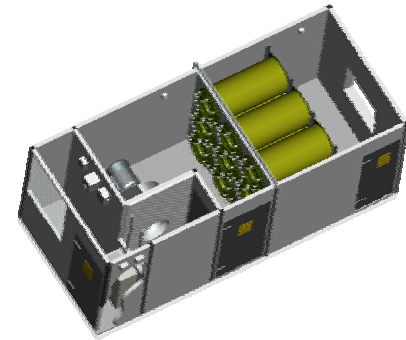
- Modular CBR 3x3 Filtration System
 - ✓ Air flow capacities 4,000 - 14,400 cfm @ 200 cfm per filter
- Modular CBR 2x2 Filtration System
 - ✓ Air flow capacities 1,000 – 6,400 cfm @ 200 cfm per filter
- Filter Housing Options
 - ✓ US Navy CBR Filter Housing to 5 filters deep
 - ✓ OpenAire™ Filter Housing to 8 filters deep



Modular CBR Filtration System Features

Overall dimensions and weight

- ✓ 3x3 system - 8' wide x 8' high x 16' to 22' long depending on housing length and options
- ✓ 2x2 system - 6' wide x 6' high x 16' to 22' long depending on housing length and options
- ✓ Weight ~ 6,800 lbs – 3x3 system with OpenAire™ filter housings, 5 deep, w/o CBR filters



Application of Modular CBR Filtration Systems



AirePod™ Modular CBR Filter System (8,000 cfm)



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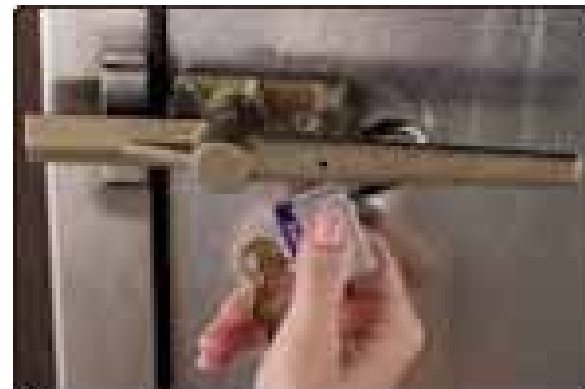
Modular CBR Filtration System Features

– Features

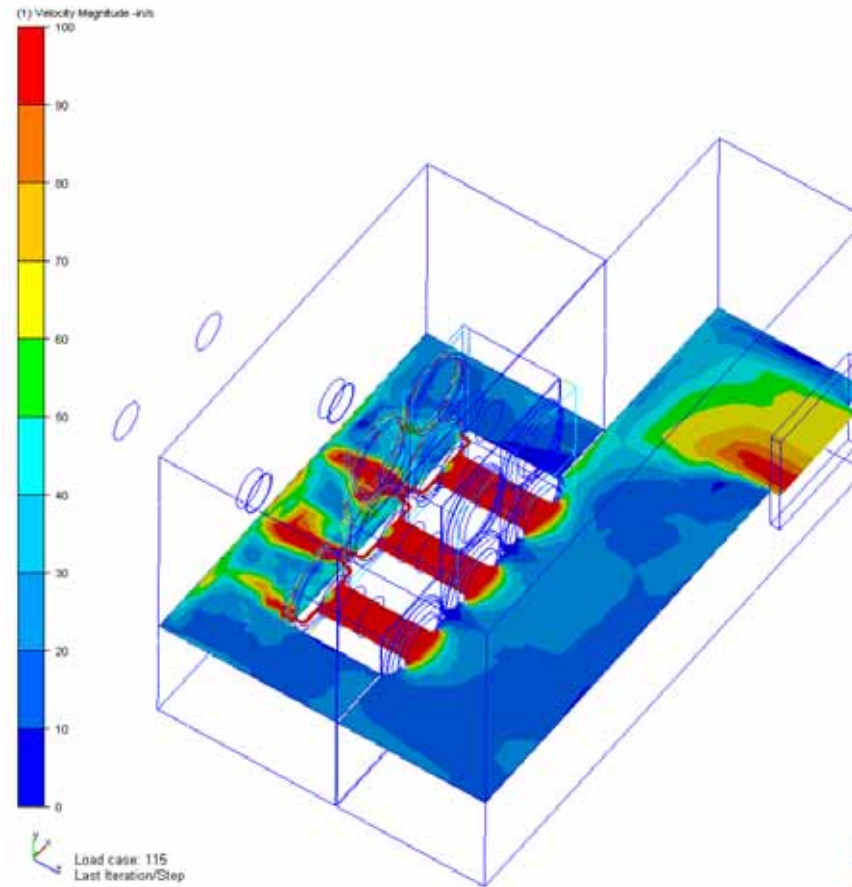
- ✓ 2 ½" double-wall aluminum casing with foam insulation
- ✓ Mostly aluminum construction with acoustic treatments
- ✓ Integrated fan, VFD motor control, lights, and gauges
- ✓ Requires only electrical power connection to fan, remote signal connections, and outlet duct connection
- ✓ Hypalon® roofing with insulation and rain gutters for exterior applications

– Additional Benefits

- ✓ Security – lockable doors
- ✓ Aesthetics



Optimized Design Using CFD



AirePod™ was designed using Computational Fluid Dynamics (CFD) to maximize filter flow uniformity and minimize static pressure losses.

Testing and Industry Specifications

- Housing Leak Test – ASME N510 – Must be $< \frac{1}{2}$ % leakage
- Gas and Aerosol Testing – ASME N510
 - ✓ **Allowable HEPA Leakage $< 0.03\%$**
 - ✓ **Allowable Penetration of Gas Filter $< 0.1\%$**
- Motor Vibration Test – Must be < 0.2 in/sec
- Noise Testing – OSHA 29 CFR Part 1910 Occupational Health and Safety Standards
- Performance Testing – VFD, Monitors, etc.
- Welding Specification – NAVSEA-S907-AQ-GIB-101/248
- Nondestructive Testing Specification – NAVSEA-T9074-AS-GIB-010/271



Potential Modular CBR Applications

- Guardian Installation Protection Program
- Joint Expeditionary Collection Protection Systems
- Special Events (Olympics, World Trade Organization Meetings, Global Summits, VIP Meetings/Forums, etc.)
- High Priority Commercial Applications (Conferences, Board Meetings)
- High Threat Targets (VIP Offices, R&D facilities, etc.)
- Shipboard Applications
- Future Hospital and Medical Shelter Systems



Benefits of the Modular, Rapidly Deployable CBR System

- ✓ 40% Reduction in Schedule
- ✓ 20% Reduction in Cost
- ✓ Technical Risk Reduction with Standardized Design
- ✓ Minimizes Design / Installation / Logistics Support
- ✓ Improves Aesthetics (reduction of ductwork, plenums, etc.)
- ✓ Redeployable System



Questions

