

TES-CLEAN AIR SYSTEMS



**25 YEARS OF INNOVATION
1986-2011**

Applying AMC filtration and ionization to Fan Filters

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2012**

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Agenda

In the following presentation I will present some “best practices” and practical “rules of thumb” for applying these technologies to fan filters.

How AMC filtration works

AMC filters remove gas phase contaminants by removing them as the air passes through the AMC media. Each AMC filter adsorbs the contaminants as a function of residence time, and so the manufacturer's specified flux rate (flow per unit area of media) cannot be increased or both the removal efficiency and lifetime will be substantially decreased.

An FFU is designed to delivery a typical 90 FPM air flow at the 0.48" pressure drop of the PTFE filter, with 20% reserve

AmericanAirFilter MEGAcel™ (PTFE Media)

Operating Data

High Efficiency Performance

MEGAcel provides efficiency and performance far superior to the competition. AAF is first with providing filters which meet rigorous I300I specifications for the manufacturing of 300mm wafers.

At a peak airflow of 100 fpm, Most Penetrating Particle Size (MPPS) efficiency is superior to the stringent requirements of 99.99995% efficiency.

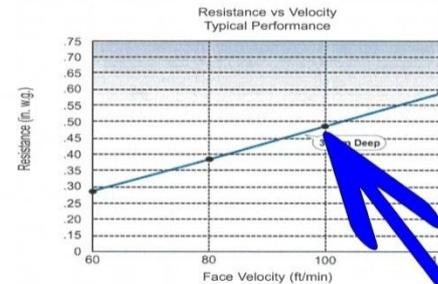
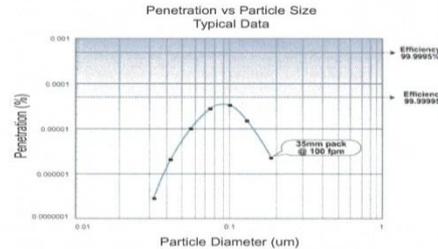
The combination of advanced levels of efficiency and the lowest possible pressure drop makes MEGAcel a simple choice for use in 300mm wafer production.

Lowest Possible Pressure Drop

Pressure drop is measured using a manometer as the test filter is subjected to a metered air volume. Testing on a volumetric basis is specified in the Institute of Environmental Sciences and Technology IEST-RP-CC007 recommended practice on ULPA filters.

AAF calculates the total square footage of usable media pack area (outside dimensions of filter minus the frame thickness and adhesive) and multiplies this number by 100 fpm to determine an accurate volumetric test flow. (This value is approximately 720 cfm for a nominal 24" X 48" filter.) This method simulates actual cleanroom airflow conditions ensuring a true measurement of pressure drop.

0.48" @ 100 FPM



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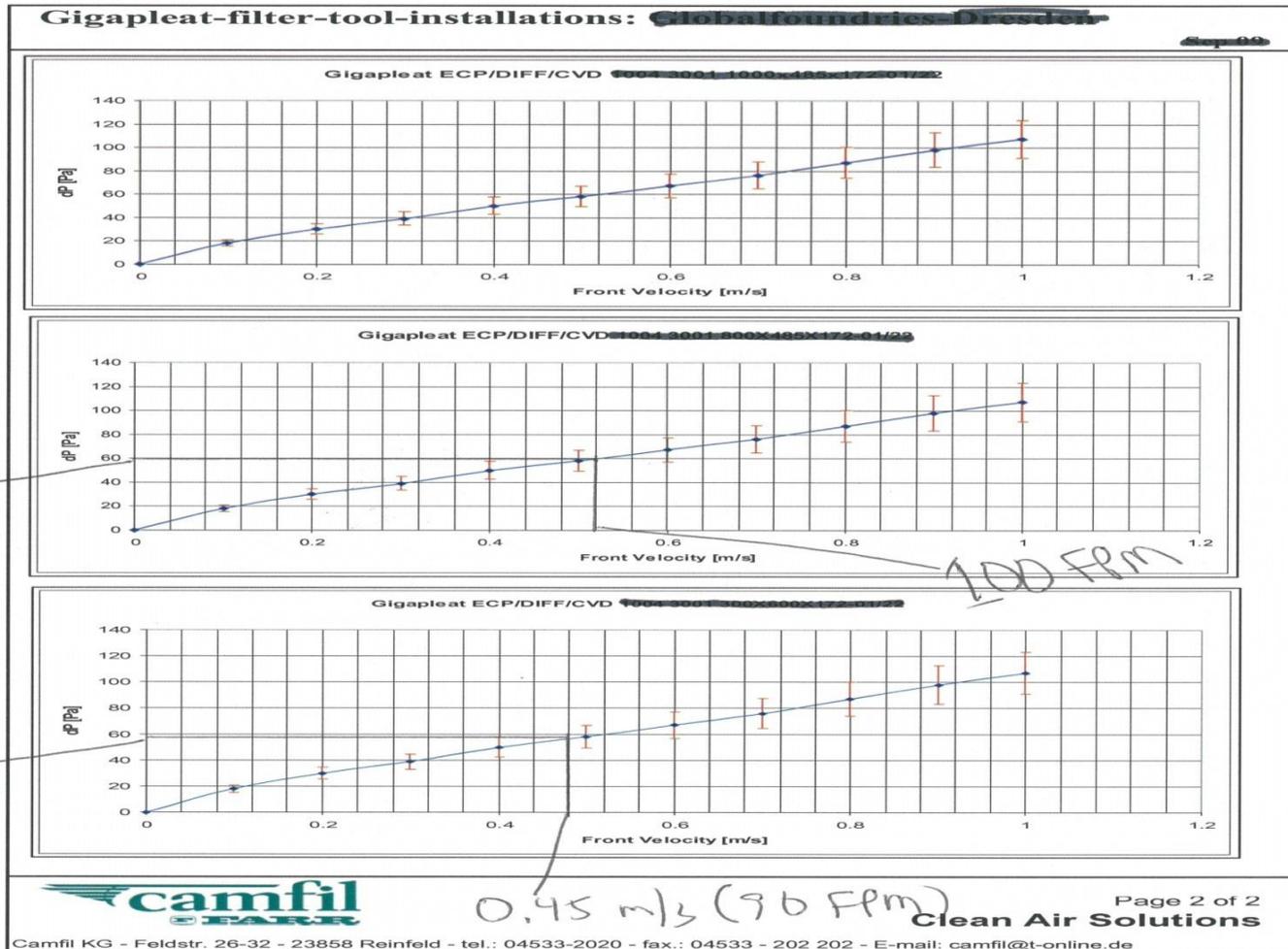
AAF has a policy of continuous product research and improvement and reserves the right to change design and specifications without notice.

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When you add an AMC
prefilter how much pressure
drop do you add to the
system?

Note: the following examples are
picked at random and could have
just as easily been an Entegris,
Purafil, American Air Filter,
Cambridge or etc. filter

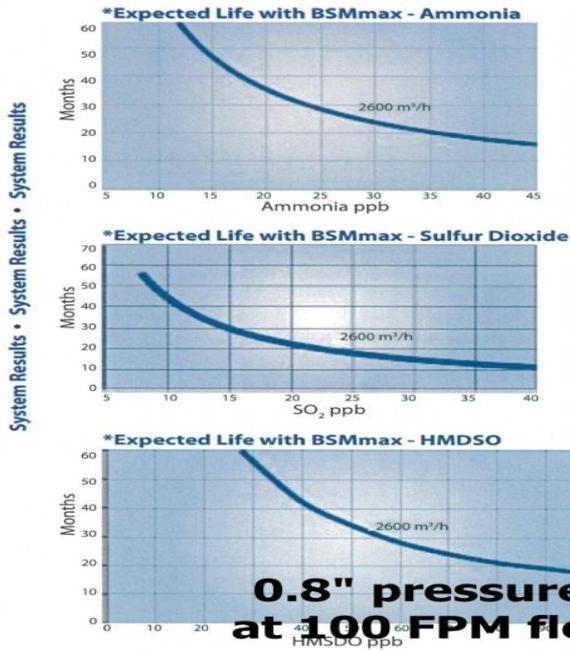
Example 1, Camfil Gigapleat @ 0.25"



Example 2, Donaldson BSM Max @ 0.8"

Donaldson BSMmax Airborne Molecular Contamination Filters

*Expected life is dependent upon actual fab conditions and based on systems results using Donaldson filters in a LITHOGUARD -12 cabinet.



System Results • System Results • System Results



LITHOGUARD® -12 Cabinet



BSMmax Filter

Contact us today!

Donaldson Europe BVBA
Research Park Zone 1
Interleuvenlaan 1
3001 - Leuven
BELGIUM

Tel: +32 16 38 37 10
Fax: +32 16 38 37 11

<http://www.emea.donaldson.com/en/semiconductor/index.html>

hpp-europe@donaldson.com

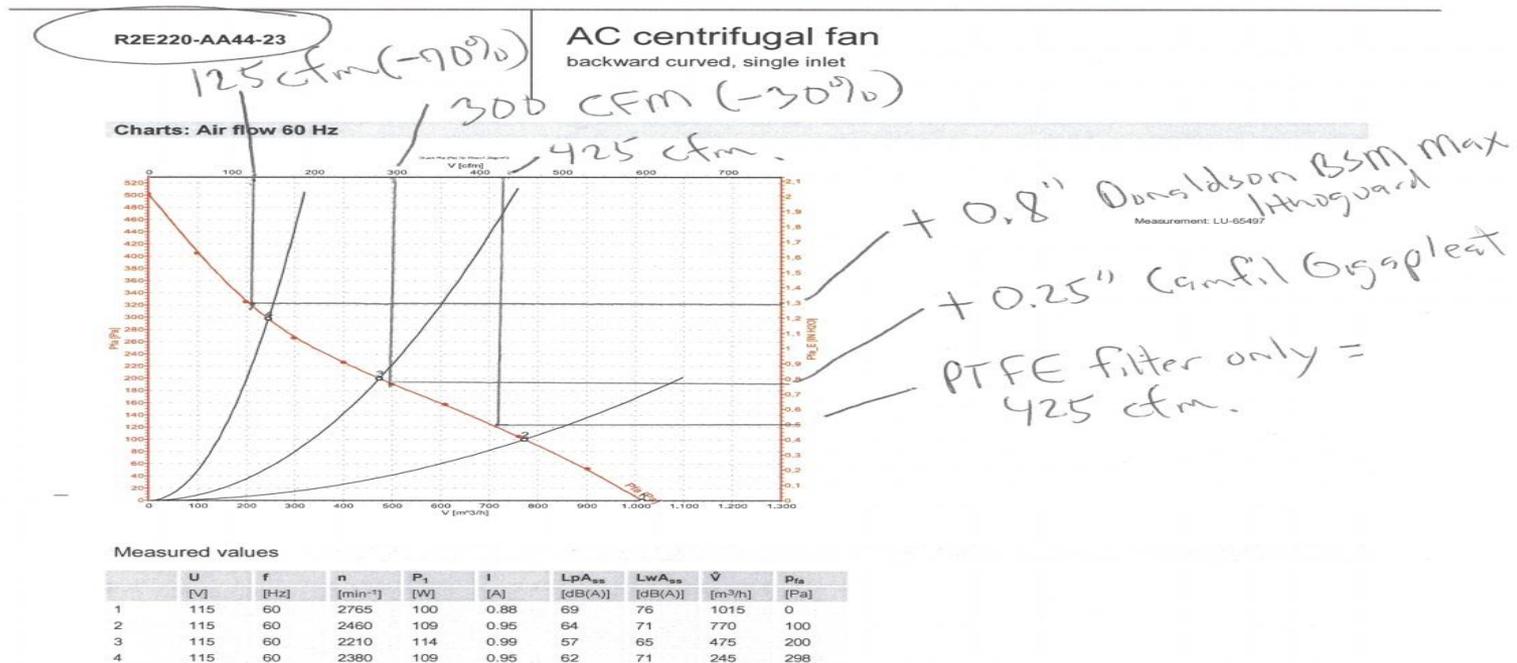
BSMmax Filters	Part #P510805	Part #P512612
System	LITHOGUARD-12	LITHOGUARD-12
Dimensions	552mm x 185mm x 430mm 21.7" x 7.3" x 16.9"	552mm x 185mm x 430mm 21.7" x 7.3" x 16.9"
Flow	**255cfm (433 m³/h)	**255cfm (433 m³/h)
Pressure Drop	**190 Pa (0.8" water gauge)	**190 Pa (0.8" water gauge)
Approximate Weight	**18 kg (40 lbs.)	**18 kg (40 lbs.)

**Results per filter

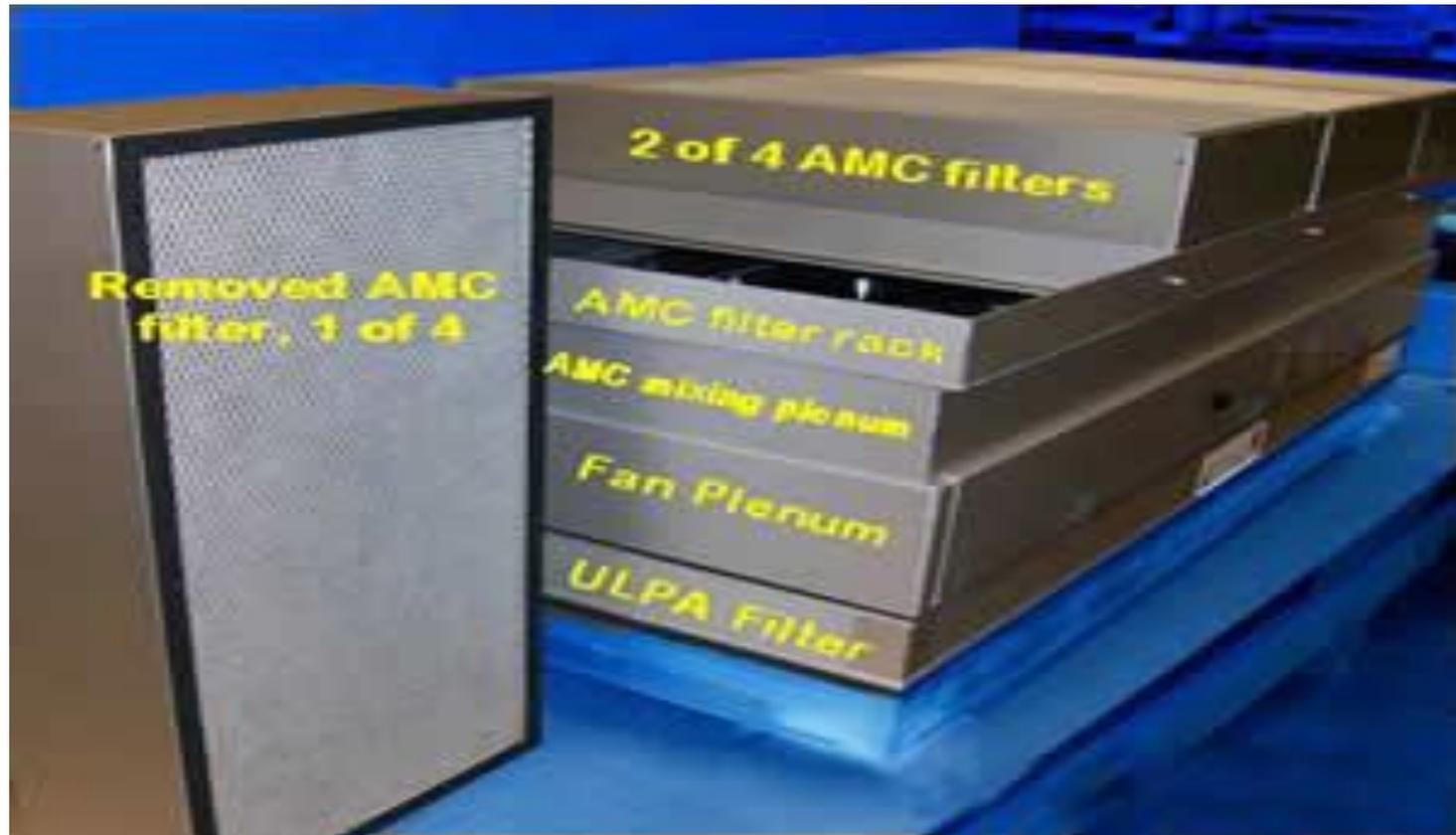
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 Donaldson.

Answer: it will knock the flow down by 30-70% from the typical 90 FPM spec, when we only have 20% reserve to work with



For proper flow through the AMC filter the AMC/PTFE ration needs to be roughly 1:1



And that single fan design limits the size of the AMC filter, forcing the flow rate through the AMC filter to

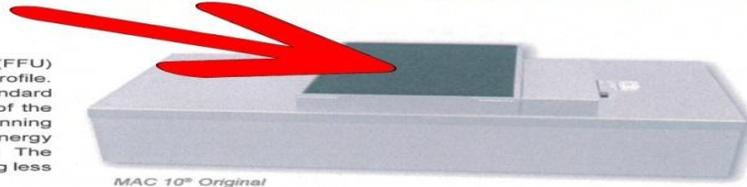


MAC 10[®] Original

■ MAC 10[®] Introduction

Extra low watts, sound, and profile.

The Enviroco[®] MAC 10[®] fan filter unit, was the first (FFU) to combine low sound, low watts and a low profile. Measuring only 51 dBA, the MAC 10[®] Original Standard (2 ft x 4 ft (600 mm x 1,210 mm)) provides one of the lowest sound levels of any FFU in the industry. Running at only 310 watts @ 90 fpm, the unit uses less energy than traditional FFUs, lowering operating costs. The MAC 10[®] Original maintains a low profile, measuring less than 13" (330 mm).



MAC 10[®] Original

MAC 10[®] Original comes standard with the filter integral with the unit housing, requiring the unit to be removed from the ceiling grid to replace the filter. The RSR unit has the filter sealed to the unit using the knife edge/gel seal construction, allowing the filter to be replaced from the roomside. The RSRE unit has the added feature of allowing the motor and filter to be replaced from the roomside.

■ Features

- » Low sound, low watts, low profile, and low operating costs.
- » Three speed switch features low, medium, and high settings. Standard 0.15 ft x 4 ft (40 mm x 1,016 mm) units.
- » Solid-State Speed Control standard on 2 ft x 2 ft (600 mm x 600 mm) and 2 ft x 3.5 ft (600 mm x 965 mm) units.
- » Forward-inclined centrifugal-type fan.
- » High Efficiency Particulate Air (HEPA) UL 900 Filter: 99.995% efficient @ 0.12 micron.
- » Snap-in pre-filter allows for easy replacement and maintenance.
- » Walkable plenum (excluding prefilter), rated to 250 lbs.
- » Mill finished aluminum exterior.
- » IES E-125 recommended ERP standard.
- » UL listed (208V, 230V, 277V) with standard UL 10 filter.

■ Options

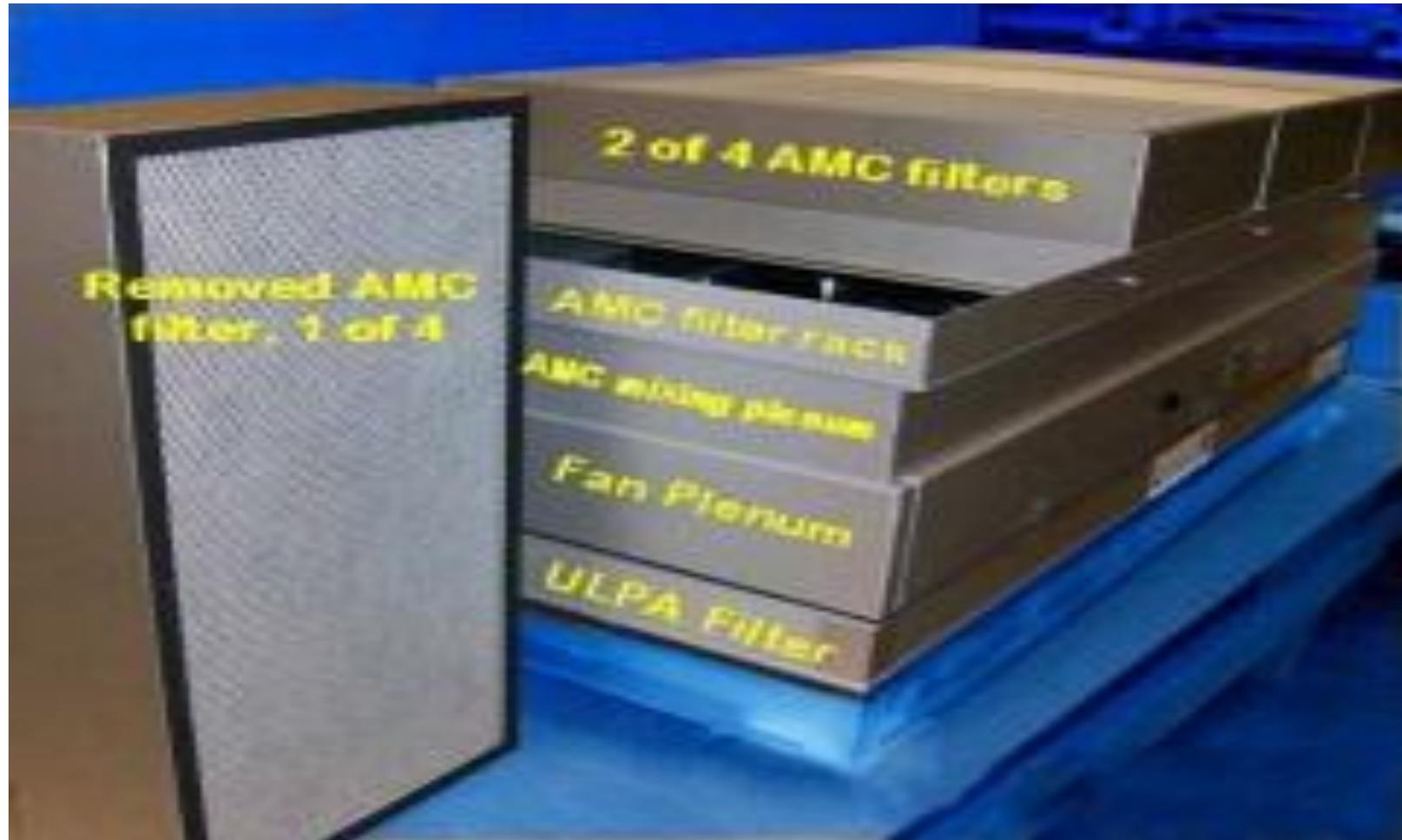
- » Solid-State Speed Control: Available on 2 ft x 4 ft (600 mm x 1,210 mm) and 2 ft x 3.5 ft (600 mm x 1,057 mm) units; allows for a full range of settings.
- » Room-Side Replacement (RSR) available with gel seal filter element; filter is replacement from the roomside.
- » RSRE provides filter and motor/blower assembly replacement from the roomside.
- » Ultra-low Penetration Air (ULPA) Filter: 99.9995% efficient @ 0.12 micron (U15).
- » PTFE boron-free ULPA filter.
- » Airflow Indicator Light: Allows external monitoring of motor operation. Red indicator is on during normal operation.
- » Monitoring and Control System: On-site or remote monitoring and adjustment.
- » CE Marked: 230V units available.
- » Duct Collar 10" (254 mm) and 12" (305 mm): Allows direct connection to the air conditioning supply.
- » Fluorescent Light: Provides illumination with minimal airflow disruption.
- » Ion Bar: Neutralizes static charges below the filter. (Universal voltage power supply required.)
- » Finish: Powder coat painted or stainless steel.
- » 3/8" Challenge Ports: Offers convenient aerosol challenge and filter testing.
- » 3/4" Knife Edge: Permits easy placement in gel track ceiling grid system (available on RSR and RSRE units only).
- » Custom sizes and configurations available; perfect for mini-environment applications.
- » Metric sizes available.

**approx 12" x 24" fan
inlet at 700 CFM =
350 FPM inlet velocity**

Ideal application of the AMC filter, versus ease of service

The ideal location for the AMC filter is after the fans, so their contribution to the overall AMC load can be removed

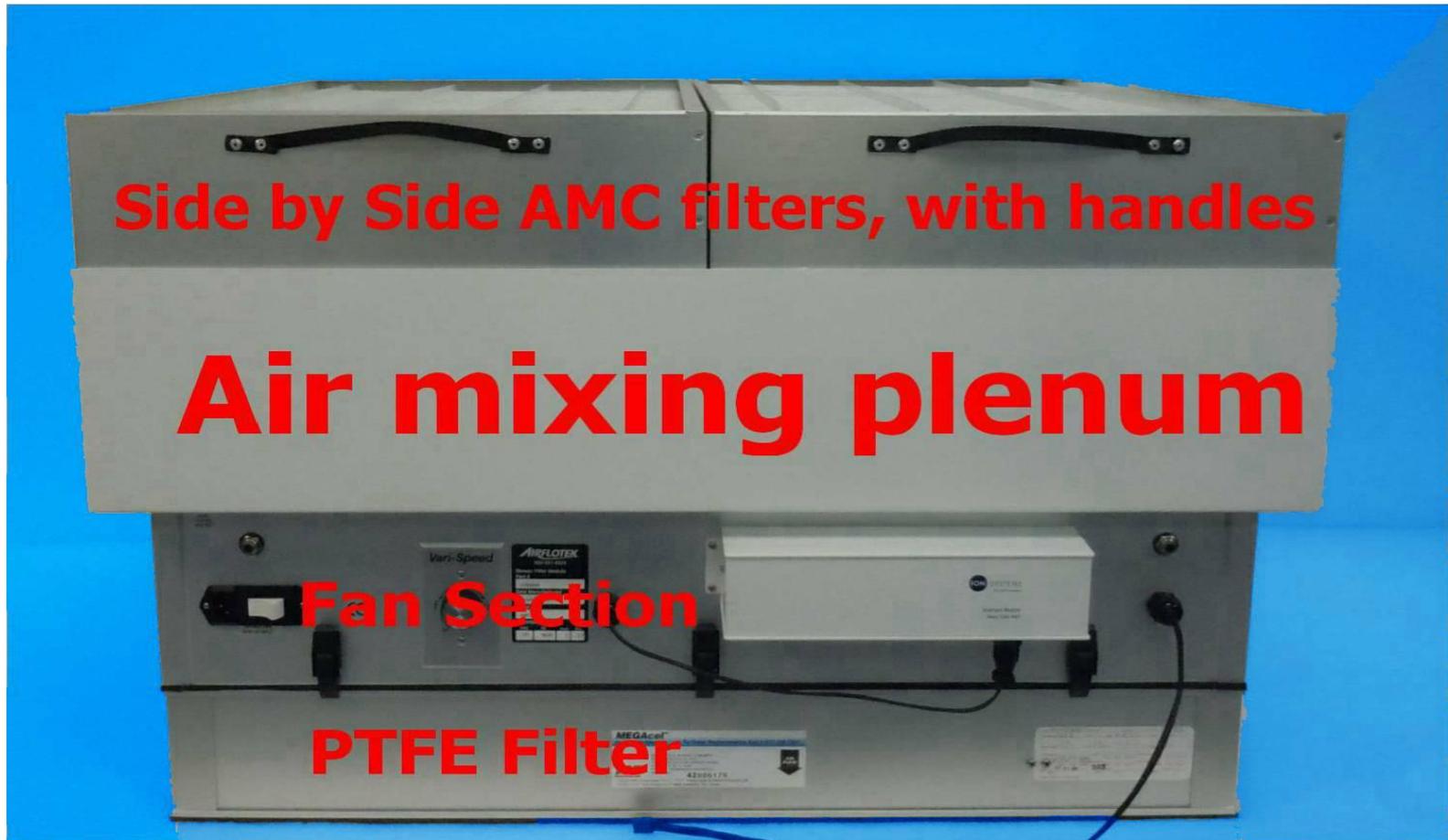
Applying the AMC filter as a “prefilter” in the system



A full height air mixing plenum

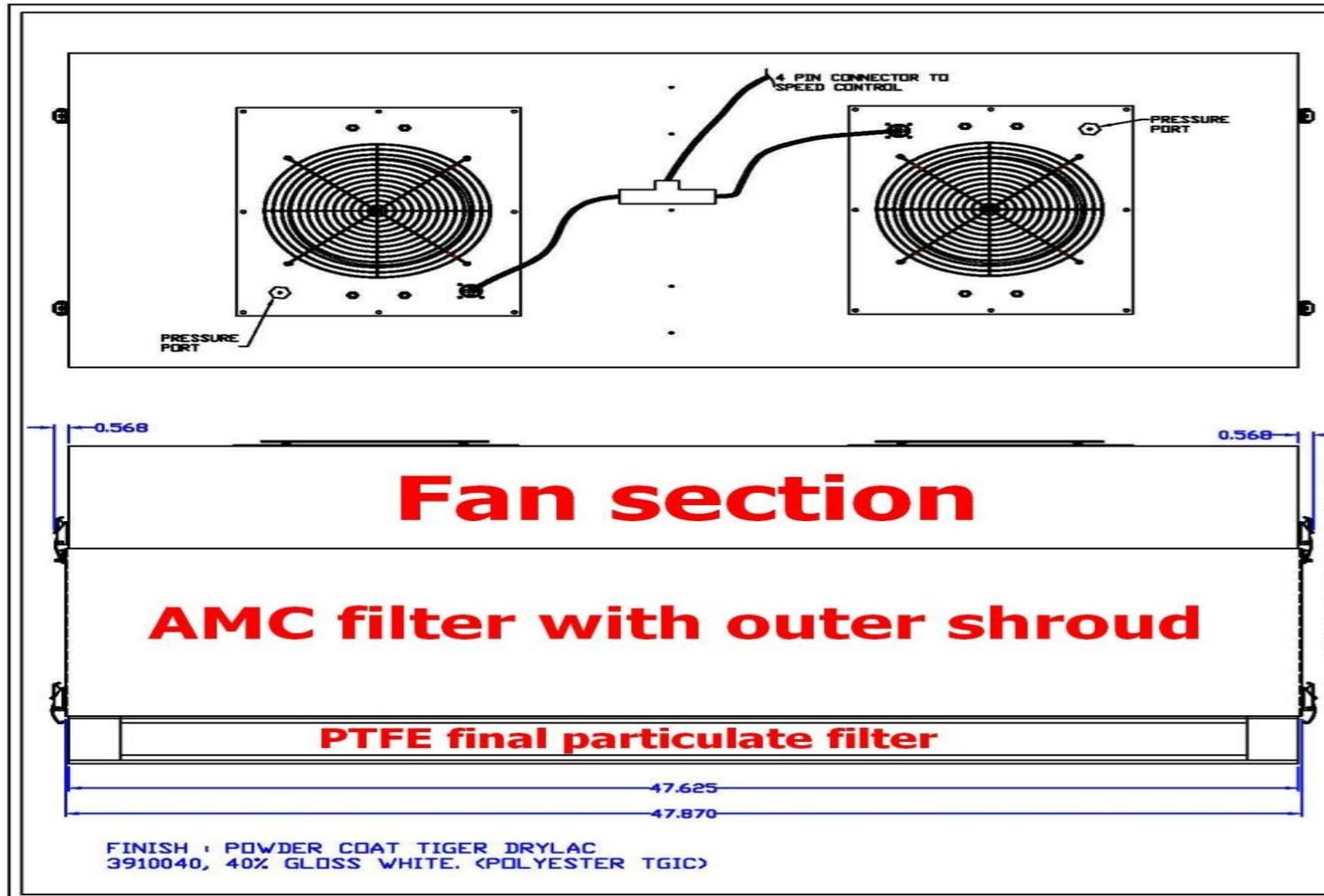


Handles are often provided for ease of changing



After fan mounting of the AMC filter is ideal both from the standpoint of lowering overall height system height and negating AMC contribution from the fans in the FFU

A sample drawing of an AMC filter applied after the fans



Getting your needs met when you need a FFU/AMC filter combination

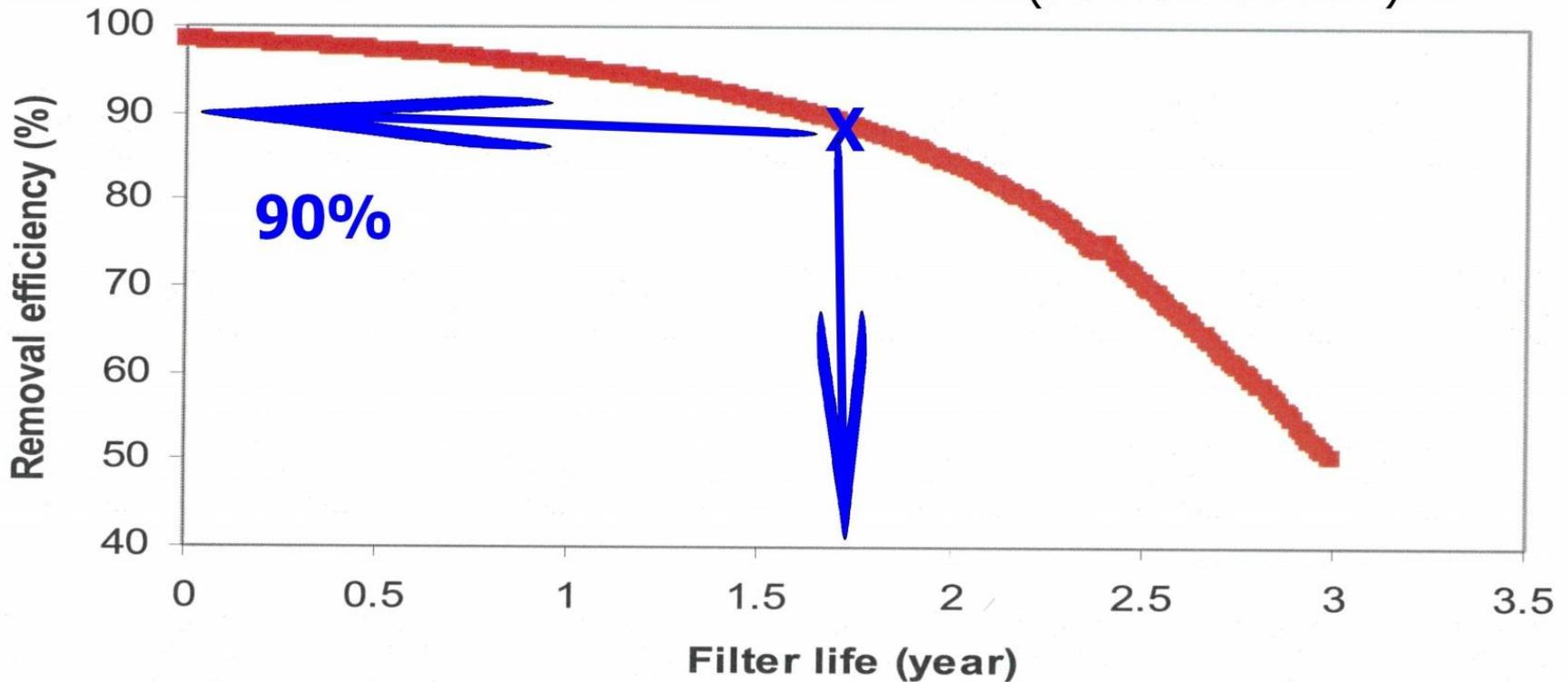
Let your preferred FFU vendor know the current concentration of the species you wish to eliminate. If you don't know the species or concentration they can hook you up with vendors who can do that work for you. Your goal is to have a solution proposed that will deliver an AMC filter/FFU combination, to meet CFM requirement, with an expected lifetime/efficiency table for the AMC filter.

AMC filter efficiency/lifetime curve

Filter Life Estimate for **?????** removal

$50\mu\text{g}/\text{m}^3$, 25°C , $50\%RH$, $0.44\text{ m}^3/\text{sec}$

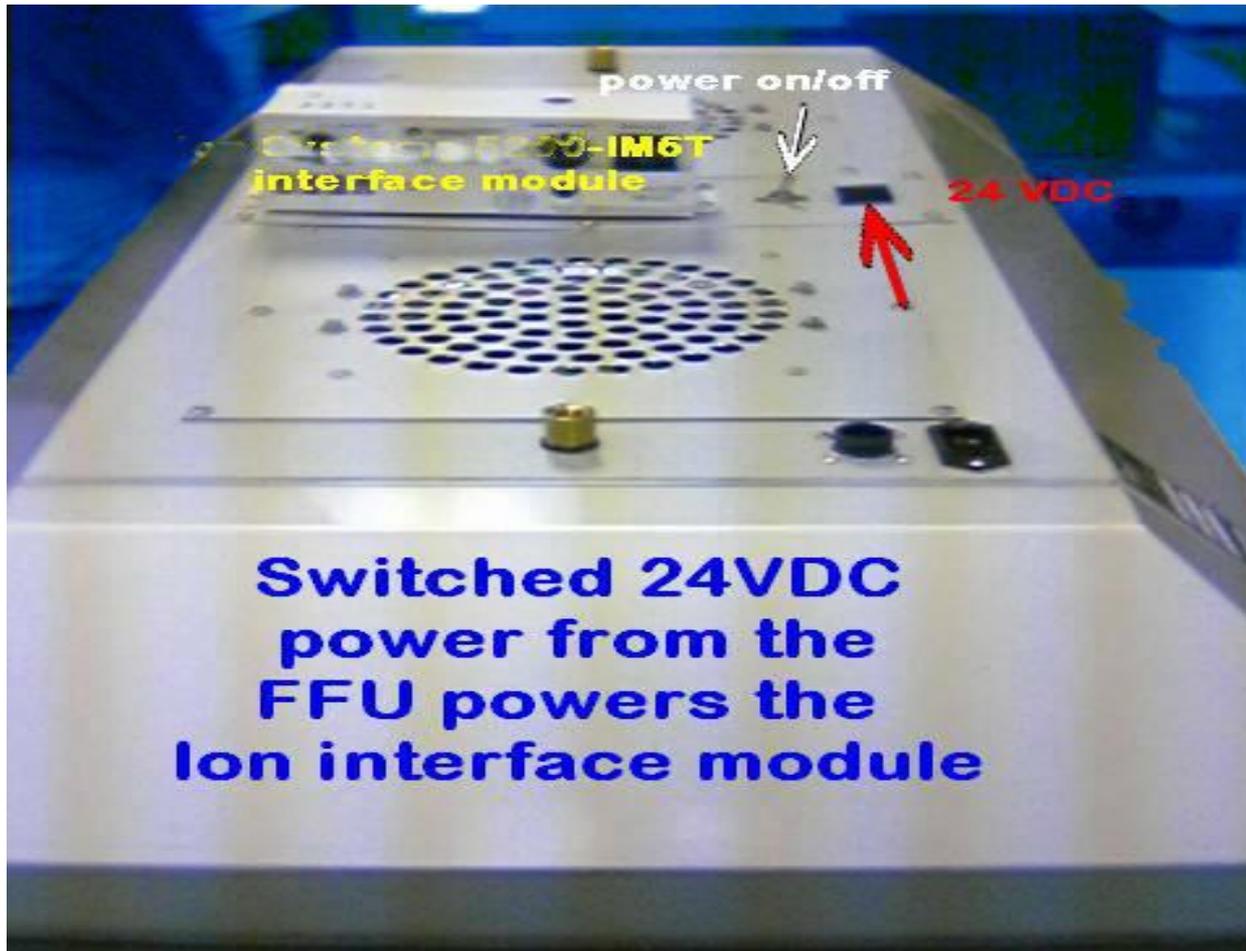
(standard 90 FPM)



Ionization and FFUs

Since the Fan Filter's job is to deliver particulate free air to the front end/Factory Interface/EFEM, or other clean zone within a tool, it is natural to think of the FFU and ionization in the same breath

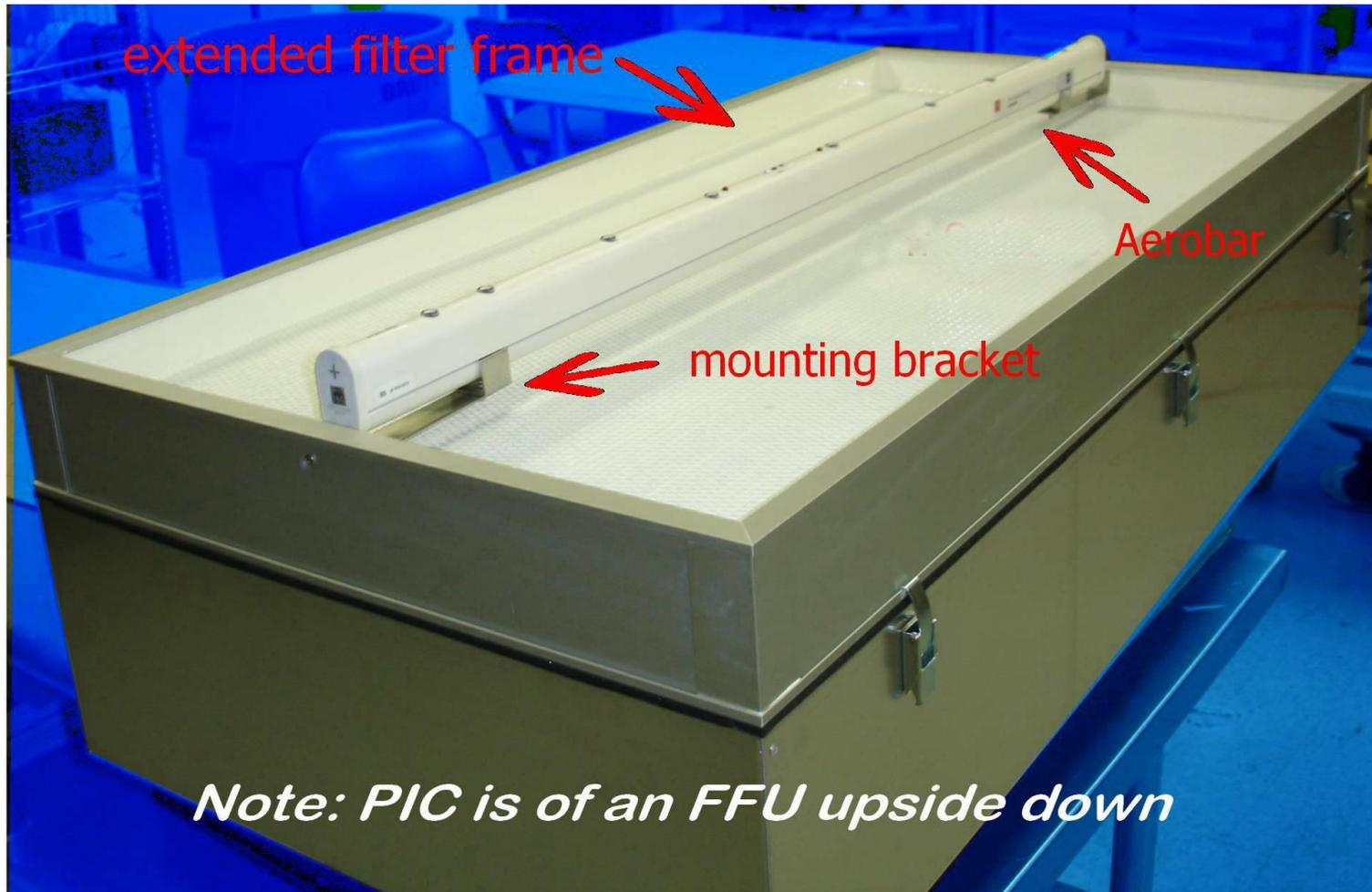
FFU powers the controller/interface module



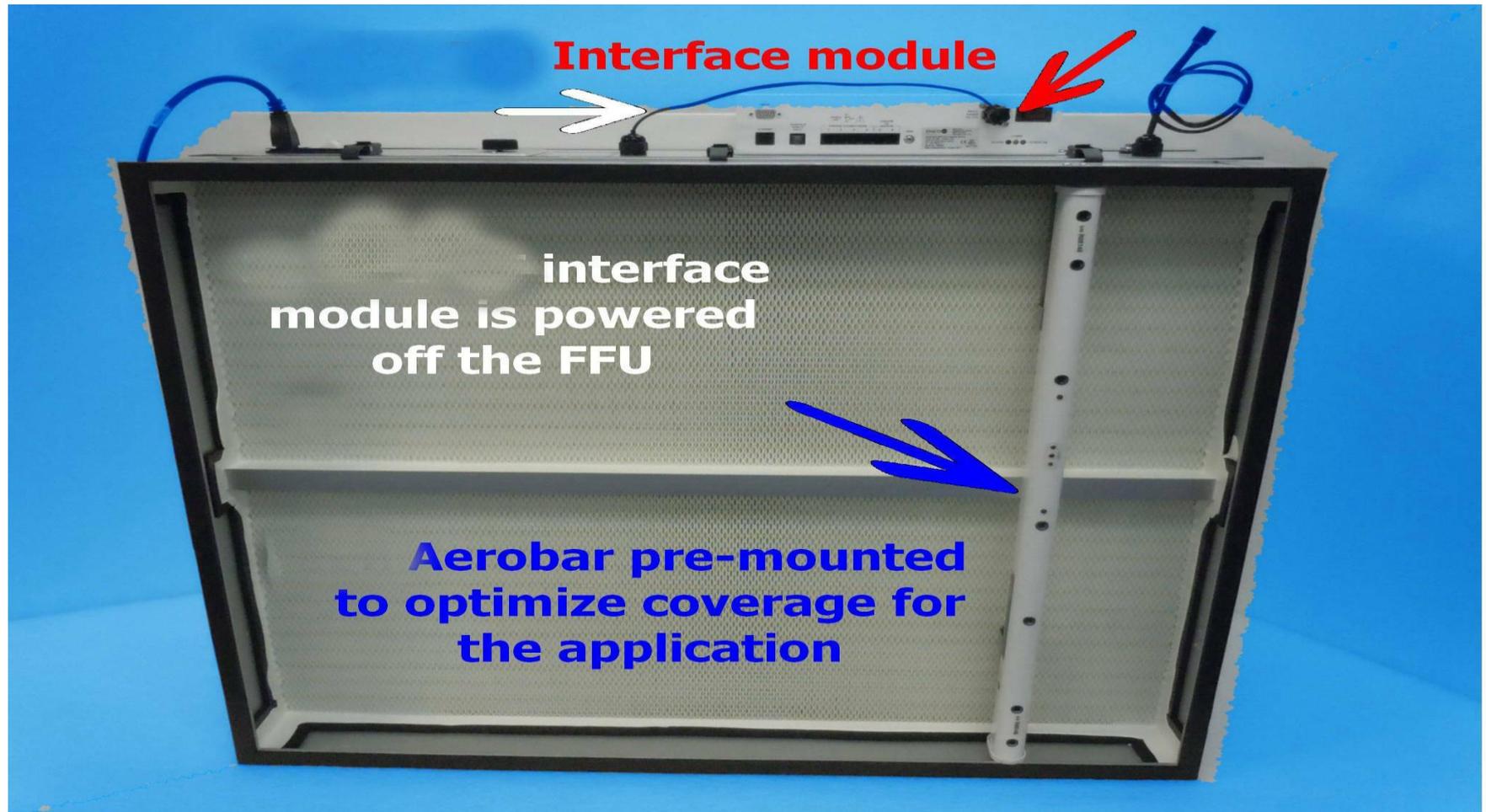
Extended Filter frame with “L” brackets, ready to have the ion bars snapped into place. (PTFE filter of the FFU is pictured upside down)



With the Ion bar “snapped’ into place



Sample FFU with pre-mounted Ion Bar and power to the controller/interface module



Conclusion

- Adding AMC filters to a FFU is a specialty and needs to be applied directly to the need, and not in a general way
- Integrating Ionization into an FFU is a good way to save steps and free up design time

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**Thank you very much
for your time and
attention**

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