

# Air Solution Company

## - Case Study -

### Cottonwood Filter Screens Relieve Snow Build-up In Louvered Air Chamber

## University Biomedical Building

*Integrating Cottonwood Filter Screen Technology to  
Reduce Maintenance Cost and Improve Air Handling Unit  
Performance During Winter Operation.*



### About The Building

This approx. 65,737 square-foot bio-medical building at a major university houses bio-molecular research labs, instructional labs, classrooms, student project space, and faculty offices. This state of the art building is situated to create a connection between the main campus and the medical school and is designed for optimal building performance and energy savings.

The University's Facilities Maintenance Group is responsible for managing all building systems across campus. One of the key areas of focus is in mechanical operations (air handling units, chiller & condenser units, cooling towers and air filtration) as these systems are most critical to maintaining a comfortable indoor environment conducive to teaching and learning. The HVAC maintenance team works year around to keep mechanical systems clean and operating efficiently, and proactively integrate new technologies and maintenance strategies that streamline their maintenance process while optimizing operational efficiency and reducing energy consumption.

### Problem

One of the facilities main air handling units had been experiencing on-going problems during the winter; snow would be drawn through the intake louver on one side of the building where it would accumulate on the MERV 8 pre-filters until the weight and moisture from the snow caused them to collapse; thus exposing the expensive MERV 15 bag filters which they relied upon to provide fine filtration to help in delivering optimal indoor air quality.

Because of this on-going winter problem, the maintenance team had to change 30 pre-filters every two weeks during the winter season (8 times) per winter and another four (4) times during the spring, summer and fall for a total of 12 times per year. Every time pre-filters were changed it would take 2.5 man hours and cost approximately \$215 in filter & labor cost. Bag filters were changed two times per year and it would take 4 man hours for per change, costing \$1,095 in filter & labor cost. In the section of the building where this unit is located there are no elevators, hence the overall cost includes the time needed to move the new filters up several flights of stairs from the dock, removing the old ones, installation of new ones and taking the old filters down to the dumpster. When changing the pre-filters it took two round trips up and down the stairs (24 filters per box) and when changing the bag filters it required 15 round trips up and down the stairs (3 large filters per box). During the winter, they had to constantly check on the filters because if the pre-filters got blinded-off with snow it would impact air flow - and if they collapsed between inspections the bag filters would become damaged and compromise indoor air quality. Because this air handling unit services critical laboratories, they simply could not allow the filtration system to be compromised - They needed a solution.



Snow shown building-up and damaging pre-filters

**Approximate annual cost to manage this problem on a single AHU = \$4,770 (excludes inspections)**

**Solution**

The maintenance team became aware of Cottonwood Filter Screening Technology and engaged their commissioning company to work with the manufacturer (Air Solution Company) to develop a solution. After analyzing the problem, the manufacturer engineered a filtration solution that included a filter framing system inside the air chamber behind the louver where it was accessible from inside the building rather than mounting them to the outside of the intake louvers that were located several stories up and not accessible. The idea was to use the air intake filters to significantly reduce the amount of snow reaching the pre-filters and bag filters.

Since putting the filters in, they not only eliminated snow related damage, but they realized another benefit – The Air Intake Filters stopped cottonwood seed and other matter from pre-maturely fouling out the pre-filters during the spring, summer and fall. “It wasn’t until we saw the cottonwood seed building up on the Air Intake Filter Screens that we realized just how serious our cottonwood seed problem was. The cottonwood seed and other fibrous matter in the air was increasing our maintenance cost and significantly reducing the efficiency and service life of our filters” said the facility maintenance engineer.



**Air Intake Filters  
Stopping Cottonwood Seed from Reaching Pre-Filters**



**Cottonwood Seed & Other Debris  
Simply rolls off of Air Intake Filters**

The Bio-Medical building is located near the banks of a nearby river and the campus is surrounded by densely wooded areas – and where there’s water, there’s usually a lot of Poplar Trees (also known as the cottonwood tree) and other vegetation which contribute to the bio-mass in the air during the spring, summer and fall. They had become so accustomed to frequent filter changes that until they became acquainted with the Cottonwood Filter Screens, they didn’t realize that they could get more out of their pre-filters and bag filters by protecting them from heavy face loading – The best part of using the air intake filter screens is that they dramatically reduced filter changes and reduced maintenance to about 10 minutes per cleaning using a broom versus up to 4 hours to change and dispose of the filters.

**The Results.**

Since installing the Cottonwood Filter Screens on their air handling unit, pre-filter changes have been reduced from twelve times per year to only three; and instead of changing bag filters twice annually, they now change them one time per year and anticipate that when nearby construction is completed that they will be able to reduce bag filter changes to one time every other year. Furthermore, reducing filter changes is consistent with the university’s campus-wide “Green Building” initiative – reducing the number of filter changes reduces filter waste and contributes to their aggregate waste

reduction – less waste goes to the land-fill. As a result of these impressive results, the university maintenance team is working with their filter representative to integrate the technology on other equipment across campus – “The cost savings opportunity is simply too great not to pursue this on a campus wide basis”, Said the Facilities Maintenance Engineer.

**Cost Justification.**

Because of the durable nature of the Cottonwood Filter Screens, they will provide 15+ years of service. Therefore, when weighing the annual cost of annual maintenance *without* the Cottonwood Filters vs. *with* them, the annualized cost of managing the system with the Air Intake Filter Screens yields a significant annual savings and a 2.9 year investment payback.

**Old Method (without Air Intake Filter Screens)**

1. Annual Maintenance including pre-filters, bag filters & labor = \$4,770

**New Method (with Air Intake Filter Screens)**

1. Total Cost for Air Intake Filter Screens, Frames and Installation = \$7,885

- A. Annualized Cost of Using Air Intake Filters (\$7,885 / 15 year service life) = \$525
  - B. Total Annual Cost for pre-filters & labor (3 changes per year) = \$645
  - C. Total Annual Cost for bag filters & labor (1 change per year) = \$1,095
- TOTAL**    **\$2,265**

**Annualized  
Cost Savings**

**\$4,770**  
**- \$2,265**  
**\$2,505**

**For More Information on Filter Screens for winter and summer application,  
contact Air Solution Company for a representative nearest you.**

Newway Company / dba



Commerce Twp., MI 48382 (Corporate)  
West Chester, OH 45069 (Cincinnati)  
**Tel.** 513-860-9784 **Fax** 513-860-9785  
<http://www.airsolutioncompany.com/>