



# Air Filtration Optimization

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Clean air is vital to building inhabitants and equipment in both residential and commercial structures, and it is estimated that U.S. markets spend over \$110 billion in heating, ventilation, and air conditioning (HVAC) costs. Approximately 15% of this amount is expended in the electricity necessary to push air across air filters. These filters are necessary to keep heating and cooling coils clean in order to maintain comfortable air temperatures as well as remove dirt and other contaminants from breathing air. IntraMicron has the capability to measure pressure drop and filtration efficiency utilizing a test blower rig, illustrated in Figure 1, that can simulate residential and commercial face velocities for a multitude of filters and configurations. IntraMicron is able to apply our expertise in HVAC filtration to reduce total ownership cost, maintain or improve indoor air quality (IAQ), and realize significant energy and greenhouse gas reductions for building users.

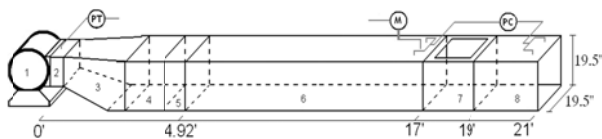


Figure 1. Schematic of test blower rig.

No two buildings have the exact same HVAC infrastructure, patterns, and behavior, and as such, live monitoring is the key to ensure that each building realizes its maximum potential operational efficiency. Depending on customer specifications and existing or anticipated air filtration needs, a custom-tailored filtration solution can be devised to ensure optimal total ownership cost of the HVAC system while reducing HVAC energy usage. Factors comprising total ownership cost include the cost of electricity necessary for overcoming pressure-volume resistance (PV work), filter cost, replacement cost, cost of storage, and maintenance and operations (M&O) cost. Figure 2 illustrates the application of the air filtration methodology implemented by IntraMicron on a 3-story,

21,000 ft<sup>2</sup> office building and the effects on total cost and energy usage from utilizing the proper filter and two different condition-based maintenance strategies for lowest total ownership cost and minimal energy usage.

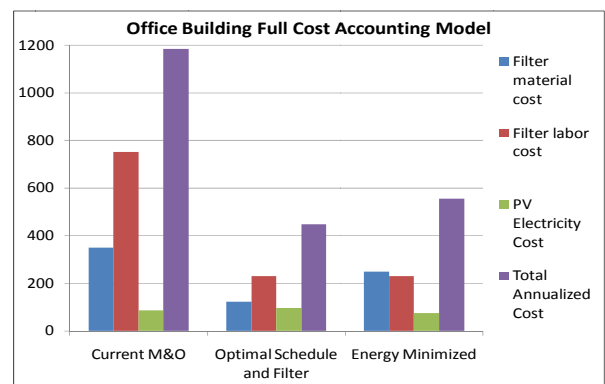


Figure 2. Office building full cost accounting model.

In addition to specifying and providing the right filter for each individual air handler, IntraMicron may also provide a multi-element structure array (MESA) that provides further energy savings and improvements in IAQ at a minimal incremental cost in capital and air filters. The MESA allows for the insertion of commercially available or customer-specified air filters to achieve capacity and filtration efficiency two orders of magnitude greater than single filter systems.

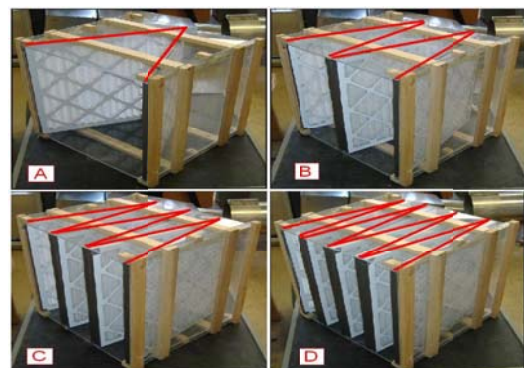


Figure 3. Multi-element structure arrays loaded as (A) "V", (B) "W", (C) "VW", and (D) "WW" configurations.