

CLEAN AIR UPDATE

Air Purification Systems for Corrosion, Odor and Air Quality

AHR Expo a Smashing Success

Over 44,000 professionals in the heating, ventilation and air conditioning (HVAC) industry were in Orlando, Florida, for the annual AHR Expo show, January 25 – 28, at the Orange County Convention Center.

The MWV Air Purification team exhibited at the show and met with customers, suppliers, engineers, and consultants who currently use or who may want to use MWV Honeycomb Matrix activated carbon and air purification systems in their industrial, commercial and residential applications.

“This is a perfect show for our team,” Bill Hall, business manager, said. “Air quality is a primary topic at a HVAC industry event.”

Our products and services can really be showcased in a lot of applications with a variety of decision makers.”

The team featured vapor adsorber and side access housing units, as well as HM® Filters.

“Our goal at the show was to demonstrate our system solutions approach,” Dave Schaaf, technical manager, said. “We want current and future customers to understand our products and to know that we can customize our offerings to meet their unique needs.”

A highlight of the show was the introduction of residential filter applications. Designed to combat the effects of corrosive gases emitted by some Chinese drywall, the HM filters may be an ideal solution to a raging issue in the construction and housing market.

In this issue.....

AHR Expo Recap, page 1.

Learn more about the differences between HM® Filters and pelletized carbon, page 2 and 3.

HM® Filters and pelletized carbon comparison chart, page 4.

Meet members of the MWV team, page 4.



Dr. John Perry and Dave Schaaf discuss the merits of MWV HM® Filters with a customer at the AHR Expo in January.



MWV Vapor Adsorber System on display at AHR Expo, Orlando.

Corrosion Protection Technology: A Fresh Look

For more than 30 years, MWV Specialty Chemicals has been a leader in corrosion protection technology for challenging environments. MWV vapor adsorber systems have provided air cleaning solutions for customers in pulp and paper, oil and gas, wastewater, and other industrial markets. Until recently, the technology used in these systems has remained relatively unchanged. Packed beds of media (pelletized, granular, flakes, etc.) have been used in various configurations to clean the corrosive air and provide protection for controlled spaces. These systems have changed with the introduction of the honeycomb matrix (HM®) adsorbent media developed and produced by MWV Specialty Chemicals. The HM adsorbent is a structured media that provides a wide range of advantages over packed bed systems.

- **Performance** – the HM units provide improved protection, and rotation of the media allows the system to adapt to different challenges while maintaining efficiency.
- **Size** – the HM media requires only 1/5 the volume of packed bed systems resulting in much smaller vapor adsorbers with 70% – 80% less weight.
- **Maintenance and Installation** – the HM systems do not require any special maintenance equipment, and the modular adsorbent greatly simplifies installation and disposal.
- **Cost** – the HM vapor adsorbers use less energy, less construction material, and less media leading to significant savings in capital and operating cost.

Performance

The HM vapor adsorber systems continue to provide the quality and performance that customers expect from MWV, but now the systems are even better. The structured HM media has improved performance kinetics that allow the system to remove contaminants with less media, even when higher flow rates are used. Figure 1 demonstrates this advantage by comparing the H₂S concentration at two inch intervals within two different adsorbent media: 4 mm pellets and HM modules. In this comparison, the superficial velocities of air are 100 ft/min and 500 ft/min in the pellet bed and HM media, respectively. Even though the HM sample was operating with a superficial velocity five times higher than the pellet sample, a shorter bed depth was sufficient to achieve the desired H₂S reduction with the HM sample.

The modular design of the new HM adsorbent allows the bed to be rotated periodically to provide the most efficient use of the media. Unlike pellet beds, which must be changed in full, the HM media can be changed in sections. This flexibility allows the adsorbent media to be fully consumed while continuously providing the same level of protection. Figure 2a shows the progression of the mass transfer zone (indicated by green arrows) within an HM vapor adsorber. The modules are rotated after the first stage becomes fully consumed but before the contaminant passes through the last stage (Figure 2b). By repeating this

process on schedule, the HM media is fully utilized in the system, and the contaminant is not allowed to pass into the protected space.

In addition to improved contaminant removal dynamics, the structured HM adsorbent media has significantly reduced pressure drop compared to packed bed systems. Figure 3 illustrates the pressure drop difference between HM media and 4 mm pellets at various superficial velocities. As shown in the figure, the pressure drop through the media at standard operating conditions is 50% higher for the pellet bed than for the HM media. Pellet media requires a deeper adsorbent bed, further increasing the pressure drop in the system. The resulting design pressure of the pellet systems is twice as high as that for the HM systems. This reduced pressure drop in HM systems allows the same amount of air to be treated with a blower motor that is half the size of that needed for a pellet system.

Size

One of the greatest advantages of the improved performance in HM media is the associated size reduction for the adsorber systems. The combined effect of a higher superficial velocity and a shorter adsorbent bed results in an 87% reduction in bed volume. The HM systems are smaller in almost every dimension: footprint, overall system size, weight, motor, and waste for disposal.

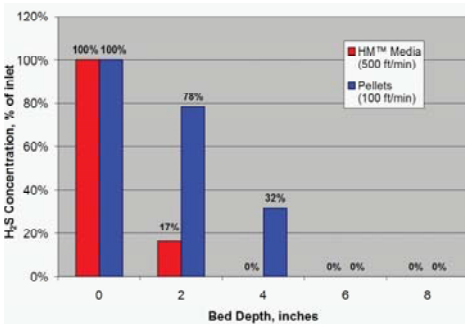


Figure 1. The concentration profile through the adsorbent bed demonstrates the ability of the HM media to remove H₂S with a shorter bed, despite a higher superficial velocity: HM media – 500 ft/min, pellets – 100 ft/min.

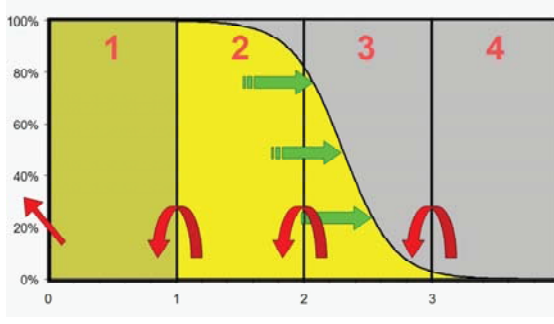


Figure 2a. When the mass transfer zone progresses out of Stage 1, the HM modules are rotated.

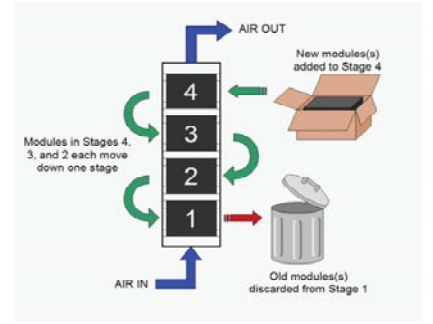


Figure 2b. HM modules are rotated down one stage after Stage 1 is consumed

at HM[®] Filters and Media

John Perry, Ph.D., MWV

Table I shows some characteristic measurements for pellet based and HM based vapor adsorbers designed to treat 1000 CFM of air. As the table demonstrates, the size advantage of the HM system is considerable. The reduced size also makes it possible to engineer systems to treat large quantities of air that are not practical with pellet systems. Systems that produce 30,000+ CFM of purified air are now possible using this new technology.

Maintenance and Installation

The new HM series vapor adsorbers from MWV have a modular design for the structured adsorbent that greatly improves the ease of maintenance for these systems. Changing of the media and filters can all be done by hand in the HM systems. The pellet systems require a vacuum truck and operator to remove the carbon, and the replacement of carbon in those systems often generates excessive dust and can require respirators and other protective equipment made unnecessary by the improvements in the HM systems. Maintenance on the tanks of pellet systems may also require confined space entry permits which are unnecessary with the HM vapor adsorbers. Unlike a packed bed system, the HM systems do not generate large amounts of dust, eliminating the need for the HEPA post filters required in pellet systems.

Another advantage of the structured media in the HM vapor adsorbers is design flexibility. Because a packed bed

is greatly affected by gravity, a large pellet system may only operate in a vertical configuration. Other orientations readily result in the formation of gaps between the bed and the wall that allows the process air to bypass the adsorbent. In contrast, the structured HM media can operate in horizontal configurations with no effect on system performance.

This flexibility of orientation combined with the smaller footprint and lighter weight greatly increases design options and, therefore, the ease of installation of these systems.

Cost

The performance, size and maintenance advantages of the HM vapor adsorbers combine to provide significant cost improvements for air purification systems. The smaller HM systems require less material for construction. The lower pressure drop requires a smaller motor. The lighter weight incurs less shipping cost and lower installation expense. These factors combine to reduce capital and installation cost for HM units; most pellet systems cost 20% – 40% more than an HM system with the same capacity.

The smaller adsorbent bed requires less media, and the higher efficiency uses the media more completely. Cleaner operation eliminates the need for costly HEPA post-filters. Module rotation does not require a vacuum truck and operator for change of the media. Less media also means reduced disposal cost for

the used media. The smaller motor, possible because of reduced pressure drop across the HM media, uses significantly less energy for continuous operation. These operation changes combine to yield significant cost reductions for HM systems. The annual operating and maintenance cost for a pellet system is typically 15% – 60% higher than that for an equivalent HM vapor adsorber.

Overall, the annualized expense for installation and use of a deep bed vapor adsorber ranges from 20% – 50% higher than the cost of a comparable HM system. These savings are summarized in Table II. Consideration of the ease of maintenance, design flexibility, and economics of HM vapor adsorbers emphasizes the distinct value advantage over deep bed systems.

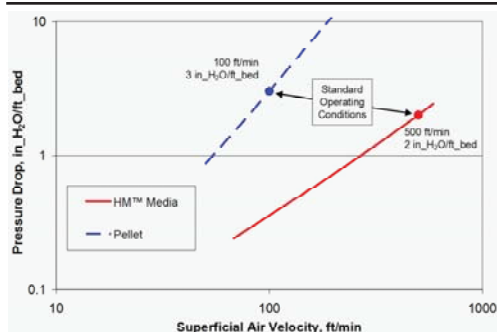


Figure 3. The pressure drop through the structured HM media is much lower than through a bed of 4 mm pellets at the same superficial air velocity.

TABLE I
Characteristic measurements for 1000 CFM vapor adsorbers: HM and pellet.

Measurement	Series 1000 HM	Series 1000
Footprint	3'4" x 4'4"	3'11" x 6'10"
Height	4'11"	7'3"
Media Volume	4 ft ³	30 ft ³
Media Weight	128 lb	860 lb
System Weight	425 lb	800 lb
Total Weight	553 lb	1660 lb
Motor Size	2 hp	5 hp

TABLE II
Cost Savings for HM[™] Vapor Adsorbers over Pellet Vapor Adsorbers

Expense Category	Savings*
Capital	20% - 40%
Operation and Maintenance	15% - 60%
Overall (Annualized)	20% - 50%

*Savings expressed as additional cost incurred with a deep bed vapor adsorber

MWV Air Purification Solutions: Air contaminant, odor and corrosion protection

Air Quality System Features	Honeycomb Matrix Systems	Carbon Pellet Systems
Protection of electrical and electronic control systems	◆	◆
Ideal for paper and pulp mills, petroleum refineries, and waste water treatment	◆	◆
Self-contained, room pressurizing, gas filtration	◆	◆
Odor, air contaminant and corrosive gas removal	◆	◆
Complies with international ASHRAE 62.1 standards	◆	◆
316L Stainless steel construction (optional 304 stainless steel)	◆	◆
Severe duty motors and coated fans	◆	◆
Customizable for new or existing buildings	◆	
Economical, small footprint, energy efficient	◆	
Excellent kinetics at 500 feet per minute face velocity	◆	
Sized from 100 cfm to 30,000-plus cfm	◆	
Traditional units using activated carbon pellets		◆
Larger units than comparable HM systems		◆
Kinetics at 100 feet per minute face velocity		◆
Includes HEPA filtration		◆
Sized from 100 cfm to 6,000 cfm		◆

Meet the Team: Richard Newcomb and Stuart Nichols



- Richard Newcomb has 18 years of industrial sales and service experience.
- He has worked extensively with pulp and paper mills, metal processing facilities, and waste water treatment plants.
- Richard provides customers with quality, solutions-oriented options for their air purification needs.
- B.S., Industrial Management.



- Stuart Nichols joined MWV in 1997 and has served the organization as a service representative, sales representative, Southeastern accounts manager, project sales / market manager, and is currently a business development and refinery specialist.
- Stuart has a strong technical service background with experience in refineries, paper mills, waste water treatment plants, steel mills and chemical plants.
- His core strengths include matching the appropriate technology to the needs of his customers.
- AAS, Instrumentation Technology; BS, Industrial Technology.



MWV Air Purification products are proudly made in the U.S.A. and deployed globally.