

Enhanced Paint Holding Capacity and Run-Off Characteristics Realized in New Booth Filter

Paul R. Micheli
Industrial Finishing

Abstract: This disclosure deals with a new booth filter that has demonstrated improved paint retention characteristics when compared to booth filters that are currently available. This new filter incorporates a two-ply construction consisting of a white polyvinyl acetate layer and a green polyethylene terephthalate (PET) layer; together these two layers constitute a 2.0" loft product with a weight of 1.80 ounces per square foot. Polyvinyl acetate is used as a binder. Recycled post consumer PET material made from plastic bottles is a 6 den natural green polyester blend. The white layer serves to collect paint overspray while the second layer has been designed for the highest efficiency, trapping more coatings in the filter media thereby preventing a higher percentage of solids from entering the environment. The new product has been named the Binks Receptor.

I. Introduction

Spray booth filters can be grouped into specific categories which represent the material constituency. Filters can be made from paper/cardboard products, fiberglass or nonwoven polyester. While fiberglass and paper-type filters may be less costly, polyester tends to present better physical retention properties. Fiberglass can also present some health issues when free fibers in the air are present. The recycled PET material is environmentally friendly and substantially cuts particulate emissions by its ability to contain overspray due to its inherent nonwoven design. In various tests conducted both in the lab and in field tests, the filters have been deemed compatible for many industrial coatings including but not limited to:

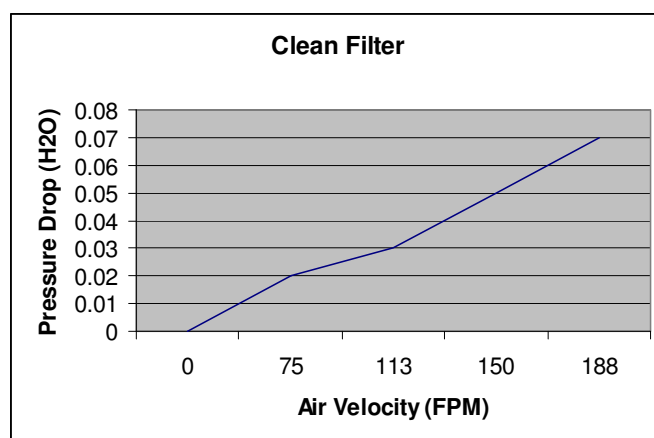
- Thermosets, solvent-based and water-based (low, medium and high solids).
- Air dry coatings, solvent-based and water-based (low, medium and high solids).
- Plural component coatings

- Rapid dry coatings
- UV and radiation-cured coatings.
- Industrial adhesives.
- Fiber-filled resins and bituminous coatings.

II. Physical Characteristics

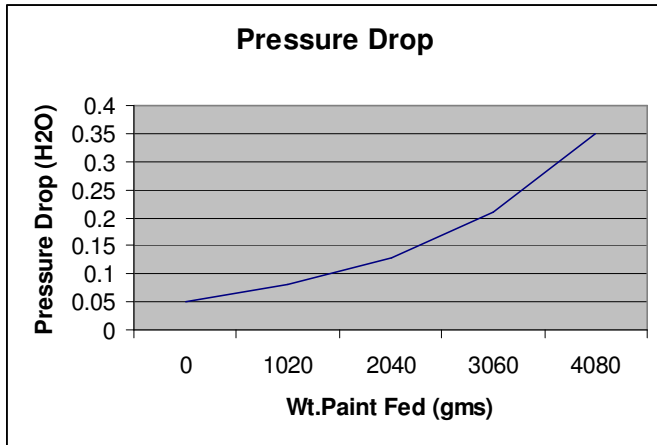
Various independent tests were run on the 2" loft material versus competition. The data was summarized on a paint arrestance filter test report. Using a Speedaire 4F342 paint spray method at 40psi, a S.W. H67WC55 Permaclad material was sprayed into the filters at a feed rate of 136gms/min. A constant air velocity of 150fpm was maintained in the test apparatus. The test results measured paint holding capacity, paint run-off, weight gain in the final filter, and average solids removal efficiency.

The following graph depicts the air velocity thru a clean filter versus the pressure drop. The graph indicates that the relationship is nearly linear throughout the range.

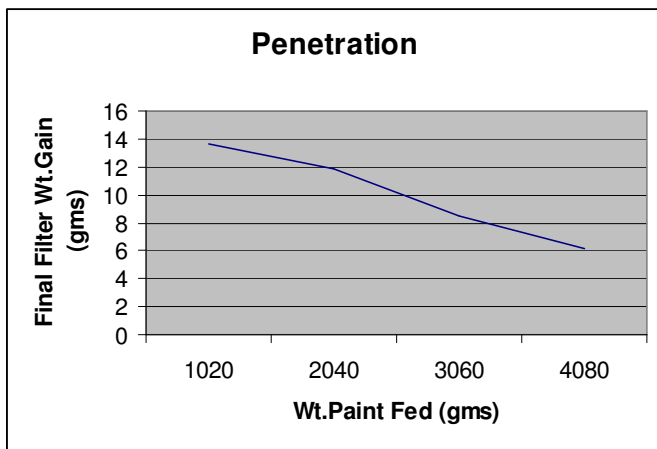


The next graph represents the pressure drop created across the filter when paint is sprayed. The total weight gain in the filter was derived from this data. The initial pressure drop at the start of the tests was 0.05 inches of water column. At the end of the tests, a total of 4080 grams of paint was sprayed with a

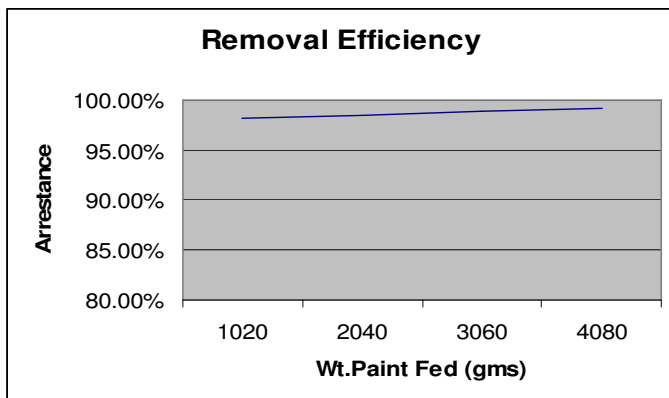
final pressure drop across the filter of 0.35 inches of water column.



Penetration is defined as the final filter weight gain as paint is fed into the filter over time.



The final filter weight gain is also used to determine the percentage of arrestance or the removal efficiency. The removal efficiency is shown in the next graph as the weight of paint fed versus the percentage of arrestance.



III. Test Results Summary

The test results can be summarized as:

2" loft product

Initial pressure drop with clean filter:

0.05 inches water column

Final pressure drop with loaded filter:

0.35 inches water column

Paint holding capacity:

2070.9 grams

Paint run-off:

911.7 grams

Weight gain at maximum percentage arrestance:

6.1 grams

Maximum percentage arrestance:

99.2%

Average removal efficiency:

98.7%

In addition to the test validation of the Binks Receptor booth filter, *independent tests* were also run against one of the leading competitive booth filter products. Both tests were run under identical conditions:

2" loft product

Initial pressure drop with clean filter:

0.08 inches water column

Final pressure drop with loaded filter:

0.21 inches water column

Paint holding capacity – competitive filter:

1927.5 grams

Paint run-off - competitive filter:

1088.6 grams

Weight gain at maximum percentage arrestance:

2.1 grams

Maximum percentage arrestance:

99.7%

Average removal efficiency:

99.4%

IV. Conclusion

The paint holding capacity of the Binks Receptor is about 7% better than the competitor's product. Enhanced paint holding capacity means that the booth filters can be used for a longer period of time. The paint run-off in the Binks Receptor filter was also about 16% less than that of the competitor's. The ability of the Binks Receptor filter to allow less

paint to run off is an indication of the holding capacity of the filter product. Less material run off is attributable to the inherent design feature of the green PET layer.

The high removal efficiency of the design indicates that the majority of the particulate emissions are substantially reduced. Because of the green recycled PET material, the ease of filter disposal is enhanced. The Binks Receptor filters also meet UL900 class 2 standards for flammability.

To summarize, the key features of the Binks Receptor filter are:

- The paint holding capacity with the 2" loft configuration shows a 16% improvement over competitive products with a similar loft.
- The efficiency of the Binks Receptor product exceeded 99% during independent testing of the Binks Receptor.
- The two-ply construction is uniquely designed to both contain overspray and capture solids material from entering the environment.
- The density and composition of the green PET layer has been designed to provide maximum paint retention and to minimize paint runoff.
- Operating costs are reduced due to the high efficiency of the filter. Fewer filter changes, reduced stack cleaning and downstream contamination, and more consistent pressure drop in the spray booth are the key benefits of this design. The consistent pressure drop leads to consistent booth velocity which equates to more consistent coatings and an improvement in transfer efficiencies.
- The green PET layer is made from 100% recycled post-consumer bottles.
- The product meets UL900, Class II standards for flammability.
- The product has been beta tested using a variety of different industrial coatings

V. Future Research

Industrial Finishing is uniquely situated to continue to make improvements to its atomization products and consumable products

such as the Binks Receptor booth filter. We will continue to provide products that are environmentally friendly within the framework of our Green Works campaign. Contact your Industrial Finishing Specialist for further details.

VI. References

[1] Blue Heaven Technologies, *Paint Arrestance Filter Test Report No. 08-1346*, 2008.

[2] Blue Heaven Technologies, *Paint Arrestance Filter Test Report No. 08-1096*, 2008.

[3] Material Safety Data Sheet – Binks Receptor Booth Filter, *U.S. Department of Labor*, 2009

[4] Suozzi, M., *Process Capability Studies*, Hughes Aircraft Company, Nov. 1990.

[5] EPA, *National Emission Standards for Hazardous Air Pollutants; Aerospace Manufacturing and Rework Facilities*, 1998.