Not Just A Workhorse Anymore

Get Cleaner Air With Advances In Baghouse Dust Collection Technology

There's no disputing that cartridge dust collection has advanced at a far quicker pace than baghouse technology, and cartridge collectors are often still the best choice for applications that demand higher performance and efficiency. But cleaner air is now possible for manufacturers who rely on baghouse dust collectors. Thanks to new collector and filter technologies detailed here, baghouse dust collection has emerged from its once humble heritage to reclaim its place as an effective mainstream technology for many dust collection applications today.

CONTENTS

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Baghouse dust collectors have been around since the beginning of dust collection time. They were among the first industrial air filtration technologies designed to help manufacturers meet government regulations, maintain productivity standards and create cleaner, safer work environments for employees. While its offspring—the sleek high performance cartridge collector—has certainly dominated the spotlight the last few decades, many manufacturers still rely on baghouse technology.

Until recently, the baghouse was considered the industry workhorse that couldn't stand up to the clean air advances of the cartridge collector. While there is still a disparity in the performance of cartridge and baghouse technology, there have been significant improvements in baghouse technology that offer improved filtration efficiency, longer filter life, lower emissions, reduced energy consumption and less maintenance. As a result, baghouse dust collection continues to have an enduring presence in many industries.

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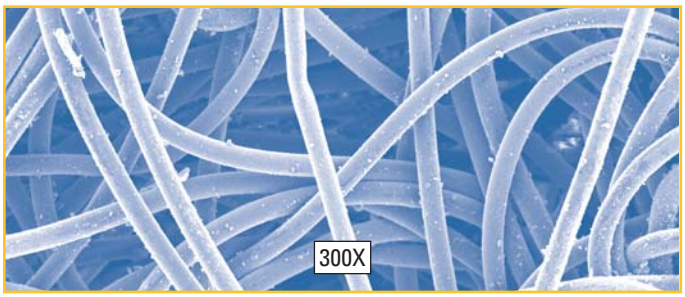
The baghouse is still often the best solution for processes with high temperature, high air volumes and heavy dust loading. It has a continued stronghold in many markets including wood, grain, glass, food, paper, metal mining, tobacco, cement and chemical. To advance baghouse dust collection for these and other industries, there have been several key improvements in bag filter media, filter cleaning technology and the baghouse collector itself.

Far From The Commodity Filter Bag

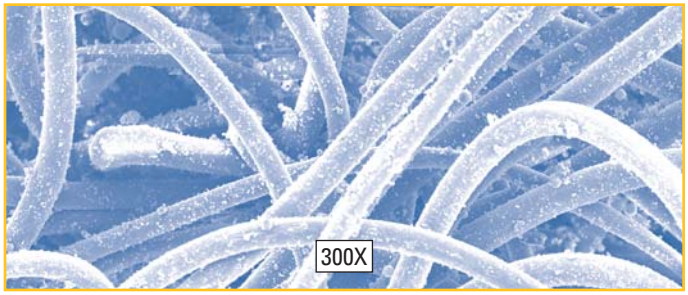
Baghouses clean the dirty air by collecting dust on the surface of the bags, removing dust from the bag surface, and then depositing dust into a collection container. If dust does not release from the bags, the pressure drop will increase, resulting in reduced suction at the collection point. In many applications, simple polyester bags will allow the dust to be dropped off into the container, but when processing sticky or hygroscopic dusts, more specialized bags are usually needed. Previously the only options were singed or glazed polyester bags and fabrics such as polypropylene.

Many more filter bag options are available today for pulse-jet baghouse dust collectors. Most notably, newer Dura-Life™* filter bag technology enlists a hydroentanglement (water) process to blend the media fibers, rather than the traditional needling process used to make conventional polyester filter bags. The needling process creates large pores where dust can embed into the bag fabric, while the hydroentanglement process creates a more uniform material with smaller pore size that allows enhanced surface loading of dust which helps prevent dust from penetrating deep into the media. This enhanced surface loading technology promotes easier bag cleaning and lower operating pressure drop, which in turn results in bags that are able to filter for a significantly longer period of time.

DURA-LIFE BAG — CLEAN AIR SIDE



POLYESTER BAG — CLEAN AIR SIDE



These photos were taken with a scanning electron microscope of bag media within a collector that was filtering fly ash. The bags were removed after 2,700 hours of use. Air-to-media ratio was 4.5 to 1. Pressure drop was 6 in. on polyester bags and 2 in. on Dura-Life.

*Made from Durapex® filter media from Polymer Group, Inc.

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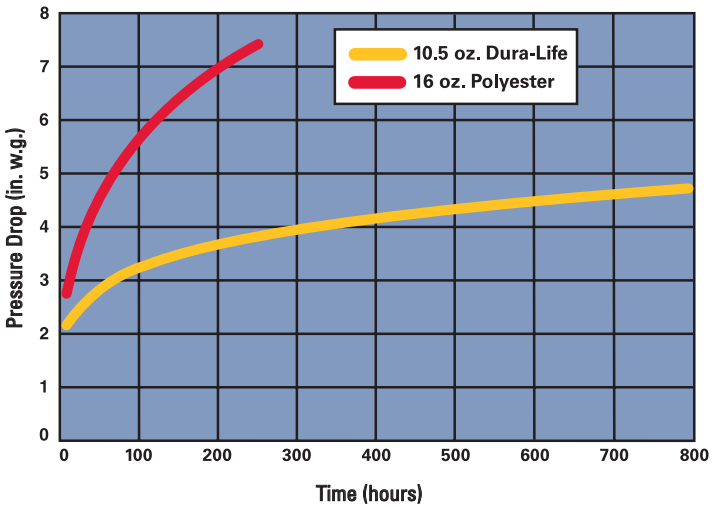
Better Surface Loading Results in Longer Bag Life



With enhanced surface loading of dust and lower pressure drop, Dura-Life filter bags last 2-3 times longer than conventional polyester bags. Pressure drop increases at a faster rate with conventional filter bags due to dust embedding in the media, shortening bag life and forcing more frequent bag changes.

These results were derived in accelerated lab tests, which correlate to field tests results, showing that Dura-Life will provide 2-3 times more life than conventional 16 oz. polyester bags in most applications.

Labor and Bag Cost Savings Due to Fewer Bag Changes

Extended bag life is a significant advantage of Dura-Life bags, considering baghouses can require 500 or more bags per collector (with lengths up to 12 feet or more). Long-term costs can be considerable. With bag life currently running at 6 months for more difficult applications, bag life and cost are chief among the concerns of baghouse users today. With longer lasting filter bags, there are fewer bag changeouts, labor and replacement bag savings, and less production downtime.

Labor and Bag Cost Savings of **$3,328** *or more per Dura-Life change-out*

Number of Dura-Life Bags	Maintenance & Bag Cost Savings
484	$3,328
376	$2,585
276	$1,898
232	$1,595
156	$1,073
124	$853
72	$495

These calculations are based on the following assumptions: conventional polyester bags are replaced annually, Dura-life bags provide twice the life of conventional polyester bags, time-and-a-half labor rate equals $45/hr. including benefits, and a three-person crew can replace 40 bags/hr. Labor and bag cost savings can further increase with larger collectors.

Annual Energy Savings Due to Reduced Pressure Drop

	Standard Polyester Bags	Dura-Life Bags
Filter Bags	484	484
Operating Delta P	5"	3"
ACFM	57,000	57,000
Motor	125 HP	125 HP
Break HP	55.4	33.2
Annual Energy Use	$12,848	$7,709

This is one example and energy savings can further increase with larger collectors. These energy savings are calculated based on the use of a variable frequency drive and the following assumptions: Baghouse collector runs 2 shifts per day, 5 days a week (4,000 hours per year) and energy costs are 7 cents per kilowatt hour.

As energy use gains more importance in the overall cost considerations of manufacturing operations, Dura-Life filter bags can help lower your annual energy costs. Because the technology traps dust on the surface of the bag, dust is more easily pulsed off during cleaning, resulting in lower pressure drop and annual energy savings.

Savings of **$5,148** *or more*

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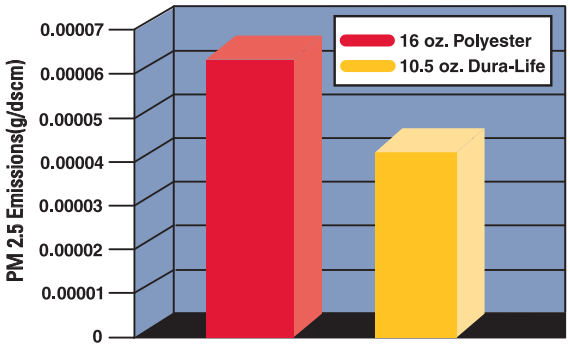
Cleaner Environment Due to Lower Emissions

Dura-Life has also been shown to keep the workplace and environment cleaner by producing 30% lower emissions than conventional filter bags, reducing the amount of dust that escapes into the air. The media in Dura-Life bags has been tested and received EPA PM 2.5 performance verification from the Environmental Technology Verification (ETV) program via ASTM D 6830-02.



Dura-Life provides 30% fewer emissions

These flat sheet results are based on independent lab tests using ASTM D 6830-02 per EPA PM 2.5 performance verification from the Environmental Technology Verification (ETV) Program comparing Durapex media from PGI vs. conventional 16 oz. polyester.

Other filter bag advancements include bags that can be chemically treated with materials such as silicone to improve dust release characteristics. PTFE (Polytetrafluorethylene) membrane, the same material used to make Teflon®, can also be laminated to the outer surface of the bags, which allows the dust to stay on the surface of the bags rather than imbedding deep in the fibers of the fabric. When bags are pulsed for cleaning, the dust easily slides off the slippery PTFE membrane and drops into the collection bin.

Further improvement has occurred with bag shapes. Bags are now available in oval and envelope shapes, which provide two distinct advantages. First, oval- or envelope-shaped bags increase the amount of bag material that can fit in a given area, increasing the collector capacity possible in tight spaces. Secondly, oval and envelope bags flex better during cleaning and allow the dust to be more easily knocked off the bags, which results in lower pressure drop and longer bag life.

Modern Day Baghouse Collectors

Collector enhancements have also occurred to ensure proper cleaning and more efficient operation. In the past, dust was most commonly removed from the exterior of the bags via higher-cost compressed air (typically 90 psi), or with a fan, which momentarily reverses the airflow and blows dust off the bag.

Now, collectors are available that use less energy than either compressed air or reverse air systems. Equipped with a medium air pressure cleaning system, these collectors have a pump dedicated to the collector that pressurizes a tank to 8 psi and then releases the air into the bags at precise intervals to clean dust off the bags. These medium air pressure systems use a smaller motor than reverse airflow type units and use less energy than collectors with compressed air cleaning systems, reducing annual energy costs. Newer designs have moved the air tank from outside of the collector to inside of the collector, closer to the bags, which has resulted in even better cleaning performance of medium pressure collectors.

The inside air tank allows the cleaning air to travel a shorter, more direct path to the bags, reducing energy loss and noise levels while improving bag cleaning.

Envelope-style baghouse collectors are also available that require fewer bag changes and less ductwork, and increase flexibility with compact, modular designs that fit into odd spaces. The newer Dalamatic® insertable envelope style baghouse combines the best of both centralized and decentralized approaches to dust collection. These versatile baghouse collectors can be inserted into various applications such as bins, silos, bunkers, storage vessels or transfer points. Dust collection is then decentralized with the advantage of less ductwork, while dust discharge is centralized for more efficient handling.

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The flat fabric envelope-style bags used in Dalamatic insertable collectors are manufactured to high tolerances and mounted on a wire frame to ensure optimum airflow and thorough bag cleaning. With envelope-style collectors, dust accumulates on the outer surface of the bag as air penetrates the fabric. A blow-pipe then injects a burst of compressed air into the filter bag, briefly reversing the airflow, inflating the bag and dislodging the dust.

A collector without a housing of its own, the Dalamatic insertable can be integrated either horizontally, vertically or at an angle within the existing process equipment or hoods. For initial installation, less ductwork means lower upfront costs. For ongoing maintenance, less ductwork reduces the chance of plugging and replacement due to wear and allows collector service without system shut-down.

Certain types of dust wear out ductwork regularly and pieces of it need to be replaced, sometimes as often as every 6 months. By positioning the dust collector in a transfer point, for instance, the abrasive nuisance dust can be captured directly, eliminating the need for ducting.

These newer Dalamatic insertable collectors also use shorter envelope-style filters (2.3-, 3.3- and 5-foot lengths available). These shorter filters are much easier to service and have as much dust-holding capacity as longer filters if Dura-Life filter media is used.

Dalamatic insertable collectors also take advantage of new developments in clean-air side filter removal. Operators pull the dirty filters out either horizontally or vertically depending on the collector orientation. This significantly reduces exposure to a messy job and eliminates the need for OSHA "confined space" entry procedures and permits.

Dalamatic insertable collectors are mounted in existing hoods on top of mixer conveyer transfer points.

Dalamatic insertable collectors (the tops are slanted) are venting each raw material silo in this room at the top of a batch house. Clean-side access for service eliminates the need for OSHA "confined space" entry permits and procedures.

Bringing Baghouses into the 21st Century

Today, more manufacturers can get cleaner air no matter what type of dust collection technology they choose. Thanks to advances on both sides of the dust collection spectrum—cartridge and baghouse—there's no longer the huge disparity that once existed between the technologies. While application needs and type of dust being filtered must always enter the selection equation, there are more advanced solutions available today to help you create cleaner, safer work environments.

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