A base fabric can also be treated in various ways to enhance filtering performance and withstand process conditions. The treatments, which can penetrate the entire fabric or coat only the surface, are chemical or mechanical.

Common chemical treatments for the entire fabric include silicone and polytetrafluoroethylene (PTFE); for the surface, they include foamed acrylic and foamed PTFE. Common mechanical surface treatments include singed, eggshell, glazed, calender, and membrane. [Editor's note: Find more information on base fabrics and treatments in articles listed under “Dust collection and dust control” (pages 108-109) in Powder and Bulk Engineering’s comprehensive “Index to articles,” December 1996.]

About expanded PTFE membrane
The membrane mechanical surface treatment is an expanded PTFE membrane consisting of PTFE fibrils laminated or thermobonded to a base fabric. The membrane is expanded by stretching it both vertically and horizontally, creating a thin cobweb-like structure with nodes and fibrils that effectively capture fine dust particles. The membrane’s extreme thinness (from 0.4 to 10.0 mils) requires the base fabric’s support.

A bag filter with an expanded PTFE membrane can provide several benefits in dust collection applications. It can:

- **Increase filtration efficiency by an order of magnitude and help meet EPA-mandated limits on industrial plant exhaust emissions.**

- **Provide surface filtration rather than the depth filtration provided by conventional filter fabric.** Surface filtration keeps the captured dust particles away from the base fabric, reducing fabric abrasion and extending the filter’s service life. With longer service life, you won’t need to change the filters as often, reducing your maintenance costs and process downtime.

- **Reduce the pressure drop, cutting energy costs.** The membrane typically reduces the pressure drop across the bag filter by about 10 percent, in turn cutting the baghouse fan’s power requirements by as much as 33 percent. Depending on your power costs, this energy savings can add up quickly.

- **Increase baghouse throughput, allowing the process to run at a higher rate.** Most plants make improvements to processing equipment before they improve their baghouses. A filter with an expanded PTFE membrane can increase baghouse throughput up to 25 percent, increasing production rates for the entire manufacturing process. Such throughput increases are especially helpful in a difficult application with an oily or moist dust.

- **Improve dust cake release.** The expanded PTFE membrane is slicker than a conventional filter fabric and more easily releases the dust cake during cleaning. However, even with the membrane the filter eventually gets dirty (with permeability reduced to the same level — about 1.5 to 2.5 cfm — as that of a dirty conventional filter) and requires replacement.

- **Handle diverse applications.** The expanded PTFE membrane is chemically inert, which means it won’t contaminate products such as chemicals, foods, or titanium dioxide. The membrane can withstand temperatures up to 600°F, making it suitable for high-temperature applications.

The PTFE membrane also increases the filter’s cost, although this initial cost is offset by improved filter performance.

**Selection advice**
To determine whether a filter with an expanded PTFE membrane or another filter is the right choice for your
After selecting a baghouse that handles your process air volume and fits your floor space and other needs, narrow your filter fabric choices to just two or three. To do this, consider the baghouse operating temperature and your product’s particle size distribution and chemical properties. Determine whether a filter with expanded PTFE membrane is right for your process by evaluating your product’s other characteristics: cohesiveness, particle shape, static charge, hygroscopicity, explosibility, toxicity, acid dew point, pH, and relative value.

Some example applications
A bag filter with an expanded PTFE membrane is suited to several applications. Here are some common ones.

Producing carbon black. A baghouse in a carbon black process can be a large shaker, reverse-air, or pulse-jet unit operating between 400°F and 550°F. Adding the expanded PTFE membrane to a fiberglass woven fabric filter helps to capture the very fine, oily, and acidic carbon black powder. But the membrane’s major benefit in this application is increased throughput: The improved efficiency allows more air through the process and, thus, greater production. Because carbon black demand is typically high, the higher production rate alone could pay for a set of filters with expanded PTFE membrane.

Reducing and conveying cement. Grinding and milling cement produces very fine, hygroscopic particles that can easily blind a bag filter. The baghouse is typically a shaker or reverse-air unit. A Nomex or fiberglass woven filter with expanded PTFE membrane not only can capture the fine dust but release its cake when the dust absorbs moisture. The membrane is increasingly popular for this application.

In a cement conveying line, a pulse-jet baghouse typically collects nuisance dust. A polyester (or less often, acrylic) needled-felt filter with expanded PTFE membrane can easily release a moist cement dust cake, which can otherwise blind the filter and create a high pressure drop across it.

Producing aluminum. Aluminum is a fine, abrasive powder and generates dust that must be collected during three phases of aluminum production: converting bauxite to alumina, reducing alumina to aluminum, and carbon bake.

In converting bauxite to alumina, expanded PTFE membrane can be used with a polyester woven filter in a shaker baghouse or with a polyester needled-felt filter in a pulse-jet baghouse. In reducing alumina to aluminum, the membrane can be applied to a woven homopolymer (that is, woven from a single monomer) acrylic filter in a shaker baghouse or a polyester needled-felt filter in a pulse-jet baghouse. In carbon bake, a shaker baghouse can use a woven homopolymer acrylic filter with expanded PTFE membrane; a pulse-jet unit can use a polyester needled-felt filter with the membrane or, for operating temperatures over 275°F, a Nomex needled-felt filter with the membrane.

Producing steel. An electric arc furnace for producing steel generates a sticky, toxic steel dust at a low concentration. The furnace is typically equipped with a large reverse-air or shaker baghouse that operates below 275°F and uses combination polyester woven filters. Environmental controls for the toxic dust are leading to more use of expanded PTFE membrane on these filters. The membrane also aids release of the sticky dust cake.