

## CREATING THE PERFECT SPIN PACK FILTER MEDIA FOR EACH APPLICATION

by Mark Willingham, Synthetic Fibers Market Manager, United EFP

(Note: United EFP is now Purolator EFP)

Today's fiber producers compete in a world market with many formidable challenges. They are simultaneously being pressed to develop new products while maintaining or reducing the selling price of their products. These challenges are prompting producers to closely examine spin pack filter media. Through the proper selection of filter media, the producer meet the quality and performance requirements of the new fibers, and at the same time reduce their operating costs by extending spin pack life.

### **Overview of the perfect filter media**

It is widely recognized that each fiber producing operation is unique, and therefore there is no "one size fits all" filter media for the industry. Simply put, for each application, there is a perfect filter media. This perfect media creates a balance between the quality of the fiber, the life of the spin pack, and the cost of use of the filter media. In some cases, producers have attempted to increase spin pack life by using a coarser filter media, but have seen their quality suffer. In other cases, producers have tried to improve quality by using a finer filter media only to see their pack life diminish.

**United Engineered Filtration Products (EFP)** has developed a systematic, engineered approach to this dilemma by offering a wide range of filter media that can be custom tailored to meet the needs of each fiber producer. This assortment of available filter media includes traditional woven wire cloth, sintered wire cloth, sintered fiber metal felt, shattered metal powder, and sintered metal powder. Each of these media has unique performance characteristics including initial pressure drop, dirt-holding capacity, gel removal capability, and integrity of pore structure at elevated pressures. A thorough understanding of these media characteristics, as well as an understanding of the actual application, are the keys to creating the perfect media.

### **Step 1- recognizing fiber quality and spin pack performance issues**

The two process-related parts of the equation- fiber quality and spin pack life- must be viewed as separate, yet connected. Changing the filter media to improve one of these would have historically resulted in a deterioration of the other. However, through innovations in filter media design it is now possible to achieve both.

The starting point in developing the perfect media for the application is to determine the actual cause of poor fiber quality and/or short spin pack life. Typical fiber quality problems are denier non-uniformity, excessive breaks or filament frays, and uneven dye-ability. Most of these factors are in some way linked to the filter media. For example, breaks are most often caused by using a filter media that is too coarse for the application, thereby allowing oversized particles to become entrained in the filament. The rule of thumb within the fiber industry is that the micron rating of the filter should be no more than 1/10<sup>th</sup> the size of the spinnerette hole.

#### **Purolator EFP**

P.O. Box 630145  
Houston, Texas 77263-0145  
Toll Free: 800.977.9473  
Tel: 713.977.0610  
Fax: 713.977.1318

Email: [info@purolator-efp.com](mailto:info@purolator-efp.com)

P.O. Box 1451  
Shelby, North Carolina 28151-1451  
Toll Free: 800.444.5103  
Tel: 704.482.7381  
Fax: 704.481.8253

Spin pack life is also determined by other factors including pack leaks, pressure rises across the filter media, and general run-ability issues. Pack leaks, for instance, occur when the pack pressure increases to a point where the seals will no longer make a positive seal. This problem can be solved with a media or combination of media with lower initial pressure or higher dirt holding capacity to slow the rate of pressure rise. Slow holes, drips, and other run-ability problems may also be caused by using the incorrect filter media.

Only after the exact cause of fiber quality problems or short pack life has been determined can the process of selecting the ideal filter media begin. Flow rate, viscosity, pack pressure, spinnerette capillary size, and the nature of the contaminant in the polymer are among the items that must be considered during the media selection process. The success rate in selecting the perfect media is directly proportional to the amount of process information available from the user. Fortunately, with a wide range of filter media available to choose from, no fiber producer has to settle for poor performance.

**Step 2- filter media selection**

The most commonly used filter media are shown in Figure 1. The chart is intended to be a general guide for a preliminary selection of media. Final selection should be made based on specific process conditions and defined filtration goals.

	<b>Wire cloth</b>	<b>Sintered wire cloth</b>	<b>Fiber metal felt</b>	<b>Sintered metal powder</b>	<b>Shattered metal powder</b>	<b>Sand</b>
Dirt holding capacity	Low- unless tiered design used	Low- unless tiered design used	Very high	High- if gradient pore design	High	Average
Gel removal capability	Fair	Good	Excellent	Excellent	Excellent	Fair
Initial pressure	Very low	Very low	Low	Very high	High	High
Pore stability	Fair	Excellent	Excellent	Excellent	Good	Poor
Cost	Low	Average	High	High	High	Very low

Figure 1

**Step 3- testing/monitoring results of new filter design**

Typically, the new design filters will be tested in a production environment on a small scale- perhaps on a few spin packs or one spinning machine. It is critical to the success of the program that this is a controlled test with the results being shared with the designer. This may be the most important part of the program as it provides the designer with actual results of the new media and guidance on how to make final adjustments to meet all goals.

**Purolator EFP**

P.O. Box 630145  
Houston, Texas 77263-0145  
Toll Free: 800.977.9473  
Tel: 713.977.0610  
Fax: 713.977.1318

P.O. Box 1451  
Shelby, North Carolina 28151-1451  
Toll Free: 800.444.5103  
Tel: 704.482.7381  
Fax: 704.481.8253

Email: [info@purolator-efp.com](mailto:info@purolator-efp.com)



PUROLATOR EFP

### Summary

Since no two spin pack applications are exactly the same, no “all purpose” filter media exists. Only through careful consideration of all process parameters can the optimum filter media be chosen. United EFP offers on-site, comprehensive evaluations of spin pack filtration and designs the filter media system to best suit each application.

*Article as it appeared in the International Fiber Journal in 2004. Mark Willingham is currently the Manager of Sales and Marketing of Specialty Metals for Purolator Facet, Inc., a member of the Purolator Advanced Filtration Group of CLARCOR. Mark has more than 25 years of experience in polymer filtration with an emphasis on filter media applications design and the cleaning of polymer filter media. Purolator EFP, formerly United EFP and prior to that Southwestern Wire Cloth, Inc. employed Mark at the time this article was written. Purolator EFP is the leading manufacturer of woven wire cloth screen packs and other porous metal filter media and is the North American distributor for Hoganas' Coldstream shattered metal powder filter media. Purolator EFP is a member of the Purolator Advanced Filtration Group, with plants in Shelby, NC and Houston, TX. Phone: 800-444-5103 Email: [info@purolator-efp.com](mailto:info@purolator-efp.com)*

#### **Purolator EFP**

P.O. Box 630145  
Houston, Texas 77263-0145  
Toll Free: 800.977.9473  
Tel: 713.977.0610  
Fax: 713.977.1318

Email: [info@purolator-efp.com](mailto:info@purolator-efp.com)

P.O. Box 1451  
Shelby, North Carolina 28151-1451  
Toll Free: 800.444.5103  
Tel: 704.482.7381  
Fax: 704.481.8253