

## Reducing spin pack operating costs through filter media optimization

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(Note: United EFP is now Purolator EFP)

### Introduction

As you read this article, someone, somewhere in one of the world's 1,500+ synthetic fiber plants is servicing a spin pack. This spin pack change was made necessary by one of several conditions common to most fiber producers, and is usually related in some way to the spin pack filter media.

It would be an understatement to say that labor costs vary around the globe and this factor provides a key competitive advantage for producers in some regions. However, one burden shared by all plants is the high cost of servicing spin packs. In this article, we will examine the most common reasons for spin pack changes, the total costs of such changes and methods to reduce the frequency of changes.

### Reasons for spin pack change

The most frequently cited reasons for spin pack changes are high pressure, leaks and run-ability problems. These are almost always associated with the filter media used in the pack. In a typical operating scenario, there would be a gradual increase in the pack pressure due to debris being captured by the filter media. At a certain point, the pressure would have increased to the point where the gaskets could no longer hold and the pack would leak. At this point, there may also be run-ability problems as the filter unloads debris and sends it downstream to the spinnerette capillary. Any of these problems on its own would be enough to warrant a pack change.

Before the problem can be solved, the exact cause of the pack change must be determined. While this may sound obvious, it is an often- overlooked first step that significantly delays the process of improving pack life. A tremendous amount of evidence can be found by examining the used filter media and gaskets for deformities or anomalies that could be linked to the failure. Every hour spent analyzing the cause of pack failure will save countless hours of trial and error later.

### Determining the total cost of spin pack changes

What does it cost to change a spin pack? This is a critical question for which there is usually not a quick and accurate answer. Even among those involved directly in the operation of spin packs in a given plant, the estimates of these costs vary widely. Some of the fixed costs such as filters and gaskets are easy to identify, while others such as labor, utilities and overhead are more difficult to quantify. Listed below are the cost components that should be considered.

#### **Labor**

- ▶ to remove, disassemble and clean pack body
- ▶ to clean and inspect spinnerette
- ▶ to reassemble and install clean pack

#### **Chemical costs**

#### **Utilities**

#### **Fixed overhead**

#### **Production loss**

United EFP has developed a worksheet to aid the user in accounting for the total cost of a spin pack change. This worksheet, in Microsoft Excel format, is available on diskette or via e-mail and has proven to be a useful tool for weighing the costs and benefits of improved spin pack filtration. An example of this worksheet is shown in Figure 1.

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**Figure 1**

<i>Screen pack and labor cost</i>	<b>Current screen pack</b>	<b>New screen pack</b>
Screen pack	\$4.00	\$6.00
Other pack expendables *	\$2.00	\$2.00
Labor to service pack **	\$50.00	\$50.00
Total cost per change	\$56.00	\$58.00
Changes/yr.	2,000	1,000
Total cost	\$112,000.00	\$58,000.00
Annual savings		<b>\$54,000.00</b>
<b><i>Increase in output</i></b>		
Production time lost during pack change- hrs./pack	0.5	0.5
Changes/yr./position	20	10
Total production time lost- hrs./yr./position	10.0	5.0
Production rate- lb./hr/position	5	5
Total production lb. lost/yr./position	50	25
Number of positions	100	100
Total production lost- lb./yr.	5,000	2,500
Price /lb. of product	\$1.00	\$1.00
Total value of lost production/yr.	\$5,000.00	\$2,500.00
Annual increase in production output		<b>\$2,500.00</b>
Combined labor and productivity savings		<b>\$56,500.00</b>

\* Screens, gaskets, powdered metal, etc.

\*\* Includes labor to remove/install and all cleaning costs

In the example shown, the cost of a spin pack change was determined to be \$50.00. It should be noted that this figure is at the low end of the range of costs for the average fiber operation. Estimates of as much as \$500.00 per pack change are not uncommon, depending on the size of the spin pack, the complexity of the spinnerette and the type of cleaning process employed. At the low end of the service cost scale would be a mono-filament pack with large spinnerette holes, while a complex hollow filament spin pack requiring a more controlled cleaning and inspection process would be at the high end of the cost scale.

It is very important to note that in virtually all spin pack applications, the cost of the filter media represents a small portion of the overall cost to change a pack. This "tail wagging the dog" effect sets up a unique opportunity to dramatically reduce operating costs by improving the least expensive part of the pack change- the filter media. As can be seen in the example in Figure 1, significant savings can be realized even though the initial cost of the improved filter media is much more than the original media.

Once the cost of a spin pack change has been determined, this cost should be made clearly visible to all those involved in the operation, cleaning and assembly of the pack. A keen awareness of the high cost of pack changes will in itself promote efforts to increase pack life.

Reducing the frequency of spin pack changes

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Once the exact cause of spin pack changes has been accurately determined, the process of selecting an improved filter media or gasket seal can begin. Our article "Extending Spin Pack Life with Engineered Filtration Products" appeared in the August 1999 issue of this publication. In this article, we noted the characteristics of each type of spin pack filter media and provided a general guide to selecting the best media for each application.

**FIGURE 2**

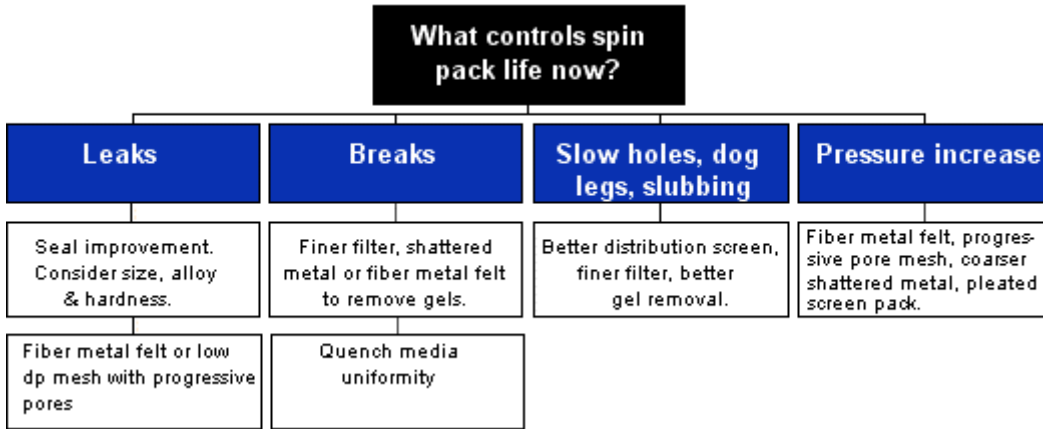


Figure 2 provides a more detailed set of recommendations for improving spin pack life. Each possible solution must be more carefully studied to determine the impact on initial pack pressure, particle removal efficiency, fiber properties and cost. A brief series of carefully monitored tests is usually required to optimize the filter media choice.

The cost of the proposed pack media can be entered into the worksheet along with the expected increase in spin pack life. From this, the user can determine if the filter media being considered is a cost-effective solution to the problem.

Summary

There is a perfect filter media for every spin pack application. This perfect media is a balance of fiber quality, spin pack life and cost. Through the process outlined above, today's fiber producers can reach a healthy balance between cost and performance and realize significant savings by increasing spin pack life.

*Article as it appeared in the International Fiber Journal. 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)*