



Sifting through the options

Selecting the right sieve material for maximum performance

by Mark Fowler

In the daily operation of the milling process, how often do you consider the efficiency of the sieving material in your sifter? Why did you choose the sieving material that you are using? New sieve designs and sieving materials have been introduced in recent years making it important to consider what the best products are for each sieving application.

There are several considerations when selecting the most appropriate material for the multitude of sieving applications in the milling process. From the type of sieve to the type of wheat, selecting the right sieving material impacts the efficiency and extraction of the mill as well as the quality of the flour produced.

Material type, micron size and percent open area are important considerations. Sieve type, weave, durability and texture are other factors that can impact the performance of the sieving material. Above all, one important factor to always remember is that the milling process is a food production process. Always confirm the material selected is food grade and complies with the regulations for food contact surfaces for the governing agency with oversight of your facility.

DEFINITIONS

To select the right sieving material, it is important to understand the terms

Sieves in the sifters are made from preformed plastic rather than wood, meaning there is no wood in the flour mill, which helps to improve sanitation. Photo courtesy of Bühler.





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A skilled miller needs to identify the direction of the weave before stretching the cloth across the sieve for the appropriate sieving result. Photo courtesy of Sefar.

used to define the technical aspects of the material. Three important terms are thread diameter, thread or mesh opening, and percent open area.

The thread diameter is the thickness of the diameter of the thread used to weave the sieve material and is generally recorded in millimeters (mm). Thread or mesh opening is the open distance between sieve threads and is commonly recorded in microns. For most modern synthetic bolting cloth, the taffeta or plain weave is used and the open distance between

threads in the warp and weft direction are the same. When silk was used, a Dutch or Twill weave may have been preferred to improve strength and durability of the bolting cloth. In these weaving styles, the warp and weft thread diameters could be different in diameter and distance apart. A skilled miller needs to identify the direction of the weave before stretching the cloth across the sieve for the appropriate sieving result. Warp refers to the threads or wires running the length of the sieving material as woven. Weft refers to the threads or wires running across the width of the sieving material as woven.

Open area of the sieving material is the proportion of total sieve area that is open space as compared to total surface. Open area is expressed as a percentage with a larger percent open area resulting in better sieving efficiency. Thread or mesh count is the number of threads in a linear centimeter or inch of sieving material. The relationship between mesh count, thread diameter and percent open area is a critical correlation to understand. Larger thread diameter for the same mesh count results in a smaller percentage of open area, but creates a more durable cloth. All sieving material will wear out eventually. Balancing durability with sieving efficiency is an important decision in selecting the appropriate sieving material.

Mesh size or opening size is critical in selecting the sieving

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material because the appropriate mesh opening allows maximum milling efficiency. Maximizing milling efficiency is the primary objective. Sieving material is selected to make the best separation of particle size in the sifter, either for distribution of stock throughout the mill for further processing or separating flour. The supplier of sieving material can

Sieving material is selected to make the best separation of particle size in the sifter, either for distribution of stock throughout the mill for further processing or separating flour.

provide a data table that will allow comparison of open area of various sieving material types with thread diameter and mesh opening size

MATERIALS

To select the right sieving material, it is essential to know the different sieving materials available. The traditional flour or bolting cloth was made from silk. Although silk bolting cloth is still available, sieving materials are more typically synthetic, either nylon or polyester; or wire, stainless steel, magnetic stainless steel, or other food grade steel options. Wire or synthetic sieving material is preferred due to cost and improved durability. The

nomenclature of sieving material reflects the history of silk weaving as well. Grit gauze and “XX” are terms that referred to styles of woven, twisted multithread silk sieving material.

Advantages of using wire sieving material are that stainless steel threads can be thinner, providing greater strength and larger possible open-

ing area resulting in a better sieving efficiency as compared to nylon or polyester thread. Wire is best used for larger mesh sizes, more abrasive stock and higher capacity streams such as break passages. However, as previously mentioned, eventually any material will fail and wire fragments that break off the wire sieving materials can be too small to be identified by a metal detector or non-magnetic and pose a potential food safety risk. When using wire cloth, it is best to confirm it is magnetic and can be managed with in a food safety program.

Nylon sieving material has the advantages of durability, high capacity with

good sieving efficiency and relative low cost. Polyester sieving material can stretched to a higher tension than nylon, but generally at a higher cost.

SIEVES

To select the right sieving material, it is necessary to know where it will be used. A plansifter, centrifugal sifter or purifier all require different sieving material. In a plansifter, all types of sieving material can be used as the stock is stretched over a flat surface. Durability and resistance to abrasion are the more critical considerations when choosing between wire or synthetic materials. Nylon sieving material may be more durable than polyester but may absorb moisture in humid climates and lose tension on the sieve. While either type of synthetic material resists fatigue better than wire, maintaining the correct tension on the sieve improves sifting efficiency. The correct sieve tension keeps the material evenly stratified, ensuring good contact with the sieve while avoiding stock from laying on the sieve due to sagging of the sieve cloth. A properly tensioned sieve also flexes less, extending the life of the sieving material.

For a purifier, polyester sieve material is the better option. Polyester does not





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MILLING OPERATIONS

absorb moisture and can be stretched to a high tension while maintaining a uniform thread opening. In a purifier, these characteristics allow for less sagging and better product flow, and distribution for better stratification and improved separation of stock. Polyester also tends to have a rougher surface as compared to nylon, which also improves the efficiency of the purifier.

In a centrifugal sifter, the stock is typically fed into the sieving space by a screw feeder. The stock is then thrown about the cylindrical sieving space by rotating beaters or paddles. The beaters accelerate the stock to aid the separation and movement of fine particles through the sieving material. The accelerated stock comes into contact with the sieving surface several times. This action requires high energy. Enclosing this force causes the sieve surface to flex repeatedly.

While this action helps prevent the sieve from blinding over without additional sieve cleaners, the continuous flexing increases thread fatigue and reduces the life of sieving material more than other sieving motions. For this reason, synthetic sieving material is preferred to wire clothing in a centrifugal sifter.

MAINTENANCE

From sieve tension to sieve cleaners, maintenance also plays a role in selecting the best sieving material. Maintaining proper tension on the sieve keeps the stock properly stratified. The right method of attaching the sieving material to the sieve frame is a vital part of maintaining the right sieve tension. The attaching method affects the performance, sanitation and ease of maintenance for the sifter. There are two primary attachment methods for sieving material: adhesives or stapling.

Both methods require stretching the sieving material over the frame, manually or with mechanical or pneumatic equipment. The use of staples is quickly being eliminated in the flour milling industry. The use of pneumatic stretching equipment and adhesives allows for the

best tension. Better tension improves sifting performance and increases the life of the sieving material, reducing downtime and maintenance cost. The elimination of staples in the sifter also improves food safety.

No discussion of sieving material is complete without mentioning sieve cleaners. Sieve cleaners come in several shapes, sizes and materials and include the traditional rubber balls and plastic cubes along with a multitude of molded shapes with metal balls or brushes.

A combination of ball cleaners and cubes are effective for preventing the blinding over or buildup in the sieving material, while at the same time scrape the corners and bottom of the sieve. In newer-style sieves, the combination sieve cleaner and pan cleaner, made of molded plastic with rubber or brushes to gently clean the sieving material and assist with the movement of the fines through the sieve, improve sifter efficiency. Whichever method is preferred, it is important to pair the appropriate sieve-cleaning mechanism with the sieving material to maximize clothing life and sieving efficiency.

SUMMARY

When selecting sieving material, never forget the primary objective, which is to maximize milling performance. Selecting the best sieving material will maximize milling performance by optimizing sifter capacity and efficiency and properly distributing product throughout the mill. The right sieving material improves extraction of the mill as well as flour quality. Material type, micron size, and percent open area are important considerations, but maintaining the balance of sieving efficiency with material durability is critical to maximize mill performance. WG

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