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TABLETS & CAPSULES

Solid Dose Digest

Insights, advice, and industry news about formulating, manufacturing, and packaging solid dosage forms brought to you by Tablets & Capsules magazine

Ask an Expert

Capsule polishers

Q: How can capsule polishers make my products better?

A: [Andre Petric](#), [Kraemer US](#), says:



Manufacturers and consumers both like to see polished and shiny capsules. Capsules covered in dust from the drug product formulation look unappealing and may have an unpleasant taste. The dust can also cause problems with bottling and blister packaging equipment and require excessive housekeeping in capsule-filling and packaging areas. Capsule polishers can

eliminate these problems by cleaning the outside of the capsules as they exit the capsule filler.

Pharmaceutical manufacturers originally filled capsules manually and then wiped the capsules with a polishing cloth to physically remove any dust from the capsule's exterior. This was effective as long as the quantity of filled capsules was small. As suppliers developed machines to automate the capsule-filling process, production rates increased and manual polishing became too slow and labor intensive. To speed the process, manufacturers collected capsules in a pail from the filler and then dumped them into a coating pan and tumbled them with sodium chloride (polishing salt) until the capsule shells were polished. They then dumped the capsules from the coater onto a sifter to remove the salt. Although effective, this method was also time-consuming because it added another production step.

As capsule fillers increased in speed over the years, manufacturers needed a way to automate the capsule-polishing process in a way that could keep up with a capsule filler's speed. This led to the development of the brush-type capsule polisher.

Brush-type polishers

A brush-type capsule polisher uses the friction of a rotating brush on the capsule surface to continuously polish a wide range of capsule sizes regardless of the capsule filler's speed. The polisher consists of a helically wound fiber brush inside a stainless steel tube, similar to a screw conveyor. A variable-speed motor drives the brush, and you can configure the polisher either horizontally or vertically.

In a horizontal polisher, the capsules enter the tube at one end, and the rotating brush gently rubs the dust off the capsules as it conveys them horizontally to an outlet at the other end. In a vertical polisher, the capsules enter the tube at the bottom, and the rotating brush gently rubs the dust off the capsules as it conveys them upward to an outlet at the unit's top.

In both configurations, the stainless steel tube has a dust port connection that allows the dust-collection air to draw the dislodged dust away from the

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capsules and out of the machine. The air volume of the dust collection system is very important and must maintain a consistent negative pressure to prevent dust buildup in the polisher and keep the dust from redepositing on the capsules.

Horizontal polishers are typically less costly than vertical polishers but take up more floor space and have a low discharge height, which limits the size of the capsule collection container and may make the use of an empty-capsule sorter or metal detector impossible. Vertical polishers require less floor space and have high discharge heights, allowing the use of large collection containers or collection containers positioned on tables for better ergonomics as well as empty-capsule sorters, metal detectors, and diverters to multiple containers.

Empty-capsule sorters

The use of a capsule polisher also allows you to integrate an empty-capsule sorter, which separates out broken capsule pieces, unfilled capsules, and sometimes partially filled capsules from the product stream before they cause problems in downstream operations. The empty-capsule sorter is located at the polisher outlet and is powered by compressed air. The capsules exit the polisher and drop into the empty-capsule sorter. As the capsules fall through the sorter, compressed air blows the light, broken capsules upward into one collection container, while the heavier, full capsules drop by gravity into another collection container for the good product.

Choice of polisher

When choosing a polisher, consider the following factors:

- Does it handle the capsule sizes and production rates for your application?
- Is it easy to disassemble and reassemble for cleaning?
- Will you need tools to disassemble it?
- What is the cleaning and drying method for the brushes? You can clean some brushes in an automatic washing system.
- Will the polisher fit the production room's space restrictions and capsule discharge height requirements?
- Do all the materials of construction fit with FDA requirements?
- Is the machine built to cGMP standards?
- Are spare parts available? You will need to replace brushes due to wear and product dedication.

Polisher problems and pitfalls

Encapsulated formulations have a wide range of dust characteristics that can make dust removal and handling difficult.

Static. Under low-humidity conditions, a capsule polisher can generate static in and on the capsules, which can cause some dusts to stick more aggressively to the capsules, brushes, and machine housing. In very-low-humidity situations, static can also cause capsule flow problems in which the capsules stick to any surface they come into contact with after passing through the brushes.

Solutions for static problems include properly grounding the polisher to dissipate the static and having a humidity-controlled environment for the filler room. This humidity control should also apply to the raw material storage so that the powder can acclimate before entering the filler.

Gummy or sticky powders. Some powders are naturally gummy or sticky even without static and can accumulate on the polisher's brushes and inside surfaces. This accumulation can cause the capsules to stick inside the machine

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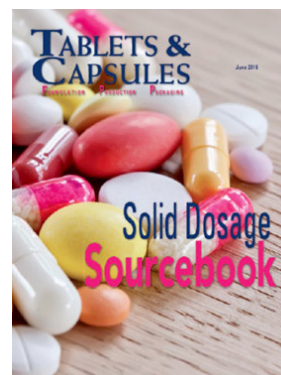
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or on any surface where they have to slide using gravity. More frequent cleanings can help minimize such product buildup.

Cross contamination. Due to their construction, polisher brushes can be difficult to clean and dry, and some brightly colored powders can stain the polymer brush fibers. This is especially true for colored products like curcumin, which stains everything yellow. Using product-dedicated brushes can help prevent cross contamination.

Mineral-based products. Mineral-based vitamin and nutraceutical powders can be abrasive, which can cause excessive wear to the polisher's brushes and mechanical components. This wear can lead to poor polishing efficiency and possibly even equipment failure. Prevent excessive wear by inspecting the machine and replacing the brushes more frequently in abrasive applications.

Andre Petric is president at [Kraemer US](#), Allendale, NJ. The company manufactures tablet dedusters.

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