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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

More Questions and Answers

Eliminating dust on tablets

Q: My tablets are dusty. What can I do to eliminate dust?



A: Andre Petric, [Kraemer U.S.](#) says:

Is dust pervasive in your tablet-press rooms? Is the packaging area dusty, causing equipment to malfunction or leading to poor seals on bottles and blister packages? If so, consider adding a tablet deduster, which can keep your production areas cleaner and reduce rejects.

No pharmaceutical or nutraceutical powder compresses completely; a fine layer of dust always adheres to the outside of tablets as they exit the tablet press. In addition, the gap between the press' punches and dies can cause burrs to form around the tablets' edges, another source of dust. If you remove this dust at the source as tablets leave the press, downstream equipment will work more efficiently.

A tablet deduster removes surface dust from tablets, dislodging it with either vibration or friction. A dust collection system evacuates the dislodged dust from the process.

Dedusters are simple devices, or they are until they don't work properly in your application. Why would that happen? Dedusters affect manufacturing only indirectly, and pharmaceutical manufacturers tend to budget less for them compared to direct equipment like a tablet press. However, "you get what you pay for"; be sure you pay for the level of performance your application needs so your dedusters deliver trouble-free operation over the long term.

Four requirements

Apart from cost, you should base your purchasing decision on a machine's dedusting efficiency and its ability to handle the volume of tablets that your tablet press generates at full speed. When integrating a deduster into your manufacturing process, gather four pieces of data before contacting a supplier: 1) the minimum and maximum sizes of your tablets, 2) the highest speed that your presses attain, 3) your tablets' hardness and the nature of the dust generated, and 4) your press' outlet height and the collection container's inlet height.

Minimum and maximum tablet sizes. These sizes, together with the speed at which the tablets enter the deduster, determine the volume needed in the machine to dedust effectively

Maximum speed. Determine the speed at which you run all your sizes of tablets to find the highest speed at which you run your equipment. The

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information allows you to determine the deduster's needed volume and the supplier to recommend the appropriate volume of machine.

Tablet hardness and nature of the dust. You should know, for example, whether your production includes tablets that are chewable or effervescent. Tablet hardness plays a role in how a supplier sizes a deduster. A deduster can damage tablets if it must operate at the limits of its capacity, with too much vibration force. Also, is the dust hazardous or toxic? If so, the deduster needs to contain the dust completely to prevent exposing the press room's personnel. A hazardous process also requires a wash-in-place (WIP) machine to prevent your colleagues from being exposed when the equipment needs cleaning.

Press' outlet height and collection container's inlet height. To gather this information, measure 1) the vertical distance from the floor to the bottom of the press' outlet chute and 2) the height of the opening of the inlet of the collection container. These two dimensions allow you to calculate the deduster's conveying height—the vertical height needed to reach the collection container.

After you collect the above data, become familiar with the types of dedusting methods. Horizontal and vertical dedusters each come with challenges and advantages that you should analyze before making your choice.

Horizontal dedusters

Horizontal dedusters use a perforated stainless steel plate or perforated tube that vibrates from side to side. The tablets fall from the press' outlet chute onto the plate or into the tube, neither of which is truly horizontal but rather slopes slightly downward. The tablets slide down as they move along a vibrating surface that is 1 meter long. The vibration dislodges the dust, which drops through a perforated plate, and the dust collector pulls it away. Some horizontal dedusters blow dust from tablets using compressed air, which enhances the efficiency.

One large benefit of a horizontal deduster is its low cost. However, buying a deduster based on price is not always the right decision. You might save upfront, but horizontal dedusters have disadvantages that could affect your facility: 1) the noise level can be high; 2) tablets remain on the plate or in the tube only briefly, and as a result, they may not be dedusted efficiently; and 3) they have a large footprint, possibly requiring more room inside the press area or the press suite than you have available.

Vertical dedusters

Two types of vertical dedusters are available: 1) vertical downward-conveying dedusters and 2) vertical upward-conveying dedusters.

Vertical downward-conveying deduster. This style of deduster is older than the upward conveying type and is very similar in function to the horizontal type. The tablets enter at the top, descend through a number of flat, perforated plates, and bounce around until they exit and drop to the next plate. They pass from plate to plate until they drop from the bottom of the machine. This type of deduster is relatively inexpensive, and its drawbacks are comparable to the horizontal deduster. Like some horizontal dedusters, some vertical downward-conveying dedusters blow the dust off with compressed air, which enhances the dedusting efficiency.

Vertical upward-conveying deduster. This type of deduster uses a perforated tray helically wound around a central column. The tray slopes upward, and with a gentle vibration, the tablets move up the spiral pathway, rubbing against each other and shedding their dust and burrs. Some suppliers blast air

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to the deduster, which assists dedusting and keeps the dust airborne to allow the dust collection system to extract it. Some machines extract the dust downward through the central column, while others draw it through the perimeter of the housing.

Numerous types of upward-conveying dedusters are available, some with a V-shaped helix profile and others with a flat helix, with contact surfaces either of stainless steel or plastic.

One benefit of vertical dedusters is their very small footprint. They also offer a long residence time, i.e., the amount of time the machine dedusts the tablets. The shortest spiral is 5 meters, while horizontal dedusters rarely exceed 1 meter. The residence time is important because the longer it is, the better the dedusting efficiency. In fact, some vertical dedusters raise the tablets 1.6 meters, providing 20 meters that increase the residence time.

The disadvantages of a vertically conveying deduster include a higher initial cost and the possibility of more initial setup, because these dedusters use two parameters for tablet vibration—resonance frequency and speed. Some suppliers offer an automatic controller that determines the optimum resonance frequency for proper operation that minimizes the operator's involvement. Ask about the type of controller before you purchase a deduster because it is important to control vibration precisely. Otherwise, the equipment could easily damage friable and soft tablets by applying too strong a vibration.

Problems and pitfalls

Manufacturers' complaints about improper dedusting often involve the dust-collection volume that their systems provide. No matter how effectively a deduster dislodges dust from tablets, the machine at some point will stop dedusting them if its collection volume is insufficient.

A deduster's inability to convey tablets effectively at the needed speeds affects production. Slowing the press to accommodate an underperforming deduster can seriously diminish production capacity.

Equipment downtime can increase substantially when you purchase a deduster based on price only. In normal operation, dedusters generate 30 to 60 vibrations per second, which can shake a machine apart if its quality is not sufficient. Deduster vendors design their higher-quality machines to operate 24 hours per day for years at a time with no downtime, and they typically provide long-term warranties.

The choices for tablet dedusters are numerous; many machines on the market look similar to others but do not perform as well. Use the information outlined above to make an informed decision and purchase a tablet deduster that best suits your application.

Andre Petric is president at [Kraemer U.S.](#), Allendale, New Jersey. The company is the inventor of vertical tablet dedusters and supplies tablet dedusters and capsule polishers for the pharmaceutical and nutraceutical industries.

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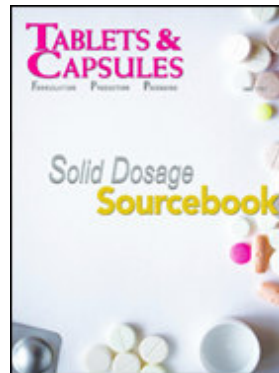
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