VAC-U-MAX

KEY COMPONENTS FOR PNEUMATICALLY CONVEYING DIFFICULT MATERIALS

Fine-tuned flow promotion devices, suitable filters and filter placement, as well as vacuum receiver design ensure peak performance in a system.

When it comes to pneumatically conveying difficult powders, the difficulty does not lie with conveying materials through the material line. Typically, once material is entrained in the line it is fluidized and moves freely. Occasionally there are problems in the tube even with free-flowing and difficult materials like Titanium Dioxide which build up in the line, with agitator devices easily breaking these materials free. The primary challenge with conveying difficult powder is getting the material to feed at a constant rate into the material line from the pick-up point and then again getting powder to discharge from the material receiver. For materials with poor flow properties, extra attention is focused on specially devised flow promotion devices, suitable filters and filter placement, and vacuum receiver design.

Feed Devices

The pick-up point is where material feeds into the tubing network that leads to the vacuum receiver. This could be a bulk bag unloader, bag dump station, or wand. With difficult powders like Zinc Oxide and Iron Oxide which have very poor flow properties, specially designed flow promotion feed devices regulate flow. These devices are most often a vibratory device or rotary screw discharger. In one application, Iron Oxide was transferred from 50 lb bags using a bag dump station to a mixer reactor. The flow properties of the material were very poor. To get product into the line, a specially devised live bin agitator, a hopper on rubber isolators with an oscillating vibrator that shakes the bin, facilitated material flow into a pickup adapter into the airflow stream.

Filters

The material of the filter, the number of filters, placement, and cleaning cycle is extremely important for difficult materials. At the top of the material receiver housing, filters separate the product from the clean air traveling back to the vacuum producer. With ultra fine powders, filters can clog and choke the entire conveying process. In one application the task was to recover residual Carbon Black, an ultra-fine powder, out of the bottom of rail cars and discharge it into super sacks. During the discharge cycle only 2-3 lbs would drop into the super sacks. After testing flow promotion with vibration, it was discovered that the material was getting hung up between the filter socks even with the automatic pulse filter cleaning. The solution was to supply a new filter plate with fewer filters but with the same filter area. For applications with low headroom, such as direct charge blender loading, vacuum receivers without filters are available with filters placed further down the line.

Receiver Design

Angular surfaces provide areas where difficult materials can bridge or hang up. Supplying a straight walled vacuum receiver eliminates sloped surfaces allowing positive discharge without requiring auxiliary vibration or agitation. The straight wall configuration terminates in an automatic discharge valve the same size as the tube, permitting rapid passage of even the most difficult to handle non-free flowing material. Peak performance comes from fine tuning and knowing which components will move the material most gently, reducing wear and degradation. All equipment must complement each other. Vacuum receivers must be able to handle the airflow provided by the vacuum source and balancing the air-to-cloth ratio of filters must occur, so filters don't shred or blind.

Whether the application requires customized components, or more economical plug-and-play solutions, pneumatic conveying solves safety hazards, production slowdowns and material loss while moving product gently and quickly from point to point with nothing in the way to impede the efficiency of movement.