

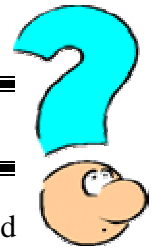
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## “Know Floe’s Korner”

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“Know Floe’s Korner” is a contribution from the members of Group 3c (Solids Handling and Processing). The objective of this section is to share their industrial learning experiences through a variety of articles and case studies. Please send your comments to Shrikant Dhodapkar at [sdhodapkar@dow.com](mailto:sdhodapkar@dow.com).

### Top Ten Tips for Reliable Design & Operation of Pneumatic Conveying Systems

Lyn Bates, Shrikant Dhodapkar, George Klinzing

1. Allow a ‘reasonable’ horizontal conveying length, (15 to 20 pipe diameters), before the first bend to allow the bulk material to accelerate. Use of flexible hose at the pickup should be kept to minimum. Excessive length of flexible hose, often in the form of a coil, is the worst pickup pipe configuration. Inability to provide proper configuration at the pickup will result in plugging condition at gas velocities higher than saltation velocity.
2. Avoid conveying line layout with bends or elbows placed back to back. This will inevitably causes excessive pressure drop and premature line plugging.
3. Consider stepping conveying lines (increasing the pipe diameter) to prevent excessive velocity at the end of the line. Be sure to maintain the minimum required Froude number at the step location, otherwise the material will salt out of the suspension. Properly stepped systems result in more efficient systems with lower degradation and wear. Using ISO pipes or tubes allows for more choices in diameters.
4. Conveying lines should not be routed like utility (compressed gas / steam) lines which follow the contours of a building. Minimizing the number of bends or directional change results in higher capacity, lower degradation, less erosive wear and more reliable flow.
5. Electrostatics effects in conveying systems can be minimized by increasing the relative humidity of the conveying air to more than 70%.
6. ‘More air’ can be ‘Less transfer capacity’ in dilute phase systems. Larger solids and gas frictional losses caused by higher gas velocities can absorb more energy than the extra input of energy. There is an optimum gas flow rate for a given lean phase flow system.
7. Install sufficient ports or couplings in the systems for pressure measurement during troubleshooting. Pressure measurement is a convenient method to measure the pulse of a conveying system. Take some time to generate the base line data for an existing conveying system. It comes in handy for future troubleshooting.
8. Proper venting of rotary airlock/feeder in a positive pressure system is critical for reliable operation. Air leakage due to clearances and returning pockets can result in reduced flow or unsteady feed rate. The leakage can be vented in a number of ways. The vent system should be designed much akin to a conveying system with sufficient gas flow and minimal bends.
9. Product damage and wear at bends is very material dependent. Blind Tee’s usually have much merit, but cause a greater pressure drop than long radius bends. Mitered elbows can be a good compromise in some cases.
10. Minimum conveying velocity is a function of conveying rate. Make sure that the gas velocity at the pickup is greater than the saltation velocity at the highest solids flow rate. Safety margin must be allowed for non-optimal line configuration at the pickup (short acceleration length, bends etc.)