
“Know Floe’s Korner”



“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.

Ten Common Myths and Misconceptions About Solids Handling

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- Misconception:** Increasing airflow rate (or providing more Oomph! to the system) will increase conveying capacity.

Reality: Increasing airflow rate in dilute phase systems will decrease conveying capacity (for the same pressure drop).
- Misconception:** Pickup velocity or Saltation velocity is a fundamental property of a material.

Reality: It also depends on pipe size and solids loading. Higher velocity required for larger line size and higher loading.
- Misconception:** Pneumatic conveying lines can be routed much like utility (air or steam) lines in the plant.

Reality: Good design practice for pneumatic conveying system requires sufficient straight run after pickup, minimization of bends or directional changes, avoidance of back-to-back bends and avoidance of inclined lines.
- Misconception:** Suitable cone angle for bin design (for mass) is same as angle of repose or angle of internal friction or angle of slide.

Reality: It is indirectly related to these measurements. Bins designed with such practices need special insurance.

5. **Misconception:** Stress at the outlet of a large silo (say 150 m³) is much higher than a small silo (say 15 m³) with same outlet dimension.

Reality: For mass flow design, the stresses in the vicinity of the outlet are largely independent of the overall size of the silo. This does not hold true for funnel flow silos.

6. **Misconception:** Mass flow hoppers result in "plug flow" as observed by uniform draw down of the top surface.

Reality: Mass flow hoppers have extensive mixing in the hopper zone due to velocity gradient. Mixed volume depends on hopper geometry and velocity profile in the hopper.

7. **Misconception:** Overall collection efficiency of a cyclone defines the performance of a design.

Reality: Overall efficiency strongly depends on the particle size distribution of incoming dust. "High Efficiency" cyclone designs rated at "99.9% efficiency for coarse particles" may collect only 50% of the incoming particulate - if the incoming dust is finer.

8. **Misconception:** More residence time in a mixer results in better mixing.

Reality: The mixture quality reaches an asymptotic limit after certain duration. The quality of mixture depends on the mixer design and compatibility between mixing mechanism in the mixer and the mixture. Extended mixing can result in attrition or fines generation, which then segregates and results in poor mixture quality.

9. **Misconception:** One can plot particle size distributions obtained from various particle size analyzers on the same plot for comparison as long as they are converted to the same type of distribution (number, surface or volume/mass).

Reality: Various particle size analyzers use different physical measurements to extract the particle size information. They are not always comparable or transformable from one to the other. Stick with one instrument for all measurements in a given process to avoid confusion.

10. **Misconception:** It is possible to drain the static charge from polymer pellets stored in a box or a container by inserting a grounding rod into it or grounding the metal container.

Reality: Static charge on insulating material can not be drained instantly even if the container is grounded or a grounding rod is inserted. The charge decay relies on surface resistivity of the polymer.