Pneumatic Conveying of Bulk Powder

Pneumatic conveying is a method used to transport bulk powder materials through a pipeline using gas or air as the conveying medium. A high-speed air stream carries the powder through the pipeline to the desired destination. Pneumatic conveying is a popular method used in industries like food, pharmaceutical, and chemical processing. It is widely used due to its efficiency, flexibility, and ability to transport materials over long distances without requiring manual intervention. However, proper design and operation are critical to ensure the safe and effective transport of bulk powder materials.

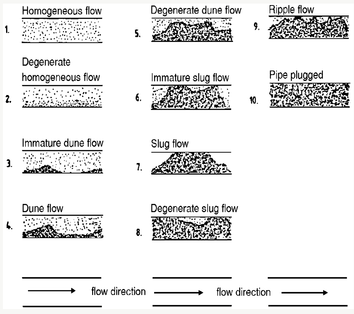


Figure 2: Typical flow regimes

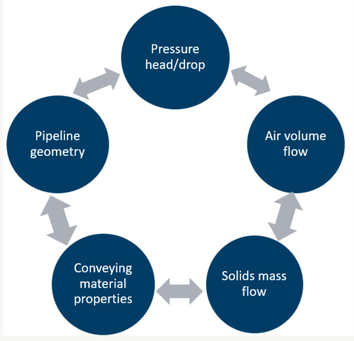


Figure 3: Main influential parameters of conveying system design & optimization

SINTEF's powder conveying test facilities & services

- High pressure (up to 9 bar) blow tank, dense phase conveying rig [Figure 7]
- Medium pressure (up to 2 bar) rotary feeder, dilute phase conveying rig [Figure 6]
- Online, real time pressure measurement
- Flexibility of adopting different pipelines, pipe components, down stream
- Complete system designs, optimization and/or troubleshooting
- Formulate computational simulations and design calculations for industrial plants [Figure 8]

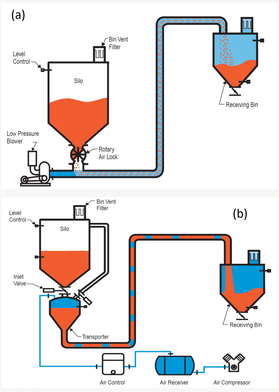
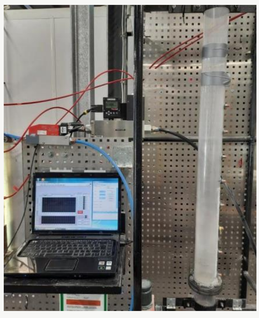


Figure 1: Modes of conveying; (a) dilute phase (b) dense phase

Characteristics, feasibility checking & pilot testing

- The fluidisation properties of powders can be observed to assess their suitability for pneumatic conveying [Figure 4 & 5]
- The required pressure head and air volume flow rate needed to achieve the desired transport rate (transport capacity) for a given conveying configuration [Figure 3]
- Various models and approaches exist for designing conveying systems based on factors such as material properties, pipeline configurations, etc.
- The accuracy and reliability of available design models may be affected by several influential parameters.
- Plant design frequently involves pilot testing of material samples, followed by scaling-up techniques.



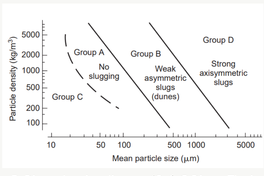


Figure 5: Dixon slugging diagram (*Ref: G Dixon. The impact of powder properties on dense phase flow. Proc Int Conf on Pneumatic Conveying. London. January 1979*)

Figure 6: Medium pressure conveying pilot rig

Figure 7: High pressure conveying pilot rig

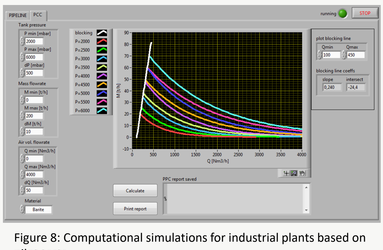


Figure 8: Computational simulations for industrial plants based on pilot tests

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