



Pneumatic Conveying - Issues & Answers Starting With the Basics

By Jack Hilbert, Pneumatic Conveying Consultants

Pneumatic Conveying has often been referred to as a "black art" rather than a science because equipment suppliers are very reluctant to provide information relative to how they arrived at a particular recommendation for any given application. Their respective experience is a key factor in their ability to provide equipment and solutions.

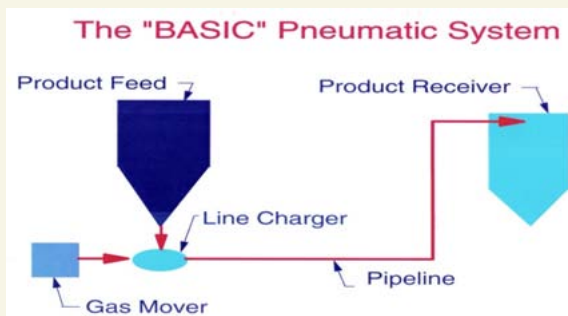
There is an abundance of academic studies, text books and printed matter available which will provide formulae, curves tables and theories but lack the ability for the "normal engineer in the plant" to apply them to his everyday problems.

Our goal is to present a series of informative articles which will take the subject of pneumatic conveying, break it down into logical sections and present not just theory, but a practical approach to how and why things work and what to do when they don't.

As this is the first of a continuing series of articles, we will take the opportunity to review the very basics of the subject to establish some fundamental definitions and concepts which will be used on a continuing basis in later articles.

In this article, we will describe the basic pneumatic conveying system; define the key parameters; and, the three primary types of systems.

Below is diagram of the basic pneumatic conveying system with the (5) primary parameters identified. As our series of articles continues, we will take each of those parameters individually and discuss them in more detail.



Pneumatic System Diagram

continued...

“The Plattco Double Flap Airlock® Valves we purchased have saved us many thousands of dollars in electricity and maintenance costs over the last year.”

Plattco Valves Tackle Extreme Pneumatic Conveying Needs

Plattco's H-Series (H-1295) was the ideal choice for a cement plant that need to improve the pneumatic conveyance of up to 20 tph of pulverized coal over 600' with pressures at +9 psi.

As a result, they were able to increase their efficiency by 10% and decrease their maintenance and electricity costs "tremendously."

project specifics:

Plattco Model:	H-1295
Material:	Pulverized Coal
Capacity:	Up to 20 tons per hour (tph)
Temperature:	450oF
Equipment Above:	Feed bin
Equipment Below:	6" pneumatic line
Pressure Above:	-20" wc
Pressure Below:	9 psi

About Our Author:

Jack Hilbert has been a respected authority in the pneumatic conveying industry for more than 37 years. His expertise has helped companies in the Food, Minerals, Cement and Power Industries. His experience includes working for Fuller Company, FLSmidth and DUCON Conveying Technology with numerous international assignments.

Jack is a graduate of Penn State University with Bachelor and Master Degrees in Engineering and is a Registered Professional Engineer in several states.

When we talk about pneumatic conveying systems, we must also be very much aware of what "mode" of conveying is taking place in the conveying line. Once again, we will discuss all the modes in more detail in future articles but below we have the basic descriptions of what each mode of conveying represents:

Dilute Phase (stream flow)

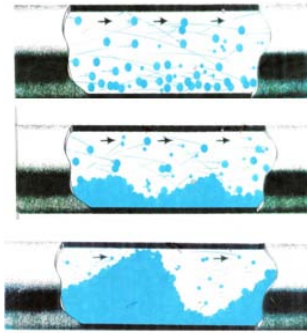
- * Above the saltation velocity
- * Typically less than 6 pounds solids per pound of air

Two Phase

- * Below saltation velocity
- * 6 - 100 pounds of solids per pound of air

Dense Phase

- * 20 - 500 pounds of solids per pound of air
- * Permeable piston
 - ♦ Special feed method required to form plugs
- * Nonpermeable
 - ♦ Special feed method required to form plugs
 - ♦ Air assist, by-pass, etc. required to limit plug length



Top: Dilute Phase,
Middle: Two Phase,
Bottom: Dense Phase

While it may seem that all materials can be handled in any conveying phase, different material characteristics can limit the phases you can consider. To obtain a dependable conveying system, choose a conveying phase that's compatible with your material. Consider these material characteristics: particle size, material density, particle shape, moisture content, abrasiveness, and friability.

In our future articles we will provide you with the information and explanations which will put you in a more knowledgeable position to make the necessary analysis and decisions.

To make sure we address any specific questions you may have in future articles, please click here to send them to me by email.

H-Series: Premiere Valve

Our H-Series valves are ideal for even the most demanding dry material handling applications with thousands of successful applications in industries throughout the world.



Excellence in Design:

- * No rotary action means no need to build clearance (leakage) into the valve.
- * Double flaps ensure that the seal is never broken throughout filling and emptying the valve.
- * All-cast construction for consistency, proprietary alloys for durability and wear resistance, seat and flapper precision-machined to eliminate air leakage.
- * Full-throat opening eliminates bridging, jamming and material build-up.
- * In pressurized applications, Plattco's patented mechanical seal eliminates the potential for shaft-seal leakage.
- * Seat and flapper can be reground several times to bring them back to "like new" condition and performance.
- * Housing is not part of the seal -- allowing it to last for decades in the worst operational environments.

About Plattco

Plattco Corporation is the recognized leader for valves that solve material handling problems in a wide variety of industries. Plattco specializes in the design and manufacture of Double Flap Airlock® Valves and associated multi-purpose slide gates. Plattco is an integrated manufacturer with engineering capabilities, a pattern shop, foundry and machine shop at its facilities in Plattsburgh, NY. Plattco invented the double flap material handling valve in 1960 and has established a proven record of innovation. Plattco was the first to install double flap airlock valves on the windbox at iron ore mines and on the clinker coolers at cement plants. Founded in 1897, Plattco began as a gray iron foundry, producing drainage castings, stock valves and other machined castings for the paper, mining and other regional industries. Plattco is employee owned.

Plattco
Corporation

Founded in 1897



Plattco Corporation
7 White Street
Plattsburgh, NY 12901
USA

International Calls 1.518.563.4640
USA / Domestic Calls 1.800.352.1731

www.PLATTCO.com