Improve Process Consistency with Line Purging

Conveying Done Right

...We are not talking about purging material out of process machines....

Instead, we are talking about purging plastic pellets, additives and regrind out of conveying lines.

It is important to understand the benefits and the cost of line purging.

Purging provides measurable benefits under these conditions:

1. **When blended materials are being conveyed and some material separation may occur.**
2. **When vacuum pumps may not convey material over excessively long conveying distances.**
3. **When material is very sensitive to moisture pick-up.**

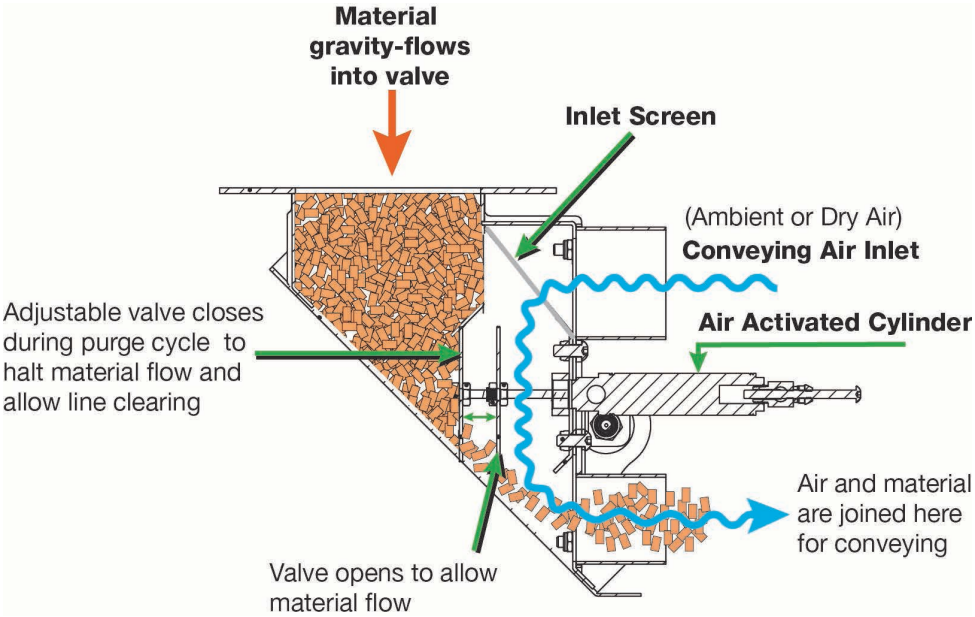
In the first two conditions, ambient air is sufficient for the purge cycle. For condition #3, it is necessary to purge conveying lines with dry air. When using standard vacuum takeoff boxes and purge valves, the hose connections could become quite complex – especially if a processor wanted to convey/purge with dry air.

To see how a modern Vacuum Purge Take-off Valve Works take a look at the diagram:

By combining the take-off box and external purge valve, we can use the plunger as a gravity dispense feeder rather than a simple open / close shut off. This provides a smooth, consistent flow. By adjusting the travel of the plunger, we control the rate material enters the air stream. This creates a very effective take off device, reduces the complexity and overall cost of the setup.

As material dispenses, airflow creates velocity to accelerate and convey the material. By bringing the air behind an internal baffle, the dispense area is protected from variations in pickup velocity or system vacuum.

In addition, we can easily connect a dry air source if needed.



This modern Purge/Take-off valve allows adjustable material/air flow, and either ambient or dry air purging of material lines.

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Ambient Air Convey/Purge

As the modern purge Take-off Valve illustration shows, ambient air is pulled through the filter on the back of the take-off box, and passes through the vacuum purge valve installed under the drying hopper.

During the convey cycle, the adjustable valve opens for air and material to flow through
the valve.

During the purge cycle, the adjustable valve closes to stop material flow, but air continues to flow, removing any material that is left in the conveying line. This ensures that the conveying line is left empty.

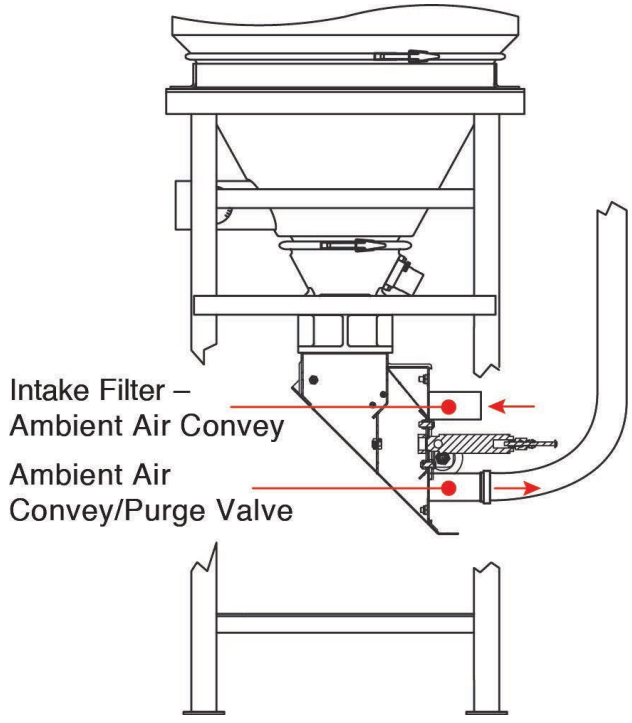
Dry Air Convey/Purge

In applications where the dried material is particularly sensitive to moisture pick-up it is advisable to purge conveying lines with dry air.

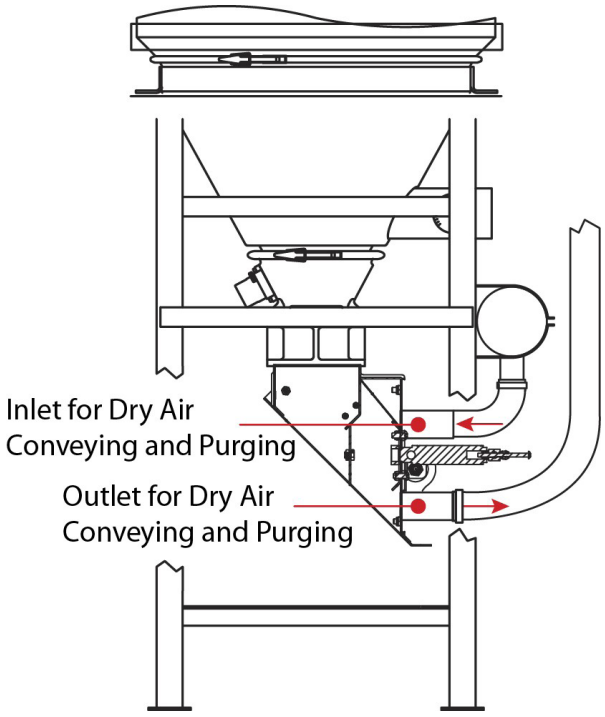
In this case, dry air is tapped from the dry air manifold and is used for conveying the material and line purging.

During the convey cycle, the adjustable valve opens and dry, tapped from the hopper return air line, is used to transport material to the destination.

Duing the purge cycle, the adjustable valve closes to stop material flow but dry air continues to transfer the material and empty the conveying line without introducing ambient moisture to the process.



Single connection for ambient air purge.



Simple dual connections for dry air purge.

Conveying Done Right

The Drawbacks vs. The Benefits

It's important to understand purge reduces the rate capacity of a conveying system. As an example, if your normal load time is 30 seconds to fill a receiver, and your time to purge adds 15 seconds, you're now moving the same amount of material in a longer cycle time…in this example, 50% longer. The net effect is reducing the system delivered rate to about 2/3 of the original capacity. This should be taken into account when designing the system.

Loading & Purging

"FILL" TIME:

Although this term may not appear on all controls, it is helpful to use for understanding the vacuum-on time of an individual receiver. The total vacuum-on time of a receiver (the length of time the vacuum sequencing valve is open) can be referred to as FILL time. All functions that happen while the vacuum valve is open (regrind proportioning, pocket conveying, purging, etc.) is all part of the FILL time.

"LOAD" TIME:

The vacuum time that a receiver uses to introduce material into a material conveying line is LOAD time. The term may be thought of as 'loading the material line'. This term is important to understand with purging systems to distinguish between the time the purge (or pocket) valve is opened (LOAD time) compared to the time it is closed (PURGE time). On systems that have no pocket or purge valves, LOAD time equals FILL time. On systems with pocket or purge valves, LOAD time is just the first part of the FILL time. Purge time is the conclusion of FILL time.

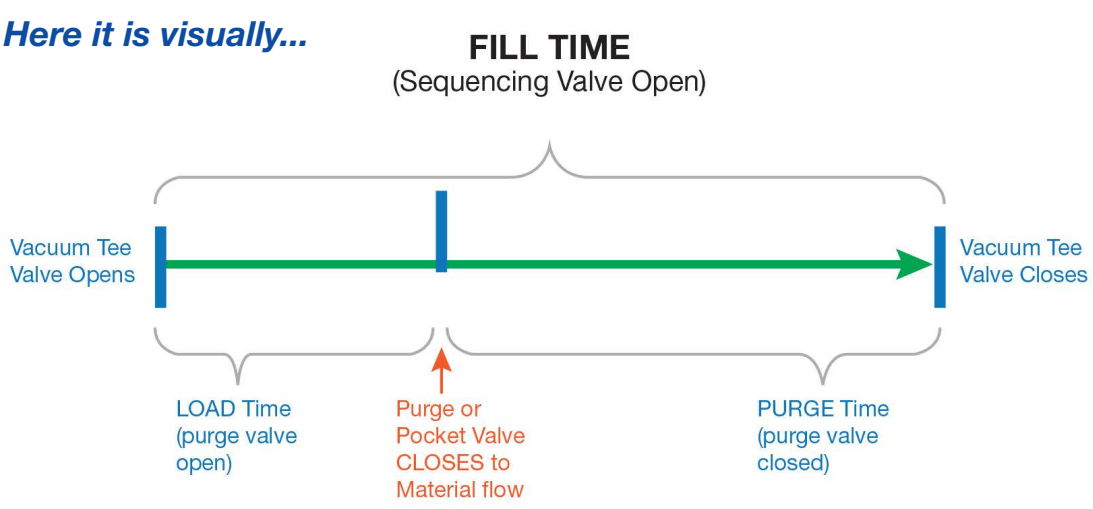
"PURGE" TIME:

The vacuum time that a pocket or purge valve is closed to material flow, but vacuum air continues to flow thru the conveying line to clean out the material conveying line is referred to as PURGE time.

LOAD time + PURGE time = FILL time

Because the functions are identical, the term PURGE time is used for cleaning out the conveying line after loading.

Here it is visually...



Note that it is common to set more PURGE time than LOAD time on the conveying control, to allow the entire conveying line to be cleaned of all pellets and even dust from the conveyed material.

Still, if you face on of the three conditions stated at the beginning of this article, the benefits of line purging overcome any drawbacks.

After reviewing the current and possible future conditions in your process, a material conveying specialist can give you the best advice.