

Receivers and Loaders: Helping Processors Automate Material Handling for Increased Efficiency, Safety and Quality

Vacuum receivers and self-contained loaders are normally mounted on top of some type of hopper, allowing for the automated handling of pellets or other materials delivered to or from a storage silo or bin, or to a blender, dryer, or processing machine. These devices eliminate the need for manual material loading and related problems such as labor cost and worker injury, process inefficiency and material contamination. Almost any plastics processing plant today will use this kind of equipment to some extent and large plants with central material handling systems may have dozens or even hundreds of loaders and receivers.

Receivers

Vacuum material receivers provide the end point for materials drawn through a central vacuum conveying system. Normally located near processing machines or storage vessels, they consist of a body, lid and filter, and are equipped with inlet and outlet connections. These connections are linked via tubes to the main vacuum line.

As materials are drawn by vacuum through the main conveying line, they are diverted to a single receiver through control system inputs that isolate the receiver by closing off a sequence of valves. This diverts the vacuum-driven flow to the receiver where the material enters, loses velocity, and falls into the receiver body. The vacuum air, no longer carrying the material, passes through a filter and returns through a dust collector to the vacuum pump. Ordinarily, the level of material in the receiver is monitored by a level switch, which signals the central system to stop loading the receiver when it is full.



Large plants, with central material handling systems, may have dozens or even hundreds of loaders and receivers.

When the vacuum cycle is completed and the material is enclosed in the receiver, a flapper valve on the bottom of the receiver body opens and allows the material to fall from the vacuum receiver into the hopper or the machine throat. The flapper then closes, ensuring that vacuum can be held through the receiver on the next conveying cycle.



Vacuum receivers can be mounted on a conventional machine hopper or on a glass direct-feed hopper.



Multiple receivers usually operate from a single vacuum source. Each will be equipped with vacuum sequencing valves, which are controlled at a receiver-mounted terminal box, with electronic connections to the master control panel for the entire system. Other control functions associated with receivers include material-line valve controls (for common material line isolation), internal demand-level switches, ratio valves to enable virgin/regrind mixes, and direct or gravity feeds.

For many years, vacuum receivers looked very much like the cone-shaped hoppers that are common on injection molding

machines. A lid was added to accommodate material inlet and vacuum outlet connections or, in the case of self-contained loaders (see below), a vacuum motor would be mounted to the lid. More recently, however, manufacturers have been re-envisioning the vacuum receiver. With the trend toward lean production techniques such as fast job and mold changes and lean inventory management, direct feed “hoppers” appeared. These units usually have a cylindrical body, often made of clear glass, mounted on the feed throat of the molding machine. Only a small amount of material would be held at any given moment so they were much easier to clean out during a material change. Also, when loading dried material, residence times were reduced, minimizing the possibility of moisture regain in the receiver. When supported by appropriate automation and a well-engineered pneumatic conveying system, direct feed provides a continuous and reliable supply of resin while eliminating the time required to clean out and manage excess resin in the machine hopper when it is time for a new job to run.

More recently, the market has seen the introduction of straight-through “tube loaders” and angled receivers. Both are substantially easier to manufacture, which keeps costs down, and the angled receivers make it much easier for operators to reach inside for cleaning or other maintenance.



Angled receivers make it easier for operators to reach inside for cleaning or maintenance.

Self-contained loaders

In a plant where only a few receivers are required, a central conveying system with a dedicated vacuum pump, piping, and controls may not be necessary or economical. In these situations, loaders can use self-contained vacuum loaders. These also can be used as a supplement to a larger central system. The function of self-contained loaders is identical to that of the receivers in a central vacuum system, but they have a built-in vacuum motor or compressed-air venturi system to move material, so these loaders can operate locally rather than centrally.

Self-contained loaders are available in a range of sizes. They provide a versatile, portable conveying capability suited to moving pelletized or regrind materials to hoppers, bins, or processing machines. The smallest self-contained loaders are designed for low volume conveying to small machine hoppers, drying hoppers, or additive bins on feeders or blenders.



Self-contained loaders have a built-in vacuum motor so they do not need to be connected to a central vacuum system.

Larger models have a larger body, motor, and filter and can move large volumes of material from nearby gaylords, granulator bins or the holding bin under a blender. While basic loaders are available in standard or built-to-order configurations, others are far more modular and flexible in design, enabling a wide range of configurations:

- Ratio loading capability (for virgin/regrind mixing)
- Closed-cycle air purging between different materials
- Automatic, post-load filter blowback and cleaning
- Gravity or air-powered discharge (for materials with poor flow)
- Direct-feed viewing chambers for machine throat loading



With the FLX conveying control users can start small and/or build a system of up to 32 receivers and ten pumps, including such high-level functions as multi-source/multi-destination loading, ratio loading, reverse convey for regrind recovery, fill sensing, and more.

And, thanks to an ever-expanding array of controls, these loaders offer easy conveyance of both virgin and regrind materials, remote operation, and quick-connecting components to simplify disassembly, cleaning, and reassembly.

Whatever the application, whatever the required throughput, central or local, permanent or portable, vacuum receivers and self-contained loaders help make processing plants more efficient, safer and better able to produce high quality products. Conair material handling experts can help you determine exactly which of the many configurations and performance-enhancing options are right for your situation.