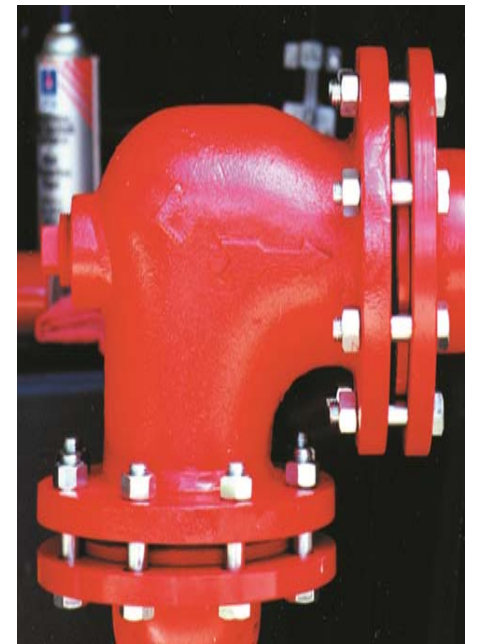


پنوماتیک سیستم‌های انتقال بار INC.

Pneumatic Conveying Systems & Components





In this presentation we hope to give a better understanding as to exactly how our equipment works, the theories and techniques we have developed over the years, and how our equipment has a competitive advantage over our competitors.

Company History

- J.D.B Dense Flow Inc. has Dense Phase Pneumatic Conveying experience dating back to 1976. Our experience is now being applied to designing and manufacturing some of the most effective, efficient, high quality Dense Phase Pneumatic Conveying Systems available today.
- J.D.B Dense Flow offers a system with low initial cost, low installation cost, and low maintenance characteristics.
- The Dense Flow System simplifies complex conveying problems. By tailoring solutions to fit varying material handling needs J.D.B. Dense Flow works hard to find the simplest most dependable solution for the conveying problem at hand.

J.D.B. DENSE FLOW INC.
Pneumatic Conveying Systems & Components

Dense Phase System Characteristics

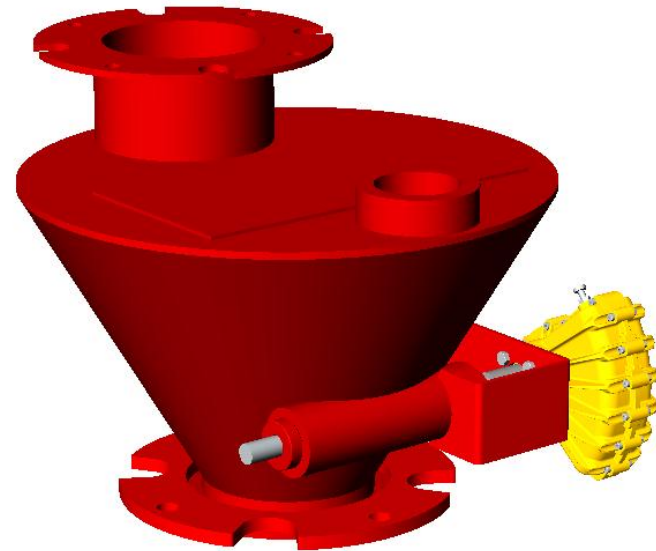
- The Dense Phase System is primarily a high pressure, low velocity, Dense Phase Pump for conveying powdered or granular materials. The system can convey a wide variety of materials ranging from abrasive material such as Sand, to corrosive materials like Sodium Chloride. Friable materials such as Extruded Alumina, can be conveyed just as easily as non-abrasive products like Fire Extinguisher Powder.
- There are five main components in a JDB Dense Flow Dense Phase System that are utilized together to create the most energy efficient, and reliable pneumatic conveying system.
- The five components are The Dense Phase Pump, Charging Hopper, Cone Valve, Pocket Elbow, and The Electronic/Pneumatic Controls

Advantages of the JDB Dense Phase Pump

- All JDB pump vessels are assembled with adjustable support legs. The adjustability of the legs allows movement up and down approximately 6". This movement allows for easy accessibility to any components that need regular maintenance or replacement. Most competitors mount their pumps on fixed legs making routine maintenance and repairs a hassle.
- Compressed air is introduced into the pump vessel through an air manifold inside the pump. The manifold both inserts air in to the system and aerates material inside the pump. The manifold is easily accessed for regular maintenance, and replacement.

Dense Phase Charging Hopper

- The Dense Flow Charging Hopper is used to direct material from the supply point to the charge opening of the Pump Vessel. A baffle inside the Chute reduces the head pressure of the material against the Closing Gate. It also has a vent connection to vent displaced air from the Pump Vessel to a Dust Collector. This feature eliminates the need of a Vent Valve on the Pump Vessel and therefore reduces maintenance on the system.

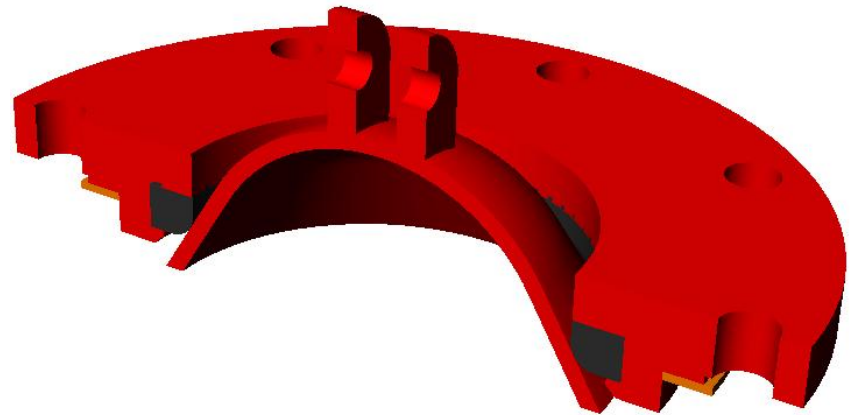


Advantages of the Dense Flow Charging Hopper

- The Dense Flow Charging Hopper allows material to fill the pump vessel freely with little to no head pressure on the inlet valve.
- The head pressure is minimized by a internal baffle and vent valve connection. The baffle diverts material into the pump vessel while air escapes through the vent.
- By eliminating the head pressure of the incoming material the pump vessel can be sealed with one inlet valve. In most JDB Dense Flow systems this single inlet valve is the only moving part throughout the entire system.

Dense Flow Cone Valve

- The Dense Flow Cone Valve is designed for use with abrasive materials and will seal against granular products up to 12 Mesh in size. When larger particles are present an automatic auxiliary gate is required to keep material away from the sealing surface. The Cone Valve may be operated by; an outside closing cylinder that is attached to an Inlet Chute, Bag Dump station, Surge Hopper...etc. The Cone Valve may also be operated by an inside diaphragm type cylinder. The Cone Valve design allows for thousands of operating cycles because the material is not rubbed against the seal and when pressure is in the vessel the cone seal becomes tighter



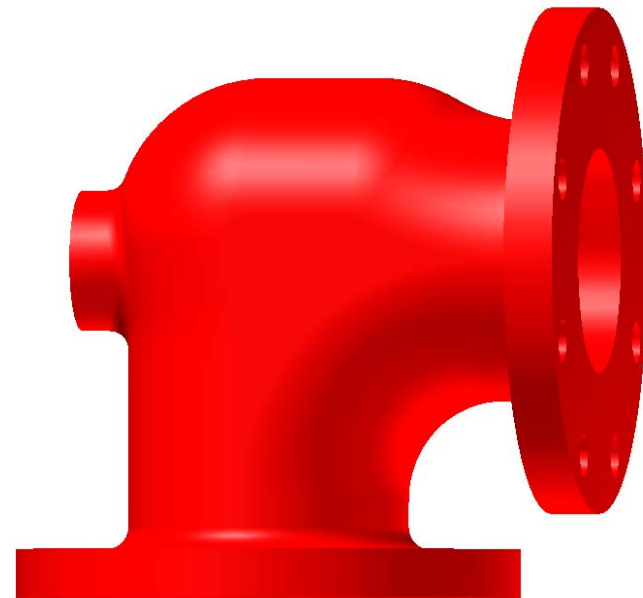
Advantages of the Dense Phase Cone Valve

- In most JDB system configurations the cone valve is the only moving part within the system, and when compared to the alternative double butterfly valve inlet configurations used by most competitors the cone valve is obsolete (especially when used in abrasive materials).
- The cone valve was designed with abrasive materials in mind. As material enters the pump vessel inlet it cascades evenly over the cone, and once the pump is full an air actuated cylinder gently pulls the cone against the inlet seal. Once the pump is pressurized the seal actually becomes tighter.
- JDB Dense Flow had a cone valve in a sand conveying system operating 24 hours a day / 7 days a week that lasted 18 years before needing replacement.



Dense Flow Pocket Elbow

- The Dense Flow Pocket Elbow utilizes a unique, but simple design characteristic which greatly increases its lifespan. Our elbow traps a designed amount of material in a “Pocket” which protects the elbows deflection point. By protecting the deflection point the pocket elbow is able to outlast other elbows 10:1 in many instances, all while being priced competitively. While the most notable advantage of using the Dense Flow Pocket Elbow has come while transporting highly abrasive materials (ie. Sand, Cullet, etc.), it is still effective with nearly all materials that are being conveyed pneumatically.



Advantages of the Dense Flow Pocket Elbow

- The pocket design has been around for over 50 years, since its original design by Jim Boothe for use on a pneumatic conveying line transporting sand at a Ford Motor Company plant. Today JDB Dense Flows Pocket Elbow design remains nearly identical to the original and has achieved timeless success through its simple and effective design.
- All sizes of the JDB Dense Flow Pocket Elbow are stock items and can be shipped the same business day that an order is placed.



Dense Flow Air/Electric Controls

- The Dense Flow Electric Control Panel is designed to meet your specific control applications whether your needs are a simple start-stop station or a fully automated system. The panels come equipped with a programmable controller to control the sequence and operations of your *Dense Flow* Pneumatic Conveying System.
- The Dense Flow Air Control Panel is designed to work in conjunction with the Electric control panel to automatically regulate and control the airflow to the system. Simple single material systems to multi-station multi-material systems can be designed.



Advantages of JDB Dense Flow Air Control Panel

- All piping and components (Solenoids, Diaphragm valves, Filters, etc.) are fully enclosed in a NEMA style enclosure. Many competitors mount air piping and components to brackets on their pump vessels which are exposed to the elements.
- All components with air flowing through them are modified in house to increase the lifespan of these components.

Advantages of the JDB Dense Flow Electric Control Panel

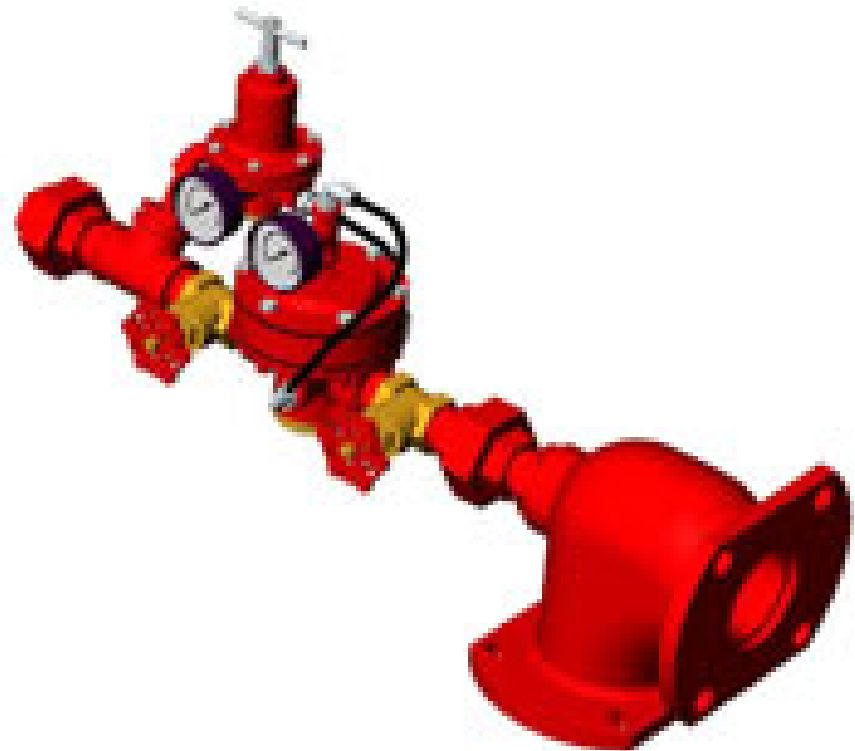
- JDB Dense Flow Electric Control panels use Allen Bradley Micrologix programmable controllers unless otherwise specified by our customers.
- We use an analog pressure control systems via the use of a Pressure Transducer. From readings given by the pressure transducer back to the PLC the electric control panel regulates the precise amount of air that needs to be added during a conveying cycle.
- Every JDB Dense Flow system is programmed custom to meet the differing needs of individual customers. No two JDB systems are alike.

Conveying Principals

- One main system design aspect that JDB Dense Flow differs from many of its competitors on is the absence air boosters along the conveying pipeline.
- At JDB Dense Flow we feel that in most applications boosters serve no advantage when considering material velocities.
- There are three characteristics that go into the design of every JDB Dense Flow conveying system; Simplicity, Reliability, and Performance. When boosters are used in a conveying system it becomes more complex, adds components that will eventually fail, and cause performance to drop.

Dense Flow Anti-Plug Device

- The Dense Flow Anti-Plug Device is an air-controlled device, which can be used to help prevent plugging of the conveying line or can also be used as booster air to the conveyor line. When using the Anti-plug Control for preventing plugging of the conveying line, the pressure on the device would be set at a pressure slightly higher than the normal conveying pressure at the Pump Vessel. The device would then sense the pressure in the line and if the material and the pressure in the conveying line are operating normally then the Anti-Plug Device would not operate; however, if the pressure in the line started to rise above the set pressure caused by material slow down in the pipeline then the Anti-Plug Device would come on to help clear the line.



Dense Flow Anti-Plug Device Continued

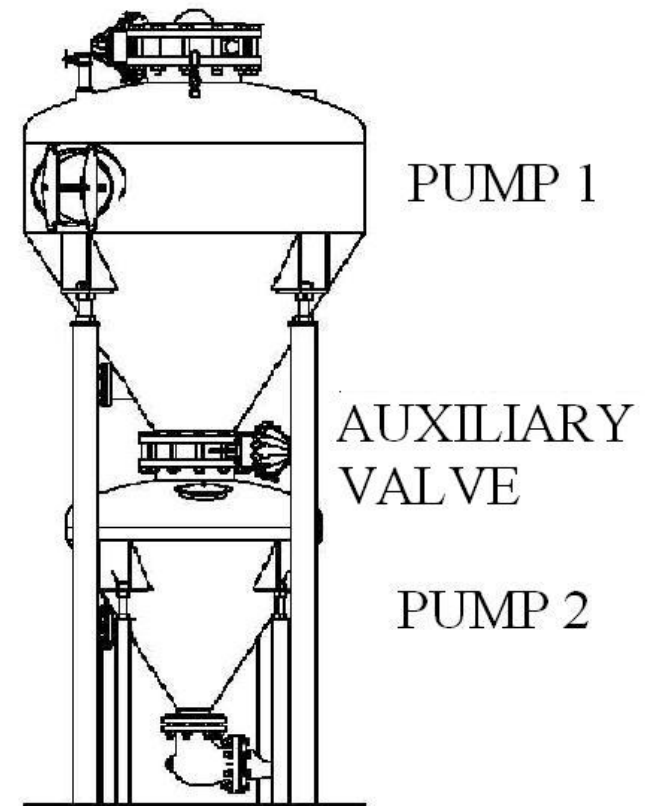
- The Anti-Plug Device can also be used as a constant boost to the material in the conveying line, due to material characteristics or extended conveying distances, the set pressure for the control would be somewhat less than the normal operating pressure of the system as indicated by the operating pressure in the Pump Vessel. This would mean that the Anti-Plug Device would come on at a reasonably low pressure and maintain the set volume of airflow into the material and the conveying pipeline to create added fluidization of the material. The booster would shut off after all of the material had been conveyed to the receiving bin and shut-off when the pressure fell below the set pressure of the Anti-Plug Booster.
- JDB Dense Flow believes in the use of anti-plug devices only when necessary. It is our philosophy that if a Dense Phase system is set up properly little to no boosters are needed. The use of unnecessary boosters will cause a system to have an increased number of maintenance problems, increased air consumption, etc.

Continuous Convey Systems

- There are booster style systems that do effectively move material gently from booster to booster. These systems are commonly referenced as continuous or full line systems.
- A continuous convey system with boosters is similar to the system described in the previous slide with the addition of multiple valves used for venting and sealing.
- This type of system essentially does move the material being conveyed in a gentle manner from booster to booster. The basic concept is that once the conveyed material has exited the pump the system stops, all the air is vented from the pump vessel and more material is added to the pump. When the pump is full it is sealed and the air is turned back on. This sequence will continue and eventually the entire line will become full of material.
- With this type of system it can be difficult to convey high tonnage rates while effectively maintaining the continuous convey characteristics. Also, the addition valves add more moving parts which will eventually wear out and need replacement.

JDB Dense Phase Double Pump System (Continuous Convey)

- The JDB Double pump system was designed to with the same continuous convey concept in mind, while maintaining the dense phase characteristics of the traditional JDB system.
- Our double pump or continuous convey system utilizes two Dense Flow Pump Vessels separated by an auxiliary valve.
- When using a double pump system compared to a traditional single pump system you eliminate your charging, or fill times, which allows you to convey more material in the same amount time without sacrificing dense phase conveying characteristics.



Benefits of a Double Pump System

- Less Air Consumption (Approx. 25%)
- Shorter Total Convey Times
- Continuous Convey
- Less Material Degradation
- Less Wear on Pipeline Components
- Less Maintenance

Dense Flow Compact Bin Vent

- The Dense Flow Compact Bin Vent is used for separating clean air from the dust laden air of a conveying system. The clean air pulse design allows for efficient cleaning of the filter cartridges. The compact design allows for installation in tight areas. Many filter options are available including; polyester, felt, paper, HEPA, and PTFE. Many custom configurations of the Compact Bin Vent can be designed and manufactured by JDB Dense Flow.



Compact Bin Vent Styles

- Round style compact bin vents all have three cartridges ranging from 84 to 208 Sq. Ft. of cloth
- Square style compact bin vents have from 4 to 9 cartridges ranging from 112 – 621 Sq. Ft. of cloth.

