Applications of Rotary Valves in Industries
by RotaryValves.com

Introduction

Rotary valves, also commonly known as rotary feeders or rotary airlocks are compact mechanical devices for continuously discharging bulk powders or granules under gravity flow. By definition it is the simplest of machines having only one moving part (ignoring the drive); a multi-vane rotor revolving in close contact in the housing and where the housing has an inlet at the top, and an outlet at the bottom.

Applications

It is a well known fact that almost all the industries out there make use of Rotary Valves to their fullest capacity. In this article, we will discuss the applications of the Rotary Valves in different industries around the world as well as the different types of Rotors used and the material they are composed of.

List of Industries

Before going into the details, let us enlist the few industries the Rotary Valves have made an impact in:

Aggregates
Agriculture
Asphalt
Baking & Milling
Biomass
Cement
Coal
Chemical
Dairy
Energy/Power
Food
Foundries
Grain
Minerals
Mining
Paint
Paper
Pet Food
Pharmaceutical
Plastic
Powder Coating
Rubber
Steel Mills
Textile
Tobacco
Waste to Energy
Wood

Now that we know some of the industries they are used in. Let us take a closer look on the properties of the valves used and their functions. One fact that we must keep in mind is that industries rarely make use of open end rotary valves and you will mostly find closed end valves everywhere.

**Selection Criteria**

All the rotary valves used in industries are listed individually but before proceeding to that, let us take a general look at the selection criteria that is typically followed while making the appropriate choice.

One of the most important and basic things that need to be kept in mind is the **performance requirement**. This decides the size of the rotary valve and includes parameters such as the throughout rate, product density, flow characteristics and
any factors that may influence these such as valve throat size, opposing air/gas leakage.

After we know about the performance details, we move onto the details of the product. This mainly involves the physical behavior of the product being used. The product used could be sticky, abrasive, corrosive, biologically sensitive, cohesive, toxic, flammable, speed sensitive and even sometimes explosive. This usually decides the finer details dealing with the design and construction of the individual components.

Now that we know how to construct the components, we need to figure out the material the parts are going to be constructed out of as well as their configuration. We need to keep the following two things in mind for that, the physical installation details and the pressure differential.

Last, but not the least but the industry requirements and the individual requirements play an ample part in the final shape and design of the rotary valve. As an example, those in the quarrying industry generally are not worried about most aspects of the valve supply providing it performs to specification and is durable, whereas at the other extreme the food and in particular the pharmaceutical industry are necessarily much more demanding. Their needs include detail design, surface finish and other features.

**Details of Valves in Individual Industries**

The details of the individual industries are given below:

The Aggregate industry involves working with different minerals mined from the Earth’s core. The valves used in this industry need to be tough and should be able to take some abuse as they deal with Asphalt, cement and other abrasive materials. The function of the valves is used to convey product from a single inlet to the place of their usage. The CI series of Rotary valves are normally used in the aggregate industry and are made up of either cast iron or stainless steel. It is a closed end rotary valve and can be seen in the figure below. This Rotary valve is
not just limited to the aggregates industry, but the same valve is used in the Asphalt Industry. Here is a video showing a rotary valve in action.

The function of the Rotary Valve in the Cement industry is somewhat similar to the one explained above. The only difference is that these valves have a different composition to reliably convey all powder bulk materials in a cement plant, including raw meal, by-pass dust, clinker, cement, fly ash, pet coke, lignite and plastic fluff. The Rotary Valve is made up of mild steel but chrome layers are applied in different thicknesses on the housing bore, end plates and the rotor tips for lower conveying pressures and product hardness and Tungsten Carbide is used for the tips of the rotor. Ceramic is also used inside of the housing bore and on end plates for wear protection at high conveying pressures and hard materials like cement or alumina.

In the Minerals Industry, companies typically use rotary valves to meter materials from the outlets of silos, hoppers, cyclones, mixers, weighers and dust collectors. Two models of these valves are generally used, the drop through model and the blow through model. These rotary valves generally consist of a cast iron body, adjustable stainless steel tips and outrigger bearings. They are generally supplied with a geared motor, but are also available as a bare shaft. When used with particularly abrasive materials, all contact surfaces on the rotary valves are treated with a tungsten-carbide hardening process. The Mining Industry also involves the transport of minerals, but in the form of slurry liquid and thus a
combination of these rotary valves is used together with diaphragm valves for the complete extraction. You can see the working [here](#).

![Image of rotary valve](https://example.com/rotary-valve.jpg)

The **Coal** Industry requires a few special features otherwise it uses the same rotary valve made up of mild steel as used in minerals industries. The valves used have a generally high filling ratio due to a specially designed inlet and have minimum clearance as to minimize the loss of air. The use of external ball bearing makes the construction of the valve much sturdier and the rotor blades can be exchanged as well as adjusted according to requirements and the deposition of carbon soot.

Nearly all **Food** and **Pharmaceutical** product characteristics are easily managed, and the basic design of the valve in this regard can remain relatively simple without compromising hygiene and ease of use. Common product characteristics include being sticky, cohesive, and corrosive. There is a slight tendency to build-up on the swept surfaces etc. These valves are usually made of stainless steel with polished or non-stick coated surfaces. As abrasion is not normally an issue, relieved rotor vane tips are normally incorporated as standard; this minimizes the drive torque requirements should the product tend to build up on the internal rotor surfaces. One additional feature in these valves is that they are easy to clean as apparent from their figures.
In Steel Mills the most important and fundamental part is the melt shop. Rotary discharge valves are in widespread use in melt shop baghouses. It is very important for the melt shops to function without interruptions. For that purpose, the rotary valves need to be designed as to ensure smooth continuous flow. The source material used is scrap steel and it is impossible to eliminate the presence of foreign objects so we need a rotary valve that ensures that these foreign objects do not get stuck between the rotor blades or the housing. The typical valves used in the steel industry are made of cast iron that have been treated to raise their working temperature but problems still do occur and cannot be fully eliminated. Due to this reason, the rotary valves are now slowly being replaced by double flap valves to prevent this problem from occurring.

Foundries are very dusty places. Whether the dust is produced in mold making, metal melting, metal pouring, or finishing and treatment (heat treating, grinding, machining and finishing), the dust should be collected with a dust collector to
provide a safe environment for your workers. The most common airlock used in foundries for dust collectors are rotary valves. The commonly used valves are made of cast iron with a slight modification. They come with an attached duckbill sleeve which can easily be replaced if it wears out from continuous usage. The same rotary valve can be used in the **Wood** industry to collect dust. In the **Textile** Industry, rotary feeders are also ideal for pollution control applications. The figure of the valve is shown and you can watch an animation of how the valve works [here](#).

The **Agricultural** Industry makes vast use of the rotary valves in many of its fields but they are most commonly used in the Dairy and Grain Industries.

Coming to the **Dairy** industry first, the function of the rotary valve is to move the product while providing a strictly hygienic environment. We need to prevent bacteriological risks and rule out contamination. AL/BL type rotary valve is used for the dairy industry. Some of the special features of this design are that there are no dead corners (no angle smaller than 135°). The rotor pockets are rounded with the rotor blades beveled on three sides. All the points that come into contact with the product are polished. There are special seals that keep the flow even and can easily be inspected. This model can also easily be demounted without the help of tools. The rotary valve can be seen in the figure.
The **Tobacco** industry also falls under the category of agriculture. The rotary valves are basically used to divide the tobacco into finer particles by passing it through the blades of the rotor. A simple cast iron rotor is sufficient to fulfill this purpose and does not require any additional add-ons.

In the **Grain** Industry, a rotary valve or an injector delivers the grain into the pipeline in pressure conveying systems. A rotary intake unit is used for larger capacities. This is driven by a small motor that increases the capacity significantly in comparison with an injector. Some of the significant features of the rotary valves that are used are that they use rubber slats which serve as an excellent seal against air loss. In addition to preventing the air from escaping, these rubber slats can also bend to eliminate clogging. The whole system is shown below. It works something like shown in this [video](#).

Like the mineral industry, the **Biomass** Industry also requires a rotary valve that can take a beating and still continue to function smoothly. The biomass industry
requires the rotary valve to feed biomass fuel into the power boiler while at the same time serve as a lock to prevent the backflow of gases and flame. It also serves as dosing valve at silo outlet to prevent the uncontrolled discharge of material out of the silo. The same rotary valve becomes a mean for energy generation and serves in the **Power** industry in similar fashion by converting **Waste to Energy**. Standard Valves used can be made up of Cast Iron, SG Iron, Ni-hard or Carbon steel. To further enhance durability replaceable body liner can be hard chromed or ceramic coated. Rotor shaft sealing options include various types of gland packing, mechanical seals, air or grease purge.

The **Chemical** industry involves the moving of pure and sensitive chemicals, whose purity cannot be compromised. These valves also require regular inspection and cleaning to ensure no mishaps occur. The valves used in this industry usually come with a rotor side-bearing mechanism, which makes it possible to open and close the side plate at a single touch, and attachment and detachment of the rotor can also be accomplished simply by removing the single center bolt. It can be viewed in the figure below.

**Baking and Milling** requires feeding powdery or granular materials into a conveying system. For this purpose Blow-Through rotary valves are used as these enhance rotor cleanouts and can be installed in tight quarters. The housing and end plates of the rotors used are machined from castings and are made of wear iron or chrome-plated wear iron. Eight blades maintain a minimum two-blade labyrinth seal to minimize air leakage. The rotors are equipped with relieved tips.
for materials which form skins or thin sheets on end plates and housing, or non-relieved tips for cereal products. The two types are shown below.

The Pet Food industry's regulations are demanding. Cross contamination is a real concern, so regular equipment cleaning is necessary. We need a rotary valve that is easy to disassemble, clean and reassemble. The Valves used can be made up of stainless steel, chrome-plated grey cast iron, nickel-plated grey cast iron or grey cast iron. The surfaces are smooth and polished and sometimes coated with Teflon. You can see the different valves below.

In typical Powder metering applications, the rotor speed is controlled to provide a controlled flow of product into a convey line, hopper or into a vacuum pick-up vessel prior to conveying. By controlling the flow of product, we can ensure that powders can be effectively conveyed from one source to a destination at a constant rate to match the application. The model of the rotary valve uses an eccentric structure in which the intake port and discharge port are offset, thereby reducing the volume efficiency of powders in the rotor pocket. Furthermore,
special edge machining for the rotor prevents powder bite between the rotor and casing. This can be seen in the following figure.

**Paper Making** is a very delicate process and even the slightest imbalance can greatly affect the quality of the paper being produced. The rotary valves come in during the drying process of the paper and are responsible for regulating the flow of the steam such that the paper dries at the desired ideal rate. This valve is almost always made of stainless steel and can be seen in the figure shown.

This [video](http://www.youtube.com/watch?v=example) shows the working of rotary feeders in most industries to give you an idea on how they work.
List of Rotary Valve Manufacturers

Given below are some of the rotary valve manufacturers located around the globe.

**Magnum Systems**

Magnum Systems, Inc. is one of North America’s leading designers and manufacturers of handling and packaging systems for dry bulk materials. The company’s engineering knowledge and application experience are greatly valued by customers that process bulk materials such as grain, seeds, cereals, sugar, flour, plastic pellets, plastic powder, sand, cement, fly ash, fertilizers, and granulate chemicals.

The *Smoot* line of pneumatic conveying systems and the *Taylor* line of dry bulk packaging equipment strengthen the Magnum brand. Many of Magnum's competitors manufacture material handling systems or packaging equipment. By offering both, Magnum serves customers who want an integrated, one-stop solution.

Website: [http://www.magnumsystems.com](http://www.magnumsystems.com)
DMN Westinghouse

DMN-WESTINGHOUSE has been designing and manufacturing rotary valves, diverter valves and other related components for the bulk solids handling industry for more than 40 years. As an independent company with no involvement in system design, their sole activity is the development, manufacture and sale of these components.

DMN-WESTINGHOUSE offers tailor-made solutions to the global food, dairy, plastics, (petro) chemical, pharmaceutical, mineral, power and biomass industries. Their line of rotary valves and diverter valves comprises a number of universal components that are suitable for many applications. They also have a range of dedicated components for use in specific industries or to handle specific products.

Website: http://www.dmnwestinghouse.com/en/
ACS Valves

ACS Valves design, engineer, and manufacture rotary valves for metering, feeding, and airlock in bulk material processing and pneumatic conveying applications. Their products are sold through a global network of sales representatives and supported by a corporate staff of applications engineers and customer services technicians.

ACS Valves was founded by current president and CEO Tom Thompson. After decades of designing and manufacturing bulk material handling systems and pneumatic conveying systems, Thompson started his own business venture, focusing his attention solely on rotary valves.

With knowledge of the entire materials handling system, Thompson's creations at ACS Valves have revolutionized the market. His innovations and applications expertise quickly made ACS products vital components of today's processing and production operations.

Website: [http://www.acsvalves.com](http://www.acsvalves.com)
**Coperion**

Coperion is the worldwide market and technology leader in compounding & extrusion, materials handling and service - as well as being a partner for global corporations and small to medium-sized enterprises in the plastics, chemicals, food and aluminum industries.

As an integrated technology provider, they use their comprehensive system and process expertise to implement individual solutions for compounding technology and bulk materials handling for their customers. This covers the full added value chain of the production process from consultation and planning, through engineering, process optimization, manufacturing, delivery, installation and commissioning through their worldwide service network. They collaborate with their customers on innovative, new, and further developed components, machines and systems, forming the basis for long-lasting, successful partnerships where the focus is on the benefit for the customer together with efficiency, reliability, and quality.

Website: [http://www.coperion.com](http://www.coperion.com)
Rotaval

Rota Val has over 45 years’ experience in the supply of Rotary, Diverter and special application valves. Their high quality, economically-priced rotary valves have been carefully designed to meet the exacting demands of modern bulk handling systems; they are manufactured in the premises of Wiltshire, United Kingdom, and have been since 1970.

Website: http://www.rotaval.co.uk
**Jiangsu Jinkuihua Machinery**

Jiangsu Jinkuihua Machinery Manufacturing Co., Ltd is a manufacturer and service provider for rotary valve. Started in 2008, the company is continuously rising on the growth chart and setting very high quality standards. Our strict emphasis on quality is combined with the latest technology to offer our customers a competitive edge.

Since its inception, the company has established a reputation for itself as a supplier of quality products. We focus on quality and aim to achieve total customer satisfaction, both in the products we offer and in the service that follows.

Website: [http://www.jkh-rotaryvalves.com](http://www.jkh-rotaryvalves.com)
Meyer

Meyer Industrial Solutions is focused on engineering and manufacturing premier system components for dry bulk material processing equipment, pneumatic conveyors, and dust collectors. They are recognized for their superior Rotary Airlock Valves, Sanitary Airlock Valves, Double Flap Gate Valves, and Pneumatic Screw Pumps that handle the toughest application. They also manufacture Gravity Diverters, Slide Gates and Blowers. No other company offers every system component for air process/bulk material handling systems under one roof like Meyer Industrial Solutions.

Website: http://www.meyerindustrial.com
Ricon Engineers

July the 6th 1979, a young Engineer Mr. P M Babaria decided to go into an Engineering manufacturing activities and Rotary Air Lock Valve was the product that touched his eyes. Like everyone else, he started with a small factory and made one model of Rotary Air Lock Valve. That was given for a trial purpose to his friend’s unit and that worked so wonderfully well. Today, there are more than 25 different models for varieties of application to handle powder and granules in industrial sector.

In addition to the Rotary Air Lock Valves we also design and manufacture certain critical products which need a detail study of requirement of our client before taking up the manufacturing activity. These products are related to Air Handling and Pneumatically Powder handling systems.

Website: http://www.ricongroup.com
Cheegers Machinery

Cheegers is a professional supplier of airlock valve, rotary valve and rotary feeder magnetic separator. Cheegers was rebuilt in 2003 from the revolution of China government factory which was built in 1958. Cheegers has been in the airlock business for the past 55 years and specialize in every kind of rotary airlock valves.

Website: [http://www.cheegers.com](http://www.cheegers.com)
ZERROR Engineering Services

Founded in the year 2009, Zerror Engineering Services is a well established engineering company, which has set a benchmark for it’s of quality, commitment, reliability and service in domestic market. Based in Kolkata, West Bengal (India), they are professional Manufacturers, Suppliers & Traders of Rotary Vane Feeder, Flow Pad Bin Aerator, Axial Flow Pad, Radial Flow Pad, Manual Gates, etc. As Service Providers, they render Repair Services of Industrial Impeller, Ceramic & Metal Coating, Tungsten Carbide Coating, Anti Abrasion Coating, Anti Corrosion Coating, etc. They claim to have requisite resources and manpower to offer high quality products and services.

Website: http://www.zerrorengineering.com
**Alpha Filter**

This company is one of the largest air pollution control equipment manufacturers in China and is located in Jiangsu province, the coastal area of east China. Since the foundation, the company has been combining their application experiences and providing the right solutions for customer air pollution control problems. The company is ISO9000 certificated. For each piece of the product, they stick to state-of-the-art manufacturing.

Website: [http://www.industrialcleanair.com](http://www.industrialcleanair.com)
Orchid Material handling Solution

Orchid Material Handling Solution Pvt. Ltd. the precursor Manufacturer and Supplier organization engaged in developing premium quality Material Handling and Conveyor Systems. It aims to be the premier choice for quality products, which comprise of Powder Transfer System, Jumbo Bag Handling System and Powder Conveying Systems. Owing to the in-depth analysis in various market courses and technologies, they have outdone the competition by accepting superior quality equipment, emphasizing sturdy construction, specifically accurate dimensions, premium finish, corrosion resistance, and maintenance-free service life. To achieve our perception of garnering diverse market needs, they offer Turnkey Projects Service at the most aggressive price.

Website: [http://www.orchidmhs.com](http://www.orchidmhs.com)
Can Group of Industries

Can Group of Industries established its operations in 2008, as one of the reputed manufacturer, supplier, distributor, wholesaler and trader of a huge collection of grain handling and pollution control equipment. The product range comprises of Grain Handling Systems, Bag Filters, and Pneumatic Conveying Systems. They manufacture their entire product range from advanced and latest technology machines that support in providing high functionality, longer functional life, and dimensionally accurate products. They also provide services of structure fabrication-erection as per the desired requirements of the customers.

Website: http://www.cangroupindustries.org
Parker Hannifin

Parker Hannifin provides highly engineered flow assurance instrumentation products and systems. These range from tube fittings, pipe fittings, needle valves, ball valves, compact stream switching valves to modular process valve packages. These items are all developed and manufactured to increase customer's up-time, maintain safety, improve production and quality control. Parker is equally committed with assisting customers in decreasing their downtime, labor and maintenance costs. The Instrumentation products are designed and developed with the customer's application requirements in mind. Parker is working closely with their customers in new opportunities and the various associated solutions to those application issues.

Website: http://www.parker.com
Emerson Process Management

Emerson Process Management Regulator Technologies, Inc. is a part of Emerson Process Management, a business unit of Emerson Electric. Emerson (NYSE:EMR) is a global company that brings together technology and engineering providing a wide range of manufacturing and processing solutions for industrial, commercial and consumer markets.

Emerson offers pressure and flow control solutions in Process / Specialty Gases, Liquids, Steam, Natural Gas and Liquid Propane. In this regard, Emerson offers more pressure regulator and relief valve solutions than any other manufacturer in the world.

Website: http://www2.emersonprocess.com
Local Manufacturers

Apart from the leading manufacturers, there are a huge number of local manufacturers also available. Most of them are found in China, followed by India and the United States of America.

Manufacturers in China: http://www.listofcompaniesin.com/china/rotary-valve/
Manufacturers in India: http://dir.indiamart.com/impcat/rotary-valves.html