



Screening and Processing



Drying System



Wood Yard



Conveying solutions in the cement industry



Maintenance and Service



Waste to Fuel



Waste to Flame



Waste to Electricity



Biomass Fuel Handling



Pneumatic Conveying

# INDUSTRIAL PROJECT AND SERVICE

[www.ispm-service.com](http://www.ispm-service.com)



A **ISPM** é uma empresa portuguesa que nasceu em 2015 com um conceito ambiental e inovador. Orientada por valores que incitam o desenvolvimento sustentável numa era industrializada, onde a geração de energia através de desperdício é, não só, uma forma de zelar pelo futuro do Planeta, mas também um meio lucrativo.

A **ISPM** é uma empresa flexível, entusiasta, socialmente responsável e adaptável às mudanças.

O nosso negócio é caracterizado principalmente por um esforço conjunto com os nossos parceiros.

Instalamos equipamentos, realizamos projetos **turn-key** e dispomos de assistência técnica com profissionais motivados e altamente qualificados. A superação de desafios, a busca pela geração e implementação de soluções tecnológicas, negócios inovadores e *out-of-the-box*, fazem parte do nosso dia-a-dia e da nossa visão a longo prazo. Somos uma empresa visionária, trabalhamos hoje para o amanhã como início do futuro.

Paulo Teixeira

A SOLUÇÃO DO  
FUTURO NO  
PRESENTE







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*BMH Technology* em Portugal e França;  
*Jeffrey Rader, Stela e Aumund* em Portugal;  
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# Pneumatic Conveying

O sistema de transporte pneumático de sólidos com recurso a ar é um método muito confiável e de extrema utilidade nas situações de difícil acesso através dos meios convencionais de transporte.



**Rotary Airlock Feeders**

Alimentadores de material em sistemas de transporte pneumático de alta/baixa pressão e sistemas de alimentação de caldeiras.



**Mark III Elbows**

A Curva Mark III para aplicação em transportadores pneumáticos, foi especialmente projetada para reduzir o consumo de energia, o desgaste e eliminar danos às fibras.



**Blower Assemblies with Belt or Direct Drive**

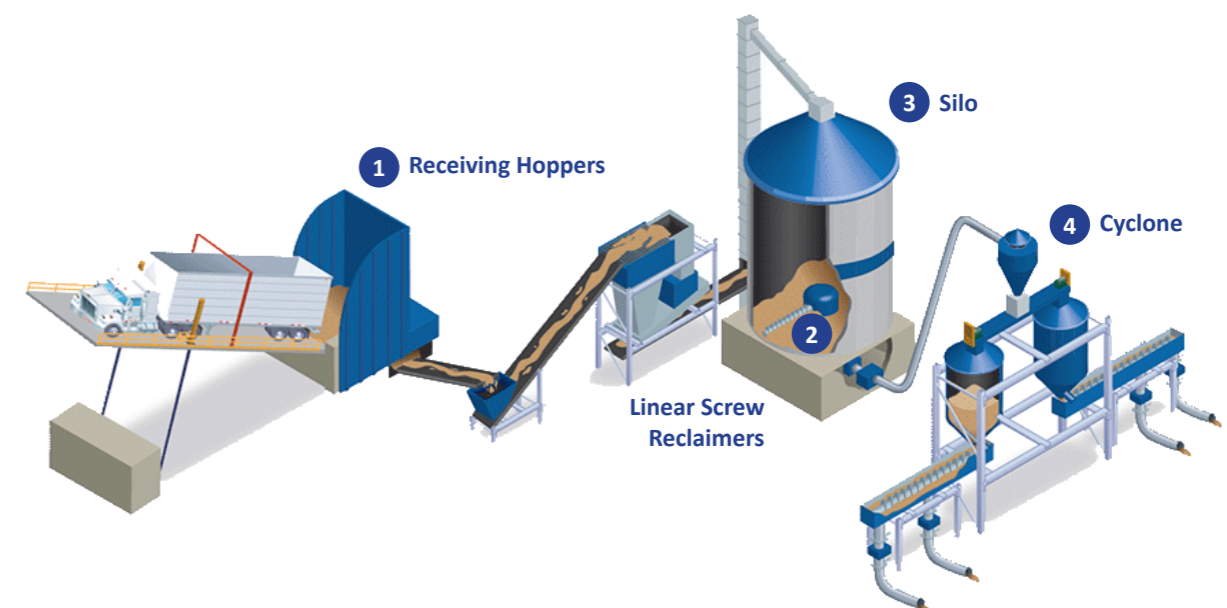
A Jeffrey Rader usa compressores de deslocamento positivo padrão para fornecer um volume de ar e velocidade constante.



**Model "E" Cyclone**

O Ciclone Modelo "E" fornece um dispositivo de descarga altamente eficiente para sistemas de transporte pneumático e de excelente desempenho para uma variedade de materiais fibrosos, incluindo aparas, pellets, serrim e casca.

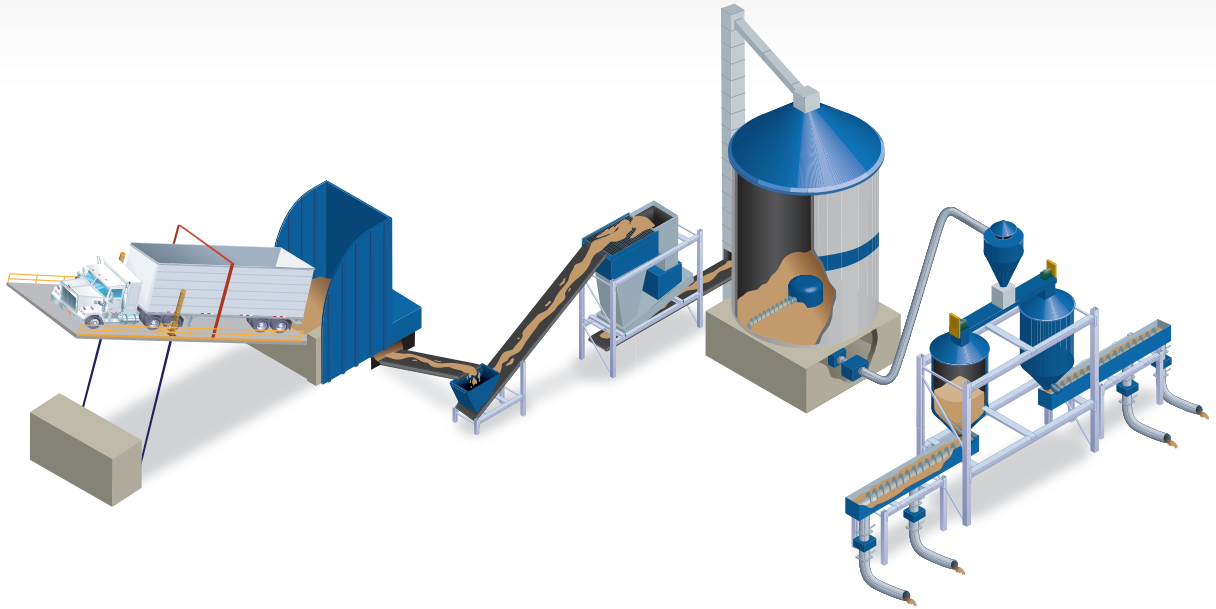
Com mais de 50 anos de experiência e milhares de instalações em fábricas de papel e celulose, a Jeffrey Rader possui um vasto conhecimento em projecto e construção de sistemas de transporte pneumático.





# Biomass Material Handling

Systems and equipment for biomass and alternative fuels.



## Applications

Jeffrey Rader material handling equipment is used in the multiple stages of biomass energy generation, from truck/rail receiving through the metered in-feed into the boiler.

Our products and experience can support your specific application, such as:

- Circulating or bubbling fluidized bed boilers
- Stoker or moving grate/floor boilers
- Cyclone and corner fired boilers
- Wall fired pulverized coal boilers
- Cement/lime kiln direct pneumatic injection
- Cement kiln pre-calciner fuel feed

In unison with that, we also have experience in the processing and handling of biomass and alternative fuels, including: wood chips, waste wood/C&D material, bark/hog fuel, sawdust, straw, miscanthus, DDGS, MSW/RDF, paper mill rejects, OCC, sludge, tire derived fuel (TDF), pellets, cubes or briquettes, coal, oil shale, and others.

With over 50 years of experience in screening, processing, and handling biomass fuels, Jeffrey Rader offers the most reliable solutions for your needs.

## Truck Dumpers & Receiving Bunkers



Jeffrey Rader manufactures truck dumpers as well as stokers, screw hoppers, and chain receiving bunkers for self-unloading trucks. Our truck dumpers are designed for dependable operation under tough conditions.

All models feature the advanced engineering and heavy-duty construction that result in fast cycle times, improved productivity, and reliable performance.

Jeffrey Rader can provide a full range of dumpers for your applications, including portables, back-on, and drive-through.

Additionally, our chain and stoker receiving hoppers are similarly designed for efficient, reliable operation under the most challenging conditions.



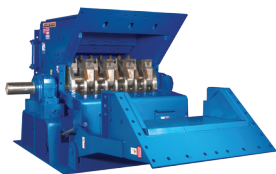
# Biomass Material Handling

## Applications (continued from other side)

### Fuel Preparation Size Reduction & Screening

Jeffrey Rader offers the following systems and equipment to optimize boiler operations:

- Primary and secondary shredding & crushing systems
- Fine grinding of fuels for PC boilers
- Air density separation (ADS) systems
- Disc screens for removal of oversized materials
- Gyratory screens and flexible deck screens



### Conveying & Material Handling



Jeffrey Rader offers complete material handling systems with pneumatic and mechanical conveying systems.

We design ruggedly-built rotary valves, cyclones, wear back elbows, ducting, and blowers for tough, high-pressure, high volume, and abrasive pneumatic conveying applications. Our pneumatic conveying systems can move material over long distances and elevations — even direct-inject into a boiler or kiln — with pneumatic conveying rates from 1 to 200 tons per hour.

Our mechanical conveying systems include durable chain conveyors, screw conveyors, bucket elevators, and apron conveyors.

### Storage & Reclaim

Jeffrey Rader manufactures the equipment and designs the systems you need to stack-out, store, and reclaim your wood chips, bark, hog fuel, biomass, and RDF products.

Our storage solutions include open pile, metering bins, A-frames, and circular silos.



Our complete reclaim systems include traveling linear screws, circular screws, stokers, cone bottom screw reclaimers, and top-pile stacker/reclaimers.

Whatever the number of days storage you require and type of product you are feeding, Jeffrey Rader storage and reclaim systems are designed to keep your facility running with a constant flow of materials.

### Boiler Fuel Feed Systems



Jeffrey Rader offers both mechanical and pneumatic boiler fuel feed systems which are a combination of our storage, reclaim, conveying, and feeding equipment. We work

closely with you to ensure that the feed system we provide is designed to meet the storage, metering, and feed rate requirements of your boiler, whether it's feeding 100% biomass or co-firing biomass with coal.

Typical feed system equipment can include:

- Boiler front day bins, silos, and hoppers
- Distribution of screws and conveyors
- Metering and robbing screws
- Expansion joints/isolation valves
- Feed chutes
- Rotary airlock feeders
- Fine grinding systems for PF boilers
- Gravimetric and volumetric feed controls

Our systems are in operation today at fuel feed rates of 3 to over 200 tons per hour.



# Pneumatic Conveying

**High-pressure, low-pressure and vacuum conveying systems for pulp and paper mills, biomass systems and boiler direct-injection systems.**

## Features/Advantages

Efficiently move chips, bark and RDF bulk material over a long distance, elevate it in a short distance or inject woody material directly into a boiler.

Pneumatic conveying rates of more than 1,000 tons per hour can be achieved with these systems. Jeffrey Rader designs ruggedly-built rotary valves, cyclones, wear back elbows, ducting and blowers for tough, high-pressure, high-volume and abrasive pneumatic conveying applications.



With more than 50 years of experience and thousands of installations in pulp and paper mills around the world, Jeffrey Rader has

the application knowledge to design and build your pneumatic conveying systems.

## Systems

### Boiler Fuel Feed Systems

Jeffrey Rader boiler fuel feed systems are typically made up of a combination of metering and conveying equipment such as underpile screw reclaimers, drag chain conveyors, screw conveyors, robbing screws, slide gate valves and rotary airlock feeders.

Depending upon the desired flow rate to the boiler, this system of equipment can be speed controlled faster or slower to obtain that desired flow rate.

Because this type of boiler fuel feed system is made of a collection of conventional and standard pieces of conveying equipment, it has the benefit of many years of industry experience along with the reliability of those types of equipment.

## Components and Equipment

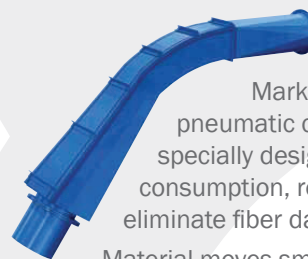
### Airlock Feeders



Jeffrey Rader rotary airlock feeders are considered to be the best in the industry. We stock a complete line of high-quality new and OEM-

rebuilt rotary airlock feeders, which are available for immediate shipment. Rebuilt feeders, which are reconditioned to our stringent design standards, offer significant cost savings.

### Mark III Elbows



The Jeffrey Rader

Mark III flat back elbow for pneumatic conveyor applications is specially designed to reduce energy consumption, reduce wear and help eliminate fiber damage.

Material moves smoothly through the elbow, first at the impact area, then guided as it changes direction and discharges into the downstream pipe.

Elbow backs and transitions are available in AR plate (200 - 400 BNH), R-35 (600 BNH) or ceramic materials.



# Pneumatic Conveying

## Features/Advantages (continued from other side)

### Components and Equipment

#### Model "E" Cyclone



The Model "E" cyclone provides a highly efficient discharge device for pneumatic transport systems and works well for a variety of fibrous materials including chips, bagasse, sawdust and bark.

The specially designed inlet impact section minimizes material damage and eliminates the buildup of material.

The Model "E" is designed for longer service life and easier maintenance. Wear parts are easily accessible for replacement. The inlet impact section is easily replaced from the outside of the unit. Abrasion-resistant alloy-plate body liners are easily replaceable through the top of the cyclone.

Replaceable and rotatable cone liners and R-35 (600 BNH) cast inlet segments are available as options. R-35 is extremely wear resistant and ideal for abrasive applications. Ceramic liners are also available.

#### Blower Assemblies with Belt or Direct Drive



Jeffrey Rader uses standard positive displacement blowers to deliver a steady volume of air at constant velocity. Electric controls are available to automatically shut off system if continuously overloaded, and interrupt material flow if a slight temporary overload occurs. A built-in check valve automatically closes when blower stops, preventing back-pressure from carrying material into blower. Inlet and discharge silencers are available to reduce noise levels.



# **E-HPS Rotary Airlock Feeder**

**For feeding material into high-pressure conveying lines  
in combustible/explosive dust applications.**

## **Features/Advantages**

The primary function of the E-HPS rotary feeder is to provide an airlock for high/low pressure pneumatic conveying systems and boiler feed systems for high combustible/explosive dust applications where ATEX (or similar) compliance is required. The E-HPS Rotary Airlock is designed to remain intact under momentary high pressure situations of up to 10 bar (150 psi).

The E-HPS feeder allows entry of material into high-pressure conveying lines with a minimum of air and pressure loss. It can also serve as infeed and outfeed airlocks in low-pressure systems.

Jeffrey Rader has built thousands of rotary airlock feeders for worldwide applications and is considered to be the best in the industry for heavy-duty applications.

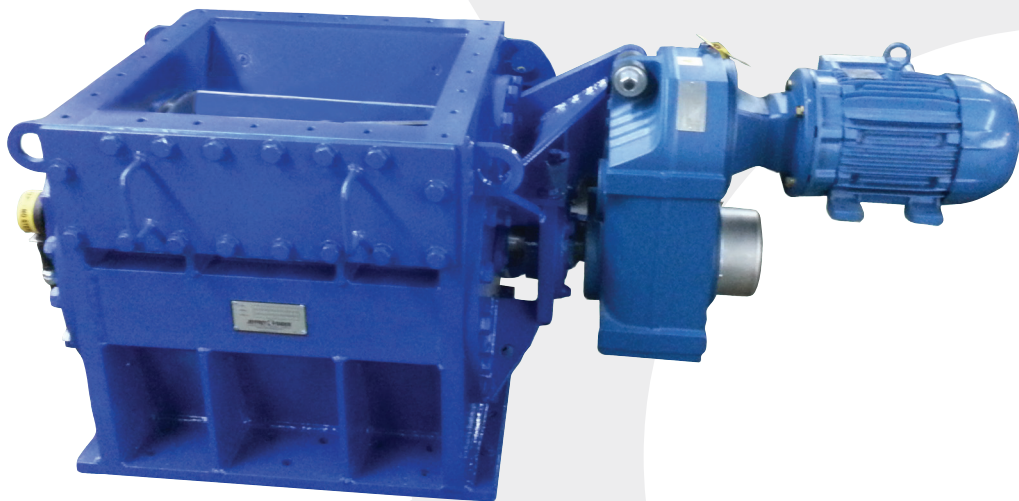
## **Functional Description**

All Jeffrey Rader rotary airlock feeders are designed for continuous duty service. The feeder consists of a heavy-duty, box-type housing that is rigidly reinforced to avoid distortion due to feed materials shearing during operation. The industrial housing is chrome-plated or fabricated from

duplex stainless steel for abrasion and corrosion resistance. Turning inside the housing bore, a rotor assembly moves material from the infeed of the feeder to the bottom discharge.

The rotor consists of heavy helical paddles with two end plates to increase rigidity. The paddles are mounted with removable shrink-type locking assemblies to a large diameter drive shaft and hard faced for extended wear and corrosion resistance. The internal rotor assembly and shaft run on high-quality roller bearings.

As material enters the feeder through the upper flange, material falls into the rotor pockets formed by the paddles. As the rotor assembly rotates, a top knife will shear any material that has not fallen completely into the pocket. The rotor, containing material, continues to turn. When the material reaches the bottom of the feeder, it falls out of the rotor pockets and lower flange of the feeder by gravity. An optional bottom wear bar is available to shear any material that does not fall completely out of the pocket. The rotor pocket then rotates back up into the starting position and the cycle repeats.





# E-HPS Rotary Airlock Feeder

## Features/Advantages (continued from other side)

### Standard Model Information

All Jeffrey Rader rotary airlock feeders are manufactured of high-quality components, and are machined, fabricated and assembled with great care. All units are carefully checked by hand at the manufacturing shop for proper operation before shipment.

The following features are standard on this model:

- Housing stress relieved after fabrication, before machining.
- Top knife for shearing material at infeed.
- Stainless steel adjustment screws for top knife clearance adjustment.
- Top knife cover to prevent material build-up on the top knife.
- A large top knife access door for inspection, adjustment, and replacement of top knife. A safety switch is supplied to interlock to system as a back-up safety device.
- Packing glands provide positive sealing on rotor shafts which are hard chromed in packing area for long life.
- Access door provided in end cover for easy inspection.
- Shaft-mount reducers and torque arm mount are standard.
- Extra heavy-duty rotor and shaft assembly, with rotor mounted onto shaft with shrink-type locking assemblies.
- Extra heavy-duty housing sufficient for rated pressure.
- Lower RPM rotor speeds to reduce tip speed and potential for spark generation in dusty environments.

### Optional Features

Below is a partial listing of optional features that may be selected at the time of order. In many cases, features may be added to existing units. Contact a Jeffrey Rader representative for more information on in-field modifications.

- ATEX certifications as required from authorized notifying body.
- Electric motor(s) by Jeffrey Rader.
- Optional drive arrangements.
- Speed sensing to detect loss of RPM.
- Anti-dusting baffle for infeed area of feeder.
- Infeed impact plate to prevent excess wear on the feeder housing.
- Sub-knife wear bar for protecting chrome or duplex stainless bore at infeed.
- Bottom wear bar for protecting chrome bore at discharge. Wear bar can be rotated four times to extend wear life.
- Tee injector and mounting base for material infeed into a high pressure pneumatic line.
- Various special materials and/or coatings to meet specific operating conditions.
- Special preparation, primer and paint as required.



# Pneumatic Boiler Feed Systems

**For feeding biomass and alternative fuels, including woody biomass, agricultural or refuse derived fuels into boilers and kilns.**

## Features/Advantages

### Fuel Feed Systems

Jeffrey Rader brand boiler fuel feed systems are made up of a combination of storage, reclaim, conveying and feeding equipment. We work closely with you to ensure that our feed systems are designed to meet the storage, metering and feed rate requirements for your boiler, whether it is feeding 100% biomass or co-firing biomass with coal. Our systems are in operation today at fuel feed rates of 3 to over 200 tons per hour.

Typical equipment can include:

- Boiler front day bins, silos and hoppers
- Distribution screws and conveyors
- Metering screws
- Robbing screws
- Expansion joints
- Isolation valves
- Feed chutes
- Rotary airlock feeders
- Fine grinding systems for PF boilers
- Pneumatic injection systems
- Gravimetric and volumetric feed controls

Depending on the boiler fuel specifications and design criteria, our system of equipment can be customized to achieve the objectives of the project. Inherent in our system design is the capability to react quickly to changes in fuel demand.

Jeffrey Rader offers pneumatic injection systems for the following types of utility or industrial boilers and kilns:

- Circulating fluidized bed boilers (CFB)
- Bubbling fluidized bed boilers (BFB)
- Cyclone boilers
- Cement or lime kilns and pre-calciners
- Wall fired pulverized coal utility boilers



### Fuel Storage, Distribution and Metering

The typical boiler or kiln feed system will include fuel storage, distribution and metering to the required number of feed points on the boiler or kiln. Fuel storage prior to injection is usually provided with day bins (silos, bunkers or bins near the face of the boiler). Day bins can be circular screw reclaimers in the bottom of silos, full live bottom screws, stokers or chains.

Fuel from the day bins can be discharged directly into the boiler feed spout or to a metering screw conveyor for feeding to a single boiler feed point



for mechanical or pneumatic injection. Distribution to multiple feed points can be accomplished with distribution conveyors (screw or chain), robbing screws and metering feed screws. A sophisticated control system utilizing level controls, variable frequency drives, and in some cases gravimetric feeders, works in concert with the boiler house DCS to optimize the distribution and delivery of fuel to the boiler feed point.

# Pneumatic Boiler Feed Systems

## Features/Advantages (continued from other side)



### Pneumatic Injection Systems

Jeffrey Rader pneumatic systems can be used to inject fuels into cyclone, fluidized bed or pulverized coal (PC) type boilers or kilns. Pneumatic injection is generally used where the fuel must be burned in suspension and is commonly used in cement/lime kiln feed systems as well as for pulverized fuel applications commonly found in power plants.

At the discharge point from the storage and metering system, fuel will be introduced into the pneumatic system through our standard rotary airlock feeder (ATEX compliant, if necessary). Once in the pneumatic system, the material can be discharged into the boiler through the pulverized fuel line, or directly into a burner.

Jeffrey Rader pneumatic systems are designed to the application taking into account the fuel characteristics, conveying distances, elevations and pressures to overcome in the pulverized fuel lines or boiler. Using positive displacement blowers and dilute phase conveying technology, our pneumatic systems can deliver fuel directly to multiple points along the face of the boiler consistently and reliably from distances of over 900 feet (300 meters). This makes them a good choice as well for retrofit applications where mechanical systems are difficult to integrate.

### Fine Grinding for PF Injecting

Secondary processing of fuels just prior to pneumatic injection is common in utility PF boilers where fuel specifications call for finely ground material at low moisture contents. We can offer this technology along with the boiler feed system in order to achieve the objectives of the project.

### Portable Systems

Our portable boiler feed systems are designed for customers looking to test burn alternative fuels in their existing boiler. For those applications, the system is designed to fit on a standard flat bed truck, allowing it to be moved to various locations. This is a very economical way to get good accuracy when feeding while providing plenty of flexibility in handling a variety of fuels.



Our portable system is skid-mounted with a hopper system for loading the material. A twin screw will feed the material, either directly into a pneumatic system, or onto a weigh belt feeder when greater accuracy is required. The material is then blown directly into a boiler or kiln, or discharged through a cyclone (when a mechanical feed is used).

The system comes with an optional control system for “plug and play” capability. Other options include a walking floor trailer system that eliminates the manual loading of the hopper by a front end loader.



# Rotary Airlock Feeders

For feeding material into high/low pressure pneumatic conveying systems and boiler feed systems.



## Features/Advantages

Jeffrey Rader rotary airlock feeders allow entry of material into high-pressure conveying lines with a minimum of air and pressure loss. They can also serve as infeed and outfeed airlocks in low-pressure systems.

Jeffrey Rader has built thousands of rotary airlock feeders for worldwide applications and is considered to be the best in the industry.

We offer a complete line of high-quality new and OEM-rebuilt rotary airlock feeders. Our rebuilt feeders, reconditioned to our stringent design standards, offer significant cost savings.

## Functional Description

All Jeffrey Rader rotary airlock feeders are designed for continuous duty service. The feeder consists of a heavy-duty, box-type housing that is reinforced to avoid distortion due to feed materials shearing during operation. The industrial housing is chrome-plated internally to extend its wear life and provide corrosion resistance. Turning inside the housing bore, a rotor assembly moves material from the infeed of the feeder to the bottom discharge.

The rotor consists of heavy helical paddles with two end plates to increase rigidity. The rotor is mounted to a large diameter drive shaft with removable self-centering locking assemblies; rotor tips are hard faced for extended wear and corrosion resistance. The internal rotor assembly and shaft run on high-quality roller bearings.

As material enters the feeder through the upper flange, material falls into the rotor pockets formed by the paddles. As the rotor assembly rotates, a top knife will shear any material that has not fallen completely into the pocket. The rotor, containing material, continues to turn. When the material reaches the bottom of the feeder, it falls out of the rotor pockets and lower flange of the feeder by gravity. An optional bottom wear bar is available to shear any material that does not fall completely out of the pocket. The rotor pocket then rotates back up into the starting position and the cycle repeats.

# Rotary Airlock Feeders

## Features/Advantages (continued from other side)

### Standard Model Information

All Jeffrey Rader rotary airlock feeders are manufactured of high-quality components, and are machined, fabricated and assembled with great care. All units are carefully checked by hand at the manufacturing shop for proper operation before shipment.

The following features are standard on all models:

- Housing stress relieved after fabrication, before machining.
- Top knife for shearing material at infeed.
- Stainless steel adjustment screws for top knife clearance adjustment.
- Top knife cover to prevent material build-up on the top knife.
- A large, hinged top knife access door for inspection, adjustment, and replacement of top knife. A safety switch is supplied to interlock to system as a back-up safety device.
- Packing glands provide positive sealing on rotor shafts which are hard chromed in packing area for long life.
- Access door provided in end cover for easy inspection.
- Shaft-mount reducers and torque arm mount are standard.
- Heavy-duty rotor and shaft assembly, with rotor mounted onto shaft with self-centering locking assemblies.
- Adjustable brass seal rings on each end of rotor to maintain close tolerances and minimize air leakage.

### Standard on Feeders for Boiler Feed Systems

- Extra heavy-duty rotor and shaft assembly, with rotor mounted onto shaft with shrink-type locking assemblies.

### Optional Features

Below is a partial listing of optional features that may be selected at the time of order. In many cases, features may be added to existing units. Contact a Jeffrey Rader representative for more information on in-field modifications.

- Electric motor(s) by Jeffrey Rader.
- Torque arm brackets.
- Optional drive arrangements.
- Speed sensing to detect loss of RPM.
- Anti-dusting baffle for infeed area of feeder.
- Infeed impact plate to prevent excess wear on the feeder housing.
- Sub-knife wear bar for protecting chrome or duplex stainless bore at infeed.
- Bottom wear bar for protecting chrome bore at discharge. Wear bar can be rotated four times to extend wear life.
- Tee injector and mounting base for material infeed into a high pressure pneumatic line.
- Various special materials and/or coatings to meet specific operating conditions.
- Special preparation, primer and paint as required.

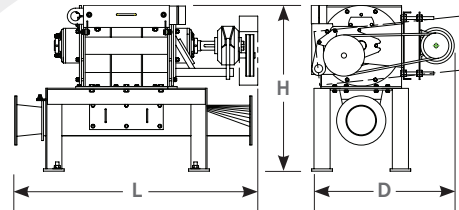
## Dimensions and Weights

IN. (MM) APPROXIMATE LAYOUT DIMENSIONS\* AND SHIPPING WEIGHTS

MODEL**	HP	L	H	D	LBS (KG)
14 x 18	2 or 3	58" (1473)	39" (991)	36" (914)	789 (358)
20 x 20	3 or 5	67" (1702)	55" (1397)	40" (1016)	1,628 (738)
20 x 25	3 or 5	71" (1803)	55" (1397)	40" (1016)	1,872 (849)
20 x 30	3 or 5	76" (1930)	55" (1397)	40" (1016)	2,093 (949)
25 x 30	5 or 7.5	82" (2083)	63" (1600)	44" (1118)	2,980 (1,352)
25 x 35	5 or 7.5	89" (2261)	63" (1600)	44" (1118)	3,495 (1,585)
30 x 30	7.5 or 10	90" (2286)	77" (1956)	47" (1194)	4,478 (2,031)
30 x 35	7.5 or 10	94" (2388)	77" (1956)	47" (1194)	4,825 (2,189)
30 x 40	10 or 15	101" (2565)	77" (1956)	54" (1372)	5,398 (2,449)
30 x 45	10 or 15	106" (2692)	77" (1956)	54" (1372)	5,882 (2,668)

\* Dimensions and weights shown are maximum for range within model size indicated. Certified drawings will be furnished for installation. Installation supervision is available.

\*\* Larger models available on a custom basis – consult factory.





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