

DRYING & COOLING SOLUTIONS



ABOUT

Since 1951, FEECO has been designing and supplying custom rotary dryers and coolers for industries around the world. Whether you're looking for a single piece of equipment, or a complete turnkey system including the necessary exhaust gas handling and material handling equipment, we can offer you a customized solution, tailored to your processing needs. Advantages of a FEECO system include:

RUGGED, YET REFINED

You can rest assured when you purchase FEECO equipment, you're getting a system that was built with longevity in mind. Our engineers work closely with our in-house fabricators to ensure everything is crafted just right. The conservative, robust design of our dryers yields a lifetime of reliable performance.

CUSTOM SOLUTIONS

What sets FEECO equipment apart from our competitors is not just the quality of craftsmanship, but the level of customization we offer. We look at our customers' unique needs, from facility layout, to material characteristics, and process goals, in order to design a system that operates at optimal efficiency, and accomplishes exactly what the customer is looking for. Our familiarity with hundreds of materials allows us to provide you with the best solution possible.

WHO WE WORK WITH

FEECO's expertise has been sought by everyone from start-ups to Fortune 100 companies seeking innovative solutions in process design, engineering, and manufacturing for a variety of industries. Some of these companies include:



COMMON MATERIALS:

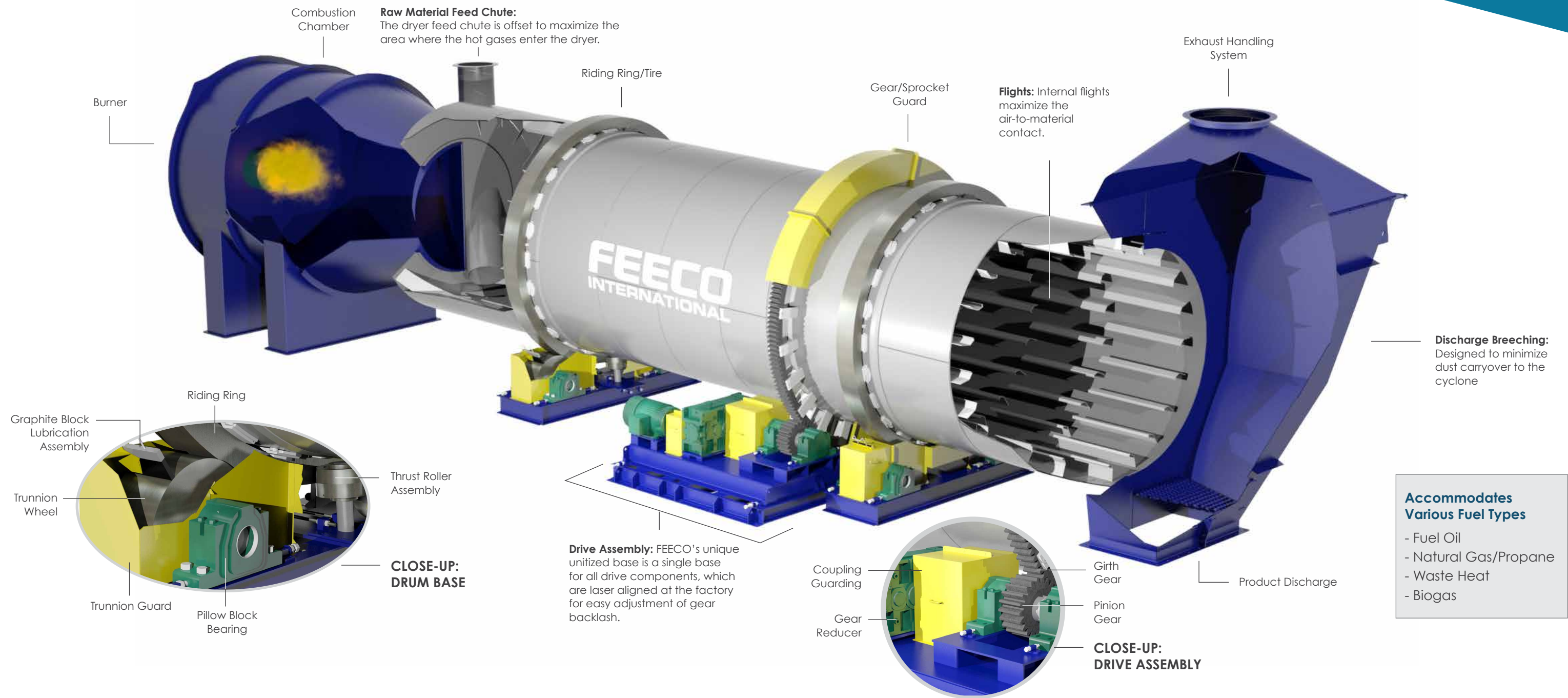
- Aggregates
- Agricultural By-Products
- Animal Feeds
- Biomass
- Biosolids
- Fertilizers
- Gypsum
- Inorganic Chemicals
- Limestone
- Manure
- Metal Chips & Shavings
- Mining Ores & Concentrates
- Municipal Waste & Sludge
- Organic Chemicals
- Paper Sludge
- Plastic Pellets & Grains
- Potash
- Reclaimed Dust
- Rubber Pellets
- Salts & Sugars
- Sand
- Steel Mill Waste Sludges
- Urea Prills & Crystals



Flexible processing **solutions**

“ FEECO offers a unique perspective in processing bulk solids, because we can not only design a custom drying or cooling solution as a single unit, but we can also look at how the entire process functions as a whole, in order to provide the most efficient solution. ”

- Shane Le Capitaine
FEECO Process Sales Engineer



DIRECT ROTARY DRYERS

Direct rotary dryers are the most common choice of equipment for drying bulk solids. These robust industrial dryers offer heavy-duty construction, efficient processing, and uniform results, even when working with variance in feedstock. When used with agglomerates, rotary dryers have the added benefit of polishing - further rounding pellets and refining rough edges.

Direct dryers rely on direct contact between the material and drying air. This direct contact, combined with the use of lifting flights, maximizes the heat transfer between the material and drying air, offering a highly efficient processing solution.

While all FEECO dryers are custom engineered around the material to be processed and the unique processing goals, the base of a direct unit can be somewhat standard. The 3D illustration above shows the build of a basic rotary dryer. Indirect units are also available.

CAPACITY | 1 TPH - 200 TPH+

DIAMETER | 3' - 15'

FEATURES

- Specially designed lifting flights
- Heavy-duty design and construction
- Process and mechanical warranties
- Co-current or counter current design

OPTIONAL COMPONENTS

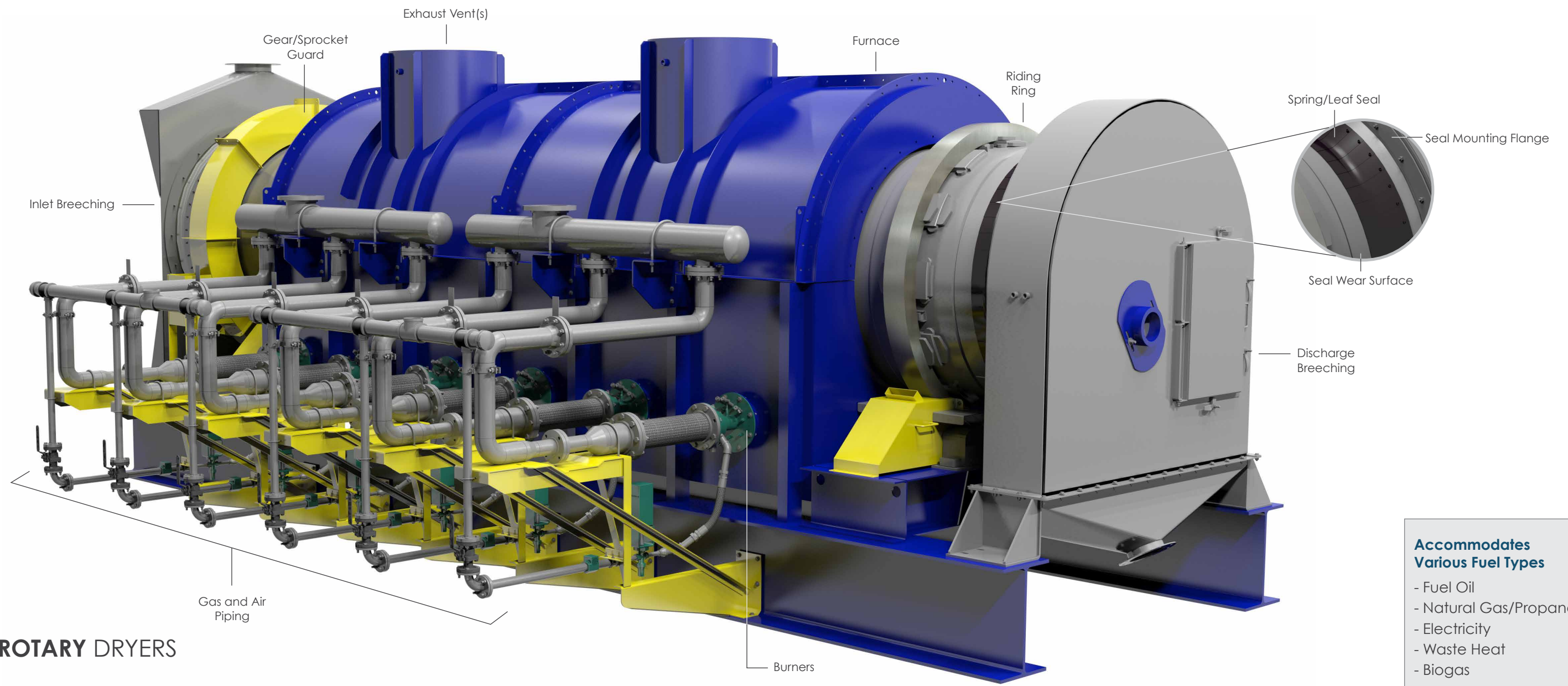
- Various Seal Options
- Knocking Systems
- Trommel Screen
- Liners
- Machined Bases
- Screw Conveyor Feeder
- Automatic Gear Lubrication System
- Exhaust Handling Equipment
- Various Burner Configurations
- Ductwork

MATERIAL OPTIONS

- Carbon Steel
- Stainless Steel
- Specialty Alloys
- Explosion Bonded
- AR Steel

DRIVE OPTIONS

- Chain & Sprocket
- Girth & Pinion Gear
- Friction Drive
- Direct Drive at discharge end



INDIRECT ROTARY DRYERS

When direct drying is not an option, FEECO offers state-of-the-art indirect dryers to suit your drying needs. Indirect dryers are similar in design to direct dryers, but instead of using direct contact between the material and drying air to reduce moisture, the heating medium is kept separate from the material to avoid contact between the two.

The drum shell is heated externally and fitted within a heat shroud. The material is dried through contact with the shell of the drum.

Indirect dryers offer three major distinctions when compared to direct rotary dryers:

1. When processing fine materials, an indirect dryer avoids the risk of entrainment. When processing in a direct dryer, fine materials can become entrained in the drying air, and carried out to the baghouse. An indirect dryer avoids this issue because there is minimal drying air moving through the drum.
2. Less exhaust air treatment is required. Because no drying air is moving through the drum, and the furnace exhaust is kept separate, significantly less exhaust air treatment is required.
3. Processing in an indirect dryer allows temperatures to be adjusted along the length of the drum, providing precise process control.

CAPACITY | 1 TPH - 200 TPH+

DIAMETER | 3' - 15'

FEATURES

- Heavy-duty design and construction
- Process and mechanical warranties

OPTIONAL COMPONENTS

- Various Seal Options
- Knocking Systems
- Trommel Screen
- Liners
- Machined Bases
- Screw Conveyor Feeder
- Automatic Gear Lubrication System
- Exhaust Handling Equipment
- Various Burner Configurations
- Ductwork

MATERIAL OPTIONS

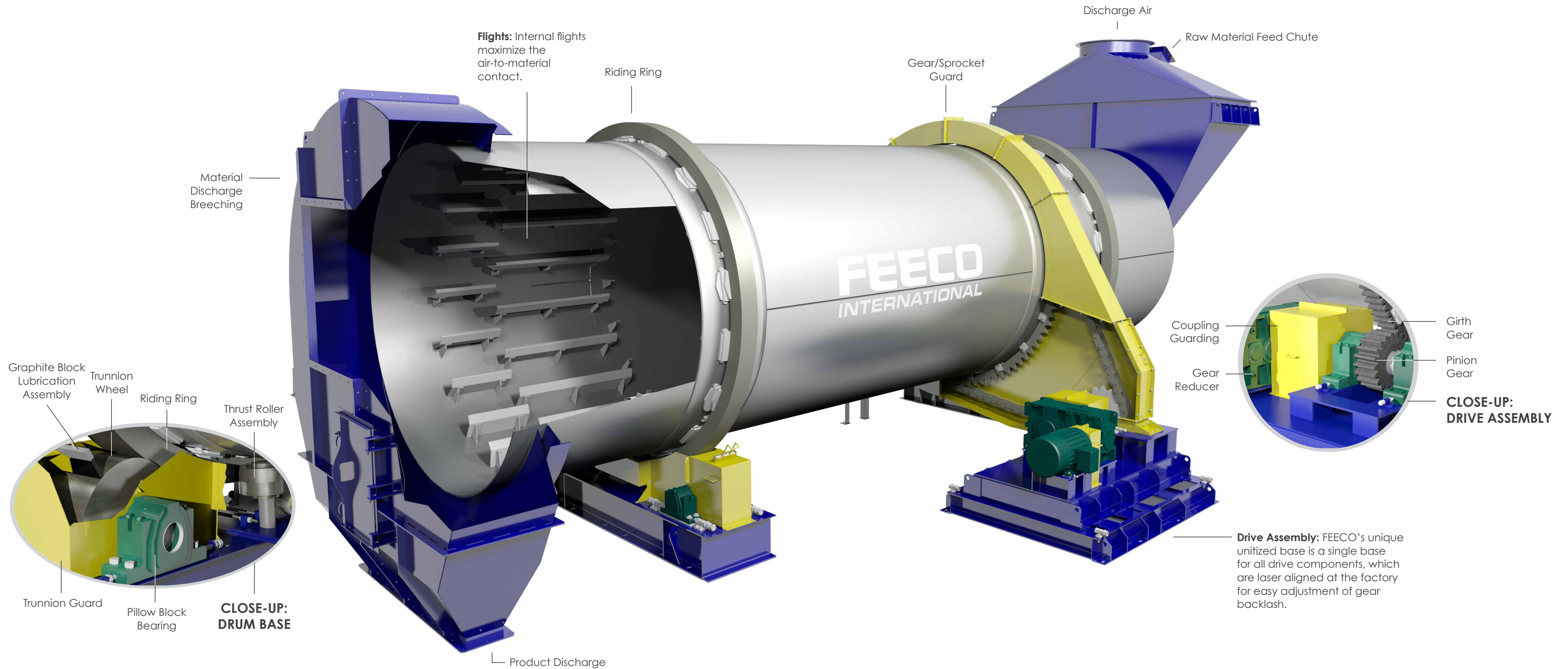
- Carbon Steel
- Stainless Steel
- Specialty Alloys
- Explosion Bonded
- AR Steel

DRIVE OPTIONS

- Chain & Sprocket
- Girth & Pinion Gear
- Friction Drive
- Direct Drive at discharge end

Accommodates Various Fuel Types

- Fuel Oil
- Natural Gas/Propane
- Electricity
- Waste Heat
- Biogas



DIRECT ROTARY COOLERS

Similar to direct dryers, direct rotary coolers are the most common choice of equipment for cooling bulk solids. Heavy-duty construction, efficient processing, and uniform results are all benefits of working with a direct cooler.

Direct coolers rely on direct contact between the material and cooling air. This direct contact, combined with the use of lifting flights, maximizes the heat transfer between the material and processing medium, offering a highly efficient cooling solution. The feed end can be lined in order to protect from incoming hot materials.

While all FEECO coolers are custom engineered around the material to be processed and the unique processing goals, the base of a direct unit can be somewhat standard. The 3D illustration above shows the build of a basic rotary cooler.

Indirect water deluge coolers are also available.

CAPACITY | 1 TPH - 200 TPH+

DIAMETER | 3' - 15'

FEATURES

- Specially designed lifting flights
- Heavy-duty design and construction
- Process and mechanical warranties
- Counter current design

OPTIONAL COMPONENTS

- Various Seal Options
- Trommel
- Liners
- Machined Bases
- Screw Conveyor Feeder
- Automatic Gear Lubrication System
- Exhaust Handling Equipment
- Ductwork

MATERIAL OPTIONS

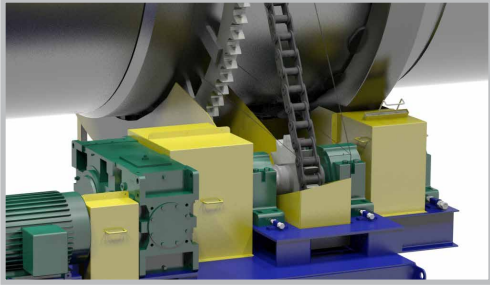
- Carbon Steel
- Stainless Steel
- Specialty Alloys
- Explosion Bonded
- AR Steel

DRIVE OPTIONS

- Chain & Sprocket
- Girth & Pinion Gear
- Friction Drive
- Direct Drive at discharge end

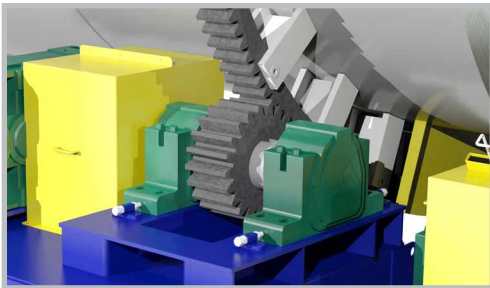
DRIVE ASSEMBLY OPTIONS

A variety of drive assembly options exist, with the choice between them depending on the amount of horsepower, and the overall size of the drum.



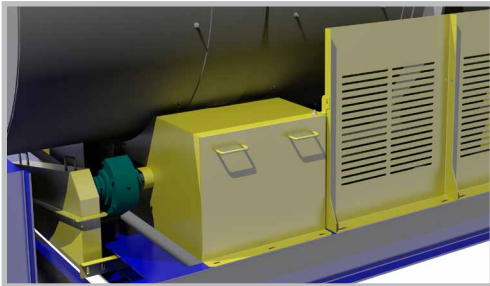
CHAIN & SPROCKET DRIVE

Chain and sprocket drive assemblies are reserved for smaller drums, running up to 75 horsepower. This type of arrangement is not suitable for larger drums running above 75 horsepower, but is ideal for smaller jobs, as it is cost-effective, and easy to run.



GEAR & PINION DRIVE

The gear and pinion drive assembly is best for heavy-duty applications running above 75 horsepower. While this type is more costly, it operates and wears better in demanding applications.



FRICTION DRIVE

Friction drive assemblies are reserved for small applications requiring low horsepower. This is commonly seen with drums around 6' and under. With a friction drive, two of the four trunnion wheels are connected by one shaft and driven by a shaft mounted reducer and motor arrangement.

Direct drive assemblies are also available.



CUSTOMIZED TESTING SOLUTIONS

The FEECO Innovation Center offers a variety of testing options to simulate the conditions in continuous, commercial size dryers. Testing in the FEECO Innovation Center offers a host of invaluable information, allowing you to gain critical data on your material, work out process variables, and develop a recipe for process scale-up.

The FEECO Innovation Center can run tests in the dryer alone, or test your material as part of a continuous process loop such as an agglomeration or granulation process.

Our process experts can work with you to develop a customized testing program around the answers you're looking for. Depending on your needs, the testing process can vary. In general, however, testing is typically carried out in two phases:

1. Proof of Process - A continuous testing phase that aims to establish the equipment setup and parameters required for continuous production of your specific material.

2. Process/Product Optimization - An in-depth study to optimize your specific material's characteristics and/or production parameters in an industrial setting.

Questions That Can Be Answered Through Testing:

- Can my product be improved?
- What type of drying method best suits my material?
- Can my material be dried and still maintain the desired characteristics?
- What equipment configuration will be required to produce the results I'm looking for?
- How can I optimize my existing process?

FLIGHT DESIGN & PATTERN

Both flight design and pattern are commonly customized in order to maximize drying efficiency. For this reason, it is common to test a variety of flight designs and patterns when designing a rotary dryer. The Innovation Center offers a flight simulator that can be utilized to test various configurations, confirming the most ideal design and pattern combination for the material to be processed.

PARTICLE CHARACTERISTICS

There are a variety of particle characteristics that can be measured and adjusted during processing to produce a product with ideal characteristics. The following properties can be measured and fine-tuned:

- | | |
|----------------------|----------------------------|
| - Attrition | - Moisture Content |
| - Bulk Density | - Particle Size Analysis |
| - Compression | - Physical Characteristics |
| - Crush Strength | - Solubility |
| - Flowability | - Temperature |
| - Green/Wet Strength | |



Fly ash pellets created in the FEECO Innovation Center

TESTING EQUIPMENT

Whether you need to test a single piece of equipment, or you're looking to try various configurations of multiple pieces, the FEECO Innovation Center is well-equipped to suit small batch tests, as well as continuous process loops. The following equipment is available for testing in the Innovation Center:

AGGLOMERATION

- Disc Pelletizer 24"
- Disc Pelletizer 36"
- Disc Pelletizer 4' 6"
- Rotary Granulator 36" x 9'
- Paddle Mixer/Pug Mill 14" x 6'
- Batch Pin Mixer 8"
- Batch Pin Mixer 15"
- Continuous Feed Pin Mixer 10"
- SC Roll Compactor / Briquetter
- Hammer Mill
- Rod Mill
- Prater Mill
- Rotex Screen – 2 deck
- Circular Screen 18" & 36"
- Pipe Reactor
- Littleford Day Mixer
- Coating Drum 2' x 6'

THERMAL

- Rotary Batch Kiln 18" x 24"
- Continuous Rotary Kiln 30" x 20'
- Indirect Batch Kiln 10.5" x 24"
- Indirect Continuous Kiln 6.5" x 84"
- Rotary Dryer 3' x 20'
- Rotary Dryer 20" x 8'
- Fluid Bed Dryer, Cooler
- Flight Simulator

SUPPORT

- Muffle Furnace
- Batch Walk-In Oven
- Fluid Bed Sample Dryer
- Steam Generator with Steam Tanks
- Tray Oven

MATERIAL HANDLING

- Steep Incline Conveyor
- Bucket Elevator
- Belt Conveyor
- Various Feeders

ON-SITE SUPPORT

In addition to the equipment listed here, we are capable of making on-site, large-scale modifications to our facility in order to accommodate your testing needs, without the hassle of bringing in external contractors.



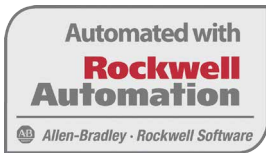
OPTIONAL TESTING CONDITIONS & EQUIPMENT

- Baghouse
- Combustion Chamber
- Direct or Indirect
- Parallel (Co-Current) Flow
- Removable Flights, Dams, and Bed Disturbers
- Thermal Oxidizer
- Water Quench Tower
- Wet Scrubber

DATA GATHERED

- Samples: Feed, Product
- Burner Fuel Usage
- Drum Slope
- Emissions
- Fan Speed
- Feed Rate
- Gas Sampling & Analysis
- Particle Size Analysis of Feed & Product
- Residence Time
- Rotational Speed
- Temperature Profiles

AUTOMATION AT ITS BEST



FEECO is a Rockwell Automation partner, providing integrated process control solutions, both as a service in the Innovation Center, and as part of a system purchase. FEECO and Rockwell Automation process control solutions are provided with current technology, motor control centers, programmable logic controllers, and data collection systems with advanced technologies for reporting. The FEECO Innovation Center features a Rockwell Automation PLC/MCC system, which utilizes current technologies for optimizing testing operations.

DATA IN REAL-TIME

Our system allows you to monitor, trend, and adjust various data points in real-time, all from a single interface or mobile device. This includes:

- Current (Amps)
- Fan Speed
- Feed Rate
- Flow Rates/Product Flow
- Fuel Usage
- Gas Sampling & Analysis
- Horsepower
- Speed
- System Pressure
- Temperature

UNPARALLELED REPORTING CAPABILITIES

A control system from Rockwell Automation provides state-of-the-art data collection and reporting capabilities. Our system allows you to select only the variables you want to report on, from the exact time frame you're looking for. This is especially beneficial in the Innovation Center, allowing returning customers to pick up exactly where they left off.

FEECO can integrate third party equipment into your control system, giving you complete process tracking and visualization.

Secure remote access to the system provides unparalleled troubleshooting capabilities.

AFTERMARKET

We are an extension of your maintenance department. From start-up and installation support, to emergency services and preventative maintenance, FEECO offers a variety of services to help keep your equipment running at its best for years to come, whether your equipment is FEECO brand or otherwise. We offer the following services:

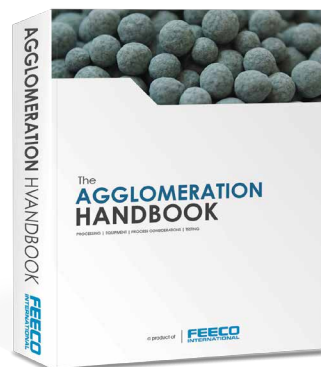
- Installation & Start-up Support
- Spare Parts
- Field Services
 - Tire & Trunnion Wheel Grinding
 - Drum Trunnion Training
 - Alignments
 - Gear Replacement
 - Spare Parts Installation
 - Laser Alignment
 - Inspections
 - Equipment Audits
- Training Programs
- Process Optimization Engineering
- 24-Hour Emergency Service





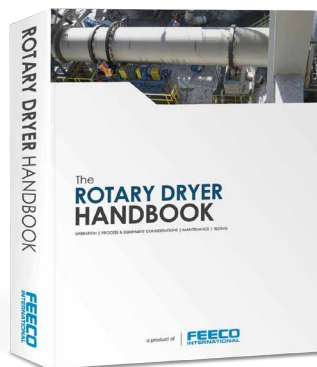
FEECO INTERNATIONAL PROCESSING HANDBOOKS

As a leader in process design and equipment, FEECO has authored comprehensive handbooks on a number of topics, some of which include:



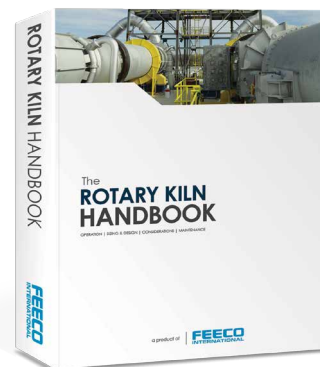
THE AGGLOMERATION HANDBOOK

The Agglomeration Handbook covers both tumble growth (non-pressure) and pressure agglomeration methods. Processing methods, equipment, and considerations in agglomeration are covered.



THE ROTARY DRYER HANDBOOK

The Rotary Dryer Handbook includes everything you need to know to make informed decisions on rotary dryers, including how they work, sizing and design, and considerations.

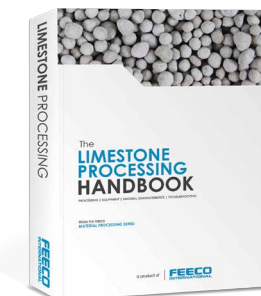
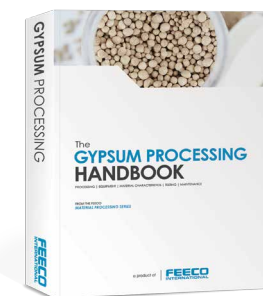


THE ROTARY KILN HANDBOOK

The Rotary Kiln Handbook covers a range of topics, including sizing and design, processes and operation, and considerations.

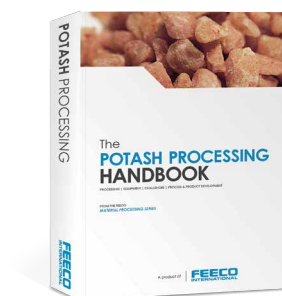
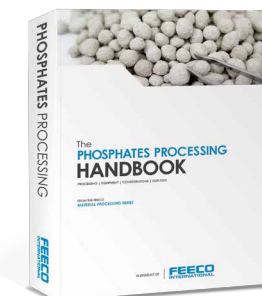
The Material Processing Series

- Gypsum
- Limestone
- Manure
- Phosphates
- Potash



Coming Soon:

- Activated Carbon
- Biomass
- And more...



Download all of the handbooks for free at:
feeco.com/handbooks

THE FEECO COMMITMENT TO QUALITY

With 65+ years of experience, FEECO International has provided full-scale process solutions for thousands of satisfied customers (including some of the world's largest corporations, engineering firms, and start-ups). Cited in over 250 US patents, the name FEECO has become synonymous with innovation and the reimagining of efficiency. As the leading manufacturer of processing and handling equipment in North America, no company in the world can move or enhance a concept from process development to production like FEECO International, Inc.

The choice to work with FEECO means a well-rounded commitment to quality. From initial feasibility testing, to engineering, manufacturing, and aftermarket services, we bring our passion for quality into everything we do. FEECO International is in the process of working towards ISO 9001:2008 quality management system compliance, with the goal of achieving ISO 9001:2008 Certification within the next calendar year.

