FEECO INTERNATIONAL
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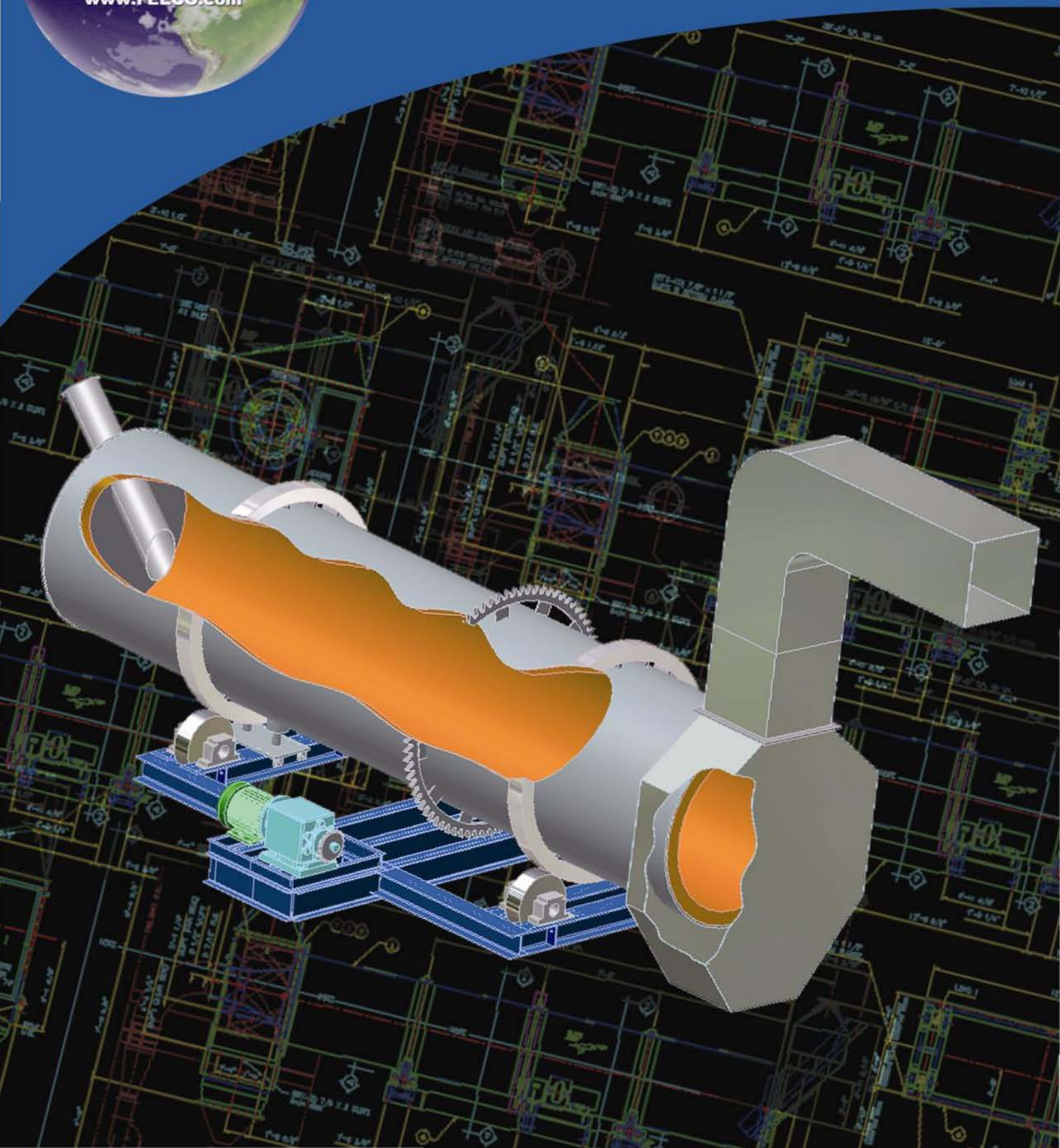
FEECO ROTARY KILNS



FEECO ROTARY KILNS

WHAT IS A ROTARY KILN?

Rotary kilns are used to heat solids to the point where a required chemical reaction(s) takes place. The rotary kiln is basically a rotating inclined cylinder. Solids retention time in the kiln is an important design factor and is set by proper selection of the diameter, length, speed, slope and internals design. There are two basic types of rotary kilns; *direct fired* and *indirect fired*.

FEECO ROTARY KILNS

FEECO International, Inc. is an industry leader in the field of **thermal processing**. We have supplied a durable line of thermal processing equipment for over 50 years. Our designs can address a vast array of bulk solid materials and processing requirements. FEECO supplies high temperature, refractory lined kilns for a number of applications and industries. All of our designs are developed with efficiency, durability and process flexibility in mind.

FEECO utilizes only the highest grades of industrial refractory, (either castable or fire brick) to cope with high temperature processes. Our engineering staff can incorporate a number of high tech, value added analyses to ensure satisfaction of each and every rotary kiln. We perform thorough heat transfer modeling to ensure proper characterization of fuel consumption and exhaust gas requirements. FEECO can perform finite element analysis on rotary kilns to ensure years of operation in spite of the mechanical rigors of elevated temperatures and massive rotating loads.

We supply rotary kiln systems to perform either **endothermic** (heat absorbing) or **exothermic** (heat liberating) processes. FEECO can design systems to operate in either parallel flow or counter current flow configuration. We have supplied rotary kiln units for mineral processes, such as calcining, catalyst recovery or treatment, and waste incineration from a number of sources.

FEECO can offer cost competitive designs for units that process as little as one ton per hour in units 2-3 foot in diameter to massive units at up to 17 foot in diameter that process hundreds of tons per hour. We have successfully processed materials at temperatures in excess of 3000 °F (1650 °C).

FEECO ROTARY KILN SYSTEMS

In addition to the kiln itself, FEECO can supply a complete system with services. These include:

- Material Handling
- Agglomeration
- Drying
- Afterburner / SCC
- Baghouse / Scrubber
- Acid Gas Removal
- Product Cooling
- Quench Tower
- Field Assistance / Installation
- Field Assistance / Start-up

DIRECT FIRED ROTARY KILN

A direct fired rotary kiln heats material by passing the combustion gases through the rotary kiln. The combustion can either occur in a combustion chamber if direct flame radiation is to be avoided or the flame can be directed down the length of the rotary kiln.

In a drying application, the contact between the gases and the solids is the primary mode of heat transfer. In a calcining application, the radiation is the primary mode of heat transfer.

Rotary kilns can operate in either the co-current mode where the gases and solids move in the same direction or in the counter-current mode where they move in opposite directions. The kiln can also operate with either a reducing or oxidizing atmosphere.

TYPICAL APPLICATIONS FOR ROTARY KILNS:

- Waste Lime Recovery
- Proppent Manufacture
- Clays
- Thermal Desorption of Organic / Hazardous Wastes
- Mineral Roasting
- Specialty Ceramics
- Plastics Processing
- Gypsum Calcining
- Tire Pyrolysis
- Bauxite Calcining
- Pigments
- Catalysts
- Phosphate Production

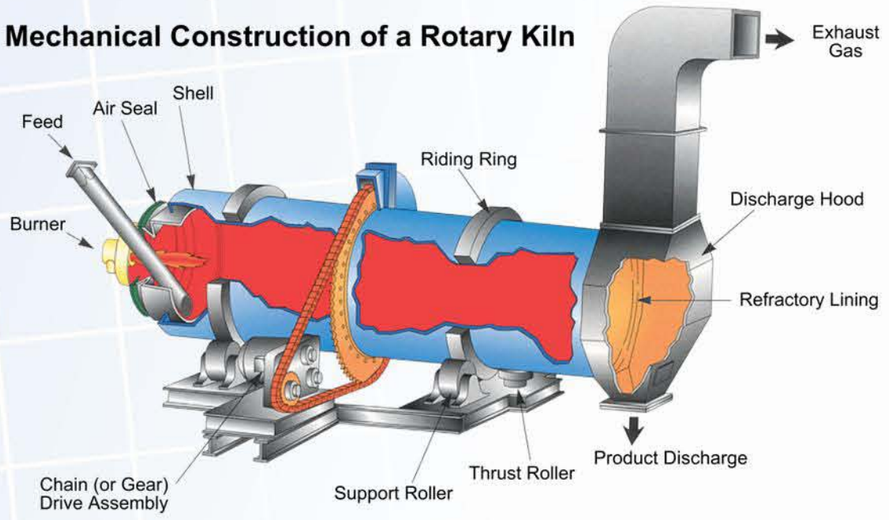
INDIRECT FIRED ROTARY KILN

With an indirect fired rotary kiln heating occurs in a furnace surrounding the outside of the rotary kiln shell. This way, the material being processed does not come into contact with the combustion gases. This can be important to the product quality or to keeping the product from reacting with the gases. Another advantage is that the amount of gases coming from the kiln that need to go through an emission control system is very small.

An integrated cooler can also be included in an indirect kiln by extending its length beyond the furnace and spraying water onto the shell.

WHEN TO USE A DIRECT FIRED UNIT OR AN INDIRECT FIRED UNIT?

As a general rule, the direct-fired kiln is more efficient in operation and has a lower capital cost than their indirect counterparts. However, there are numerous applications where an indirect unit offers better overall economics. This includes when a material needs to be kept at a constant temperature for a period of time and the desired temperature range is small. Another is when the kiln exhaust gas is to be treated or recovered. Since the products of combustion do not come into contact with material any gas generated will not be diluted by them. Also, for fine materials this lowers gas velocity in the kiln and reduces material entrainment.



FEECO INTERNATIONAL, INC.

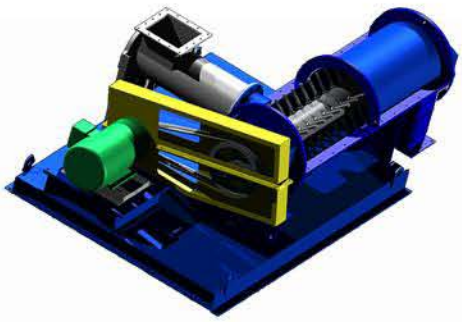
At FEECO, we specialize in turning problems into opportunities. Our mission is: "To provide innovative solutions that meet our Customer's needs by supplying high quality products, processes, and services at a competitive price." We are committed to meeting your needs on time and within budget. Since 1951, we have been designing, manufacturing, marketing and installing equipment, systems and process development throughout the world. You'll find the combined talent of highly trained staff of engineers, technicians, CAD operators, skilled fabricators and site service personnel ready to serve your project needs.

FEECO LABORATORY

FEECO has the ability to test your material in our laboratory both in batch and pilot scale tests. The rotary batch kiln, shown here, is used to observe the behavior of material as it is heated using a programmed temperature profile. This profile is matched to that expected in a commercial kiln.

Samples can be taken from the batch kiln at regular intervals to check on the progress of a reaction. Analysis of the samples allows determination of the time and temperature required to obtain the desired product quality. This information is then used to help size the commercial kiln.

FEECO TECHNOLOGY



FEECO's Advanced Technology is a driving force of our company. We use advanced configuration software built upon AutoDesk's AutoCAD to reduce turn around time and create advanced system designs.

We also specialize in Solids based design using AutoDesk's Inventor. By utilizing the power of 3 dimensional software we are able to let you visualize your equipment design and layout.

Let us show you how **a technology driven, processes offered company** can assist you with your design, processes, equipment or production needs.

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