



# DRYERS & COOLERS

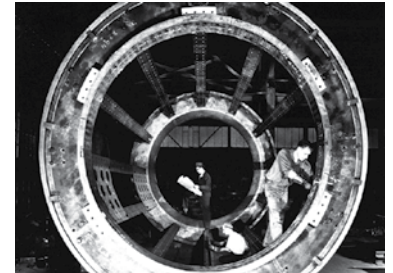


Fluid Bed Dryer Used for Copper Concentrate

Since 1887, Heyl & Patterson has provided custom-engineered thermal processing and bulk transfer equipment solutions to industries worldwide. Combining cutting edge technology with superior serviceability, as well as a commitment to meet and exceed our client's needs, Heyl & Patterson is well positioned to provide new product solutions for many years to come.

Heyl & Patterson's Renneburg Division offers a wide range of drying and cooling equipment. Fluid Bed Dryers & Coolers, Rotary Dryers & Coolers, Flash Dryers & Coolers, Agglomerator/Granulators and the MultiDisc Thermal Processor can be customized to dry or cool any product.

The purpose of a dryer is to remove moisture and harden the soft, mud-like granules of a wet substance. Among the items to be considered in drying are the proper diameter-to-length ratio, flighting design, temperature range, air requirements, furnace design and a number of other factors. A cooler uses chilled air or water as a cooling medium to lower the temperature of a hot substance to a level at which it can be more easily handled. A dryer and cooler can also be combined to deliver extra processing efficiency and productivity.



Vintage Photo From Our Archive



# FLUID BED



Fluid Bed Dryer for Waste Biomass Product

## Fluid Bed Dryers and Coolers

Heyl & Patterson fluid bed dryers are among the most efficient and cost-effective on the market. We have conventional designs available for powders and granular materials, as well as unique designs for materials which exhibit characteristics not normally conducive to fluid bed processing, such as sludges, filter cakes, agglomerates, etc. Factors such as particle size distribution and density, starting and final moisture content, product temperature, drying air temperature, air velocity and retention time of the material in the dryer are considered in the selection of the dryer. Various combinations of designs, applications and process materials can be fully tested in our research laboratory.

Renneburg fluid bed dryers are continuous flow processors which treat materials suspended in a rising flow of gas. The flow of gas makes the solids being processed behave like a fluid. The fluidizing action exposes each particle fully and continuously to the drying gas stream, achieving a very high rate of thermal transfer and product movement. It is a technology which delivers effective, energy-efficient processing.



Installation of Fluid Bed Dryer for Lignite



Fluid Bed Dryer Used for Spent Grain

## FLUID BED COOLERS

- Designed as standalone units or in combination with dryers
- Trough air swept design
- In-bedplate or pipe coils
- Evaporative water spray design



Complete Fluid Bed Dryer System Used in the Mining Industry

## About Fluid Bed Dryers

In a fluid bed, the material being processed is completely suspended and surrounded by a rising gas steam, causing the material to act like a fluid. The gas steam is also the medium for heat and mass exchange. As a result of this gas-to-solid contact, very high rates of heat transfer are accomplished while gently handling the solids. The dryer's bedplate uniformly distributes the gas steam during operation and supports the bed of material during shutdown. The final product moisture is a function of retention time and product temperature.

Two types of Fluid Bed Dryers & Coolers are available:

- **Trough-Type** employs a first-in/first-out "plug flow" method of product handling to ensure an average residence time for each product particle. This produces precise control of temperature levels and final product moisture. Trough designs are also readily adapted to in-bed indirect heat transfer techniques.
- **Circular-Type** has the additional advantage of back-mixing processed material with wet or sticky feeds to achieve uniform flow. Circular designs can be fitted into compact installations due to their small footprint.

Our fluid bed dryers can be refractory-lined for operation as calciners. They can also be installed in combinations and in pairs to enhance processing efficiency and productivity.

## Specifications

- Cylindrical design for back-mix flow, or rectangular design for plug flow
- Fluidized-media design for sticky, lumpy or otherwise hard-to-handle materials
- Units up to 18 feet in diameter
- Inlet gas temperature up to 2200°F (1200°C)
- Stainless steel or high-temperature alloy bedplate, or refractory brick dome designs
- Variety of control systems, from burner management only to complete PLC-based process control

## FLUID BED FEATURES

- High thermal efficiency – maximum heat utilization of drying gas steam
- Completely pneumatic fluidization – no moving parts results in a very low-maintenance design
- Pilot plant testing available
- Relatively small equipment footprint
- Low initial capital cost
- Completely pre-piped and pre-wired NFPA-approved burner valve trains
- Uniform product quality

## FLUID BED OPTIONS

- Combined drying/cooling configurations
- In-bed heating or cooling coils for additional heat transfer capability
- Special abrasion- and corrosion-resistant designs
- Dust collection and emissions control equipment, including cyclones, baghouses, scrubbers, etc.



Rotary Agglomerator/Granulators Used to Process Copper

## Agglomerator/Granulators

Heyl & Patterson designs both rotary and fluid bed agglomerator/granulators to process powder and bulk hard to handle products into spherical pellets. Rotary units utilize the rotational element of a horizontal drum mounted at a slight incline to create agglomerates. Custom designed rotary drums can provide short or long retention times, reaction processes, and controlled particle size through rotation speed and inclination. Fluid bed units typically combine drying with particle agglomeration or granulation by spraying the wet feed material onto a bed of seed material. The fluidizing action then provides the means for efficient and thorough processing.



MultiDisc® Thermal Processor Used in the Mining & Minerals Industry

## MultiDisc® Thermal Processors

The Heyl & Patterson Inc. MultiDisc® Thermal Processor is a cost effective and innovative method for indirectly drying and cooling bulk solids, using conduction-convection heat transfer principles. Indirect processing produces a high product to surface area ratio, efficient processing at low temperatures and minimal off gas volumes.

The MultiDisc® Thermal Processor is recommended for countless drying and cooling applications. Its innovative design reduces surface fouling, pluggage and power consumption, effectively reducing overall operational costs.



Flash Dryer

## Flash Dryers & Coolers

Heyl & Patterson flash, or instantaneous, dryers differ from conventional flash dryers because they employ the principle of selective processing. This ensures that every particle's residence time is proportionate to its size and weight.

The result of selective processing is a homogeneous final moisture content and a high quality commercial product without physical or chemical degradation. Special back-mixing equipment can also be installed for effectively feeding pasty or sticky products.

Several sizes of standard designs are available to handle feed rates ranging from 100 pounds per hour to 50 tons per hour. Complete testing in our research laboratory ensures the suitability of your actual product with our various flash dryer designs.

Renneburg flash dryers are currently used to process a variety of materials, including chemicals, minerals, sludge, food stuffs and plastics.



# ROTARY



Barge-Mounted, Mobile Rotary Dryer Used to Process Bauxite

## Rotary Dryers and Coolers

Heyl & Patterson rotary dryers are among the most versatile dryers available, capable of handling almost any bulk solid material regardless of its conveyance and handling characteristics. Our rotary dryers can be configured to meet a wide range of needs and applications. Factors such as starting and final moisture content, product temperature, drying air temperature, air velocity and retention time of the material in the dryer are considered in the selection of the dryer. Applications and designs can be investigated in our testing facility. Whatever the properties of the material you need to dry, Heyl & Patterson will design and manufacture a rotary dryer that will meet all your application objectives.

Renneburg rotary dryers are available in several sizes and types. Standard designs utilize both direct and indirect heat sources and are available in either parallel flow or counter flow configurations.

Direct-heat rotary dryers can operate on fuel oils, natural gas, propane or coal. In addition, steam-heated clean air and flue gases may be used as a heating medium.

Indirect-heat rotary dryers are available in steam tube designs and standard rotary models. When the standard rotary design is used, convection heat transfer is employed. Heating mediums include electricity, fuel oils and natural gas.

Capacities may vary depending upon the material being processed. The suitability of a material to a particular dryer design can be fully tested in our research laboratory.



Rotary Dryer

## ROTARY FEATURES

- Accelerated processing without product damage
- Wide application range
- Customized for every application
- Low energy consumption
- High capacity
- High heating efficiency
- Small flow resistance
- Low abrasion wear on rotating components

## ROTARY OPTIONS

- Variable inclination
- Variable speed
- Various flighting designs
- Dust collection and emissions control equipment

## ROTARY COOLERS

- Air-cooled units for non-dusty granular or crystalline materials
- External water-cooled units operate under inert atmospheric conditions
- Combination air and water cooling can be used

	Agglomerator/Granulator	Calciner, Fluid Bed	Calciner, Rotary	Dryer, Flash	Dryer, Fluid Bed	Dryer, Rotary	Flail Mill	MultiDisc® Thermal Processor	Pug Mill	Screw Press
Agricultural			●		●	●		●		●
Alternative Fuels			●		●	●				
Biomass/Torrefaction			●	●	●	●				●
Ceramic		●	●		●	●		●		
Chemical	●	●	●	●	●	●		●		
Coal			●		●	●		●		
Environmental		●				●		●	●	
Fertilizers	●			●	●	●	●		●	
Food		●		●	●	●		●	●	●
Glass			●	●	●	●				
Metals			●		●	●		●		
Mining & Minerals	●	●	●	●	●	●	●	●	●	
Petroleum					●	●			●	
Plastics			●	●	●	●				
Pulp & Paper			●	●	●	●				●

## ALL DRYERS & COOLERS

### Materials of Construction

- Carbon steel
- Stainless steel
- Special alloys for corrosion or abrasion resistance

### Heat Sources

- Direct-fired using natural gas, LPG, fuel oils, coal
- Indirectly heated using steam
- Heated by waste heat sources such as furnace exhaust or boiler flue gas

## Safe and Secure

### Minimizing Risks, Protecting Workers and Equipment

We work diligently to ensure the utmost protection measures are incorporated into everything we do, and take advantage of a facility's available energy options for the utmost efficiency. The safety precautions built into our equipment collectively works against overall component failures, while shielding workers and equipment at optimum levels.

At Heyl & Patterson, we've been pioneering solutions for the chemical processing industry since 1887 – let our experience work for you. For further information, visit [www.heylpatterson.com](http://www.heylpatterson.com) or call today.

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