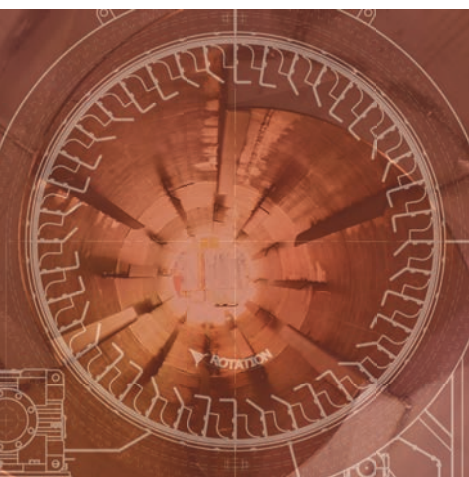
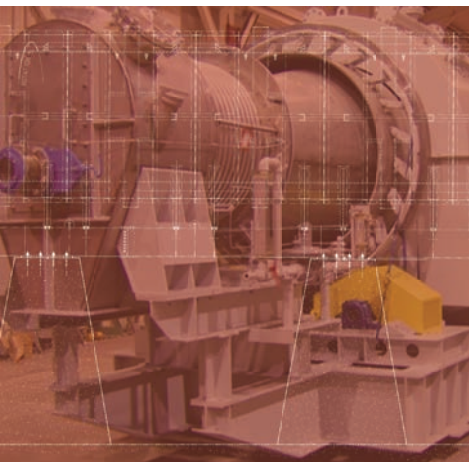


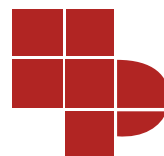
# ***Innovative Thermal Processing Equipment***

Since 1874, Heyl Patterson has been known for pioneering engineered thermal processing equipment for powder and bulk solids in industries worldwide. Whether processing catalysts, chemicals, biomass, paper and pulp, activated carbon, food products, fly ash, fertilizers, metals, minerals, or other solids, our custom-engineered equipment solves today's unique processing challenges. From industrial rotary dryers and coolers, rotary calciners and fluid bed dryers and coolers, to flash dryers and specialized thermal processors, our equipment is highly-efficient in processing a wide range of materials.



## ***Complete Range of Equipment:***

- Rotary Dryers & Coolers
- Rotary Calciners & Kilns
- Fluid Bed Dryers & Coolers
- Flash Dryers
- MultiDisc® Thermal Processors
- Rotary Mixing, Curing, & Coating Drums
- Rotary Agglomerators
- Screw Presses
- Mills & Cookers



**HEYL PATTERSON**  
THERMAL PROCESSING

## Rotary Dryers & Coolers

Heyl Patterson rotary dryers and coolers efficiently process a wide range of materials from powder and bulk solids to liquid sludges and sticky adhesives. Dryers can be specified to achieve the desired final moisture based on product temperature, drying air temperature, air velocity and material retention time. Direct and indirect heat sources and parallel flow or counter flow configurations provide uniform drying and cooling. Heyl Patterson dryers and coolers can be operated with gas-based, electricity-based, or steam-based heat sources.

### Features & Benefits:

- Highly-efficient design operates with low energy while providing accelerated processing without product degradation
- Versatile design accommodates difficult-to-handle materials and variations in surge feed rates
- Adjustable retention time for precise temperature and moisture control
- Variable speed and inclination processes a wider range of materials
- Air-cooled designs process non-dusty granular or crystalline materials
- Full penetration shell welds, shell alternating seam welds, continuous flighting welds, and solid steel tire, trunnion and thrust rollers provide long-lasting durability

### Industry Examples:

- Hemp & Biomass
- Carbon Fiber
- Fertilizers
- Inorganic Chemicals
- Paper Pulp
- Fly Ash
- Waste Recycling
- And more



Alternating 45° and 90° tip flights in all rows provide uniform showering over the shell cross-section. Alternating rows of flights provide uniform showering along the shell length. This prevents short circuiting of the gas through the shell to minimize reductions in drying performance.

Cooling design options include counter-current air swept, internal or external water-cooled, or a combination of air and water-cooled.

### Rotary Flight Designs:

- 45° & 90°
- Straight, Saw & Gusseted
- Completely Customized



## Rotary Calciners

Heyl Patterson rotary calciners continuously process bulk materials at medium to high temperatures through an indirect heat source. Our calciners are designed to handle materials that are fine and dusty, sensitive to oxidation, combustible, explosive, potentially contaminating or thermally sensitive. With temperature control through independent heat zones and an enclosed rotating shell which is indirectly heated, complete separation of heat source and product can be achieved. Heyl Patterson calciners can be operated with gas-based, electricity-based, or steam-based heat sources.

### Features & Benefits:

- Multiple heat zones provide independent control for temperature profiling (ramp up, soak, & cool down)
- Custom-designed internal shell components provide maximum heat and mass transfer
- Expandable and dust-tight seals for processing special applications
- Adjustable retention time for precise temperature and moisture control
- Burners fire tangentially to eliminate localized overheating
- Full penetration shell welds, and a thickened shell plate at tire and drive support for long-lasting durability

### Industry Examples:

- Catalysts & Chemicals
- Activated Carbon
- Metals
- Minerals
- Biomass
- Fly Ash
- Coal
- And more



Co-current and counter-current material/gas flow designs with multiple heating zone configurations are available. Integrated coolers provide cooling of product prior to discharge.

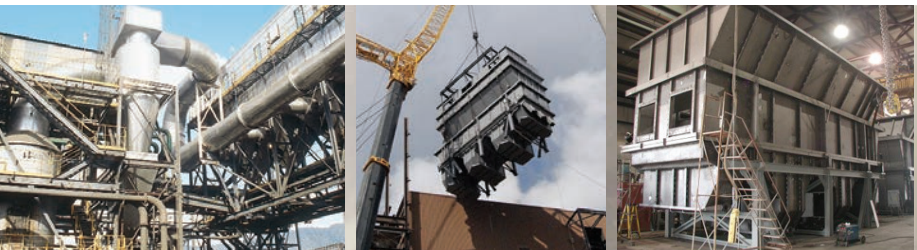
Calciners can be customized to handle material temperatures of up to 2200° F (1200° C) as well as various process atmospheres including inert, oxidizing, reducing, and dehumidifying.

### Calciner Design Attributes:

- Single-piece or split-flanged design for easy removal of furnace shell section
- Plug flow operation for product uniformity
- Electric, fossil fuel or waste heat sources
- Integral coolers for product cooling prior to discharge

## Fluid Bed Dryers & Coolers

Heyl Patterson static fluid bed dryers and coolers provide maximum thermal efficiency and uniform drying and cooling of free-flowing materials such as minerals, chemicals, plastics, biomass, wood products, and coal. Conventional designs are 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 filter cakes, agglomerates, etc.



### Industry Examples:

- Coal
- Metallurgical Ores
- Coke
- Hemp & Biomass
- Plastics
- Dried Distillers Grains (DDG)
- Rubber
- And more

### Features & Benefits:

- Pneumatic fluidization design means no moving parts and low maintenance
- Gentle fluidizing action for efficient processing without product degradation
- Designs for back-mix and plug flow available
- Fluidized-media design for processing sticky, lumpy or other difficult-to-handle materials
- Stainless steel, high-temperature alloy bedplate, or refractory brick dome designs

## Flash Dryers & Coolers

The Heyl Patterson flash dryer and cooler is ideal for drying high moisture, temperature-sensitive materials such as chemicals, minerals, food products, plastics, gypsum, and powders. Using the principle of selective processing, these units ensure every particle's residence time is proportional to its size and weight, resulting in a high quality product free of physical and chemical degradation. Special back-mixing equipment can also be installed for effectively feeding pasty or sticky products.



### Industry Examples:

- Alumina
- Plastics
- Flour
- Sodium Bicarbonate
- Fluorspar
- And more

### Features & Benefits:

- Provides a homogeneous final moisture content without product degradation
- Flash dryer design handles feed rates ranging from 50 to 1600 pounds per hour

### Complete Processing Solutions:

Heyl Patterson's team of expert engineers provide support for complete system integration, from the dryer, cooler or calciner support system and emission control, to ancillary equipment and a variety of automation options.

## MultiDisc® Thermal Processors

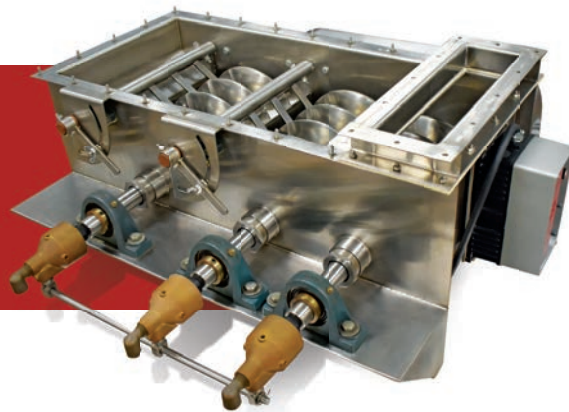
The MultiDisc® Thermal Processor is a cost effective and innovative method for indirectly drying and cooling bulk solids, using conduction-convection heat transfer principles. Indirect processing using this high product-to-surface area ratio is highly efficient with minimal off gas volumes. Its innovative design reduces surface fouling, pluggage and power consumption, effectively reducing overall operational costs.

### Features & Benefits:

- Indirect processing provides a high product-to-surface area ratio and minimal exhaust gas volumes requiring less costly air pollution control equipment
- Versatile design allows heat transfer fluids to be circulated in series or parallel flow patterns
- Compact size delivers total processing capacity in a footprint that could barely accommodate the drive train of similar thermal processors

### Industry Examples:

- Grain
- Gypsum
- Organic Chemicals
- Pigments
- Metals
- Fly Ash
- And more



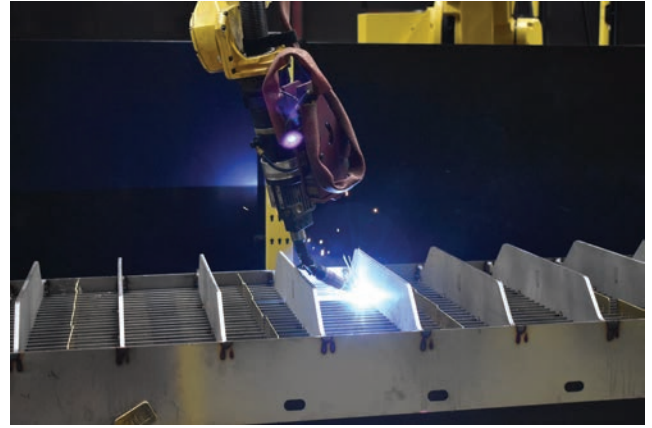
## Inspections & Field Services

No one likes breakdowns. That's why we offer a comprehensive inspection program that helps to monitor and maintain your equipment. We will review previous inspections and document current conditions of components that need adjustment, maintenance, monitoring, or replacement.

From emergency breakdowns, startup assistance and scheduled outages, to parts installation and training, our experienced professionals will help keep your equipment running smoothly while offering expert advice.

## Engineering & Manufacturing

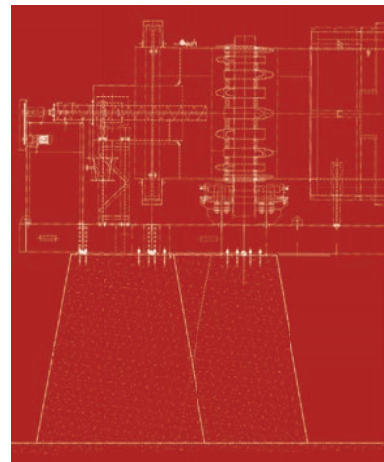
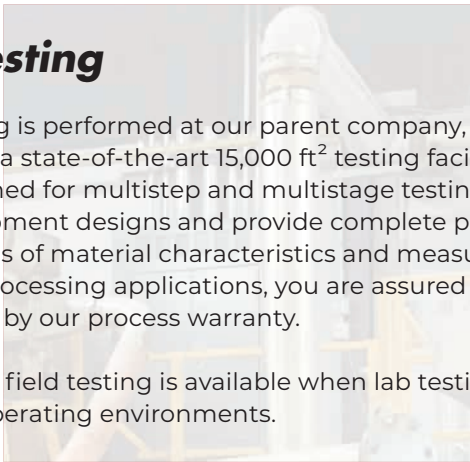
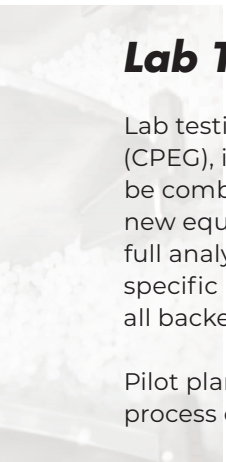
- Equipment designs are verified using Finite Element Analysis (FEA) to ensure trouble-free service and long life
- 3D equipment modeling
- State-of-the-art manufacturing facilities on 3 continents with robotic cutting and welding
- Manufacturing expertise working with mild steel, various grades of stainless steel, duplex steels and other exotic alloys for specialty applications
- Welders certified to ASME & AWS standards
- ISO 9001:2015 certified



## Lab Testing

Lab testing is performed at our parent company, Carrier Process Equipment Group (CPEG), in a state-of-the-art 15,000 ft<sup>2</sup> testing facility. Multiple pieces of equipment can be combined for multistep and multistage testing to simulate field operation, validate new equipment designs and provide complete process solutions. Combined with our full analysis of material characteristics and measurements of material behavior in specific processing applications, you are assured an efficient, reliable and safe solution, all backed by our process warranty.

Pilot plant field testing is available when lab testing would not effectively simulate process operating environments.



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