

# ***Processing Solutions for Biomass, Paper, & Wood***

Carrier Vibrating Equipment provides processing equipment to efficiently convert biomass feedstocks to energy and fuels. From raw wood, sawdust and other forest byproducts to delicate cellulose products, crops and waste, our line of equipment performs a variety of steps in the conversion process.

Drying, mixing, separating, cooling, metering, screening, conveying, and reclaiming biomass feedstocks can be performed without plugging and without product degradation. Our team of engineers will help analyze your materials and design the most appropriate system for torrefaction, gasification, or biochemical processes.



Trusted in these Industries over 70 Years

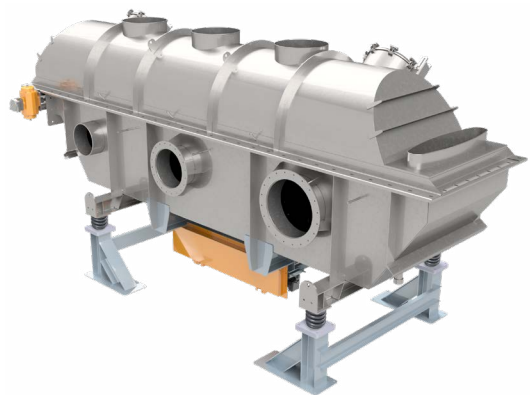
## ***Equipment for Processing Biomass:***

- Vibrating Fluid Bed Dryers & Coolers
- Bulk Flow Heating/Cooling Exchangers
- Vibrating Feeders & Screeners
- Vibrating Conveyors & Spiral Elevators
- Vibrating Bin & Storage Pile Dischargers

**Carrier®**  
***Vibrating Equipment, Inc.***

## Vibrating Fluid Bed Dryers & Coolers

Vibrating fluid bed dryers and coolers provide gentle and efficient drying of biomass feedstocks. All surfaces of the material are evenly dried with the use of the heated air that fluidizes the solids while the angled vibration helps mix and convey during the process. A cooling zone can be included to reduce the temperature of the feedstock and moisture content through evaporative cooling.



### Features & Benefits

- Optimized fluidizing velocity and vibration provides maximum energy efficiency.
- Plug flow delivers consistent first-in, first-out material output
- High temperature designs provide minimal footprint with maximum efficiency
- Zoning allows multiple functions such as simultaneous drying, classification, and cooling to be performed

### Options

- Iso-Max™ dynamic reaction reducer
- Patented Delta-Phase® drive
- Variety of fluid deck designs
- Access manways & doors
- Recirculated gas and closed loop systems
- Custom controls



### ***Iso-Max™ Dynamic Reaction Reducer***

Significantly reduce the low dynamic reaction transmitted through the fluid bed isolation springs by up to 96%.

## Bulk Flow Heating/Cooling Exchangers

Bulk flow heating/cooling exchangers provide indirect heating and cooling of bulk materials using a gravity-fed design to flow material between thermal plates. These units are ideal for temperature-sensitive materials that require a long residence time.

### Features & Benefits

- Indirect heating/cooling design provides intimate contact between solids and plate coils for maximum efficiency
- Counter-current fluid-to-material flow ensures even heating or cooling of materials
- Adjustable feeder on the discharge provides precise control of product flow rate and residence time
- No moving parts within product contact for low maintenance



### Uniform Mass Flow Feeder

The mass flow discharge feeder delivers a consistent and uniform product by regulating the flow rate and residence time.

### Options

- Uniform, mass flow discharge feeder
- Aeration or vibration
- Access doors
- PLC controls



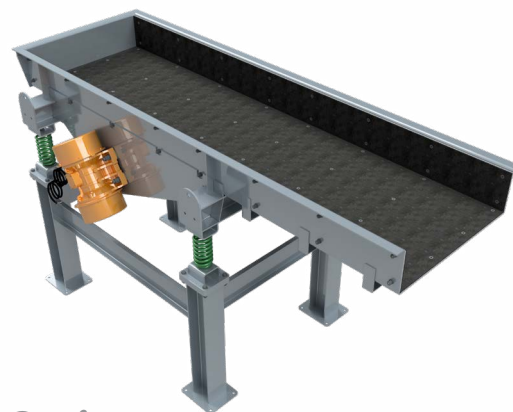


## Vibrating Feeders

Vibrating feeders provide efficient, economical metering of biomass feedstocks with simple control of the feed rate. They can be designed to withstand heavy loads from dumping. Scalpers or screeners can be included to prevent unsuitable material from entering downstream processes.

### Features & Benefits

- Large capacity vibrating feeders handle heavy headloads
- Natural frequency drive units maintain stroke under extreme headloads for safe and reliable operation
- Direct drive units provide efficient conveying of materials in severe operating environments
- Fixed or variable feed rates provide versatility for different process requirements



### Options

- Removable dust-tight covers
- Variety of discharge designs
- Several isolation arrangements including suspended from above or supported from below

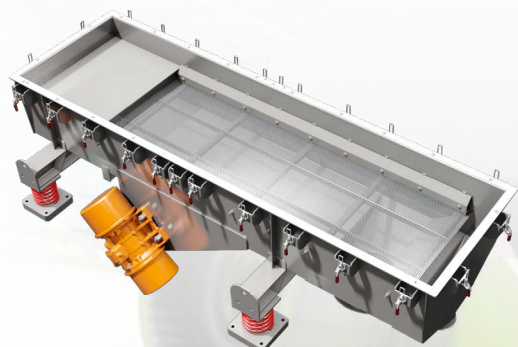
### Removable Dust-Tight Covers

Mitigate dust and contamination from processing operations with optional dust-tight covers.



## Vibrating Screeners

Vibratory screeners are designed to screen, scalp, feed, dewater, or separate materials. Multiple decks can be incorporated into the unit to efficiently separate biomass materials of varying size.



### Features & Benefits

- Robust designs for reliable operation and maximum screening efficiency
- Custom screening deck designs
- Elliptical or circular motion designs for increased efficiency
- Tuned, two-mass, natural frequency and brute force designs

### Options

- Custom screening media
- High-temperature designs
- Removable dust-tight covers
- Optional ball decks
- Variety of discharge designs
- Several isolation arrangements including suspended from above or supported from below



### Screening Decks & Media

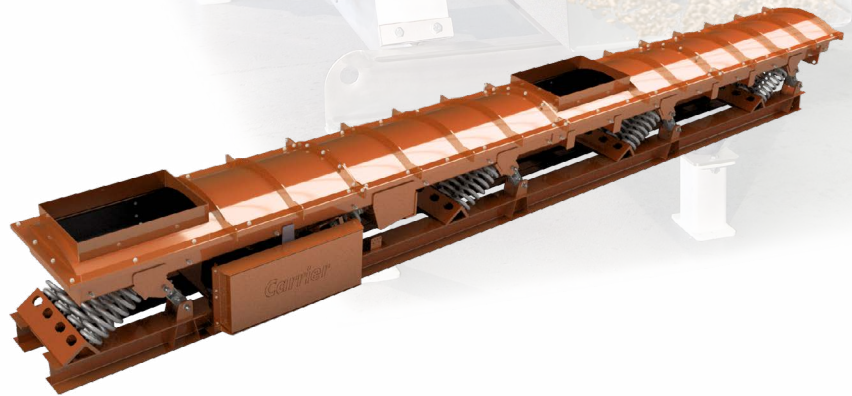
Perforated plate, wire mesh, wedge wire and other custom media designs are available for your specific application requirements.

## Vibrating Conveyors

Vibrating conveyors are ideal for transporting a variety of materials including raw wood and biomass feedstocks and pellets with controlled, gentle vibration. Additional processing including dewatering, screening, separating, and drying can be performed along the conveyor.

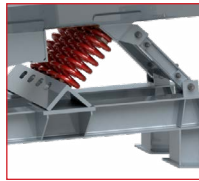
### Features & Benefits

- Few moving parts, easily-cleaned surfaces, and low maintenance compared to other conveyor technologies
- Leak-proof, monolithic troughs eliminate spilling, waste, and contamination
- Natural frequency design for low stress and long life



### Options

- Abrasion-resistant troughs or liners
- Variety of spring designs
- Two-way conveying
- Manual or automatic bypass gates
- Dust-tight covers
- Counterbalanced and/or isolation



### Spring Designs

Available with either metal coil springs or leaf springs and/or other custom configurations depending on your application.

## Vibrating Spiral Elevators

Vibrating spiral elevator are ideal for when materials need to be elevated within a compact footprint. Spiral elevators can also dry, cool, heat or condition a wide range of pellets and biomass feedstocks.

### Features & Benefits

- Versatile design capable of drying, heating, or cooling material while transferring vertically to another process
- Adjustable stroke, speed, and retention time control for efficient processing of materials
- Jacketed flights provide indirect heat transfer with steam, oil, or water
- Direct-drive motor design eliminates over-stroke



### Options

- Heating & cooling
- Jacketed flights
- Specially designed water connections
- Materials of construction
- Enclosures, access doors, & windows
- V-Trough conveyor design



### Heating & Cooling

Holes can be incorporated into the tower to force air out and across the material to heat and cool.

## Vibrating Bin Dischargers

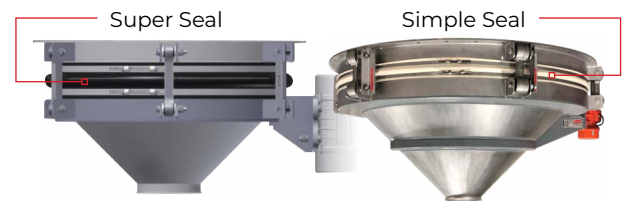
Bin dischargers promote plug flow from hoppers and maximize storage capacity for a variety of paper, wood and biomass materials. An internal pressure cone ensures precise energy transmission for positive, continuous flow of material from storage bins on a first-in, first-out basis. Available configurations include vibrating bin discharger, live bottom bins and vibrating live bins.

### Features & Benefits

- Suspension system with heavy-duty hanger arms isolate the silo or hopper from the vibrating forces
- 45° heavy-duty outer cone for structural rigidity
- Versatile design allows materials to be discharged directly into a truck or rail car
- Ships pre-engineered and pre-assembled for quick installation

### Options

- Molded neoprene Super Seal or Simple Seal inlet sock
- Pressure or vacuum units
- Variety of motor classifications
- Bolted expansion joints
- Cycle timers & slide gates



## Vibrating Storage Pile Dischargers

Storage pile dischargers are proven to enhance the flow of dry biomass from storage. Its sloped, heavy steel drawdown skirt maintains constant vibratory contact with the materials and transmits impulses from bottom to top. This typically produces a draw down angle greater than its natural angle of repose to increase the live storage area and eliminate flow stoppages.

### Features & Benefits

- Unique design increases “live” storage area of stockpiles reducing the need for reclaiming material from above
- Produces a predominantly vertical flow-stream of predictable diameter to withdraw uniformly and concentrically as well as maintain constant command of top layer sloughs
- Controlled vibrating action promotes the flow of stockpiles and can be adjusted to deliver continuous flow of bulk solids

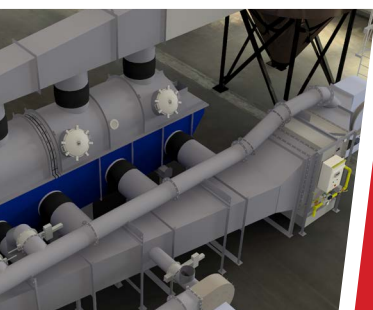
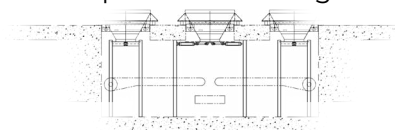


### Options

- Configurations for flat bottom bins, stacking towers, reclaim piles and unloading
- Various diameters and capacities

### Versatile Configurations

Adaptable to existing installations.



### Complete System Integration for Biomass Conversion & Processing

Carrier Vibrating Equipment can help with the design and selection of complete equipment solutions for the conversion of biomass, paper, and wood products.





## Engineering & Manufacturing

- Technology profile of over 150 patents
- 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

Be confident that your processing is efficient with CPEG's 15,000 ft<sup>2</sup> state-of-the-art test lab. With our lab, you have access to the most extensive testing capabilities in the industry. 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. Field testing with rental equipment is available when lab testing would not effectively simulate process operating environments.

## Aftermarket Parts & Services

Carrier offers a full line of aftermarket parts for its equipment. Our Aftermarket Sales Team will assess your parts needs and recommend the best solution. Our engineers are available to assist in any redesign or retrofit your existing equipment for new applications.

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