CarouselUSA
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CASE STUDY | QUERÉTARO, MEXICO

PRECISION TURNTABLE & VESSEL RACK SYSTEMS

How Two Custom Model 37HD Turntable and Vessel Rack Systems Were Engineered, Fabricated, and Installed in 12 Weeks for a Continuous Ion-Exchange Process

Product Installed: **Carousel-USA Model 37HD Turntable and Three-Level Vessel Rack (2 systems)**

OVERVIEW:

Calgon Carbon needed two complete turntable and vessel rack systems to serve as the rotating structural foundation for its ISEP continuous ion-exchange separation process at an industrial food-ingredient processing facility in Querétaro, Mexico. The ISEP system carries process vessels continuously through the separation cycle, so the equipment had to combine heavy load capacity with slow, exceptionally consistent rotation.

Carousel-USA engineered and delivered a fully customized, modular turntable and rack solution built for both durability and speed of manufacture — two complete systems designed, fabricated, and installed in 12 weeks.

THE CHALLENGE:

Several factors made this difficult:

- **Rotation quality drives process quality** — separation performance is tied directly to the consistency of rotation at roughly 0.05 to 0.10 rpm, under heavy load
- **Heavy, elevated loads** — a full array of process vessels carried across a three-level, 28-foot rack, while keeping the rotating assembly stable and aligned
- **Seismic environment** — the site required the turntable and rack to withstand significant seismic ground acceleration
- **Compressed timeline** — two complete systems engineered, fabricated, and delivered in record time, which meant designing for fast, reliable manufacture as well as for service
- **Cross-border installation** — final erection in Mexico with a local crew, and a language barrier between that crew and Carousel-USA's specialized assembly knowledge

THE SOLUTION: MODEL 37HD TURNTABLE & VESSEL RACK

Carousel-USA engineers designed a heavy-capacity precision turntable carrying a modular three-level vessel rack. The drive package was selected and sized around smooth low-speed motion rather than raw output, and the rack was built as a bolted modular frame so it could be fabricated on purpose-built fixtures, shipped, and reassembled in the field without loss of accuracy.

KEY FEATURES

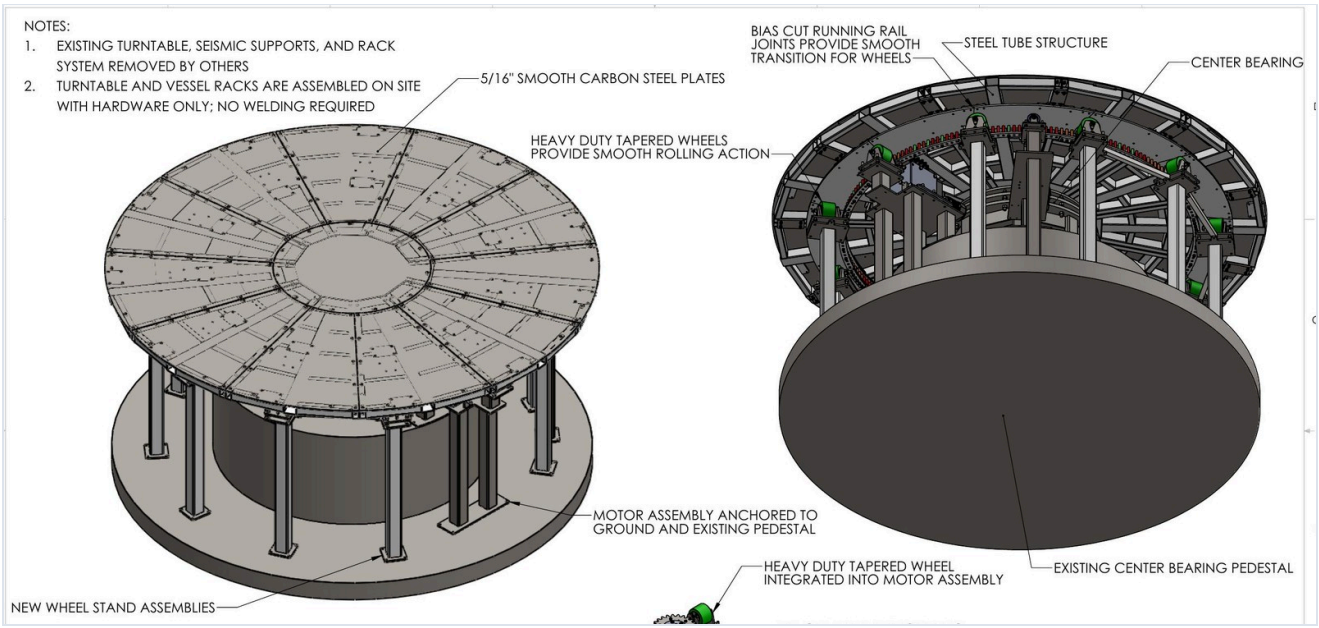
- **NORD right-angle helical bevel gearmotor** — pin-gear drive, variable 0.05 to 0.10 rpm, clockwise or counter-clockwise
- **80,000 lb load capacity** — distributed across precision tapered steel alloy support wheels on a 12 ft turntable
- **Three-level vessel rack** — 28 ft tall, 112 in deck to deck, with a circular vessel array on each level
- **FEA-verified structure** — structural sizing driven by finite element analysis against the site's seismic ground-acceleration requirements
- **Bolted modular assembly** — site erection with hardware only, no field welding required
- **Automatic lubrication** — running rail blade and pin greasing, supporting a 30-year design life
- **Made in the USA** — designed, engineered, and fabricated in Fontana, CA

Purpose-built fixturing at the Fontana facility (left) and the vessel rack structure assembled in the shop prior to shipment (right).

DESIGN PROCESS:

Because separation performance depends on rotational consistency, the turntable was engineered around smooth, drift-free motion at very low speed. Heavy-duty tapered wheels carry the distributed load with low rolling friction, bias-cut running rail joints give the wheels a smooth transition, and an automatic greaser services the rail blade and pins in operation.

Structural sizing was driven by finite element analysis against the site's seismic ground-acceleration requirements, covering both the turntable and the rack above it. Carousel-USA's engineering team then developed the tooling, fixtures, and manufacturing processes that allowed those analysis-verified structures to be built at a rapid pace — the manufacturing-engineering capability that made the schedule achievable.



General arrangement of the Model 37HD turntable — the smooth steel top (left) and internal structure (right), showing the wheel stand assemblies, pin-gear drive, and center bearing.

IMPLEMENTATION:

Both systems were engineered, fabricated, and delivered in 12 weeks. Final erection took place at the Querétaro facility with a local crew. Carousel-USA's installation team coordinated and supervised the work on site, bridging the language barrier by demonstrating each step directly and transferring the company's specialized assembly knowledge to the crew. Because the turntable and racks assemble with hardware only and require no field welding, the structure went up in a predictable, repeatable sequence and could be verified level by level.

Foundation and pedestal preparation at the Querétaro facility ahead of erection.

The turntable and vessel rack systems installed within the process structure, ready for Calgon Carbon to integrate their ISEP equipment.

RESULTS:

Two complete Model 37HD turntable and vessel rack systems were delivered for a continuous ion-exchange process where rotational consistency directly determines separation performance.

- Slow, drift-free rotation held at 0.05 to 0.10 rpm under heavy distributed load
- Large elevated structures engineered to site-specific seismic requirements using FEA-based sizing
- Purpose-built tooling, fixtures, and processes supporting rapid, precise fabrication
- Two complete systems engineered, fabricated, and installed in 12 weeks
- Cross-border erection coordinated and supervised alongside a local crew

The full scope was designed, engineered, and fabricated at Carousel-USA's facility in Fontana, California.

This project reflects Carousel USA's commitment to precision engineering, durability, and American-built quality.

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