BARNHART

LIFTING LETTER

www.barnhartcrane.com

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WORLD'S LARGEST VIDEO DISPLAY GETS A LIFT FROM BARNHART

COVER STORY

Barnhart frequently takes on huge commitments, and occasionally encounters one of colossal proportions.

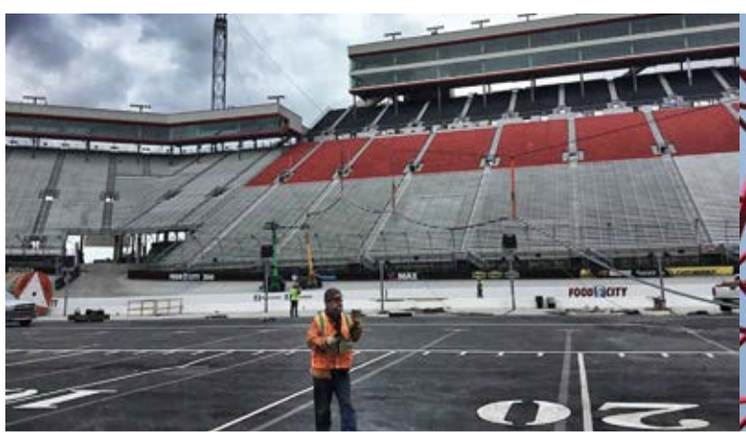
Barnhart's assignment this time was to design the method and perform the installation of the world's largest outdoor, permanent, four-sided center-hung television display at Bristol Motor Speedway in Bristol, Tenn. Nicknamed "Colossus," the display was composed of four custom-built screens, each approximately 30 feet tall by 63 feet wide. The screens would hang from a halo-shaped truss and cage, with an additional circular LED display screen underneath.

Barnhart was hired by Rentenbach Construction, the general contracting firm responsible for the overall project, for their ability to rise to a challenge.

"We chose Barnhart because we had confidence in their reputation and knew they had experience and expertise with unusual construction and rigging projects," said Tony Pettit, project executive for the company.

In addition to the unique nature of the project, Barnhart was also facing a tight deadline with a heavily-promoted unveiling date of April 15.

According to Barnhart Project Manager Tommy Thomasson, "It was a tall order on a short schedule. They started the advertising for the opening before we even began the engineering."



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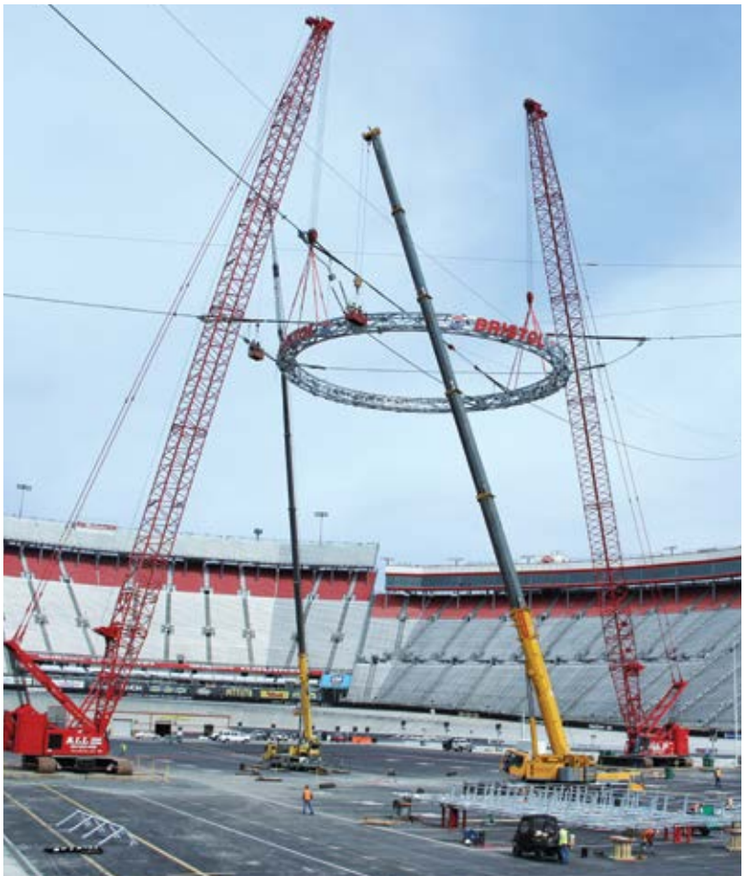


In January, Barnhart began erecting four permanent towers, each approximately 200' tall, at the corners of the stadium. But the biggest challenge was devising a method to suspend and run the 3 1/2" diameter cables, similar to those used on suspension bridges, that would support the mammoth 380,000 lb. display.

The cables ranged in length from 576-676' with a weight of 27 lbs. per foot. The Barnhart team had to unroll and raise the cables without damaging the bleachers and sky boxes in the stadium. The team utilized a system of winches, crane blocks, and temporary messenger and pull cables to suspend the 3 ½" cables by lifting them, connecting one end of each cable to a tower, and then pulling opposing cables from the diagonal towers together.

While the cabling system was being engineered, Barnhart was also assembling the halo and cage. With the cables in place, Barnhart lifted the 130,000 lb. halo with two Manitowoc 999 cranes in early March. Barnhart personnel, working from man baskets lifted by smaller hydraulic cranes, connected the 3 ½" suspension cables to the halo pin connections. The cranes then lowered the halo so that it was fully supported by the suspension cables.

A couple of weeks later, the 160,000 lb. cage, or gondola, was lifted in place. Again, Barnhart utilized the Manitowoc cranes along with two additional 350 Ton hydraulic cranes.
"I've been in this business for 40 years and this is the most unusual project I've ever seen," noted Pettit. "Plus, every component of this project was big – from pins to bolts to towers."

"This was a triumph of engineering," said Thomasson. "Outstanding engineering and execution made this project a success, "

In the end, Barnhart completed their portion of the project on time, and the Colossus was unveiled, as scheduled, on April 15, 2016.

REFINING: DeltaValve Removal And Replacement

ILLINOIS

1) During a turnaround at a refinery, Barnhart had to devise a solution for removing a DeltaValve so that the client could replace the seal on a coke drum. There was a tower section above the drum and valve and the client did not want to remove it as it would have added significant time and expense to the project. Therefore, accessibility was a challenge in an area that was extremely congested.

A further challenge was that the area around the valve was full of piping and conduit and the drill stem, which blocked access. Obstructions had to be removed to gain access.

2) Barnhart located a tall, narrow opening in the tower section where they could insert their cantilever beam with a moveable counterweight to lift the valve out. The beam was an ideal tool for lateral movements and avoiding obstructions.

3) Barnhart rigged to the DeltaValve using an existing lifting frame and upended the valve with an air chain hoist to lift it to the cantilever beam. The valve was then removed through the tower. The drill stem also had to be removed during the process. Once the seal was replaced, Barnhart reset the valve using the reverse process.

STEEL: Stacker Reclaimer Offload And Transport

INDIANA

1) Barnhart was hired to receive components from ship's gears at a steel mill in Indiana. After traveling from Shanghai, China, the ship arrived at the client's dock. The ship's crane offloaded the cargo to Barnhart's Goldhofer using 20 lines of PSTe in single and double wide configurations. B

2) The cargo was not only large and atypical in size, there were also many components. Barnhart handled 10 large components on the Goldhofer while local Teamsters onsite hauled another 60 with a truck and trailer. B

3) The largest component was the Oberbau (German for "superstructure") which was 70' tall and over 400,000 lbs. This was used to construct a large material handling device called a stacker reclaimer to move bulk materials like coal and iron ore onsite at the steel mill. B

4) In order to handle these odd-shaped pieces, Barnhart used multiple trailer configurations and utilized pyramid stands to support one component properly without damaging it. B

OIL AND GAS: Equipment Rigging And Transport

TEXAS

1) Barnhart was tasked with moving a blow out preventer (BOP) and lower marine riser package (LMRP) from a manufacturing facility outside of Houston to the Texas Terminal. The team first had to install rigging and lift and position the BOP and LMRP into shipping frames using a CK2500 crane and an all terrain crane. The customer experienced difficulties during the shipping frame installations, which resulted in delays to the schedule.

2) The positioning of the LMRP stack had moved the Friday before work commenced, which required adjusting Barnhart's lifting approach and trailer positioning. A plan was developed to accommodate these changes, allowing the team to execute work efficiently and safely. Here, the Barnhart team makes final adjustments before backing the EasTrac trailer under the down-ended BOP.

3) The two pieces of equipment were successfully transported over-the-road 50 miles to the Texas Terminal in Houston where they were offloaded by port cranes.

CIVIL: Pedestrian Bridge Offload And Set

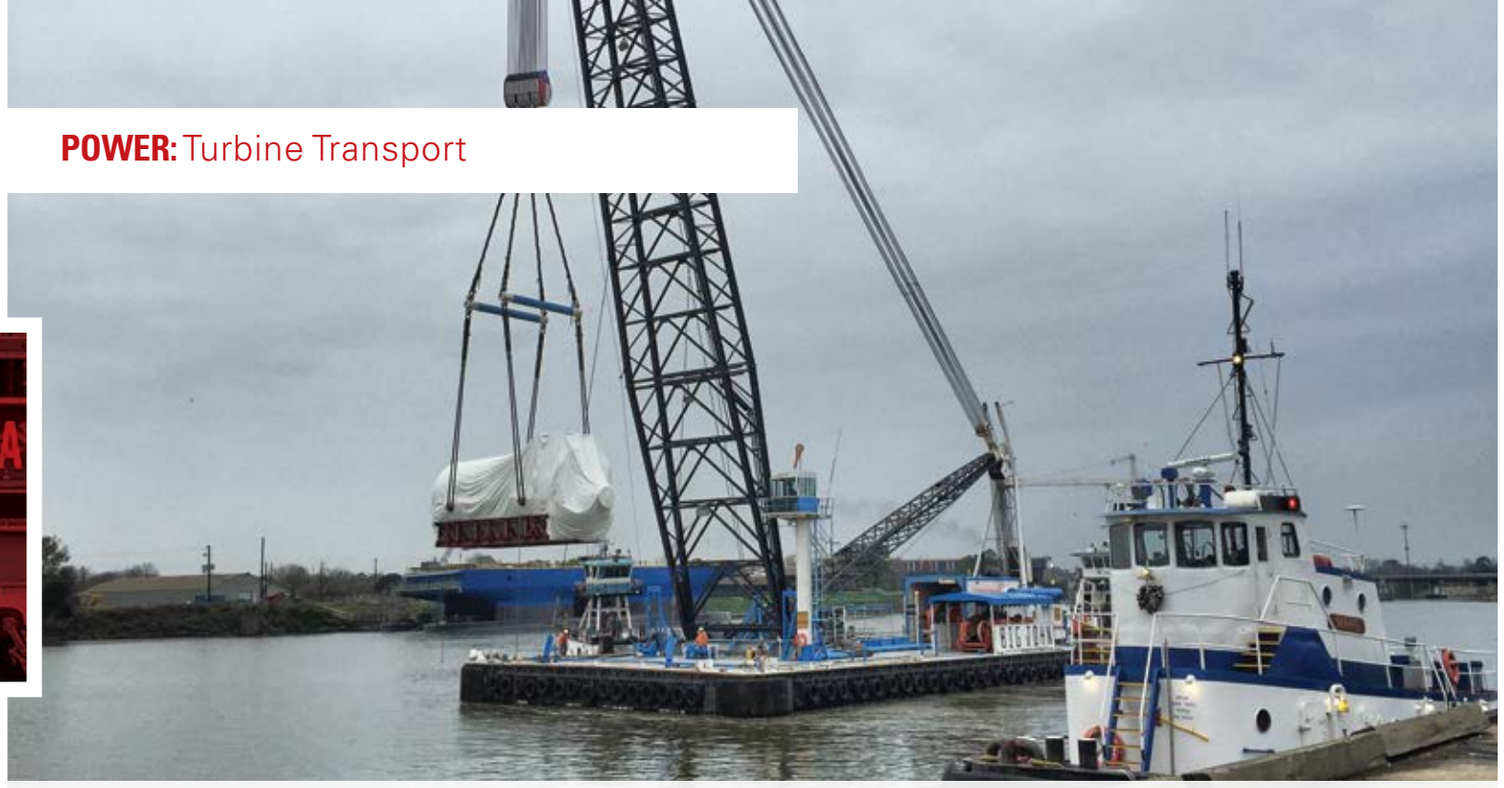
TENNESSEE

1) Barnhart was part of a high-profile project at the Tennessee Riverpark, the installation of 190-foot pedestrian bridge over South Chickamauga Creek. The bridge, made of high-strength, low-alloy weathering steel, was constructed in Fort Payne, Ala. and delivered to the creek by barge where Barnhart was hired to offload and set it. B

2) Access to the site was challenging. Barnhart had to travel through a factory to reach the site and then transload onto shorter trailers. From there, the cranes required the assistance of a wheel loader to get through the mud. Still, Barnhart had both 200 Ton cranes set up and ready when the barge arrived. Barnhart then offloaded the 115,000 lb. pedestrian bridge. B

3) The project enjoyed extensive media coverage with news crews, the mayor of Chattanooga and the city council visiting the site. But it was business as usual for Barnhart, as the team successfully set the bridge on the concrete pilings, completing the job safely and on schedule. B

POWER: Turbine Transport



OKLAHOMA

1) Barnhart was charged with providing engineering, barge and roll off equipment to receive a steam turbine generator in Houston and a gas turbine in Savannah with the eventual destination of the Port of Catoosa in Oklahoma. At the Port of Houston, pictured above, the steam turbine was moved by a floating crane to a hopper barge for the trip to the Port of Catoosa. B

2) The steam turbine is unloaded at the Port of Catoosa with Barnhart's CC2600 heavy lift crane in superlift, hauled to the laydown area on a Goldhofer trailer and then loaded to the customer's rail car with the CC2600. The final destination for both turbines was a power generating station in Oklahoma. B

3) The gas turbine arrives at the Port of Catoosa from Savannah by barge. The gas turbine represented a milestone, as it was the first of its size to go into commercial operation in the United States. The team had to coordinate its arrival to coincide with a celebration planned by the local government and the client, which impacted the loading schedule. B

POWER: Transformer Transport And Set

WASHINGTON

1) Barnhart was hired to receive, haul, and rough set a transformer for a utility district in Washington state. The transformer was transloaded from rail and transported to the utility district's storage yard. This project required mobilizing, assembling, and operating specialized machinery moving equipment and specialized transportation equipment. At the rail station, Barnhart first offloaded the car using climbing jacks, a 500 Ton slide system and pipe stands and then loaded the transformer onto 10 lines PSTe Goldhofer trailer. B

2) The Barnhart equipment was then relocated to the utility district's storage yard for offload while the transformer began its journey. Key to the move was Barnhart's prime mover, nicknamed "Elvis," a 1970s era 700 horsepower Pacific Truck with a maximum speed of 28 mph. Elvis assisted the Goldhofer PSTe on some particularly steep sections of the haul route. B

3) One of the biggest challenges Barnhart faced was coordinating pre-haul wire lifts along a nine-mile, utility-dense route. The move took place at night between 8 pm and 2:30 am with bucket trucks and a police escort. Elvis provided assistance by pulling the load up some steep sections of the route. Good coordination and communication with local utilities, the city and the client resulted in a successful journey. B

4) Once at the storage yard, Barnhart used 200 Ton climbing jacks to offload the transformer from the Goldhofer. The Goldhofer was then moved out from beneath the transformer and pocket jacks were used to lower the transformer to the storage pad. B

OIL AND GAS: Jack Up Stack Transport

TEXAS

1) Barnhart was hired for an emergency job to transport two jack-up stacks for an oil platform from the client's Houston facility to George Bush Airport. Each stack weighed 200,000 lbs. B

2) The haul included down-ending the individual components onto our 130' trailer comprised of 14-Line THP and drop deck. At the request of the customer, Barnhart's engineering team had developed this unique down-ending frame to handle this specific equipment. B

3) The 25-mile transport to the airport was done at night to avoid traffic congestion. Upon reaching the airport, Barnhart coordinated the lifting of the equipment to the Antonov AN-225, the largest aircraft in the world. The jack-ups were transloaded from the trailer to the aircraft for delivery to Singapore where they were loaded onto a drill ship for an emergency situation. B

4) The short timeline created numerous challenges, which both the project managers and field team were able to overcome. They successfully navigated the complex permit system, unique logistical challenges and stringent schedule. B

NUCLEAR: Rotor Unload And Haul

GEORGIA

1) A nuclear plant in Georgia hired Barnhart to unload and haul a new rotor. The rotor, which was 46' long and weighed 360,000 lbs., arrived at a rail spur on site. The team used gantries to lower the rotor to the 12 line PST Goldhofer trailer. Designing and fabricating wooden saddles for the haul proved to be a challenge as the rotor could only be supported in specified locations. B

2) Barnhart then transported the rotor a quarter mile to the facility. The rotor was transported through the "Sally Port" to the turbine generator building. B

3) The rotor was picked up by the plant's overhead crane. It was staged in the facility until a scheduled outage a few months later. B

4) During the refueling outage, Barnhart was enlisted to remove the old rotor so it could be replaced with the new one. The process was reversed, as the old rotor was hauled out on the Goldhofer trailer and unloaded with gantries. It was then set on V-shaped skids and a building, pictured in the background, was placed on top of it and bolted down, providing protection for the rotor until it is moved again for refurbishing. B

NUCLEAR: Feedwater Heater Bundle Removal and Replacement

CONNECTICUT

1) During a 12-day critical path outage at a nuclear plant in Connecticut, Barnhart was tasked with removing and replacing two feedwater heater bundles. After removing the old Alpha bundle, Barnhart slid the new 65,500 lb. bundle from a shipping shell using four 60" pull-up gantries and a hydraulic slide system. The bundle geometry arrived in a different configuration than what Barnhart expected, which could have created significant delays. However, the problem was quickly solved through good communication with the customer and plant.

2) The bundle was loaded onto a transporter and moved onsite to the building access opening. It was hoisted with gantries and set on a 16" slide track on top of a 750 Ton turntable which sat on a slide track. The building access opening was only 14' x 9'.

3) The bundle had to slide and rotate multiple times in order to make it into the building. Working conditions and tolerances were tight, up to ¼", because the plant wanted to minimize cutting of pipes and removal of obstructions. Barnhart also faced very restrictive floor loading issues.

4) Barnhart repeated the same process for the removal and replacement of the old and new Bravo units. Working within the 12-day critical path schedule from first cut to final weld, Barnhart completed the job safely and on schedule.

WOOD AND PULP: Dryer Installation

MAINE

1) Barnhart's extensive range of equipment and innovative engineering proved to be an asset with a project at a wood and pulp mill in Maine. The project scope was to haul and set two Yankee dryers weighing 141 tons each. First, the dryers were hauled a ½ mile from onsite staging utilizing six lines of PST to a raised building opening. B

2) Barnhart had to hoist the dryers 20' in the air to reach the building opening using gantry with a rigging tray arrangement that incorporated the 16" slide track. B

3) Once at the elevation, Barnhart slid the dryers along the slide track and handed them off to the gantry. Floor loading issues were a problem, and Barnhart had to use transverse beams to support our track system on load bearing points. B

4) In tight working conditions, Barnhart had to rig, lift and rotate the dryer using a spreader with swivel hook in order to rough set the dryer on its support steel. B

5) Despite these challenges, which also included tight tolerances, an accelerated schedule and logistical considerations, the dryer was installed on schedule with no safety incidents. B

CHEMICAL: Boiler Offload, Haul And Set

MISSISSIPPI

1) The project began in Catoosa, Oklahoma where Barnhart received two "D" style package boilers by rail. The team loaded the boilers, which were 44' long and weighed 228,000 lb. each, onto the barge using a crane. The barge then transported the boilers to the Port of Bienville Industrial Park in Pearlington, Miss. B

2) After the arrival of the barge, Barnhart used a third party 300 Ton friction crane to offload the barge. Barnhart then placed and secured the first boiler onto a 12-Line Goldhofer THP trailer and hauled it using a prime mover truck. Despite many sharp turns and steep slopes in the 36-mile journey to the plant, the boiler was kept level and arrived safely. B

3) Upon arrival at the plant, the prime mover truck carefully guided the trailer around tight corners and over a ditch using 38' barge ramps. The boiler was picked off the transport system using the 400 Ton gantry lift system. The system then properly positioned and placed the boiler over the anchor bolts and onto the pad. The process was repeated for the second boiler. B

NUCLEAR: RFM Mast Removal And Replacement

LOUISIANA

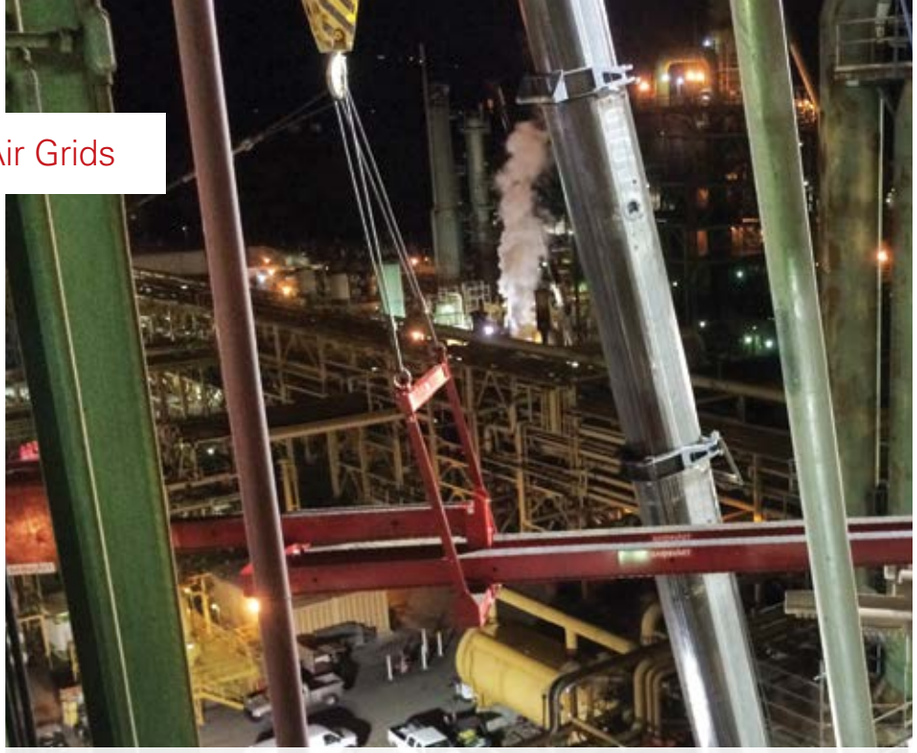
1) The scope of the project was to remove and replace a 35' long refueling machine (RFM) mast at a nuclear plant in Louisiana. Barnhart first received the old mast, which was wrapped due to contamination, from a hook to a tailing device on Powered Saddle Rollers (PSRs). The project required the design and fabrication of a tailing device specifically made for the project. B

2) Barnhart maneuvered the mast through the containment hatch opening and transported it outside of the Q deck. There were very tight tolerances of 1 5/8" for clearance through the hatch. The floor inside containment was not suitable for standard rolling or skate methods, so the team had to design a track that allowed the PSRs to transport the load over an uneven and under-supported floor. B

3) The process was reversed for the installation of the replacement mast, which was guided back along the track through the containment hatch opening where it was then tailed vertically for access through the travel path. B

4) With the mast in its vertical position, it could then be maneuvered into the containment building for installation. B

REFINING: Remove And Replace Air Grids

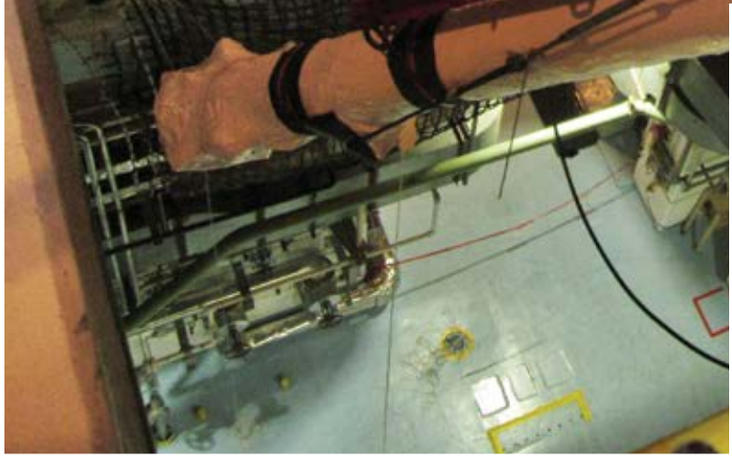


CALIFORNIA

1) Barnhart was hired to remove and replace four air grids inside the regenerator of a Fluid Catalytic Cracking (FCC) unit at a refinery in California. The refinery was in the middle of a turnaround and needed an efficient solution to get the job done quickly. Barnhart arrived on site on Friday, finalized engineering on Saturday, and by Sunday was ready to make the first pick. B

2) Barnhart had to navigate the 28,000 lb. air grids through some tight and congested spaces. They utilized their moveable counterweight cantilever system, a safer alternative which offered more control. The remote-controlled counterweight moves along the beam to balance the load. B

3) The short timeline created numerous challenges, which both the project managers and field team were able to overcome. They successfully navigated the complex permit system, unique logistical challenges and stringent schedule. B



MINI TIP STICK

Barnhart's Mini Tip Stick is a highly flexible tool and a unique piece of equipment in the industry. Its size, weight and capacity enable it to maneuver smaller pieces of equipment in and out of tight spaces.

Like its big brother, the Tip Stick, the Mini is a beam with a hydraulically powered lifting lug that can move along the length of the beam on a powered screw jack. It offers a single, adjustable pick, which eliminates the need for a tailing device and can be configured as a cantilever system or a tilting beam. For equipment lifts that involve both changing and unknown centers of gravity, it provides an ideal solution.

The Mini Tip Stick was particularly useful in a project at a nuclear plant in Georgia removing and replacing two heat exchangers. Barnhart received the existing exchangers from the reactor floor, downended them with the tool and loaded them down through a narrow opening to the truck bay.

The process was reversed with the new exchangers. They were upended using the Mini Tip Stick and lifted through the reactor floor for installation.

The Mini Tip Stick was instrumental in the removal and replacement of two heat exchangers at a nuclear facility. B

BRANCH PROFILE: Phoenix

B The Phoenix branch's 68,000 square foot facility is part of the SAFER program.

Barnhart's Phoenix branch occupies a unique niche. Nearly 68,000 square feet of its 72,000 square foot facility is devoted to storage of a very specific kind.

The facility acts as a response center for the SAFER (Strategic Alliance for Flex Emergency Response) program, storing $30 million of backup equipment for the nuclear industry in case of an emergency. This equipment includes pumps, industrial grade fire hoses, generators, and lights that can illuminate five acres. The equipment has been preloaded on 46 trailers and, once deployed, can be at any nuclear facility in the United States within 24 hours.

Barnhart's football-field size storage facility is climate-controlled and has been upgraded to nuclear storage standards. Three full-time employees maintain and test the equipment on a regular basis. A similar SAFER storage arrangement is in place at Barnhart's Memphis branch.

The site is so essential to the program, it attracts an assortment of distinguished visitors according to Branch Manager Jim Moyer. "Senators, Congressman, industry executives and top U.S. and Japanese nuclear regulators regularly tour our facility," he says.

While the branch only opened three years ago, it is starting to make a name for itself serving the nuclear and fossil power industry, regularly performing remove and replace work involving feedwater heaters, transformers, heat exchangers, and boilers. Barnhart also specializes in the mining industry, and the largest copper mine in the country is located in Arizona.

In addition to its home state, the Phoenix branch also serves clients in New Mexico and Colorado. B

Barnhart's "Hammerhead" at work in a copper mine.

STORAGE SOLUTIONS

Barnhart's Phoenix and Memphis branches represent just a fraction of the company's storage capabilities. In fact, Barnhart has more than 40 locations nationwide with outdoor storage and more than 700,000 square feet of indoor storage. Our facilities are located in the Central United States, Great Lakes and Mid Atlantic area and along both the Gulf and Pacific Coasts.

Whether your project is delayed or your equipment is early, Barnhart stands ready to unload, store and reload your heavy cargo in one of our many locations that are accessible by rail, land and water. Barnhart also offers long-term services for the storage, handling and logistics of critical operating spares for plants, process facilities and other businesses. Our warehousing, labor, trucking and maintenance services offer customers a unique package.

Pictured left to right: Back row: Jim Moyer, Vaughn Knipfer, Tom Blachowski, Irvin Wells, Richard Scroggins. Front Row: Julie Googins, Doug Scalf, Rob Smelcer, Tyvette Wilkins, Richard Burke, Ray Thompson. Not pictured: David McMullen, DeAndre Snow, John Baker

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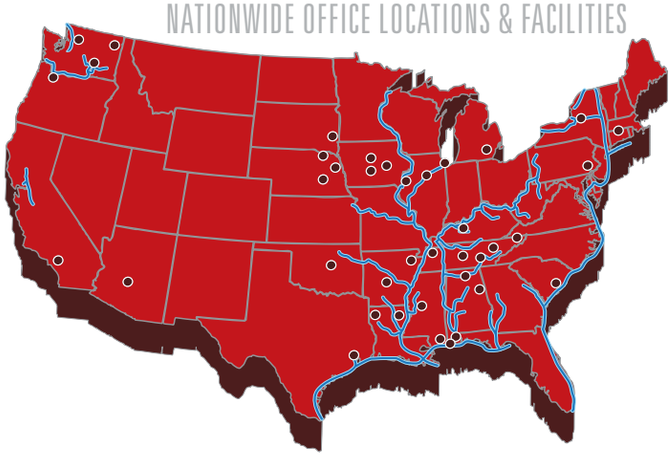

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- FAIRHOPE, AL SERVICE CENTER
- GADSDEN, AL FULL SERVICE
- MOBILE, AL FULL SERVICE
- PHOENIX, AZ RIGGING & TRANSPORT
- BLYTHEVILLE, AR FULL SERVICE
- LITTLE ROCK, AR FULL SERVICE
- LONG BEACH, CA RIGGING & TRANSPORT
- MIDDLETOWN, CT FULL SERVICE
- CHICAGO, IL RIGGING & TRANSPORT, HEAVY LIFT TERMINAL
- EAST MOLINE, IL (CATTANI) FULL SERVICE
- LADD, IL (CATTANI) FULL SERVICE
- AMES, IA FULL SERVICE
- CEDAR RAPIDS, IA FULL SERVICE
- DES MOINES, IA FULL SERVICE
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- MEMPHIS, TN FULL SERVICE, HEAVY LIFT TERMINAL, SERVICE CENTER
- COLUMBIA, TN SALES
- HOUSTON, TX RIGGING & TRANSPORT
- MT. VERNON, WA (SICKLESTEEL) FULL SERVICE
- RICHLAND, WA RIGGING & TRANSPORT
- PORTLAND, OR FULL SERVICE
- SPOKANE, WA FULL SERVICE

BARNHART EQUIPMENT

ALTERNATIVE HEAVY LIFT
- Modular Lifting Tower
- Pull-Up Gantry
- Hydraulic Slide System
- Jacks & Rams
- 4-point Gantry System
- Strand Jacks
- Modular Hoists

TRANSPORTATION SYSTEMS
- Dual Lane Transporters
- Goldhofer PSTe
- Hydraulic Dolly Systems
- Barging
- Ramps and Temporary Bridges

MARINE HEAVY LIFT
- Derrick Crane – Mississippi River
- Barge Crane – Gulf Coast
- Barge Crane – Great Lakes
- Heavy Lift Terminal – Great Lakes
- Heavy Lift Crane – Houston

TELESCOPIC BOOM CRANES
- From 7 Tons to 650 Tons

LATTICE BOOM CRANES
- Crawlers from 100 to 1800 Tons
- Truck cranes from 115 to 800 Tons
- Ringer cranes from 360 to 1,800 Tons

OPERATED CRANE SERVICE
- Over 450 cranes
- Lattice Boom to 1,760 Tons
- Telescopic Boom to 600 Tons
- Full turnaround services
- Nationwide Network of Crane Branches