News from SC&RA

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FOR IMMEDIATE RELEASE

Fagioli, Process Group and Bechtel Equipment Operations in SC&RA Rigging Job of the Year Awards

(FAIRFAX, Va. – June 5, 2009) – The Specialized Carriers & Rigging Association (SC&RA) has announced the winners of the Rigging Job of the Year Awards. The awards went to Fagioli, SPA, S.Ilario D'Enza, Italy in the Jobs Over $750,000 category; Process Group, Inc., Cambridge, Ontario, Canada, in the $150,000-$750,000 category; and Bechtel Equipment Operations, Milwaukee, Wis., in the Under $150,000 category.

Over $750,000: Fagioli Transports, Lifts, Installs More than 400 Modules at Offshore LNG Plant

For the world's first off-shore Adriatic Liquefied Natural Gas (LNG) plant, Fagioli transported, lifted and installed various modules weighing up to 4,800 tons. Now installed in the Adriatic Sea at a depth of approximately 91 feet, the terminal is the first concrete off-shore LNG receiving and re-gasification terminal of its kind. It was built and assembled in Algeciras, Spain.

The terminal delivers energy to the Italian National Gas pipelines system via the Adriatic coast, providing approximately 10 percent of the country's entire gas supply. The LNG terminal consists of a gravity-based structure (GBS), which includes LNG tanks inside the structure and numerous modules on top of the structure. The terminal measures 656 feet long by 328 feet wide and is 164 feet high. It is the first offshore LNG regasification terminal designed and built with extended modularization, using a completely new assembly process.

Equipment included an elevator system with four lifting towers, four main girders and 16 strand jacks with a capacity of 7,200 metric tons; a skidding system with 12 skidding shoes; a 12,000-metric ton capacity 64 strand jack lifting system for the LNG tanks installation; 300 self-propelled modular transporter self-propelled modular transporter (SPMT) axle lines; 8,000 metric tons of construction equipment, all mobilized by Fagioli; two 750 metric ton capacity lattice boom crawler cranes; and six auxiliary mobile cranes.

The contract, extending from 2006 to 2008, included engineering, all heavy transport and lifting, as well as load-in modules from barges and ships to the Algeciras, Spain site. The project also involved the transport of modules to a temporary storage area or close to the installation area. The complex design of the elevator system used to load in all the modules and related equipment required innovation, engineering and technological research, 3D model simulations and site tests.

From November 2006 to April 2007, the Fagioli team unloaded six tank sections, weighing up to 1,600 tons each, from a marine vessel. Fagioli installed 64 strand jacks and assembled structures onto the GBS roof to lift and fix the tanks inside the GBS.

The terminal was assembled in a deep dry dock, and all the prefabricated modules had to be installed on top of the GBS and skidded over a wide gap of more than 131 feet in the air, then lifted to a height of 98.5 feet. All load-in operations were performed using SPMTs.

To install the modules on top of the GBS, Fagioli's in-house team designed an elevator system which combined a skid and strand jack method enabling the modules to be lifted from the quay side to the top of the GBS and then skidded into place.

The elevator girders, used to lift the modules up to the GBS roof, were positioned 52.5 feet above the bottom of the GBS. The girders, each 114 feet long, lifted each module 88.5 feet vertically to the roof of the GBS.

The towers had to be removed before the modules were skidded onto the elevator girders. Once the modules were on the girders the towers were moved back into position and connected to the girders. Each strand jack and skid shoe was rated for 600 metric tons. The skid shoes moved slowly, about 16 inches per stroke of the jack from the elevator girder onto the GBS. Once on top of the GBS the modules were skidded onto their final position.

The sequence of installation spanned from April 2007 to April 2008 when the job was finished. Among the installations was the first the living quarters which weighed 1,310 metric tons. Other projects in sequence included load in operation of the 1,650 metric ton EIB module; lifting of the flare on top of the GBS; transport, lifting and installation of a 2,360 metric ton GTG module; lifting and installation of the 1,650 metric ton EIB; installation of the 203 metric ton flare tower; installation of a 460 metric ton pig launcher; installation of the 600 metric ton east breasting module; transport, lifting and installation of a 4,800 metric ton ORV module; installation of a 150 metric ton maintenance building; transport, lifting and installation of 2,100 metric ton BOG module; installation of a loading platform; and, finally in April 2008 the installation of a 600 metric ton west breasting.

At peak times the company dedicated 15 engineers and 50 technicians to the project, which involved approximately 25,000 engineering man hours for more than 600 heavy operations executed at the site. The total weight of the components installed was 35,000 metric tons. Eleven of the modules installed weighed from 700 to 4,800 metric tons; 36 heavy components weighed up to 500 metric tons.

$150,000-$750,000: Process Group Replaces Huge Ball Mill Shell in Operating Cement Plant

The Hanson Permanente Cement Plant in Cupertino, Calif. is supported by two ball mills that grind raw feed material for production of cement. When ball mill #2, developed a structural failure, Hanson had to replace the shell section. Located adjacent to one another in a congested space within the cement plant, the ball mills were originally installed as the plant was being built around them. The challenge was to replace the mill shell measuring 17 feet in diameter by 60 feet long and weighing nearly 900,000 pounds.

Hanson determined that the removal of the surrounding building steel and plant utilities was not feasible and the replacement of the mill shell in pieces inside the congested plant was nearly impossible. Additionally, the shell needed to be replaced without plant production interruption.

PMI America, the US-based millwrighting and rigging division of the Process Group of companies, was called upon to provide the solution. PMI had to find a path inside the mill building that allowed X-Y-Z dimensional travel of the huge mill around building interferences to an exterior wall, and to then create a receiving and rigging corridor in the outside and adjacent courtyard area.

Two weeks before the job began, Hanson revealed that the prior approved wall opening location involved an undetected pre-stressed beam that could not be cut, and a utility rack contained cabling that could not be relocated. The wall opening had to be raised by 10 feet.

Consequently, falsework needed to be redesigned to stay within the capacity of selected gantries at the increased elevations. The wall opening became 17 feet 6 inches wide by 20 feet high, and wall bracing was partially removed to create just inches of clearance for the mill.

The courtyard area had to be modified to assure safe operation of gantry equipment. PMI designed a rigging support pad of concrete over a compacted granular base to create a stable foundation. The two 15 1/2 inch twin tracks were placed to support a 500-ton hydraulic gantry system manufactured by Lift Systems Inc.

The ball mill includes a shell with internal liners, and heads and trunnions at both ends that are supported from bearings anchored to concrete piers. A gear surrounding the mill interfaces with a drive system. Once the mill was shut down, the ball charge was removed and the electrical systems locked out; then the bearing caps over the trunnions were removed.

To remove the 130,000-pound gear, the gantry system was set up beneath the mill. Once suspended, W12 beams were inserted through the gear for support. Lattice towers surrounding the gear allowed it to be disconnected from the shell and remain in place as a one-piece assembly. This method allowed the mill shell to be extracted by propelling the mill away with only a fraction of an inch clearance between the shell and gear.

Next, PMI leap-frogged the pier in the path of travel to the opening in the wall, using an elevated runway track and a modified saddle with four wheel boxes. Each wheel box contained four 100-ton machinery skates, allowing the saddle to roll along the elevated runway.

The 500-ton gantry leg sets #1 and #2 were positioned with runway track outboard from one another and at specific distances from the mill center of gravity. The mill was then lifted from a push up position while providing a piggyback ride for the 25,000 pound west bearing. Once the elevated runway was finalized, the bearing was released and rolled away on the runway to the wall opening for removal by a mobile crane.

The gantry legs travelled with the suspended ball mill over the elevated runway until leg set #1 reached the pier. The mill was raised to its final travel height of 26 feet to underside of the mill shell and the support of the west end of the mill was transferred from the gantry legs to the rolling saddle.

The mill was then propelled along the elevated runway by gantry leg set #2 as far as possible, then leg set #2 was repositioned to regain travel distance to move the mill completely to the opening in the wall. The mill continued its travel until the rolling support saddle reached the west end of the runway. The overhanging mill load at the west end was transferred to gantry leg set #3 set up outside the wall opening. The mill was then raised by outside and inside gantry legs to allow the rolling saddle to be relocated back to the other end of the elevated runway. Once in position the mill east end load could be transferred from inside leg set #2 to the rolling saddle.

The courtyard gantry propelled the mill’s westward travel until the rolling saddle, supporting the mill’s east end, reached the end of the runway. Gantry leg set #2 was set up outside to take the load from the rolling saddle, and allowed the mill to travel clear of the building.

Gantry set #1 was reintroduced inside of the collapsed gantry set #3. This was followed by sequential load transfers to allow both gantry sets #3 and #2 to be repositioned over the ball mill trunnions. They took the load with twin path extra TPXC 20,000 slings.

PMI removed Gantry #1 and fully lowered the mill until it rested on two custom fabricated saddles supported on the PMI hydraulic skidder track. The mill heads and trunnions, each weighing 70,000 pounds, could then be moved. With gantry sets #3 and #2 holding trunnions at both ends, the heads were unbolted and rolled away from the mill. The old shell, which then weighed 585,000 pounds, was free and clear for disposal.

At last it was time for the re-installation of the new mill shell, which weighed in at just under 590,000 pounds, and the dance of the gantry leg system began in reverse.

PMI completed the project in 14 days and within budget. PMI recognized Atlas Industrial Contractors for hiring supplemental local labor and providing a third set of Lift Systems gantry legs and to Sheedy Drayage for supplying its 10-line transporter and crane rental.

Under $150,000: Bechtel Equipment Operations Installs Four Feed-Water Power-Plant Pumps

In November 2007, Bechtel Equipment Operations (BEO) was hired by Bechtel Power to install four huge and cumbersome cooling water circulation pumps that stood 46 feet tall and weighed 84,700 pounds each, at a generating station in Oak Creek, WI. Unfavorable site conditions included very low allowable ground pressures surrounding the pump house, as well as an underground grit chamber and a manhole that required access at all times for existing plant operation.

The BEO team looked at two conventional options to set the pumps— using a Liebherr LR 1400 that was on site or bringing in a Grove GMK 7550 to make the lifts. From the start, the concept of using the LR 1400 had several issues. The underground grit chamber put the crane into a large radius situation requiring the super lift. Due to site conditions, the crane would need to be broken down and rebuilt at the lift site, resulting in higher costs and impacting the schedule of the larger Bechtel Power project since the pumps arrived on site at a rate of one per month. However, using the GMK 7550. would result in an estimated cost of $600,000 for mobilization, demobilization and rental costs alone.

BEO found a third alternative in the form of the J & R Lift-N-Lock Series 1400 gantry that was already on site for the offload of generator and turbine parts. First, BEO had to determine if the pump house walls could support the weight of the gantry and the pump. Another challenge was that one wall had four open spans in which the pumps were to rest once in their final position. Could the gantry track span these openings and still support the weight of the generator and the pump? After running the calculations, the first two challenges were put to rest.

The third challenge was that the pump needed to be rotated 90 degrees which could be solved with a power rotator. The next challenge was that the gantry could not reach the final set elevation of the pumps, falling shy by 18 feet. The pumps' final elevation was 8 feet below the floor of the pump house pit. The solution was to use two 30-ton chainfalls which allowed the pumps to reach their final set elevation and were more efficient than lowering the dead section of the gantry, removing the kickers and still having to lower an additional 9 feet with the chainfalls.

BEO's final challenge in determining if the gantry was a viable option was that the chainfalls did not fit the power rotator. The shackles that were designed to fit the power rotator were too large and using multiple shackles would decrease the ground clearance. The pumps stood 46 feet tall; however, the gantry at full extension stood only 39 feet, 7 inches. The solution was to design link plates and spacers that allowed the chainfalls to be pinned to the power rotator and not decrease ground clearance.

After BEO determined the gantry system would work, rigging engineers needed to look at combining the gantry with a crane to tail the pumps down into the 10-foot-deep pit. The combination would result in extremely tight tolerances. The gantry was limited to 28 feet of travel during the tailing operation, allowing the pump to clear the front pump house wall while keep the tailing crane, a Demag AC120, within radius. The pump cleared the front wall by less than 3 inches. With the gantry at full extension, the pump cleared the anchor bolts protruding from the floor by less than 12 inches.

It took two days to set the pumps but the timing of their arrival made the project last four months, from December 2007-March 2008. During this time, Wisconsin faced its second worst winter on record with more than 100 inches of snow and temperatures dipping to below -30 F.

The Specialized Carriers and Rigging Association (SC&RA) is an international trade association of nearly 1,300 members from 43 nations. Members are involved in specialized transportation, machinery moving and erecting, industrial maintenance, millwrighting and crane and rigging operations, manufacturing and rental. SC&RA helps members run more efficient and safer businesses by monitoring and affecting pending legislation and regulatory policies at the state and national levels; researching and reporting on safety concerns and best business practices, and providing four yearly forums where these and other relevant member issues can be advanced.

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