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Strand Jacks Efficiently Lower Over 100 Irregular Loads at Texas Bridge Project

VALPARAISO, IN, April 23, 2021 — To construct the three v-pier bridges that comprise the Panther Island Bridges in Fort Worth, Texas Sterling Construction Company needed an enormous falsework structure composed of large steel beams, pipe, timbers and wood. Erecting the form with conventional cranes was not a problem, however, removing the structure once the concrete was poured and hardened presented a challenge.

The completed bridge did not allow access to the falsework with a traditional crane. In addition, a key concern was the anticipated variation of the loads both in shape and weight. Each section of falsework weighed roughly 70 tons but due to structural variations, an individual lifting point might equal three tons at one point and 15 tons at another. What could provide the required lifting capacity and control the uneven loads in the limited footprint? Texas Sterling called upon the heavy lifting experts at Engineered Rigging for a solution.

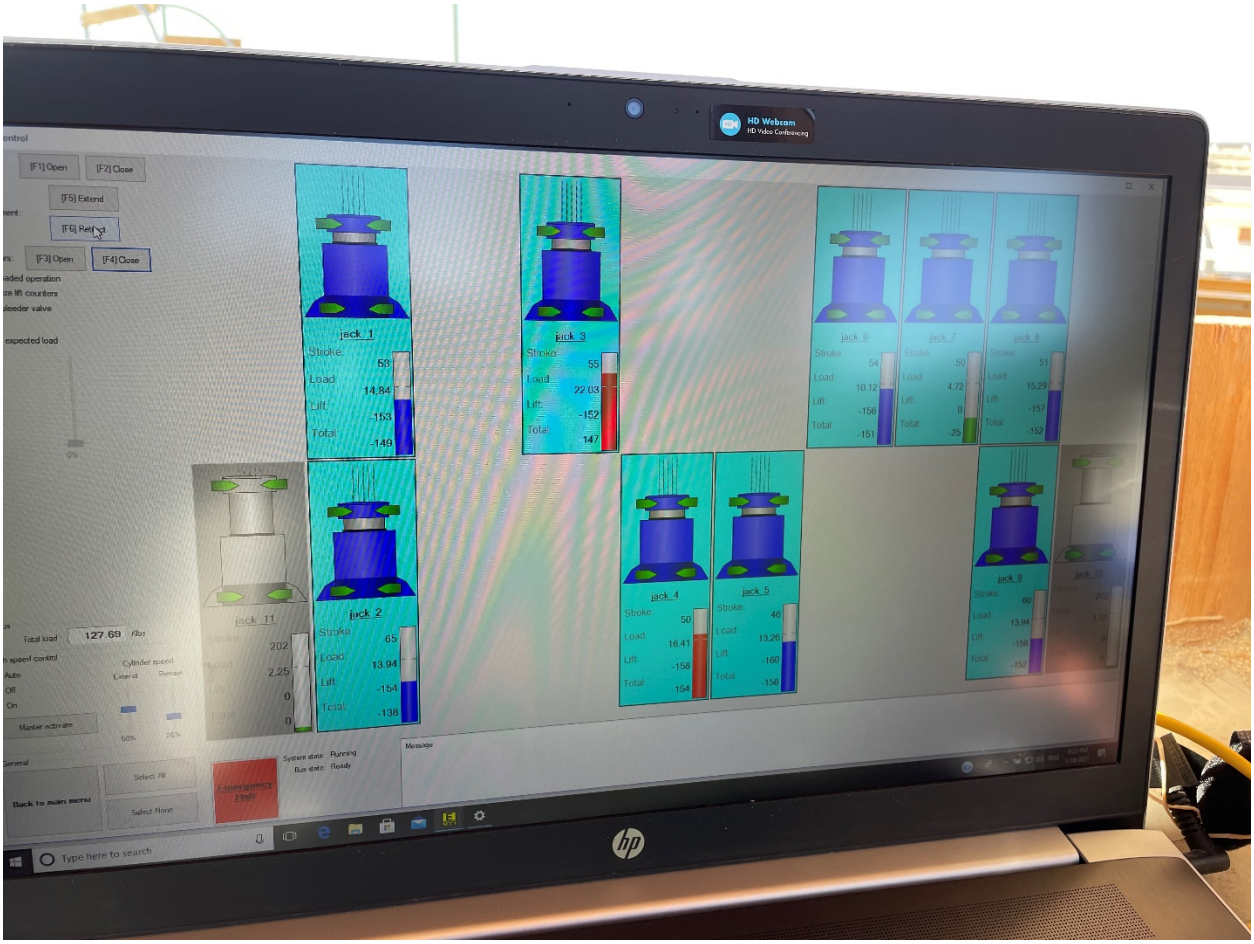
Drawing upon their recent experience working on the Cline Avenue Bridge in East Chicago, the engineers at Engineered Rigging quickly identified strand jacks as a viable solution for Texas Sterling's project.

“Strand jacks offer the highest lifting capacity in the smallest footprint,” explained Engineered Rigging’s President Christopher Cox, P.E. “They are also easy to configure and very safe to use which makes them a winning option in a variety of settings from civil infrastructure applications, such as bridge building, to critical lifts in the nuclear and heavy fabrication sectors.”

Given the massive weight of the Panther Island Bridge’s falsework structure, a dozen 17-ton Enerpac HSL-1507 strand jacks were needed to fulfill the heavy lifting requirements of the project. In addition to being powerful, the strand jacks boast a compact, portable design that worked within the Panther Island Bridges’ space limitations.

Working in sections, crews installed the 12 strand jacks along the bridge; linked them to the load with the single strand either cantilevered over the side or running through a precast hole in the concrete deck. A single operator then extended the jacks to transfer the weight of the falsework section to the strand jack system. With the weight secured and locked in place on the strand jack wedges, crews removed the steel or wood legs supporting the falsework. From the position on top of the bridge, the operator then lowered the load as much as 30 feet to the ground in roughly 8-inch increments. The powerful lifting capacity of the strand jacks allowed the contractor to hoist and lower extremely large chunks of the falsework which reduced the number of lifts and expedited the disassembly portion of the project.

The Smart Cylinder Control System (SCC), a key feature of Enerpac’s strand jacks, facilitated the synchronous control by enabling one technician to operate the 12 strand jacks simultaneously with a single laptop. The SCC system also automates lifting and lowering cycles while displaying individual and accumulative stroke/load on a simple graphical user interface. Engineered Rigging adjusted the control system’s software parameters to optimize the automated management of the uneven loads.



“We could see how the individual strand jacks were responding, and we tuned the system to automatically accommodate the imbalance,” Cox added (see photo above). “We developed one set of parameters that accommodated about 80 percent of lifts and several other custom configurations for the outliers.”

In addition to identifying the best equipment for the project, Engineered Rigging worked alongside the Texas Sterling team training them on how to install, maintain and use the 12 strand jacks in unison. Roughly 100 lowering operations will be performed with the gear during the Panther Island Bridges project which maximizes Texas Sterling’s return on the investment. The flexibility of the system will allow the strand jacks to be used on future projects as well.

“The jacks are easy to transport and set up and can be used over and over again,” Cox said. “They can be safely operated via computer from the top of a bridge or a variety of project locations.”

How Does a Strand Jack Work?
Essentially, a strand jack is a linear winch, in which a bundle of steel strand moves through a main lifting jack. Above and below the cylinder are anchor systems with wedges that grip the strand bundle simultaneously. Lifting and lowering a load is achieved by hydraulically controlling the main jack and two mini jacks (at the top and bottom) alternately. If the system loses pressure, a closed wedge mechanically locks the load in place. This safety feature eliminates the dangers associated with the suspended loads of cranes. Up to 60 strand jacks ranging in sizes from 17 tons to over 1000 tons can be controlled simultaneously by a single operator.

About Engineered Rigging
Engineered Rigging (ER) is a global innovator in heavy lifting solutions. By leveraging decades of experience and a wealth of technical expertise, ER overcomes the most complex logistical challenges for a variety of industries. The company provides equipment rentals and sales, engineering services and the design and fabrication of custom lifting technology. For more information, visit www.EngineeredRigging.com

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