# Synthetic Solution

A 770-USt capacity Manitowoc MLC650 crane with variable-position counterweight (VPC) swings one of the 100-USt precast beams into place.The MLC650, a 330-USt Manitowoc MLC300 with VPC were rented from Maxim Crane Works. The Twin-Path high-performance slings are visible in green and the synthetic equalizer blocks in yellow.

Two Slingmax high-performance roundslings and synthetic equalizer blocks proved to be the best way to complete the rigging needed to pick and place 100-USt precast concrete beams during fast-track bridge construction in Pittsburgh, Pennsylvania.

Those slings, used in an inverted basket rigging configuration around the equalizer blocks, formed the last link connecting other rigging to each end of the 154'9" long precast concrete beams that Swank Construction recently placed for the new bridge.

The 21 beams will support the deck of the new Fern Hollow Bridge, which replaces the 49-year-old one that made national news when it collapsed on Jan. 28 as U.S. President Joe Biden was heading to Pittsburgh to talk about the need to improve our infrastructure.

The bridge's owner, PennDOT, wanted a new bridge built well but as quickly as possible.

## The Team

PennDOT chose architectural and engineering company HDR to design the new bridge and Swank Construction Company to build it.

The New Kensington, Pennsylvania, construction company is not only the project's general contractor, it's also doing much of the work itself.

Swank built the drilled-shaft concrete foundations, built the concrete piers, installed the giant precast deck beams, and will install the bridge deck.

The beams were cast and tensioned by PennStress, Blair County, Pennsylvania.

The rigging is provided by I&I Sling, Aston, Pennsylvania, and LGH, Chicago, Illinois.

The cranes and operators were rented from Maxim Crane Works, West Mifflin, Pennsylvania.

Swank rented three Maxim cranes for the job. The largest was the 770-USt MLC650 lattice-boom crawler crane with Manitowoc's variable position counterweight (VPC) and 200' boom.

The second was a 330-USt Manitowoc MLC300 with VPC and 200' of boom, and the third was a 242-USt Liebherr LR1200 with 200' of boom.

## Two-Step Placement

The three-span Fern Hollow Bridge will stretch 447' from hilltop to hilltop some 60' above Frick Park.

Each span uses seven of the precast, prestressed concrete beams to support the four-lane, 64'-wide deck.

Each end span runs from an abutment to the nearest pier. The center span runs from pier to pier.

The green Slingmax Twin-Path synthetic slings and yellow equalizer blocks completed the rigging for setting precast concrete beams that were 8' tall, 4' wide, 154' long, and each weighed 100 USt.

Since the beams were too long and heavy even for the MLC650 crane to set directly onto the two piers, the beams for the center span were set in two steps.

The 770-USt MLC650 with VPC was set up on a hilltop near one of the abutments, and the 330-USt MLC300 was set up in the valley close to the piers.

When a truck delivered a beam the bridge site, the MLC650 lifted the beam, swung about 180°, and set it onto the abutment and the nearest pier. When

two beams had been placed that way, the Manitowoc MLC300 and Kobelco CK3300G-2 worked together to move each one so it sat on the two piers and formed part of the center span.

To set beams for the remaining end span, Swank moved the Manitowoc MLC650, to the hill at the other end of the bridge.

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Most of the rigging for the MLC650 VPC's single-crane lifts of the beams was fairly straightforward.

Swank's chief engineer Bill DelSignore said that he chose synthetic roundslings both for the upper and lower rigging based on weight, performance, and availablity.

The upper rigging consisted of two sets of round slings. Each was rated for 150,000 lbs. and reached down 130' from the crane's hook.

From there to the connection with the beam ends, things got trickier.

The last 15' from the end of the upper rigging to the two eonnectors embedded in each end of the beam required that the connecting slings be used as a two-part basket around an equalizing block.

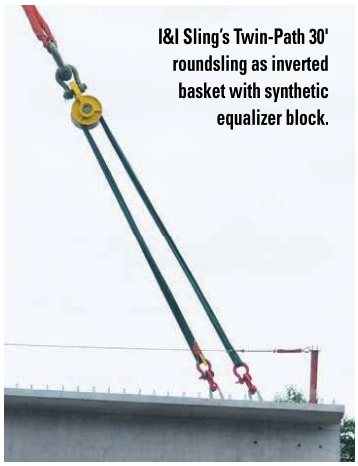
"Often, you might use a wire-rope sling in this type of application," said I&I Sling's project manager, Janice Ketchum, "but based on the length and weight of these beams, the wire rope sling would have been 2.5" in diameter, which would have presented D/d ratio concerns, among other things."

She added, "Also, wire rope of that diameter weighs about 11.6 lbs. per foot, so the two 30' slings would've weighed about 700 lbs., and that doesn't count the equalizer blocks."

Ketchum said that, instead, Swank chose to use two 30' Slingmax Twin-Path high-performance synthetic slings and two 75-USt capacity Slingmax synthetic equalizer blocks.

"Using the the Twin-Path synthetic roundslings and equalizer blocks saved hundreds of pounds and enabled Swank to reach the right D-to-d ratio," she said.

Ketchum also noted that Twin-Path slings have a built-in overload detection technology called the Check-Fast inspection system. "If a user can see the early warning indicator (EWI), they can quickly see the sling has not been overloaded. If the EWI is missing, they know right away to take it out of service and send it in to an authorized I&I Sling/Slingmax dealer for inspection."



I&I Sling's Twin-Path 30' roundsling as inverted basket with synthetic equalizer block.

All of the beam lifts went smoothly as planned, and the bridge may be able to open by year's end. ■