Sundt Construction

Customer Success Story

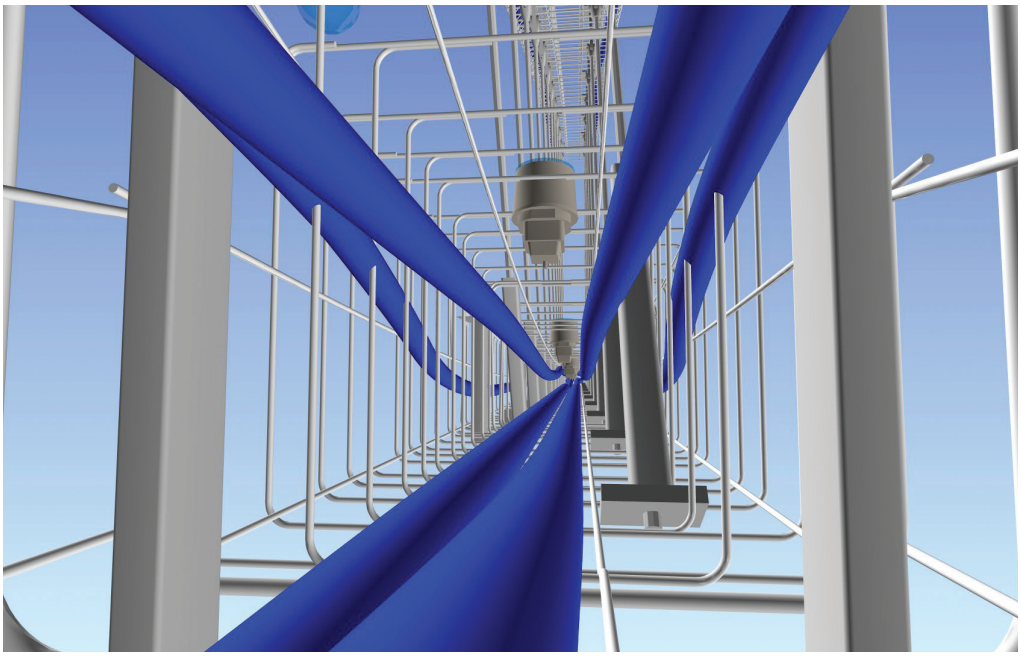
AutoCAD® Civil 3D®
Autodesk® Revit® Structure
Autodesk® Navisworks® Manage

A key benefit of our virtual construction model was the ability to visually communicate with our subcontractors during planning sessions and, as a group, develop a more realistic construction schedule.

— Eric Cylwik
Modeling Engineer
Sundt Construction, Inc.

Virtual preconstruction with BIM for Infrastructure.

Sundt Construction uses Autodesk BIM solutions to help construct a signature bridge in Texas.



Network of post-tension tendons shown in 3D. Image courtesy of Sundt Construction, Inc.

Project Summary
For many years, Sundt Construction (www.sundt.com) has been at the forefront of using Building Information Modeling (BIM) solutions for the virtual design and construction of its vertical construction projects such as office buildings. Now the firm's Heavy Civil division has transferred lessons learned on those projects to its horizontal infrastructure projects, using Autodesk® BIM solutions for the virtual design and construction of highways and bridges.

Sundt recently used BIM to help devise the best construction solution for the renovation of a high-profile bridge in Fort Worth, Texas. The reconstructed bridge, designed by the Texas Department of Transportation (TxDOT), will be built on the site of the current bridge and will feature 10-foot pedestrian walkways and 12 precast post-tensioned concrete arches that run the length of both sides of the structure. Each arch will be 24 feet tall, 163 feet long, and weigh more than 300 tons. Polished stainless steel within the arches and bridge superstructure will be illuminated at night with embedded lighting. Sundt is the general contractor on this $24.2 million project and Sundt's concrete division is self-performing all of the concrete work.

The Challenge
"This bridge contains a web of structural and lighting elements," says Eric Cylwik, a modeling engineer for Sundt. "In addition, there is an intricate network of post-tensioning tendons, including internal ducts embedded in the concrete that curve in all three dimensions as they thread through the arches." The complexity of the structure requires careful planning to prevent construction delays. But it was very difficult to visualize how all of these components fit together—and to make sure they did fit together—just by looking at 2D drawings.

Autodesk®

Improved preconstruction planning, visualization, and coordination.

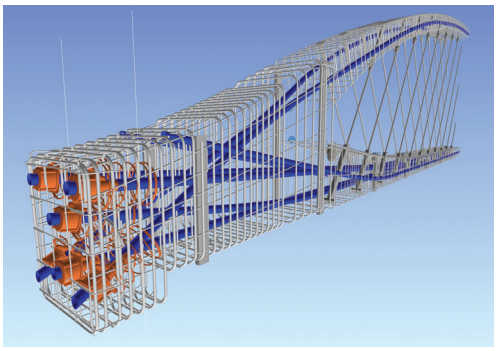
The Solution
Sundt created 3D construction models using Autodesk BIM solutions, which help the project team to identify and resolve issues that might delay the project, before the onset of construction. The team used AutoCAD® Civil 3D®, Autodesk® Revit® Structure, and Autodesk® Navisworks® Manage® software to create a precise virtual model of the bridge from the TxDOT 2D design drawings for improved preconstruction planning, visualization, and coordination.

"We modeled the post-tension ducts in Civil 3D using alignments, profiles, and simple subassemblies that represented the cross-sectional shapes of the ducts," explains Cylwik. "Then we imported that model into Revit Structure, which we used to model the rest of the bridge, including the concrete arches and every piece of embedded rebar, all the lighting elements and hangers, as well as the bridge's superstructure, substructure, and deck." Sundt also used Revit Structure to incorporate information from its subcontractors and generate its project shop drawings.

Once the virtual model of the bridge was complete, the team used Navisworks Manage for clash detection, to help identify and correct potentially costly coordination issues well in advance of the bridge's construction. This was particularly important due to the unusual rebar patterns and curved paths of the post-tension ducts that stem from the organic shape of the arches. Sundt also used Navisworks Manage to create a 4D model of one of the arches, exploring the construction sequencing of the concrete pours, which will happen offsite with the arches lying on their sides.

Plan Carefully
"A key benefit of our virtual construction model was the ability to visually communicate with our subcontractors during planning sessions and, as a group, develop a more realistic construction schedule," says Cylwik. All the subcontractors attended meetings to review the model and determine installation times for the various components within the bridge.

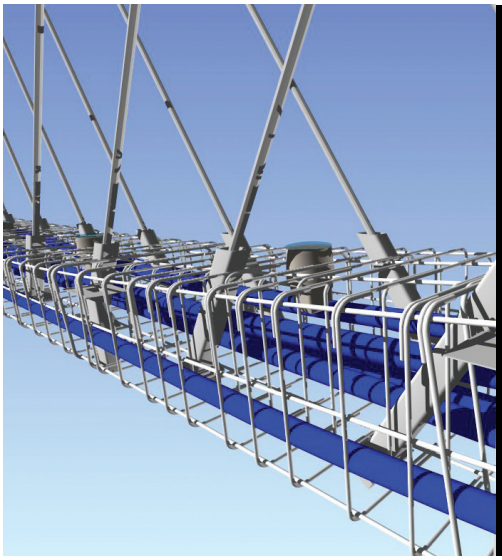
"For example, the meeting points of the arches are particularly complicated, with the oddly shaped rebar configuration and all the post-tension tendons merging into a tight space," says Cylwik. "Being able to zoom in and virtually crawl into these spaces helped us understand how long a specific task would *really* take and determine the order of the work. The end result is more effective communication between all parties. Everyone better understands their own scope and schedule, and everyone else's as well. For example, the rebar installer 'sees' what the post tension duct installer needs to do, and vice versa."



Creation of 3D construction model improved preconstruction planning and coordination. Image courtesy of Sundt Construction, Inc.

The Result
Sundt will cast all the arches offsite and then place them on both sides of the old bridge at night. Construction began in January 2012 and once all 12 arches are in place, crews will close and demolish the current bridge and build the new one in its place. The timing of the 150-day bridge closure is carefully planned to avoid important commercial and tourist events for the city. To capitalize on these events and minimize further traffic disruptions, there is a significant monetary incentive available to Sundt for early completion. "With the help of Autodesk BIM solutions for virtual construction planning, we are better able to visualize the construction schedule and analyze implications of installation order and other construction decisions. Meeting participants have a clearer picture in their minds of the schedule and what needs to be done to meet that schedule," reports Cylwik.

For more information, visit **www.autodesk.com/bim.**



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Portion of virtual model of 7th Street bridge arch. Image courtesy of Sundt Construction, Inc.

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