

COMPANY

United Structural Design, LLC

LOCATION

Arizona, United States

SOFTWARE

Autodesk® Revit LT™

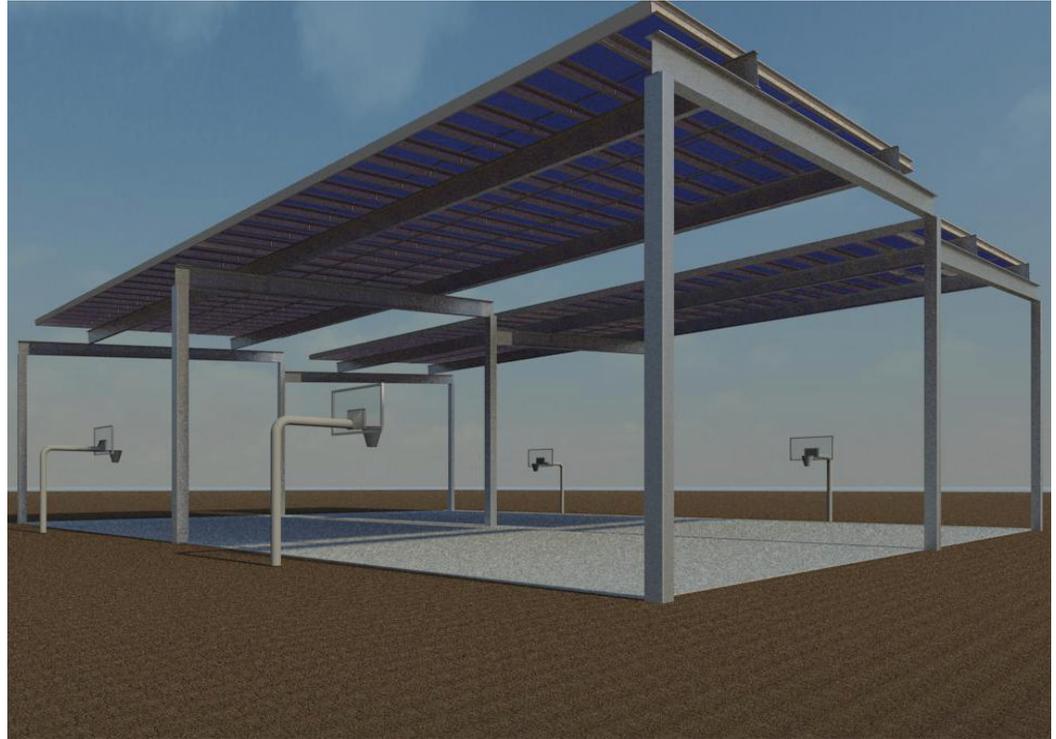
Autodesk® A360

BIM on a budget

A small structural engineering firm stays more competitive with Revit LT

Revit LT is the best low-cost option for BIM and 3D modeling. The software works the way a structural engineer thinks—in three dimensions. It's easy to use and differentiates our firm, giving us an instant competitive advantage.

—**John Elder**
President
United Structural Design, LLC



Madison School District solar shade canopy over existing basketball courts — Phoenix, Arizona.

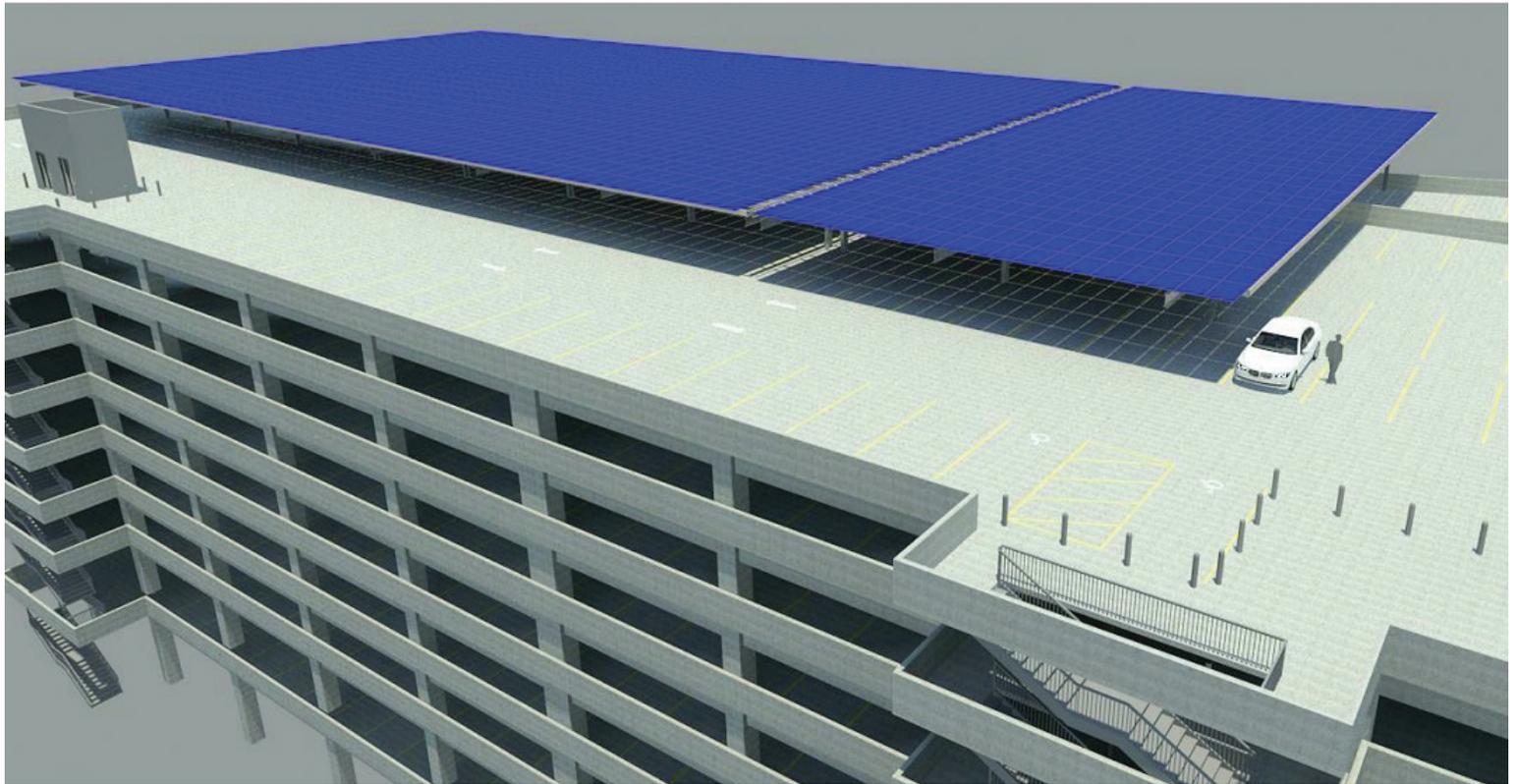
The firm

United Structural Design, LLC is a structural engineering consulting company based in Arizona. The company was founded in 2013 by John Elder and Ben Crellin, two structural engineers with close to 20 years of combined engineering experience. The company focuses on creating safe, efficient, and sustainable designs using traditional engineering methods combined with advanced computerized analysis and Building Information Modeling (BIM) processes.

The challenges

“When we started our company, we needed to find creative ways to minimize startup costs,” says Crellin. “That meant we needed to prioritize how we invested our time and money on design tools and software training.” They considered using AutoCAD®, but developing 2D CAD standards for the company would be time-consuming and they needed to hit the ground running. Furthermore, they realized that their industry is moving towards BIM. “To distinguish ourselves, we wanted to start where the industry was going and use BIM instead of the traditional CAD tools that many other small firms use,” explains Elder. “We felt that BIM’s innovative model-based approach would help us leapfrog our competition.”

In addition, Elder and Crellin are the company’s sole employees, so besides their engineering work, they must also perform all management and operations tasks. “Finding the extra time for support activities such as marketing and accounting can be difficult, but they must be done to keep the business running,” says Elder.



607 kW solar installation in Honolulu, Hawaii above an existing eight-story parking garage.

With Revit LT, we're not drawing lines to represent a beam. We're drawing a beam to represent a beam and everything is automatically modeled to scale. Autodesk software helps increase productivity. Additionally we develop a better spatial understanding of the structure and its surrounding components. The result is that we deliver better designs in less time.

—**Ben Crellin**
Principal Engineer
United Structural Design, LLC

The solution

Elder and Crellin chose Autodesk Revit LT™ software for their new firm. "Revit LT is a low-cost option for BIM and 3D modeling," says Elder. "The software works the way a structural engineer thinks—in three dimensions. It's easy to use and differentiates our firm, giving us an instant competitive advantage."

With Revit LT, every drawing sheet, 2D and 3D view, and schedule is a presentation of the model, and the software keeps the model and associated drawings synchronized. "So as we develop our 3D design model, the software is automatically generating and coordinating our 2D drawings, saving us time and improving the accuracy of our documentation," says Crellin. "And by relying on the drafting standards built into the Revit LT software, we can deliver clean, professional 2D drawings to our clients, without having to spend time developing new drafting conventions or contracting external drafting consultants."

Get an engineering perspective

The 3D modeling environment of Revit LT enables Elder and Crellin to visualize their designs in a way that 2D CAD tools do not. "As we're designing, we can see the building structure and how it all fits together," says Elder. "We can work more effectively. It also helps us to catch conflicts with other disciplines or notice design elements that need to be improved."

For example, the firm was recently tasked with designing a three-story, 90,000 square foot mini-storage facility. The design required long span structural steel beams to support the elevated floors. However, as they were modeling the beams using the standard shapes provided in Revit LT, it became apparent that the original beam they chose was too deep. They modified their design and the framing in order to use a shallower section. "With Revit LT, we discovered the issue as we were designing," says Crellin. "Without missing a beat, we simply updated the beam sizes in the model. We didn't have to waste time correcting drawings, because the changes to the model are automatically reflected in all of the sheets."

Capitalize on time savings

This feature benefited the firm on a recent project where the architect's plan had ten-inch thick walls. "We don't have to spend time creating different types of structural components because the software is preloaded with industry standard structural elements. So when we add a beam, we just select the appropriate size and position it in the model," explains Elder. "The software automatically draws the beam to scale in 3D space and also in all affected 2D or 3D views of the model. And if we need to change that beam, the software updates it in all views automatically."

This feature benefited the firm on a recent project where the architect's plan had ten-inch thick walls. "We mistakenly assumed they wanted ten-inch stud walls—but actually they wanted six-inch walls with four inches as an architectural feature that wasn't part of the structural system," says Crellin. "To update the model, all we had to do was change the properties of the wall type and all the walls of the same type updated automatically—as did all the drawings."

"Since it's just the two of us, anything that saves time can make a difference—even if it's just a few minutes or a half-hour here and there," says Elder. "The time savings add up, giving us a chance to tackle business support tasks like making sales calls or updating our website."

Visualize emerging designs

The firm also uses Revit LT and Autodesk® A360 cloud-based collaboration service to quickly and easily produce model-based design visualizations for clients. "We're getting more and more requests from clients and owners to provide renderings or 3D images of what the structures will look like when they're finished," says Elder. "With Revit LT and Autodesk's A360 cloud, we can provide those deliverables without paying for outside contractors. And we can charge for the deliverable—bringing in more revenue while satisfying the needs of our customers."

"We're taking on more and more solar projects, and the aesthetics of the solar structure is an important aspect on some of those projects," says Elder. The firm designed solar panel installations that are currently underway at several schools in Phoenix's Madison School District. The panels are mounted on shading structures over outdoor recreational areas and parking lots.

"Since these project didn't require traditional architectural services, we provided conceptual designs that would normally be done by architects," says Crellin. "We helped with the layout of the panels and the design of the shading structures, and also produced renderings of proposed designs." The firm imported aerial photography into Revit LT and used those images as a reference. Then they overlaid the 3D design components, including the solar panels, steel structure, and concrete foundations.



3-story, 65,000 square foot Dysart storage facility in Surprise, Arizona.

The 3D modeling environment of Revit LT enabled us to try out different orientations and configurations. From the design model, we can effortlessly produce renderings that helped our client see what the final installation would look like.

— **Ben Crellin**
Principal Engineer
United Structural Design, LLC



The results

“Revit LT is very affordable and allows us to work more quickly and effectively,” says Elder. “Even though we’re a small company, Revit LT enables us to successfully compete with much bigger firms.”

For more information, visit www.autodesk.com/revitlt



John Elder P.E., S.E., Principal Engineer



Ben Crellin P.E., LEED AP, Principal Engineer

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