

# Together we are shaping a smarter future for construction

## TEKLA SOFTWARE BY TRIMBLE

Trimble is a technology company with a vision of transforming the way the world works. Trimble's construction offering ranges from total stations to advanced software, giving the industry tools to transform planning, design, construction and operation of buildings. The company also has products for trades like logistics and agriculture.

## TRIMBLE BUILDINGS

In addition to Tekla, Trimble Buildings brands include names like SketchUp and Manhattan Software, targeting architects, engineers, fabricators, MEP contractors, general contractors and construction managers, and building owners. The software solutions promote constructible models and collaboration. Trimble Buildings offering blend groundbreaking innovations and practical features, helping the industry achieve transformative results.

## TEKLA SOLUTIONS

Tekla software is at the heart of the design and construction workflow, building on the free flow of information, constructible models and collaboration. It is the people who make the difference, while Tekla gives tools for realizing projects around the world from housing and bridges to factories and skyscrapers. Good communication and elimination of waste make the industry more sustainable and cost effective, improve your projects and in the end your customers' happiness.

- **Tekla Structures** is the most developed Building Information Modeling software on the market. It makes accurate, constructible modeling of any structure possible.
- **Tekla Structural Designer** gives engineers the power to analyze and design buildings efficiently and profitably.
- **Tekla Tedds** automates repetitive structural calculations.
- **Tekla BIMsight** is a free professional tool for construction project collaboration allowing anyone combine models, check for clashes and share information.
- **Tekla Field3D** is an easy-to-use 3D tool for utilizing Building Information Models on mobile devices.
- **Tekla Civil** is a comprehensive, model-based solution for heavy civil engineering design needs.



## Modeling Flexibility: Alfred Miller Draws on Technology Edge for Industrial Strength Solutions

### Solutions



Please note that some products are not available in all areas.  
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# overview

Lake Charles, Louisiana-based Alfred Miller Contracting, a national general contractor, is best known for its specialized design/build skillset on industrial and petrochemical construction projects.



In business since 1947, the firm has become a particularly accomplished precast concrete fabricator thanks in large part to its custom-developed multi-stage casting process. The company has fabricated and installed a range of composite precast solutions from trenches, sumps and electrical ductbanks to precast/prestressed structural components and structural foundations.

Today, the company continues to push the envelope with help from technology, specifically advanced structural design software—a move that has provided greater flexibility in design analysis and coordination along with the ability to complete complex projects that might otherwise be impossible.



## DEMAND DRIVEN

Like many others, Alfred Miller’s road to new technology was expedited by a project challenge.

In early 2015, Alfred Miller’s team won a bid to construct a large blast rated maintenance warehouse building which also housed the control room for a new \$10 Billion Liquefied Natural Gas plant. The precast warehouse structure included a structural concrete floor slab.

At first the engineering design seemed straightforward. The structural floor slab (200ft x 325ft x 12” thick) is supported by 401 piles below. The slab/pile combination needed to support heavy equipment loading in certain areas including storage racks, jib cranes, and even HS20 truck loading.

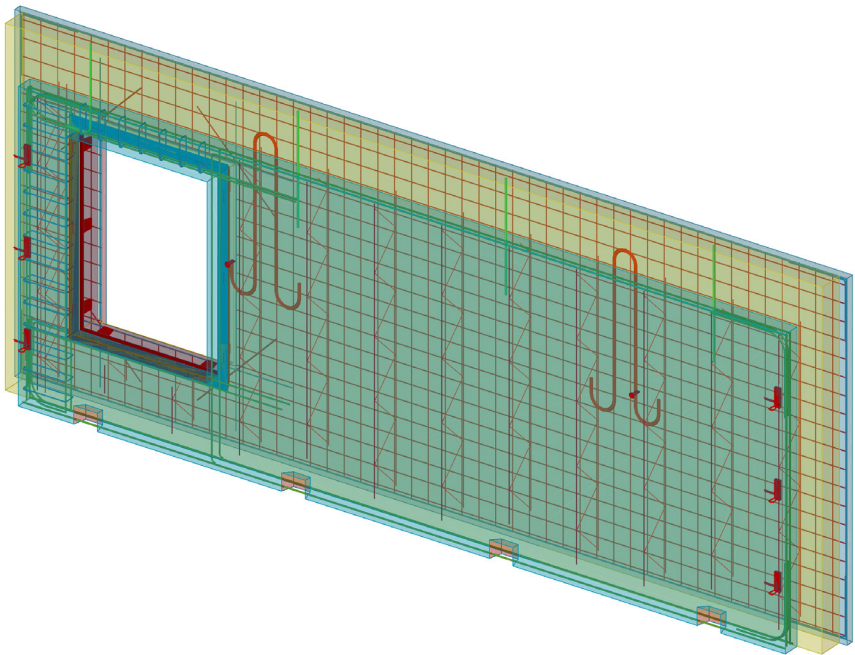
Rebekah Morlock, PE, LEED AP, Engineering Technology Manager for Alfred Miller, recalls, “Initially, I adopted a conservative approach to the analysis, relying on manual techniques and empirical evidence. Unfortunately, the analysis proved impossible to perform effectively. I couldn’t get a good feel for the pile loads and overloads to allow me

to optimize the number and placement of them within the very large space.”

Frustrated with the results, Morlock suggested to her executive leadership that the company invest in a structural design solution, namely Trimble’s Tekla Structural Designer.

Tekla Structural Designer is an engineering solution for analyzing and designing concrete and steel systems of all scopes and scales with sophisticated modeling, analysis and design tools. It also incorporates advanced collaborative BIM workflows and IFC compatibility to facilitate design coordination with other project disciplines even at a very early stage of the design-build-operate process.

Key features range from the ability to make quick comparisons of alternative design schemes to cost-effective change management and seamless BIM collaboration.





While executive leadership was cautiously optimistic, they approved the purchase of the light version of Tekla Structural Designer.

Morlock downloaded the version and got to work. Within a few hours, she was able to model and a finite element approach to analyze a stronger, more cost effective slab concept, immediately saving \$70,000 by reducing the amount of reinforcing required and optimizing the location of the piles below as compared to her manually prepared concept. The next day, the firm bought the full version of Tekla Structure Designer.

Morlock used the solution to model five interconnected slabs to create the whole slab in about 30 minutes.

She says, “The software is smart enough to know that even if I break up the slabs to simplify construction and support multiple pours, that all elements will carry loads as one system. Ultimately, we saved \$126,000 in reinforcement that would have been required had we gone with the empirical approach. Ever since this first project, Tekla Structural Designer has become a mainstay.”

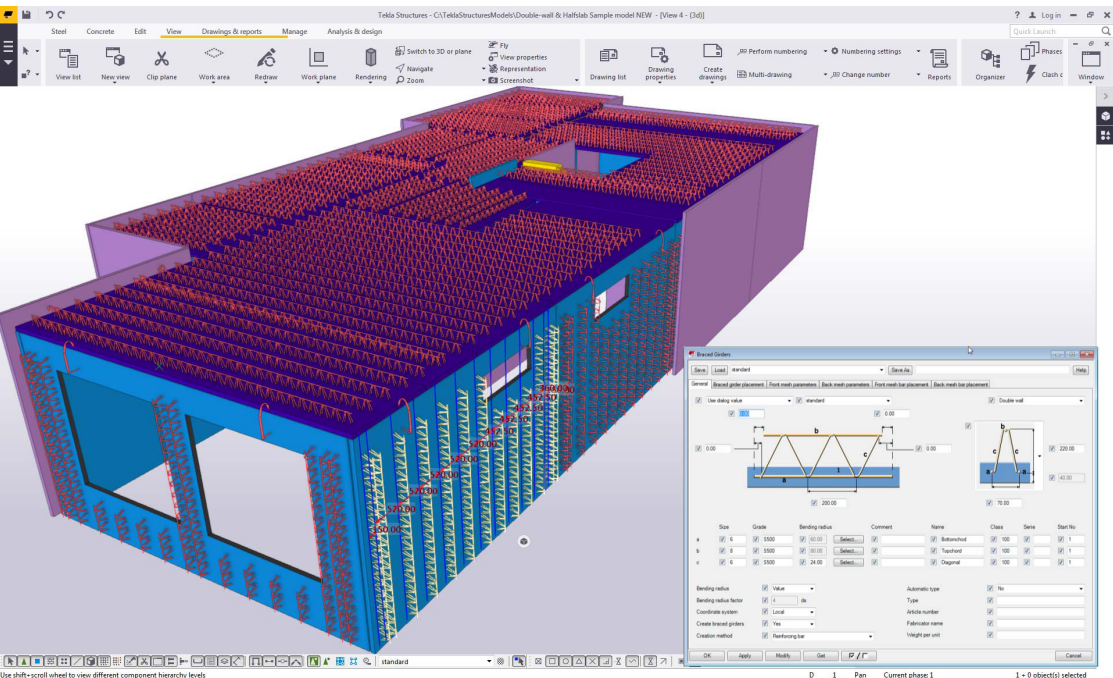
Morlock especially likes the tool’s ability to move through schematic design to detailed design and structural analysis with one model in instead of multiple solutions and the ability to make changes on complex projects very quickly to determine the optimum solution to maximize profit and schedule.

She adds, “Our company is unique in that we can’t just design to the cheapest material cost; we also have to look at production cost of the precast and schedule as sometimes schedule is more important than cost.”

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# OUTSIDE THE BOX

Soon after completing the design of the maintenance warehouse, Alfred Miller was tasked to engineer a 98,000 lbs, 17'-4" x 17'-4" by 14'-0" tall precast manhole chamber for another process within the same industrial plant.

Morlock says, "Early on, we analyzed the manhole project by hand for in-place construction. When we shifted from a cast-in-place product to a precast prefabricated solution, we realized that we needed to evaluate the system for three conditions: in service, lifting and transportation. However, we had no precedent for this type of analysis."

With Tekla Structural Designer, Morlock was able to design a solution for all three scenarios.

"There's no other way we could have designed this system within the scope defined by the owner," she adds. "With the structural design tool, I was able to model all three scenarios very quickly using the standard modeling techniques and then had the flexibility to manipulate it in a way that would be counterintuitive to most structural design approaches."

Her design worked beyond expectations. The manhole chamber was fabricated at the Alfred Miller site, lifted by two cranes onto a truck and delivered to the site on schedule. Since installation, the owner has not noted any structural problems.

Since those early days, the firm, and Morlock in particular, have continued to put the structural design solution to work. Project managers, operation managers, and other non-engineers regularly ask Morlock to create a model or run a quick analysis in Tekla Structural Designer to support a bid estimate or value engineer an existing project.

Morlock concludes, "It has the basic tools for routine analysis and the flexibility to support outside the box scenarios. Our customers, particularly those in the industrial sector, are exacting and time-driven. They need for us to have the flexibility to change and still maintain hard deadlines. This technology allows us to meet those expectations. It's powerful and quick—and it's paid for itself many times over since implementation."

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