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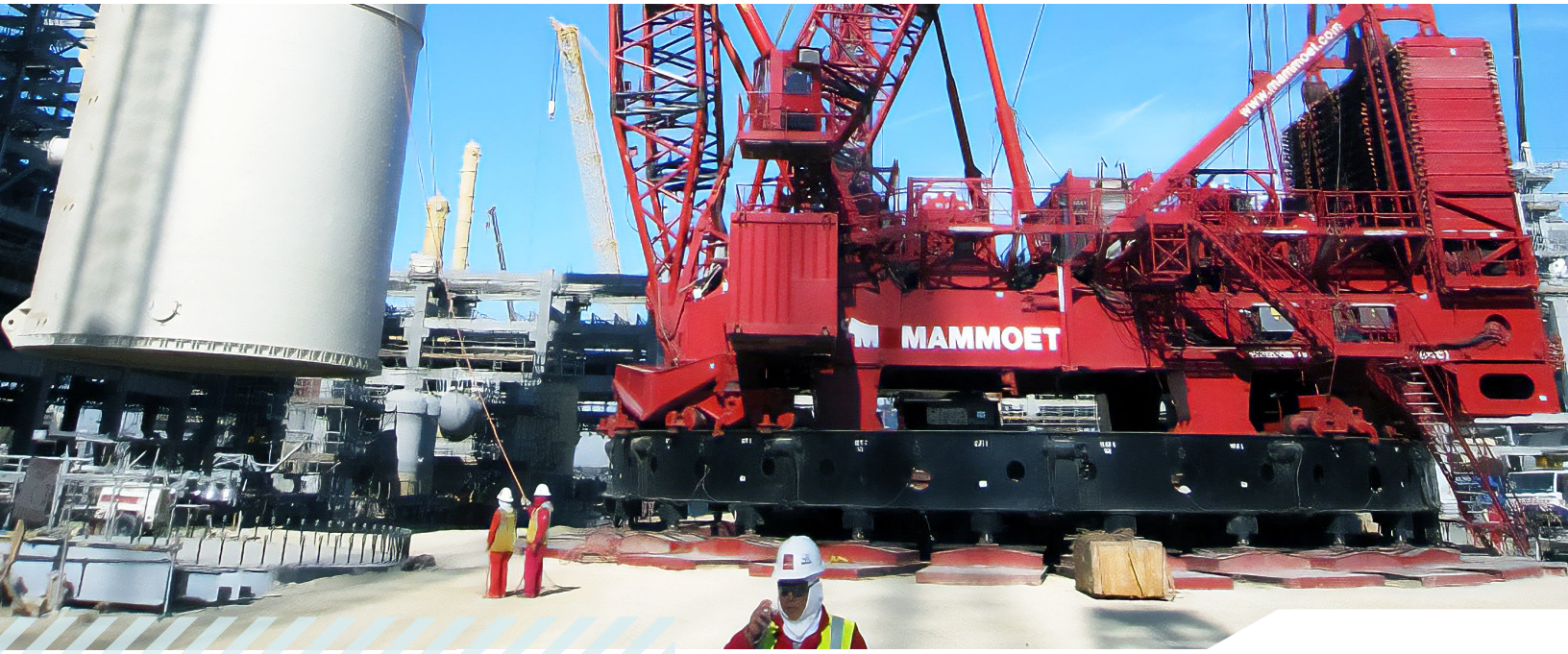
Case Study

PHE
PAYNE-HUBER ENGINEERING

Data with Context: How Mathcad Helps Payne-Huber Achieve Peak Quality Assurance



Structural engineering affects almost every aspect of our lives, often in ways we don't expect. Of course, structural engineers are integral to the construction of apartment buildings big and small, the safety of high-rise offices that house workers in cities around the world every day, and the soundness of bridges that carry cars over major intersections and bodies of water alike. But structural engineers are also vital to operations we don't see or think of very often—and in Michael Mills' case, that means process equipment in oil, chemical, and food refineries. Through his company, Payne-Huber Engineering, Mills supports the additions, repairs, and renovations to these plants by developing the structures and foundations that support the equipment. Companies like Payne-Huber play an important role in helping industries transport critical materials and converting them to support societal structures — as an example – designing a concrete "tabletop" structure, which supports a large vessel and the foundation to support the equally large crane which placed the vessel.

Attaining Code Compliance with Ease

As a former member of the U.S. Army Corps of Engineers, Mills takes pride in ensuring his work abides by the various structural codes. These regulations protect all parties involved—including the public, owners, operators, insurers, and the design engineers themselves—allowing the engineers to meet everyone's expectations while providing safe structures. PTC Mathcad Prime, PTC's engineering calculations software, promotes adherence to structural codes by allowing the inclusion of many details which might otherwise be missed or omitted. The software enables Mills to codify the work required to meet structural design regulations. And by offering an easy way to conduct repetitive calculations, Mathcad helps to ensure all calculations will lead to a safe and reliable structure.

Every Detail Matters

A Mathcad user since 2014, Mills appreciates how much more detailed the software is when compared to Excel. Specifically, it allows him to see the original formulas and follow the results from beginning to end—he can essentially track his own thought process throughout the calculations. He builds his Mathcad worksheet templates to match critical structural codes and regulations, which helps keep his work in check.

Mathcad proved itself to Payne-Huber during the design of a large, concrete "tabletop" for an oil refinery in which #14 bars were used in the 7'x7' beams. The piers for this structure stretched 70 feet into the ground. Mills used a Mathcad worksheet to calculate the strains in the concrete and steel. The worksheet was extensive, and Mills was able to seamlessly transform it into a formal, 600-page report for his client. Because of Mathcad, Mills was

able to produce several iterations of loads and conditions without having to sacrifice the streamlined nature of his work. Mathcad's automation is well-suited to revisions and reuse between projects, and with the ability to calculate pipe weight, length, volume of fluid, and wind and seismic loads, and any other additional computations – all of which can be performed with ease.

Looking at the Bigger Picture

Mathcad has the capability to add more context to calculations than Excel, and this bigger picture view can result in safer, more efficient structures. Excel is not unit-aware and cannot handle engineering units. Mathcad's capabilities reduce the chance of error—and if the units are off, major problems can follow down the road. Mathcad can also integrate images and other outside materials, allowing engineers to be able to display the greater context of their work. This helps with Payne-Huber's quality assurance and eliminates the chance for something to go wrong because of a small calculation error or misunderstanding.

When so much is at stake, structural engineers must prioritize accuracy and

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Michael Mills, Payne-Huber

safety. Triple-checking your work—getting that extra peace of mind—is an important step in the process. Mathcad gives engineers the opportunity to confirm that their calculations are precise and will lead to sound structures. "Every time you cross a bridge or go up a tall building, thank a structural engineer," Mills said. "Tools like Mathcad are helping engineers achieve better accuracy and accountability in their calculations, leading to the safe, reliable structures we often take for granted." By giving context to their work, Mathcad allows engineers to feel confident in their calculations by providing a traceable path that matches up to stringent regulations.

Click here to give Mathcad a 30-day free trial and learn how it can clarify your calculations firsthand.

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