

editor's note



I USED TO THINK THAT SOCCER REFEREES WERE THE MOST INVOLVED GROUP WHEN IT CAME TO DISSECTING OBSCURE DETAILS, BUT IT TURNS OUT THAT ENGINEERS ARE JUST AS FASCINATED BY MINUTIA.

The October 2017 Steel Quiz (you can see past Steel Quizzes at www.modernsteel.com) featured a framing plan and posed the question: "Can you spot the potential constructability issue with the proposed framing plan shown at right?"

One person immediately voiced his opinion on the matter on a well-known engineering listserv, posting that he didn't think the structure would be stable once the temporary bracing was removed. No, replied another engineer, it would be stable, but something bizarre, like a Bessel function. A third engineer agreed it would be stable, but thought the deflection calculations would be extremely difficult. (You can view the entire thread at <http://tinyurl.com/steelquiz>).

Okay, agreed yet another engineer. It might have an axial compression load associated with the framing resulting in a catenary (tension) load. So it might work, but they'd never be daring enough to actually try it.

Of course, not every engineer participating in the discussion agreed. One thought it might deflect into a funnel shape, which would destroy the wall and ceiling finishes.

The debate continued, with one of the earlier posters explaining that it's non-linear and recursive, the design is similar to what you sometimes see in wood roofs and it will probably be stable—unless you have the potential for ponding issues. After a little more debate, one of the engineers opted to model the design in RISA 3D and declared that it would indeed work.

And then it got really interesting. One of the engineers built a physical model out of Sharpie markers and chopsticks. And then loaded it with an AISC manual to show its stability! Another decided an independent peer review was needed—so they modeled it with four apples (the columns) and four butter knives (the beams). And to test the stability, they loaded it with a bottle of V8. And yes, they posted pictures of all their efforts.

More discussion ensued, which resulted in yet another engineer building models showing the system would be stable with three, four or even five beams.

From there, the diagrams got more and more technical, showing loads and geometry to explain how the whole system worked. Others created yet more detailed 3D models, and one person ran it through STAAD Pro to analyze it.

Finally, yet another of the dozens of posters in this exchange built a large-scale model and loaded it with concrete blocks to demonstrate it would work.

But through it all, my favorite comment came from Larry Kruth, AISC's vice president of engineering and research, after viewing the thread: "Should we let them know this framing is actually in a building constructed in the 1990s? It was stable and remains so after erection."

I hope this month's Steel Quiz is just as popular!


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