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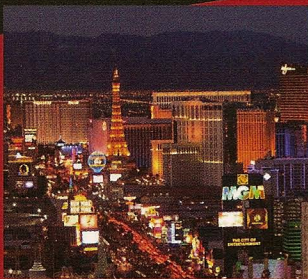
EDUCATING BUILDING OWNERS, ARCHITECTS AND CONTRACTORS

## GREEN'S NEW MEANING

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The Phams agreed to steel framing for their 7,200-square-foot (669-m<sup>2</sup>) home in Pelican Hill, Calif.

# FOCUS ON EFFICIENCY

## BUILDING WITH STEEL CAN SAVE TIME AND MONEY

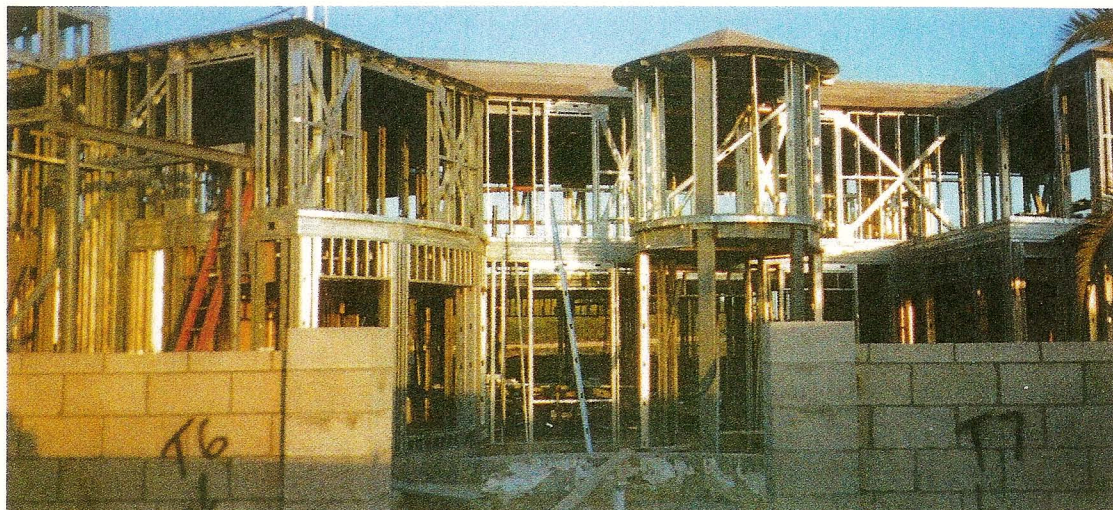
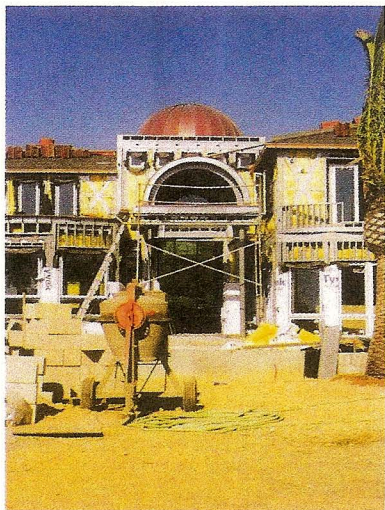
BY DON WHEELER

**AS A LICENSED GENERAL** contractor and custom homebuilder since 1979, I have extensive experience building with wood and steel. My desire to be more environmentally conscious in my work led me to build exclusively with steel beginning in 1997. Originally I switched to steel framing to avoid cutting down trees to frame homes. My wife's family lives in Washington and I have seen the ramifications of clear cutting on the environment there. Being from California, I also liked the idea of building with steel because of wildfires. In recent years, I have found many more benefits to building with steel, including its design flexibility, durability, sustainability and ease to work with. Along the way I've learned a few tips of the trade to make the process of building with steel more efficient.

### FIRST EXPERIENCE

Although I had a lot of experience with non-load-bearing steel, I had never built a structure using steel framing before 1997. My first project with steel framing was a custom home in Pelican Hill, Calif., for the Phams. The project was a second commission for this client; their first home also was built in Pelican Hill but was constructed





To save time on a job site, have your supplier place a label on the steel designating where it goes in the structure.

with wood framing. We had many problems with the lumber, including warping, termites and mold, which more than doubled the framing pick-up costs. The Phams were disappointed with the design of their first home, and before we finished it they sold the home and purchased another lot in Pelican Hill. After being hired to build the 7,200-square-foot (669-m<sup>2</sup>) second home, I pressed the Phams to change the framing from wood to steel. Although reluctant at first, they soon became supportive, which led to my first steel-framed home.

The Phams' home has many arches and serpentine walls. I thought the framing of arch soffits and walls was going to be difficult, but steel creates many advantages to framing barrel ceilings, domes and other details. Steel-framing material can be bent to an exact radius for any detail requiring a curve. It also is easy to make any radius in the field; steel cut correctly can bend to form any shape needed.

Ten years later, the benefits of steel framing are visible to anyone who visits the Phams. Their home has no plaster cracks anywhere because steel does not expand and contract like wood. Steel also makes a stronger, straighter structure compared with wood,





## [ FIELD TECHNIQUES ]

which causes less movement in a building. For example, wood always is platform framed. Steel typically is balloon framed with ledger material attached to the track and studs below. This allows the diaphragm to be attached directly to the top plate of the floor. It also allows the top and bottom plates of the

next floor to be directly attached. This means less material and less work. It also results in a stronger, more direct shear transfer. By framing this way, you have eliminated a separation of walls with a rim joist and hinge point that is responsible for most plaster cracks.

The consistency of the material is another bonus. I don't have to order extra to compen-

sate for inferior stock. When I ordered lumber, a certain amount was unusable. Long lengths of steel have no premium price because steel is sold by the pound rather than the foot, which is not the case when buying premium lengths of lumber.

The cost savings of working with steel framing are tangible. For instance, a home I built on Balboa Island in Newport Beach, Calif., originally called for wood framing. The engineering consisted of seven moment frames, which are structural steel made of

Steel-framing material can be bent to an exact radius for any detail requiring a curve.

red iron, along with numerous structural-steel posts and beams to support the wood framing. The line item amount for the structural steel ran more than \$150,000. When the structure was re-engineered for steel framing, we were able to remove six moment frames, all the structural-steel columns and most of the steel beams. With wood framing, the foundation would have cost \$85,000; the foundation with steel framing cost \$35,000. And we reduced our structural steel cost to \$12,000.

### LESSONS LEARNED

While building the Phams' home, I decided to become a steel framer rather than a panelizer. For now, stick framing with steel works best for me because it provides the most control. In all my years of construction, I have never seen a perfect project. If I need to adjust a wall a small amount for plumbing or electrical or accommodate a ceiling height for an unlevelled foundation slab, I can easily make these adjustments with stick framing.

I must admit framing with steel is more labor intensive than panelizing. You must determine how to make it go faster for you. One way is to be innovative—there's more than one way to do things. Another way is to spend more time planning a project. More planning requires less construction time and lower time and labor costs.

For instance, I carefully review my set of plans. An engineer may recommend I build

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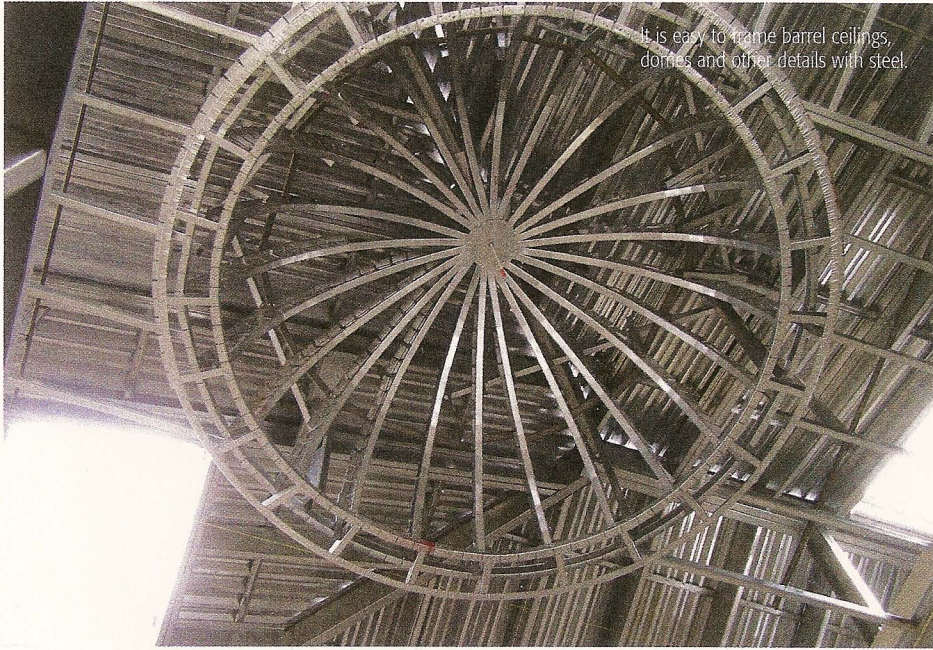



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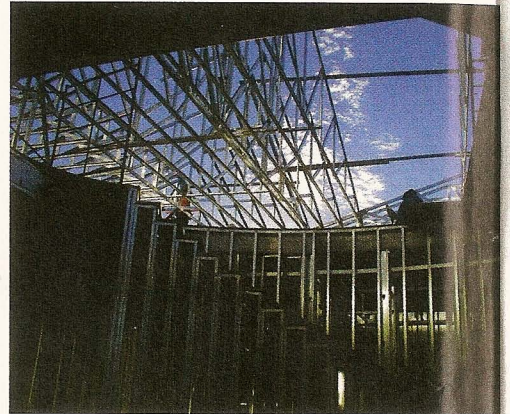
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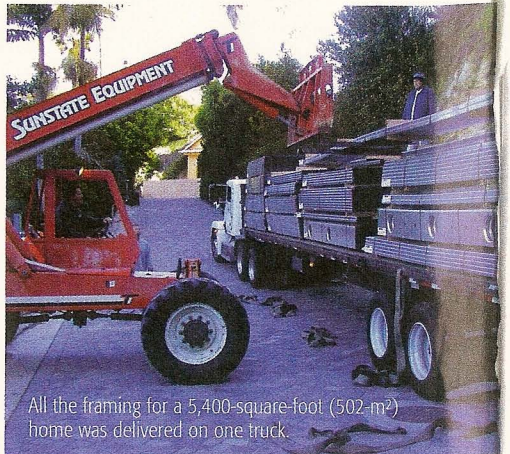




It is easy to frame barrel ceilings, domes and other details with steel.



Field-built trusses provide more control on a job site.



All the framing for a 5,400-square-foot (502-m<sup>2</sup>) home was delivered on one truck.



with 5 1/2 or 6 inches (140 or 152 mm), but it actually may be OK to build with 3 1/2 inches (89 mm), which is a cost savings. However, I never change the size or gauge of the material specified by an engineer without a field memo to substantiate the change. It is critical to work with an engineer who has the experience and technical knowledge to design with steel framing. For example, a six-unit project I was working on originally was designed with heavy structural-steel post and beams and light-

Steel can be ordered cut to an exact length, saving time and leaving very little scrap.

gauge steel as infill framing. I worked with an engineer to redesign the units, omitting practically all the structural-steel members. By using light-gauge steel as the primary structural integrity of the building, we saved \$300,000.

Practical field experience has helped me with estimating and ordering of material. I create spreadsheets, including a cut list, which combines all the steel lengths so everything can be bundled the same; material re-cap list, which makes it easier for the rollformer to roll everything out; and materials order list. By controlling how steel is bundled and shipped, it will be more organized for my crew to identify. I also have everything cut to size. Because I take the time to pre-plan and lay out, I know exactly what I need for a job, which eliminates scrap. Although all steel scrap is recyclable, it still doesn't make sense to unnecessarily waste steel.

In addition, I make sure materials are marked. I have my supplier place a label on the steel designating where it goes in the structure. And I take the time to sort through the materials when they arrive on the job site and lay them out in a way that makes them easily accessible for the crew.

#### WHAT I KNOW

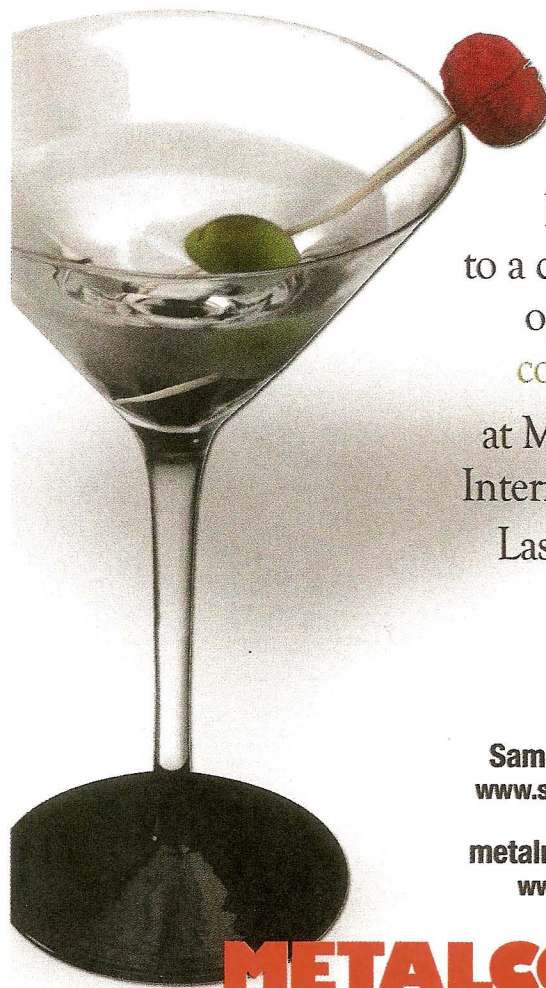
Although I still prefer to stick build

with steel, I am taking my own advice that there's more than one way to do things. I'm now working toward combining the best of panelization with the best of stick building. When I do panelize, I prefer to do it on-site because I like that control. If I need to change the size of something, I can easily do that on-site. However, one thing I won't

waiver from is careful planning. It saves a lot of time and, consequently, money on the job. ■

*Don Wheeler is president of Wheeler Construction Co., Anaheim, Calif. He can be reached at donwheeler@sbcglobal.net or (714) 473-0229.*

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