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THE FUTURE OF FRAMING

April 2014

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The mission of *Structural Building Components Magazine (SBC)* is to increase the knowledge of and to promote the common interests of those engaged in manufacturing and distributing structural building components. Further, *SBC* strives to ensure growth, continuity and increased professionalism in our industry, and to be the information conduit by staying abreast of leading-edge issues. *SBC's* editorial focus is geared toward the entire structural building component industry, which includes the membership of the Structural Building Components Association (SBCA). The opinions expressed in *SBC* are those of the authors and those quoted, and are not necessarily the opinions of Truss Publications or SBCA.

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editor's message

by Scott Ward

Grooming a New Generation of Leaders

SBCA President Scott Ward offers five steps to start mentoring the next crop of leaders for your company and the truss industry.

At the last SBCA Open Quarterly Meeting (OQM), I was approached by one of our association's long-standing and active members, Mr. Ken Cloyd. With a concerned look, he asked me a question for which I didn't know an answer. He wanted to know where all the young leaders in our industry were and how we were going to get them engaged in the association to help promote the best interests of our industry. As I looked around the meeting room, I realized that, as someone in his 40s, I was the "baby" in the room! This was startling, to say the least!

You've undoubtedly read or heard in the news the many stories about the residential construction industry's labor shortage. The housing bust lasted too long...way too long...too many skilled and experienced people in our industry were forced to move on. We lost a great deal of mentors and leaders to "early" retirement. We lost others to industries that weren't impacted as deeply as housing. So many truss plants went out of business and their former employees couldn't wait around for our industry to recover.

Even though our company survived, we were forced to cut way back on our number of employees. In many cases, we had to let go our least experienced employees, which were typically our youngest workers. As a result, in just a few years, the collective age of our workforce got much older. I'm sure most of you had similar experiences.

Yet, if your facility is anything like ours, the young people we kept were some of our most promising. We need to focus on these individuals now and groom them to become the next generation of leaders in our companies and in our industry. But how do we start to make that happen? I suggest beginning with these five steps:

1) Choose Wisely

The first challenge in growing the next generation of leaders is choosing the right individuals to mentor. Do you go after the hardest workers? The brightest? The most well-liked? Personally, I'd choose the most dedicated. If you have a young person who understands the value of our industry and the rewarding career it can offer, they get the big picture. I'd argue these are the people you can count on to be committed to take on leadership responsibilities.

2) Mentor Closely

Building leaders is a long-term process. Just like raising kids, it is accomplished through a million small conversations, learning moments, completed tasks and informal evaluations with feedback. You can't turn someone into a leader by being passive. You have to be engaged with them every day, looking for every opportunity to help them grow.

3) Train Continually

I know it's a cliché, but every moment is a teaching moment. If you're mentoring an individual, or group, to become part of your company's leadership team, there has to be a commitment on your part to ensure they learn everything they can about their job and the business. If you're training a future leader to be a line foreman, expose them to truss design, sales and dispatch. Help them understand and appreciate

Continued on page 6

at a glance

- ❑ We need to focus on our younger employees now and groom them to become the next generation of leaders in our companies and in our industry.
- ❑ Just like raising kids, building leaders is accomplished through a million small conversations, learning moments, completed tasks and informal evaluations with feedback.
- ❑ There has to be a commitment on your part to ensure the employees you mentor learn everything they can about their jobs and the business.

Editor's Message

Continued from page 5

where their current job responsibilities fit within the whole process; they'll make better decisions now and will be more well-rounded for the future.

As part of that training, it also doesn't hurt to get them thinking about community service. Offer them opportunities to attend SBCA Chapter meetings, give presentations to building officials, and travel to the BCMC show and SBCA OQMs. The more they are immersed in the culture of our industry, the more they will view this as a life-long career as opposed to their current job.

4) Test Regularly

In order to lead, they have to prove they know what they're doing. Don't hesitate to put their knowledge and skills to the test—make them prove themselves. I think about how many times my dad asked me to do something and I thought, "How in the world am I going to do that?" Once I found a way and got it done, I had a lot more confidence in myself, and so did he.

5) Communicate Openly

Of course, you have to openly communicate your expectations and your evaluation of their performance. In turn, you have to solicit their evaluation of you, the company and their coworkers. If you aren't happy, or vice versa, everyone needs to know so you can work to fix it. Being unsatisfied with something and hoping it will fix itself is a practice in futility.

Before I wrap this up, here's one more cliché: leaders aren't born, they're made. It's our responsibility to start making them. If we don't commit to doing it now, soon there won't be anyone in our companies, or our association, who will ensure the truss industry continues to thrive and remain relevant in the residential construction industry. SBC

SBC Magazine encourages the participation of its readers in developing content for future issues. Do you have an article idea for an upcoming issue or a topic that you would like to see covered? Email your thoughts and ideas to editor@sbcmag.info.

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framers council

by George Hull

Doing More with Less Requires a Better Approach

The National Framers Council was formed to help improve the entire building industry.

Increasing the structural and energy efficiency performance of a building, while simultaneously removing raw materials out of the structure, is a growing trend in the building construction industry. It's not an easy task, and takes effective communication and collaboration between building architects, structural designers, component manufacturers and framing labor contractors. I've provided labor and turnkey operations in constructing homes and multi-family wood structures for over 35 years. I'm committed to open communication with the various design professionals and manufacturers I work with because it's clear to me, and to many of my fellow framers, that in today's market this collaborative approach is vital to survival.

As its first Chairman, I am happy to introduce the formation of the National Framers Council (NFC). From my perspective, the primary goal of NFC is to provide a voice for framers as we work together with other professional organizations in our industry. NFC can play a vital role in addressing this market push to maximize the use of raw materials in building structures. Further, through collaboration and educational programs, NFC can raise the bar for framers nationally and help to ensure safe, good quality framing across the U.S.

Beginning in June 2013, members of the Structural Building Components Association (SBCA) began discussing the value of having component manufacturers develop a closer working relationship with us, the framers who install their products. Through a series of subsequent meetings, a group of us realized there was a strong interest in creating a national framing council as part of SBCA. Thus, NFC was born. Since then, we have received input and interest from framing contractors (both labor and turnkey), engineers, building designers, manufacturers, general contractors and material suppliers, as well as safety professionals eager and interested in the potential of such an organization. Frankly, the amount of energy and enthusiasm behind this group has been very encouraging to those of us who started it.

From the framer's perspective, there are many pressures today to do more with less. The only way that's going to happen is for framers—the individuals tasked with actually constructing the physical building—to have a voice in the process.

From a practical standpoint, NFC's first focus is to develop a national safety program for framing contractors. Without a strong workforce of framers, there will not be an adequate pool of labor to build today's more complicated structures. Beyond developing a visually-based, standardized safety program comprised of training, a jobsite-specific safety manual and toolbox talks, a multi-pronged approach to safety on the jobsite will help us minimize risk and promote framing as a valuable career path with professional growth opportunities.

The program NFC is currently developing will be available in English and Spanish, and includes best practices for the installation of all the component types that goin into framing, such as floor joists, I-joists, floor and roof trusses and cornice/fascia. Furthermore, developing industry standard details for these installation best practices

at a glance

- Successfully constructing a building today takes effective communication and collaboration between building architects, structural designers, component manufacturers and framing labor contractors.
- NFC's first focus is to develop a national safety program for framing contractors.
- NFC also plans to develop a scope of work document outlining standard responsibilities for framers and subcontractors.

will help ensure consistent, first-rate work is being performed across the country. Through this educational program, framers will become NFC-certified. Our goal is for every framer to become certified and establish that he/she knows what needs to be done in order to be safe on a jobsite and follow installation best practices. By raising the bar, NFC-certified framers will show the rest of the industry the commitment they have to safety and performing high-caliber work.

Working with component manufacturers, suppliers and designers to develop common sense-based, best practice approaches to framing will naturally lead to better material utilization and ensure quality framing on the jobsite. Components can save a lot of time on the jobsite, but only if they are designed and installed correctly. One of NFC's goals is to encourage framers to use components and to promote components to their builders. By closing the communication gap between component manufacturers, designers and framers, and emphasizing safe installation practices, I am confident we can increase the use of properly designed and installed components and decrease jobsite headaches.

Future plans for NFC include developing a scope of work document outlining standard responsibilities for framers and subcontractors. Currently, there is no standard scope of work for framers. By establishing an industry-wide standard that defines what framers are responsible for on a jobsite, NFC can help clarify changes to compensation if the scope of work is increased (or decreased) by the general contractor.

Another NFC goal downstream is to help provide insurance to all NFC-certified employees on the jobsite, in order to protect framers and their livelihood. Through NFC, we also want to address other issues such as communication with design professionals and standardizing details and processes, quality control programs, and professional training, which will help to attract and maximize labor in today's market, as well as increase product awareness and spur further innovation.

From the framer's perspective, there are many pressures today to do more with less. The only way that's going to happen is for framers—the individuals tasked with actually constructing the physical building—to have a voice in the process. Framers are a rowdy bunch and we want our voices to be heard. We need to be able to communicate and collaborate effectively up and down the supply chain. Further, we need to have a more united approach to implementing safety and installation best practices to ensure we accomplish our part in the construction process as effectively as possible. NFC can and will help us accomplish this in a way that will ultimately improve the entire building construction industry. SBC

George Hull is President of Hull Associates, LLC in Arlington, TX. He brings more than 35 years of framing experience as the first Chairman of the National Framers Council. For more information about NFC, visit framerscouncil.org.

by Daniel Lawless, MSCE, Structures

Connecting Wood Trusses to Braced Wall Panels

Let's take a look at connecting parallel chord roof/floor trusses to braced wall panels.

In order for a building to resist wind and seismic forces, the roof and floor framing must be adequately attached to the braced wall panels to provide a continuous load path for the lateral loads, as shown in Figure 1.

At exterior walls, these in-plane lateral loads are usually transferred from the braced wall panel through the floor to a braced wall panel or foundation below by the rim joist, end joist, band board, blocking or wall sheathing provided at the end of the floor framing system, as shown in Figure 2.

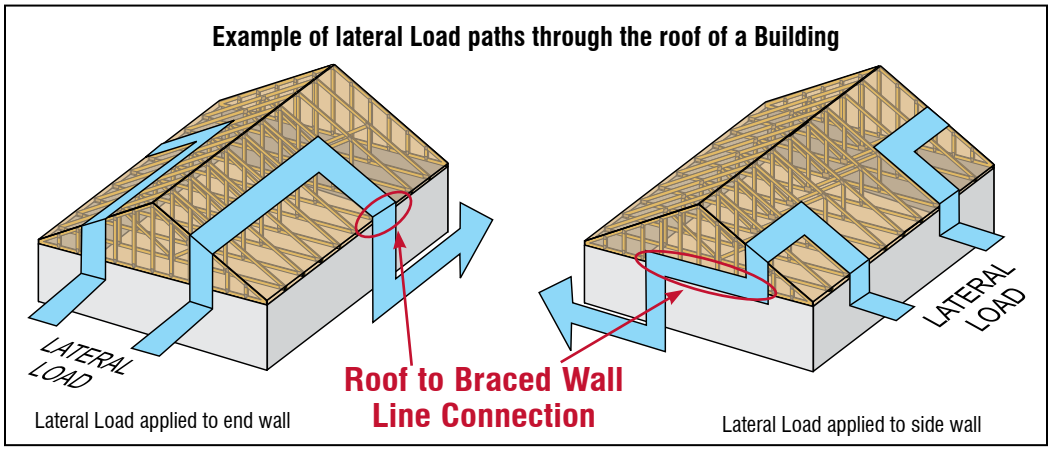

Figure 1. Examples of Lateral Load Paths (from BCSI-B8, with connection note added in red).

However, when shear walls are located in the interior of the structure, additional blocking and/or framing members may be needed to connect the braced wall panels to the roof or floor system. The *International Residential Code (IRC)* provides details for these connections in Figures R602.10.8(1) and R602.10.8(2), as shown in Figure 2.

The code-provided details apply to sawn lumber framing only and do not necessarily work for connecting metal plate connected wood trusses because of their open web configurations.

Question

How should parallel chord roof/floor trusses be connected to an interior braced wall panel that does not have a truss located directly above the wall?

Answer

When the trusses are oriented parallel to the wall, the simplest method of connecting a braced wall panel to the roof/floor system above is to frame and sheath the wall up to the roof/floor deck above and attach the roof/floor sheathing to the double top plate of the braced wall panel with 6d common (0.113" x 2.0") nails at 6" on center, as shown in Figure 3.

This method eliminates the need for installing additional blocking members to transfer the forces from the roof framing to the braced wall panel. However, long length studs not typically found on jobsites may be required, so there is a need to plan ahead if this method is used.

If a truss oriented parallel to the wall is not provided directly above the braced wall panel and the wall is not framed up to the roof deck, *IRC* Section R602.10.8 requires that blocking be used to connect the braced wall panel to the floor framing, as follows.

> **R602.10.8 Braced wall panel connections.** *Braced wall panels* shall be connected to floor framing or foundations as follows:
>
> 1. Where joists are perpendicular to a *braced wall panel* above or below, a rim joist, band

at a glance

- The *2012 IRC* does not provide sufficient details on how to connect wood trusses to braced wall panels.
- SBCA has developed a couple of details and will continue to develop standard details that provide code-compliant connections between roof/floor trusses and braced wall panels.
- Component manufacturers can provide framers with specialty or standardized blocking panel products to reduce the time needed to install the blocking between trusses for these connections.

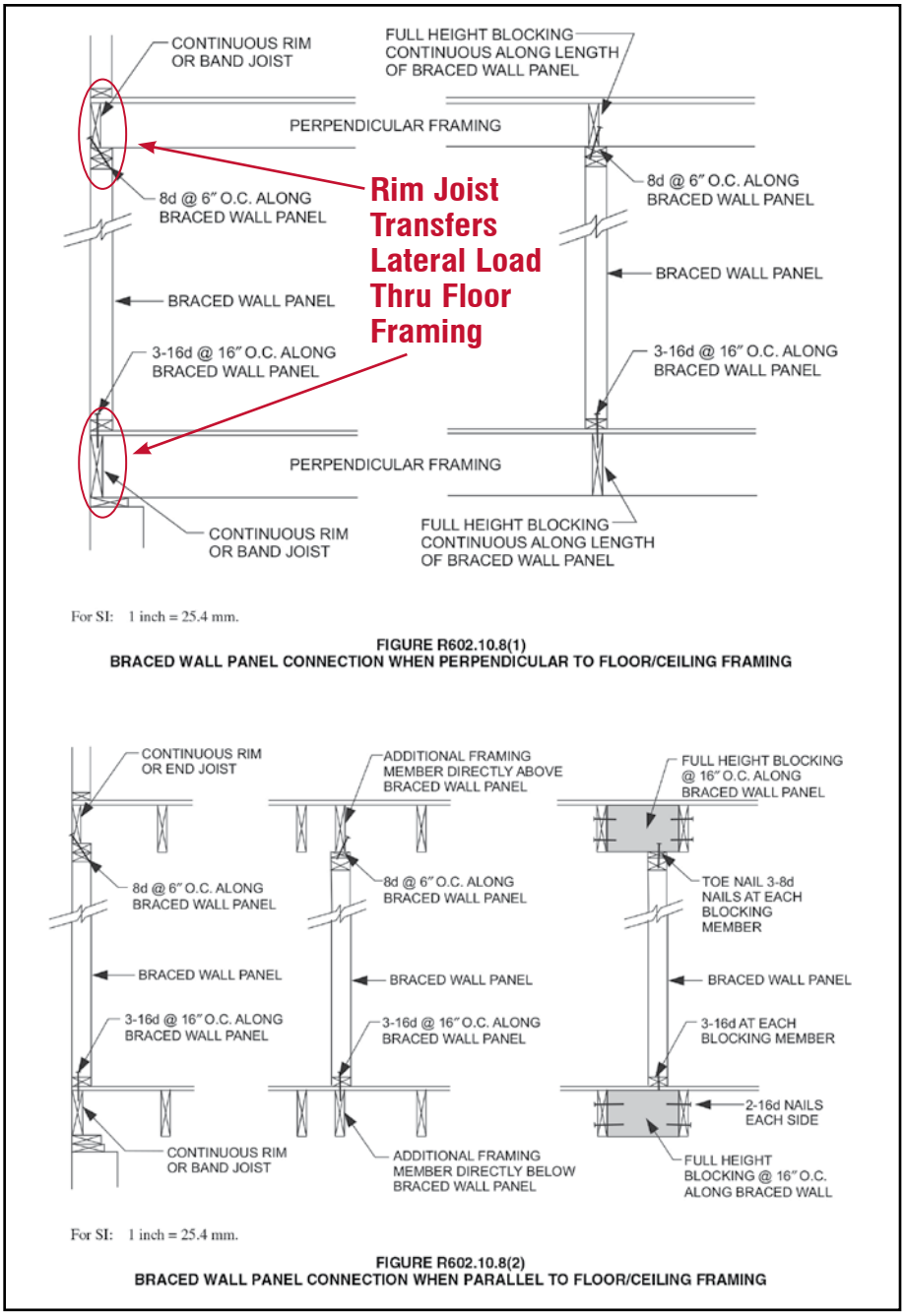

Figure 2. IRC Braced Wall Panel Connections (with connection note added in red).

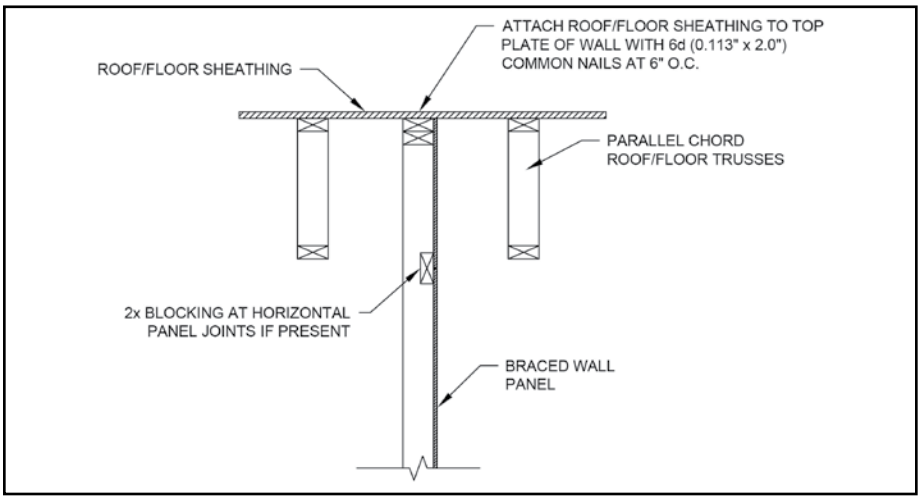

Figure 3. Detail Showing Braced Wall Panel Framed and Sheathed up to Roof/Floor Deck.

joist or blocking shall be provided along the entire length of the *braced wall panel* in accordance with Figure R602.10.8(1). Fastening of top and bottom wall plates to framing, rim joist, band joist and/or blocking shall be in accordance with Table R602.3(1).

2. Where joists are parallel to a *braced wall panel* above or below, a rim joist, end joist or other parallel framing member shall be provided directly above and below the *braced wall panel* in accordance with Figure R602.10.8(2). Where a parallel framing member cannot be located directly above and below the panel, full-depth blocking at 16-inch (406 mm) spacing shall be provided between the parallel framing members to each side of the *braced wall panel* in accordance with Figure R602.10.8(2). Fastening of blocking and wall plates shall be in accordance with Table R602.3(1) and Figure R602.10.8(2).

3. Connections of *braced wall panels* to concrete or masonry shall be in accordance with Section R403.1.6.

Figures R602.10.8(1) and R602.10.8(2) are shown in Figure 2. The full height block-

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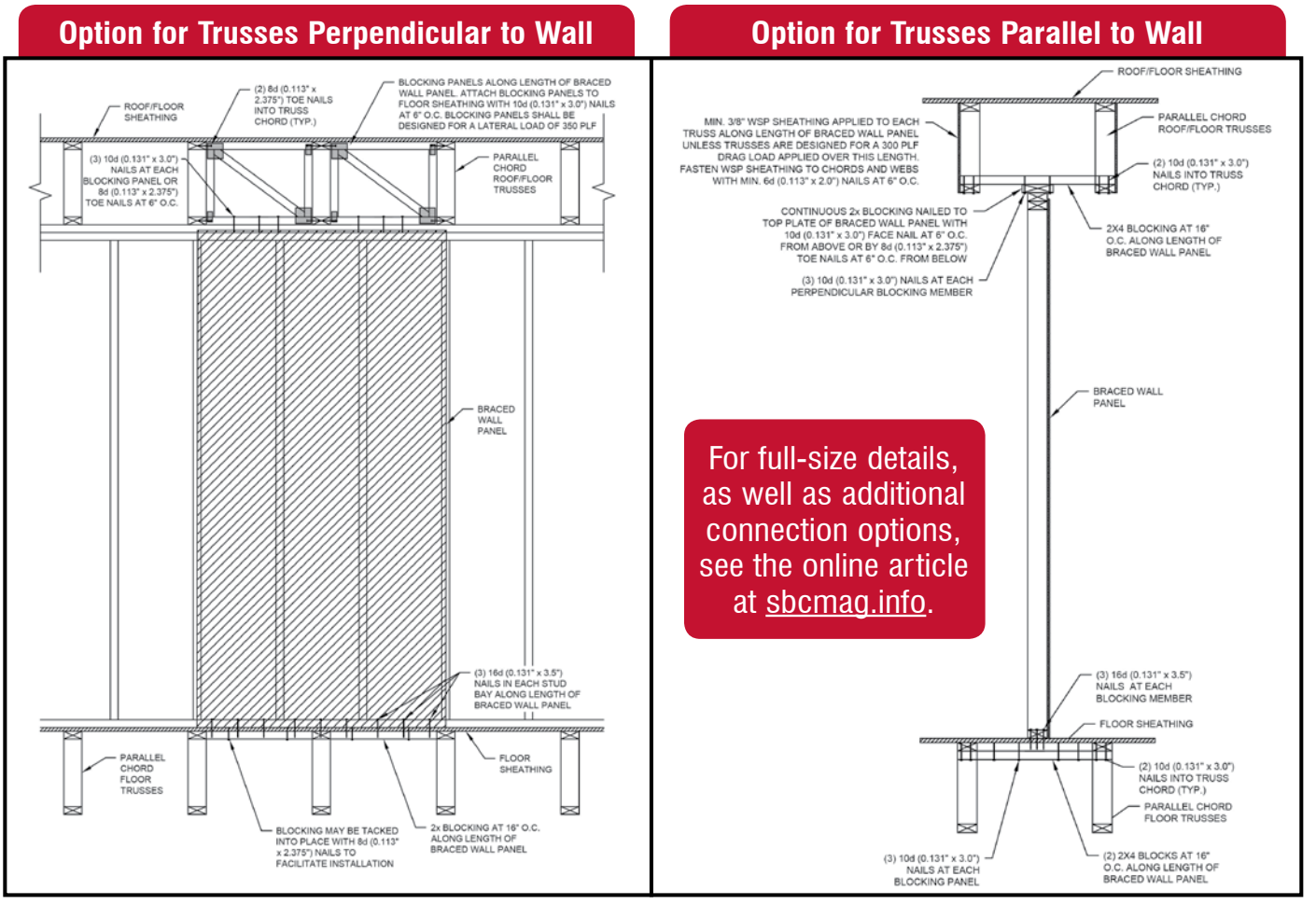

Figure 4. Braced Wall Panel Connections to Floor Truss Connection Options.

TQ&A • Continued from page 11

ing between joists shown in the *IRC* details cannot be attached to floor trusses because of their open web configurations. To address this issue, SBCA is developing standard details that can be used to connect interior braced wall panels to a floor truss system, as shown in Figure 4.

Since the trusses can be oriented either perpendicular or parallel to the wall, two different cases must be considered. For trusses perpendicular to the wall, blocking panels or full depth rim board blocking must be used to transfer forces from the roof/floor sheathing to the top plate of the braced wall panel, and to prevent the floor trusses from rotating. For trusses parallel to the wall, wood structural panel (WSP) sheathing must be applied to the side of the roof/floor trusses to transfer forces from the roof/floor sheathing down to the bottom chord of the truss. Alternatively, the truss can be designed for a drag force of 300 plf along the length of the braced wall panel. Blocking is then used to transfer the forces from the bottom chord to the top of the braced wall panel. In both cases, blocking must also be added below the braced wall panel to provide a nailing surface for the 16d nails used to connect the sill plate of the braced wall panel to the floor sheathing.

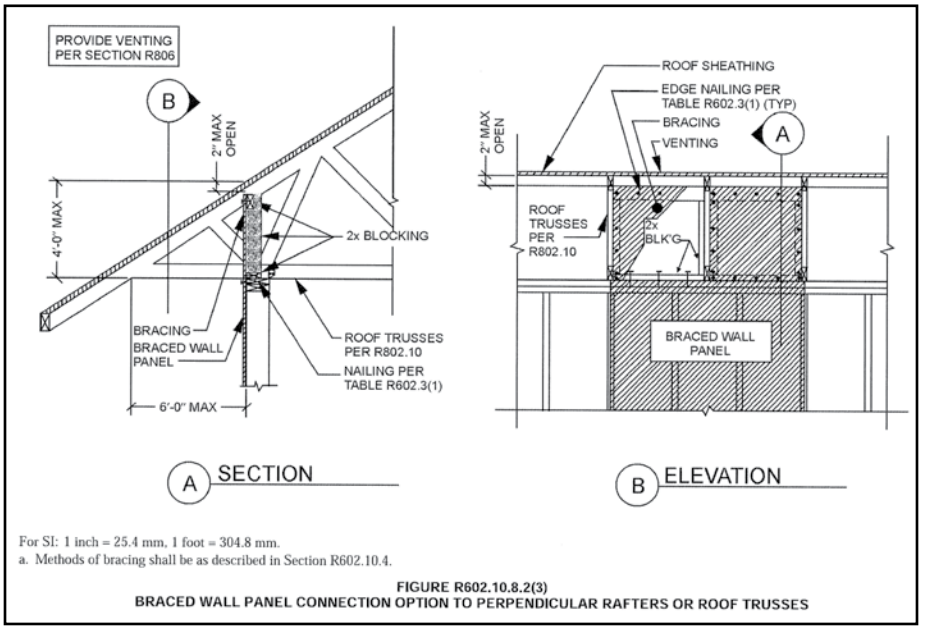

Figure 5. Braced Wall Connection to Roof Trusses per *2012 IRC*.

The details provided in Figure 4 are only for residential structures built in accordance with the *IRC*. The walls are to be non-load bearing and shall have a self-weight not greater than 120 plf. Floor trusses shall be spaced a maximum of 24" on center and shall be

Continued on page 26

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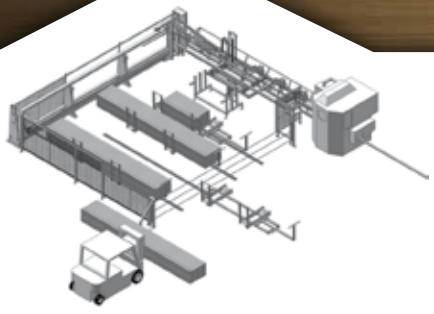

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Find Your Niche

Putting Your Expertise on a Pedestal

by Sean D. Shields

"Our customers hire us primarily for our wood engineering expertise," said Larry Zhou, President of Universal Timber Structures (UTS) in Auburndale, FL. Their customers want the trusses, but Zhou drives home the point: that their engineering and design knowledge and capabilities is what truly differentiates them among their competition. Why the focus on engineering services? "Trusses are trending toward becoming a commodity," said Zhou. "We provide value through focusing on the design needs of each customer and giving them exactly what they want."

One simple example is their involvement in the construction of the Corpus Christi Catholic Church in Celebration, FL. The engineering expertise and value proposition evident in this project are universal and applicable to any project no matter what structural building component is used. In this case, UTS supplied large timber trusses for the main building, and traditional metal plate connected wood trusses for the secondary buildings.

Establishing Their Niche

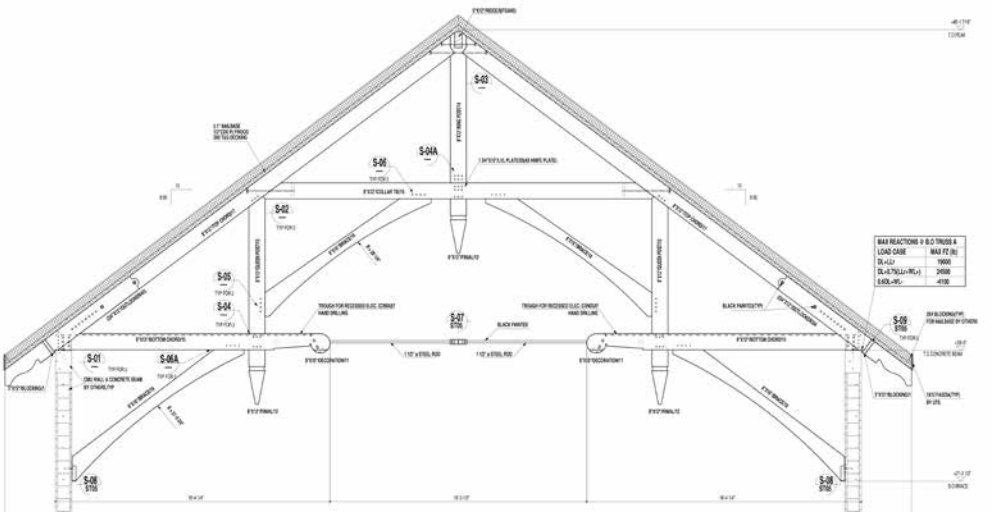
UTS started more than 40 years ago as a large timber truss installer. In the 1980s, the market for heavy timber waned, as the market shifted more toward steel and concrete. To regain market share, in the 1990s, UTS ownership invested in computer-controlled production equipment to create a more consistent quality product. During the 2000's, UTS has expanded to offer full design-build services for both large timber trusses and metal-plate connected wood trusses.

"Big timber isn't a huge market; we may only work with a customer once every two to three years," said Zhou. "So offering a unique set of services to go along with our products is essential." UTS focused on providing excellent engineering services, relying on computer-controlled timber production and fully-automated truss fabrication equipment to ensure the final product conformed exactly to the design specifications.

"Over the past ten years, our reputation has steadily grown," said Zhou. "Now, we do projects all over the world." While UTS is primarily known for their large timber products, they also provide metal plate connected wood trusses for the projects that require them. "There are many buildings, like this church, where the main building uses timber trusses, but secondary structures like bathrooms and classrooms have lower profile ceilings where [metal plate connected wood] trusses are the best framing method," said Tom Petrino, VP of Sales for UTS.

"Realizing the Concept" Meeting

One key aspect to their business approach is being involved, to the greatest extent possible, in the initial design and engineering phase of the project. In the case of the church in Celebration, UTS had worked with both the architect and the general contractor in the past. The architect had made initial concept drawings and the congregation had selected the drawings they liked best, which featured distinctive "hammer-beam" trusses exposed throughout the sanctuary. At that point, the engineering firm contacted UTS and invited them to meet together with the architect.



It was the kind of "realizing the concept" meeting UTS has with many of its customers. "We looked at the design ahead of time and did some initial analysis," said Petrino. "We talked about the challenges in the layout, sought answers to our questions about the kinds of materials they wanted to use, what types of connections they wanted, etc. Essentially, we wanted to know the look and feel they are going for."

In addition, UTS uses these meetings to identify any framing layout issues they see during their initial review of the architectural drawings. "Many times, we identify opportunities to optimize the layout to minimize the number of trusses needed or materials required for the project," said Petrino. "This is typically when we get a sense for budgeting constraints they may have on the project, which we also try to help them out with."

Building Information Modeling

After the initial meeting, the UTS engineers draw up initial plans for the building. They work through all the connection details, figure out truss spans in the context of layout configurations and determine optimal timber member sizing. The engineers identify opportunities for layout and material optimization, and recommend alternative approaches, depending on the customer's priorities and preferences (see figure above).

It should be pointed out that all of this initial work is done free of charge to the potential client. "We have confidence that because of our approach we have a great chance of getting the job," said Petrino. "Being part of the design-build project early on puts us on the inside track. Many times, they end up listing our company in the specifications when it goes out to bid."

During this process, UTS uses building information modeling (BIM) software to render a three-dimensional image of the building. "We use BIM for two main reasons: one, the modeling helps us show our client what their designs look like in 3D; and two, it enables our engineers to see that all the geometry works out the way it's expected." Due to their approach, Zhou and his team relish the tough jobs. "The more complicated the structure, the more we like it because we know our process can deal with it." Continued on page 18

Find Your Niche

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From Bid to Production

Once they get the project, it's just a matter of working out the contract and putting the shop drawings together. After the drawings are approved, they order the necessary materials. "Unlike dimensional lumber, large timbers aren't just sitting on a shelf somewhere," said Petrino.

Typically, it can take from six to eight weeks to get the timber materials needed for fabrication. Often, the project calls for specialized connections that need to be custom made. "We typically tell our customers that, from the signed contract, it takes three to four months to be ready to install," added Petrino. "That usually works out well for them to get the building ready with the foundation and walls."

Installation

"We supply and install the complete roof system," said Petrino. "Including the trusses and tongue-and-groove roof decking, as well as the nail-based roof insulation to get the R-value the customer wants." UTS also designs the roof system so that sprinklers can be installed above the decking, allowing the sprinkler head covers to be flush with the ceiling profile.

Thanks to all of the early design meetings and collaborative engineering made possible through the BIM software, the biggest challenge UTS faced during this church installation was with the truss-to-wall connections. "As with any project, we know what we have to do, but as the system gets more complicated there are more opportunities for there to be problems," said Petrino. "In this case, some of the anchor bolts weren't quite right, but it wasn't a huge problem to overcome."

Conclusion

UTS's success has come out of their ability to take their company's unique strengths—engineering acumen, computer-controlled production equipment, building information modeling and 40 years of installation experience—and leverage them to establish their niche in the large timber industry. This approach carries over into the commercial, multi-family and residential projects they undertake, where all the advantages of engineered structural building components are used. Further, their tailor-made approach to meeting each customer's unique needs allows them to ensure they are, in the end, well compensated for the value addition they provide their customers. SBC

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Framing a House in Three Days

Optimization Is a Key Component

by Frankie Ferrero, E.I.T.

Arriving onsite at BCMC Build, framing an entire house in just three days looks like a daunting task. How did we do it? Obviously, using what we know best—structural building components. They are optimized to reduce the required time to frame a structure through labor and material efficiencies. They also, by definition, markedly reduce jobsite waste.

Photo 1. The Framing the American Dream jobsite shows how much more progress (and fewer workers) are by the house being built with structural components (on the left) compared to the house being built with stick framing (on the right).

Labor

When designed and installed correctly, components can greatly reduce the time required to frame a structure. Arriving preassembled, components require less lumber on the jobsite to finish the construction process, which results in fewer connections. In the Framing the American Dream project, two identical houses were constructed simultaneously—one using stick framing and one using structural building components. Stick framing took 401 hours compared to 148 hours with components—63 percent less time! See Photo 1.

However, in order for those time savings to be realized, it is critical the components are placed on a square and level foundation. Further, they need to be designed and installed correctly, which is often easier than getting an ideal foundation. Without these conditions being met, it's difficult for framers to gain the maximum benefit from using components.

In the case where components are not designed or installed correctly, it may actually increase the amount of time to frame a structure because of the needed modifications and potential redesign and reshipment of the components. Therefore, it is essential in the design process to ensure that components are designed from the framer's perspective and that unbuildable plans are not created. If done properly, using components results in less labor than stick framing because less material needs to be assembled and connected, and the connections themselves are much less complicated.

Material

Trusses use triangulation, which optimizes the transfer of forces (compared to stick framing). Truss designers then optimize layouts to further reduce the number of trusses needed. This decreases the number of trusses that are built, and thus also the number of trusses that need to be installed on the jobsite. Less material also results in less dead load in the structure, which has a trickledown effect on the overall load the structure, and especially the foundation, has to resist. In order to evaluate exactly how much material is saved by using triangulation compared to stick framing, check out the subsequent analysis that was completed using the following parameters and assumptions:

sample calc:

Structure span = 20ft

Structure square feet (SF) = span x span = 20 ft x 20 ft = 400 ft^2

Number of truss vs. the number of stick frame placements to achieve span = span / on-center spacing (rounded up to nearest whole number)

Linear feet (LF) of lumber = sum of overall lengths of lumber per configuration

LF / SF = ratio of linear feet (LF) of lumber to structure square feet (SF)

Loading and deflection conditions:

- Top Chord / Rafter
  - Live Load = 20 psf (snow = 20 psf)
  - Dead Load = 10 psf
- Bottom Chord / Ceiling Joist
  - Live Load = 10 psf
  - Dead Load = 5 psf
- Roof Pitch = 6/12
- Deflection = L/240 (Live load deflection limit)
- Deflection = L/180 (Total load deflection limit)

Stick framing (rafter and ceiling) conditions:

- SP visually graded lumber design values using the SPIB effective date of June 1, 2013.
- Collar tie located $^1/_3$ of the way down from the top of the rafter.[1]
- Collar tie spaced not more than 4' on center.[2]
- Rafter span is half the total span.
- Spans and on-center spacing obtained from Southern Pine Council span tables.
- See the online version of this article to view SBCA's Technical Evaluation Report (TER) entitled "Code-Compliant Construction of Conventionally Framed Roofs & Roof Trusses." This TER details the requirements for conventionally framed roofs and roof truss construction per *IRC* Section 802.[3]

Truss conditions:

- SP visually graded lumber design values using the SPIB effective date of June 1, 2013.
- Bearing condition: pin, roller, roller for the three span conditions.
- No repetitive member design factor is used due to larger on-center spacing, and to ensure a more apples-to-apples type comparison.
- Truss on-center spacing was optimized 1" at a time until the maximum allowable CSI was reached using standard industry truss design software.
- Top chord lumber sizes and grades for a particular span were selected based on the lumber sizes and grades of the rafters (per span tables).
- Bottom chord lumber sizes and grades for a particular span were selected based on the lumber sizes and grades of the ceiling joists (per span tables).

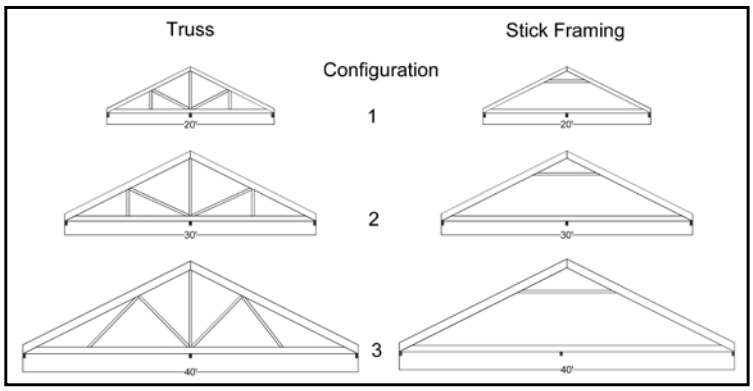

Figure 1. Lumber configuration and bearing conditions for the trusses and stick framing used in this analysis (see the Sample Calculation in the sidebar on page 20).

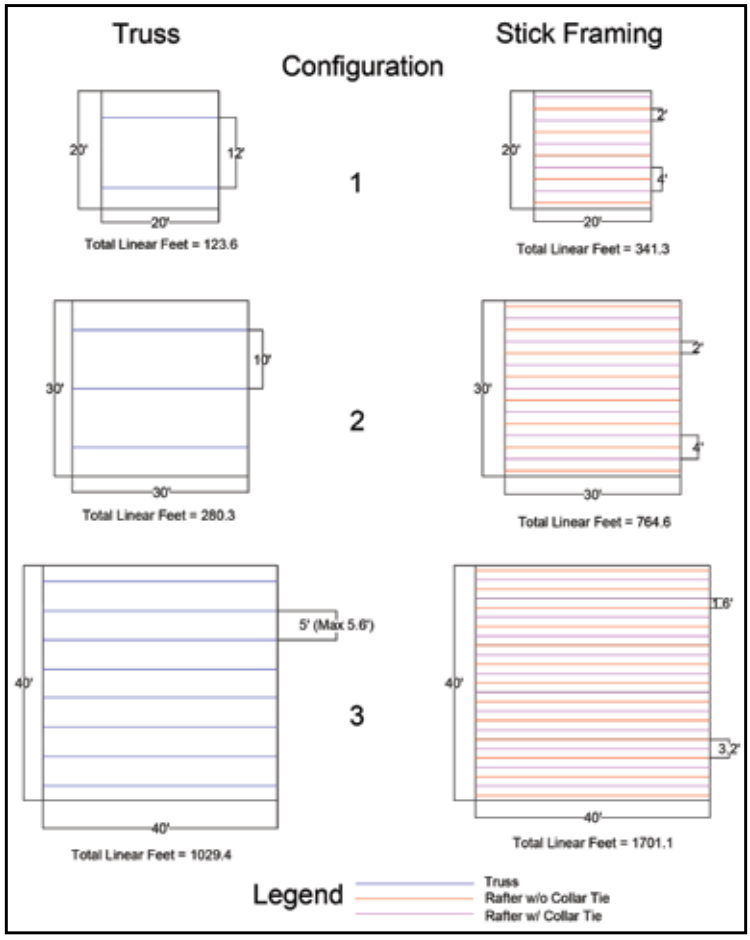

Figure 2. Plan views of the spans and their associated square footage identify the optimal number of trusses versus the number of stick frame placements needed to support the given roof surface area.

Additional assumptions:

- The number of truss versus stick frame placements (i.e., instances of use) to achieve span was determined by dividing the length of the structure (same as the span) by the on-center spacing. The location of shear walls and end conditions was not evaluated to determine if additional instances would be required.

The goal of using these assumptions was to keep all the variables of design the same for both the trusses and the roof stick framing, and then only vary the spacing needed to resist the applied load. This provided, on an equivalency basis, the differences in the board footage used to resist identical assumed loads. See Figures 1 and 2 above.

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[1,2] See section 4.7.6.1. of TER No. 1204-02: Code-Compliant Construction of Conventionally Framed Roofs & Roof Trusses. Updated October 4, 2013. sbcmag.info/TER1204-02

[3] TER No. 1204-02: Code-Compliant Construction of Conventionally Framed Roofs & Roof Trusses. Updated October 4, 2013. sbcmag.info/TER1204-02

Config #	Lumber			On-Center Spacing (max)	Total Linear Feet	LF / SF Ratio
	Rafter	Collar Tie	Ceiling Joist			
1	2x6 SP No. 2	2x4 SP No. 2	2x6 SP No. 2	2-0-0	341	0.85
2	2x10 SP No. 2	2x4 SP No. 2	2x8 SP No. 2	2-0-0	765	0.85
3	2x12 SP No. 2	2x4 SP No. 2	2x10 SP No. 2	1-7-3	1701	1.06

Table 1. Stick Framing (Rafter/Ceiling Joist) Analysis.

Config #	Lumber			On-Center Spacing (max)	Total Linear Feet	LF / SF Ratio
	Top Chord	Webs	Bottom Chord			
1	2x6 SP No. 2	2x4 SP No. 2	2x6 SP No. 2	12-0-0	124	0.31
2	2x10 SP No. 2	2x4 SP No. 2	2x8 SP No. 2	10-0-0	280	0.31
3	2 x12 SP No. 2	2x4 SP No. 2	2x10 SP No. 2	5-7-0	1029	0.64

Table 2. Truss Analysis.

Config #	Span (ft)	LF / SF Ratio	
		Stick Framing	Truss
1	20	0.85	0.31
2	30	0.85	0.31
3	40	1.06	0.64

Table 3. Rafter vs. Truss LF / SF Ratio Comparison.

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Tables 1-4 provide the results of this analysis.

At a glance, it is easy to see the truss configuration is always able to achieve a better LF / SF ratio than the stick framing (rafter and ceiling joist) configuration. By utilizing triangulation, trusses have an optimal system to distribute forces. Through the truss design process, an optimized configuration of that system results in a lesser number of trusses needed to frame the same roof area, on an apples-to-apples basis.

On an equivalency basis, Table 4 below illustrates clearly that trusses use significantly less lineal and overall board footage to frame the same roof area. One would then assume the speed of installation should be faster and the cost of lumber used should be less for the truss roof system.

It should be noted, the framing reality of applying the sheathing system over the trusses with a wider on-center spacing does potentially reduce the overall labor time savings. However, this approach is focused on an analysis that keeps all the variables the same except for truss or stick frame spacing. Effectively, it provides a good basis for evaluating the efficiencies that can be realized using trusses. It is up to the component manufacturer to decide how to take advantage of these inherent capabilities.

Waste

Components also generate less waste than framing using traditional methods. Starting with fabrication, component manufacturers want to produce the most trusses from their lumber supply, and thus they optimize the amount of board feet they have available to produce the most trusses. Then, arriving preassembled, there is less required cutting and assembly onsite, which reduces the amount of scrap lumber, clean up time, costs for waste disposal, and promotes a safer jobsite. Furthermore, using wood components is environmentally responsible, since wood is the only renewable building material with nearly 5 million trees planted daily.

In the Framing the American Dream project, the house built with stick framing generated 17 yards of wood waste, while the house built with components only generated 4 yards—that's less than a quarter of the waste created by stick framing.

Concluding Thoughts

We were able to frame an entire house in three days because we used structural building components. They were designed and installed correctly, which allowed us to benefit from using components and greatly reduce the amount of time needed to frame the house compared to traditional stick framing methods. In addition to the savings associated with labor costs, less material overall was used, which shows how components are able to maximize material utilization and reduce the amount of required lumber. The value engineering provided by components makes them environmentally responsible as well, since it ensures that the building industry gets more bang for their buck from the amount of raw material used to resist loads. Ultimately, through triangulation and the principles of engineering, components are able to more efficiently transfer forces than traditional stick framing, which reduces the amount of material, labor, waste, and thus the amount of time necessary to frame a structure. SBC

Config #	Span (ft)	Linear Foot (LF)			Board Footage (BF)		
		Stick Framing	Truss	% Truss Use to Stick Frame Use	Stick Framing	Truss	% Truss Use to Stick Frame Use
1	20	341	124	36	460	116	25
2	30	765	280	37	1542	362	23
3	40	1701	1029	60	4055	1523	38

Table 4. Rafter vs. Truss LF and Board Footage Comparison.

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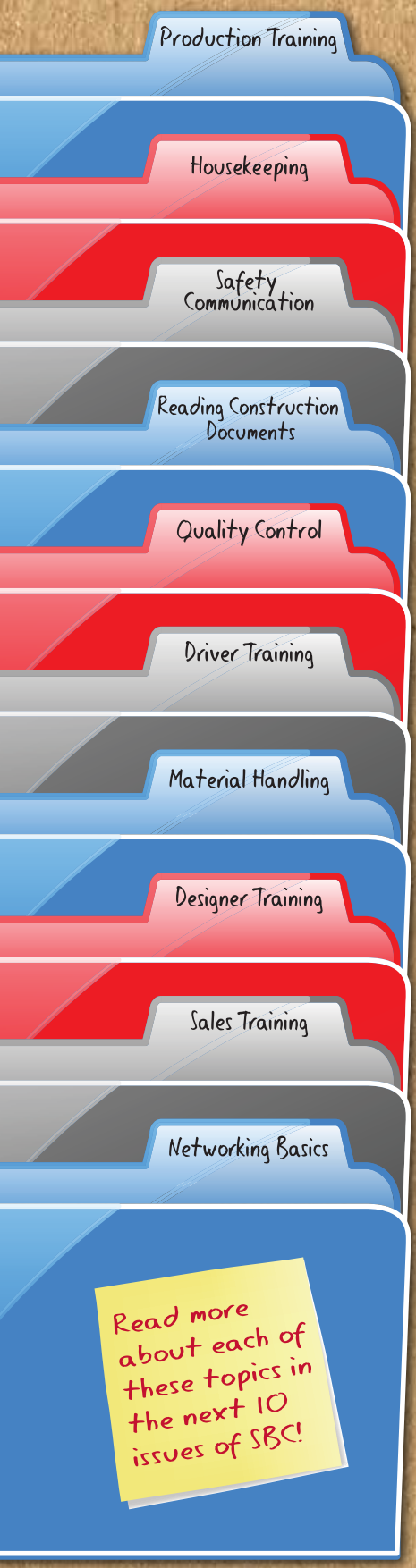
TOP 10 Employee Training Tools

by Ben Hershey & Sean D. Shields



Finding and retaining employees is a significant challenge. There are several facets to this issue: identifying a pool of viable candidates; convincing them the component manufacturing industry is a valuable career option; and, providing a great work environment so they don't jump ship when the work becomes difficult or they are approached with a slightly better offer. Your workforce development approach is a key part of your overall strategic business plan. Finding the right people to fit into your culture and work inside your team structure is a process each company must establish on its own. If you find a good source of employees that fit your business, it makes sense that you would want to keep that knowledge proprietary.

Identifying that good source of employees is first and foremost about establishing relationships within your community. It starts with getting to know high school guidance counselors, administrators and industrial arts teachers; giving presentations to drafting students at local community colleges; and reaching out to local workforce development boards and employment offices. Building these relationships is a proven long-term solution to finding the quality candidates you need when you have a job opening. The only problem is that it is a longer-term solution, and doesn't typically produce job applicants overnight. Yet, if you have an immediate hiring need, a few quick calls to schools in your community may yield surprisingly positive results.

In the short term, if you haven't built these relationships, temporary staffing agencies and/or an outside consulting service like those offered through SBCA's Consulting Services program may be a viable alternative. The goal of SBCA's Consulting Services program is to help serve your best interests through the relationships and tools at their disposal to find and attract applicants.

Another important issue is convincing potential applicants that a career in this industry is worthy and rewarding. You must show a commitment to their need for growth. Making an overt and continual commitment to formal and on-the-job training goes a long way toward keeping your employees effective, efficient and satisfied. Providing continual training and professional growth opportunities not only strengthens your workforce, but it also makes a huge difference in retaining your valuable employees when they get offers from elsewhere.

The good news is that offering employee training is very simple. It doesn't have to take a huge financial or time investment, and you don't even have to create it yourself. In upcoming issues of ***SBC Magazine,*** we are going to look at the top ten training needs for component manufacturers, walk through the issues associated with each of those training needs, and provide guidance on industry best practices for offering basic through advanced training in each of the areas outlined on page 25.

The good news is that, in almost every one of these areas, SBCA has created both formal and informal training tools to help component manufacturers focus their training efforts and get the most out of each training session. We will pull generously from these programs, and use a lot of photos and illustrations to help capture the vision of what your employee training programs can look like.

Training won't help you find employees, but once you've found them, it sure can help you keep them and turn them into an impressive truss and wall panel production machine. Likewise, continual professional development can go a long way in maintaining employee retention. If your company makes training a part of its strategic plan, you will find your employees want to be a part of that success. **SBC**

Production Training
We will cover basic skills production employees need to have as they start out at the plant. We will also explore some bad habits veteran staff members must avoid.

Housekeeping
Housekeeping is a huge issue for OSHA inspectors. Safe collection and disposal of sawdust, as well as the elimination of other debris that may negatively impact safety, will be covered in detail.

Safety Communication
Creating an environment of safety doesn't just happen. It takes not only a dedicated set of procedures and formal trainings; it takes daily reminders and informal discussions on safe practices. Communicating hazards effectively is a good way to mitigate the potential for accidents and ensure your employees have each other's backs.

Quality Control
Beyond implementing a formal QC program, it's important to use the data collected through the inspections to provide targeted feedback to the production process. One aspect of the QC program is finding and fixing mistakes; the other part is using the program as a manufacturing process improvement, training and management information tool. Identifying areas of opportunity to improve your company's quality through-put will improve your production process and profitability.

Material Handling
With all the work that goes into designing and producing each component, it's vital they are handled and stored properly in the yard to avoid damage to joints or members before they are delivered safely to the customer. We will cover forklift training, storage basics and cargo loading.

Driver Training
Component delivery drivers have a wide array of responsibilities beyond operating a commercial motor vehicle. They are responsible for loading, securing cargo, unloading at the jobsite and being the company's representative at the jobsite. We will cover everything from driver basics to jobsite best practices.

Reading Construction Documents
The component industry is full of complex documentation, from blueprints and truss design drawings to bids and contracts. Reading these documents and knowing what to look for is a key to doing an assigned job well. We will discuss some of the most common mistakes typically made and highlight areas that need close attention.

Designer Training
Effective truss designer training is one of the most challenging and important aspects of the component manufacturing business because a great deal of the value you provide to your customers relies on the strength of your design work. Effective training is, therefore, key to the success of your business.

Sales Training
Your sales force not only needs to understand the truss design and production process, they also need to be adept at understanding contracts and appreciating the company's liability position. Above all, they must have the ability to communicate the company's value proposition effectively in the marketplace to differentiate you from your competition and grow your market share.

Networking Basics
While not essential for producing a high quality product, much like with sales, training your key employees on how to reach out to your community effectively can pay significant dividends in the long run through greater market acceptance of your products and greater sales opportunities.

parting shots

Share your stories and photos with us! Send submissions to partingshots@sbcmag.info.

On October 7, 2013, the Truss Manufacturers of Texas (TMAT) hosted a golf tournament at the Quarry Golf Club in San Antonio to raise money for Operation FINALLY HOME and BCMC Build, who constructed a home for Pfc. Cody Nusbaum. This charity event raised $10,000 for the project.

"It was a great event; everyone was just looking for ways to give money to the cause," said Jack Dermer (American Truss Systems). The photo at left shows Joel Torrez (MG Building Materials Ltd.) and Tracy Roe (Stock Building Supply) presenting the check to Daniel Vargas of Operation FINALLY HOME.

To kick off the SBC Legislative Conference in Washington, DC (May 6-8), the Capital Area Chapter of SBCA is hosting a golf tournament on Tuesday, May 6, at the Fort Belvoir Gunston Golf Course. All proceeds from the tournament will be donated to Operation FINALLY HOME and BCMC Build to construct a home for another deserving veteran in Charlotte, NC. It's not too late to register for this charity event. Contact Trish at 608-310-6768 or tkutz@qualtim.com. SBC

TQ&A • Continued from page 12

sheathed with a minimum of $^{23}/_{32}$" OSB. The details are for braced wall panels only. If engineered shear walls with hold-down devices are used instead of braced wall panels, the uplift and compression forces at the ends of the wall must be considered in the design of the wall to truss connections.

It should be noted that the *IRC* provides an additional method of connecting perpendicular roof trusses to a braced wall panel in Item 3.2 of Section R602.10.8.2 and Figure R602.10.8.2(3). As illustrated in Figure 5, this method was developed for a gable/hip truss to exterior wall connection, but it could also be applied to an interior wall if the roof sheathing is attached to the 2x blocking. This method may be used in lieu of the details provided in Figure 4. However, the detail from the code is more difficult and time consuming to install than the details developed by SBCA.

Concluding Thoughts

After reviewing these details, component manufacturers may want to consider supplying blocking panel products made with leftover lumber pieces from the manufacturing process. It might also be possible to manufacture and inventory certain depths of blocking panels for use with common floor truss depths. This is an opportunity to reduce waste, add a product line, and provide customers with an efficient and cost-effective way to comply with building code requirements. SBC

To pose a question for this column, email technicalqa@sbcmag.info.

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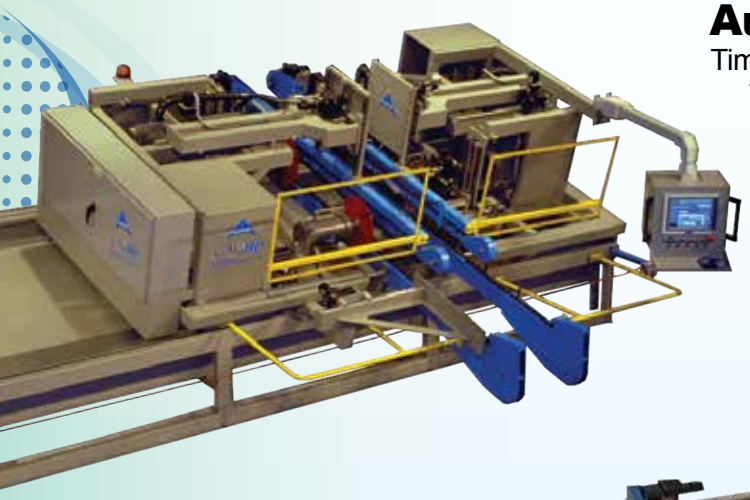

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