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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 Rick Parrino

Become the "Go-To" Person in Your Market

Local relationships can drive your business.



at a glance

- Component manufacturers have to be proactive locally in pursuing those outside the industry, including building officials, members of the fire service, specifiers, framers and lawmakers.
- It's not hard to put a value on having eyes and ears like theirs in the market, when they are willing to look out for your business while they're doing their jobs.
- The more smoothly the installation of CM products goes, the less issues we have to confront in the field and the less we have to overcome challenging building code provisions, the more builders will want to buy and install our products.

Last month, I started outlining how important relationship-building is to the future success of our industry (see **Editor's Message**, November 2014). I strongly believe component manufacturers have to be proactive locally in pursuing those outside the industry, including building officials, members of the fire service, specifiers, framers and lawmakers. These people can be important sources for information, especially when challenges arise in the marketplace.

However, too often they only come to us if there's a problem. Obviously, that's not when you want to start forging a relationship. You want to start off on the right foot, as a reliable resource of good information who makes their job easier, long before they need you to solve an immediate issue. That's not to say there won't be times when there is a difference of opinion or competing agendas, but even then the discussions can be valuable.

The light bulb went on for me when I was visiting with my lawmakers in Washington, DC. While those guys are some of the most influential figures in my community, and have proven to be good at helping me resolve issues on the few instances when I have exhausted all my other alternatives, it's really my relationships with local building officials and the fire service that provide regular value to me and my company.

One good recent example relates to the requirement for ½-inch gypsum to be applied to all unprotected floor joists that is in the 2012 and 2015 model codes (see **SBC Magazine**, May 2013). I have attended my local building official meetings as often as I can for the past few years and made some great friends. It's amazing how many times something will come up that has the potential to impact our business, and I probably wouldn't have known about it unless I was sitting there. Of course, being a regular fixture in the room has given me the opportunity to weigh in on those code issues and provide science and data gathered by SBCA staff that supports our industry's point of view. By providing good information, the hope is it influences their ultimate decision in our favor.

Thanks to all the work SBCA staff has done on the gypsum requirement code provision, I was able to share with our local guys the many problems associated with it, including how it puts us at a significant competitive disadvantage to solid-sawn floor joists. If I hadn't spent the time getting to know all of them, and hadn't provided good information in the past, I highly doubt I would have been as successful informing them on their decision over this damaging code provision. Again, we don't always agree on these issues, but we have good conversations about them, and that strengthens our positive relationships.

Another great example is field installation. Recently, I got a call from one of the building inspectors in my market. He had driven by a jobsite and noticed that the roof trusses weren't braced properly and a storm with potentially high winds was coming. He wasn't officially inspecting the jobsite, and didn't even know if the trusses were mine, but he wanted to give me the heads up, just in case. It's not hard to put a value on having eyes and ears like theirs in the market, when they are willing to look out for me and my business while they're doing their jobs.

Continued on page 6

Along those same lines, when Jason Blenker and I were driving back home from BCMC in October, I got a call from one of our local building inspectors with a question about a stick framing application. I warned him I was traveling and couldn't look anything up for him, but Jason and I both agreed on what we thought the code requirement was. The inspector was thinking the same thing, but just wanted to bounce the idea off of me to see what I thought. That discussion led to the three of us kicking a couple options back and forth to resolve the situation. He thanked us for our input and wished us safe travels.

After I hung up the phone, Jason laughed and remarked on the good relationship I have with those guys in my market. Even though it was a stick framing and not a component-related issue, the inspector still felt comfortable asking me about it. It's valuable being a "go-to" guy in my market because it works both ways. I know that if I have a question about an upcoming project, I can send it to one of them to look at ahead of production to confirm that they don't have a problem with our design. That review and approval is not a requirement of their job; they don't have to do it. However, resolving potential issues during the plan process as opposed to fixing it after installation saves a lot of time and money. To me, this communication is priceless!

One last example relates to education. I'm sure you all can relate to the importance of installers following the guidance regarding best practices we provide in our Jobsite Packages. Errors during installation can be made worse when the building inspector doesn't know or understand what to look for, and the problem only presents itself after the home is finished and somebody has been living in it for a few years. Going back in and fixing it can be a costly headache at best, and a lawsuit at worst. With all the new building inspectors out there with relatively little experience, it is vital that our industry reaches out to provide education on proper component installation.

Thanks to the relationships we have built over the years in our market, we have received several invitations to give educational presentations on BCSI to new-hire inspectors and hand them copies of BCSI to use in the field. Fortunately, those education sessions haven't been limited to just new guys. I've had the privilege to join some of the other manufacturers in Iowa and give presentations to the building official and fire service trade groups as part of the Iowa Truss Manufacturers Association (ITMA) Chapter of SBCA. Those chapter-led presentations are an effective way to get a big bang for your buck and reach a lot of markets all at one time.

So why are these relationships so valuable to my company's bottom line? It's pretty simple when you think about it. The more smoothly the installation of my products goes, the fewer issues I have to confront in the field. Likewise, the less I have to overcome challenging building code provisions, the more builders will want to buy and install my products. It's not rocket science, but I can tell you it does take a commitment on your part.

The good thing is you don't have to reinvent the wheel. Over the years, SBCA has created a lot of educational materials, handouts, slide presentations and brochures to make giving educational presentations and developing lines of communication really easy to do. Don't hesitate—this winter, reach out to SBCA staff and get their help. Start building relationships that will pay you back for years to come. **SBC**



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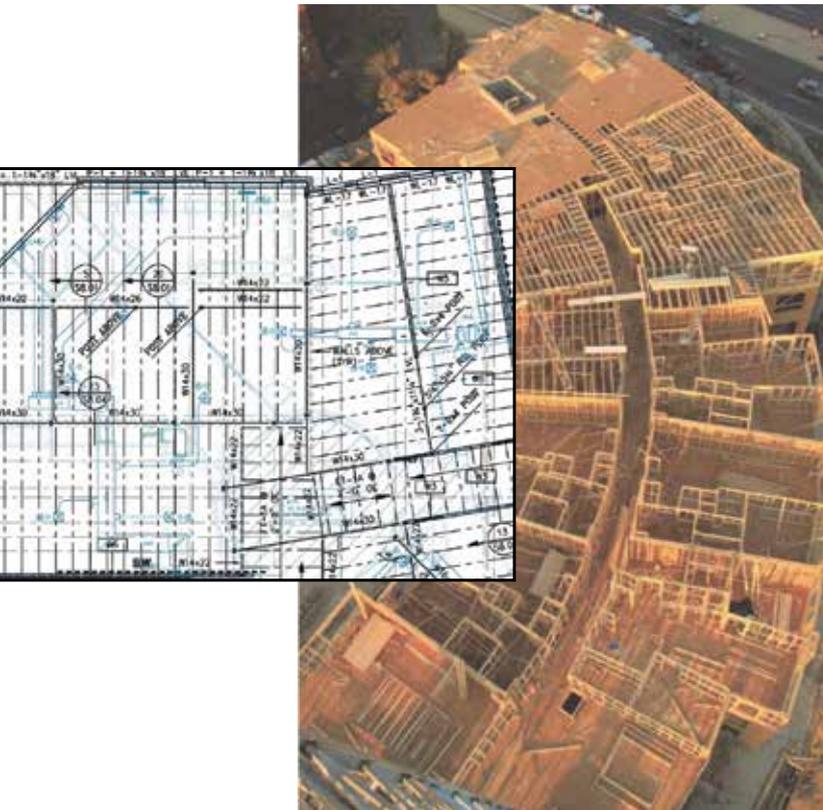
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The Turnkey Movement Is Here

Component manufacturers should be happy about this trend.

Homebuilders are beginning to come full circle, and that should have every component manufacturer out there a bit excited. At BCMC this past October, Scott Stevens of MODU-TECH and I gave an education presentation, “Turnkey Is the Future of Framing,” making this very point.



Componentized framing allows for CAD overlays that make addressing issues during the design phase of the project easier, which means smoother installation even for complex building designs.

Once upon a time, the builder controlled and provided the whole package: lot development, plans, materials and labor. In the 1940s and 1950s, homeownership skyrocketed and homebuilding surged; builders expanded rapidly and looked for ways to construct homes faster and more economically. That movement led to the division of responsibilities among the trades and outsourcing of materials and labor.

I would argue that wasn't a bad thing. After all, that division encouraged specialization, which means every aspect of a building can be built by experts in their field, as opposed to generalists. The downside risk, particularly as light-frame construction has become more complex, is that inadequate communication can fragment the various trades working on a project and lead to costly mistakes and frustrating delays.

As you know first-hand, since the housing bubble burst, builders have searched for every way they can to control costs. They've squeezed their designers, they've squeezed their material suppliers, and they've squeezed their labor suppliers. They need to build homes profitably, or they go out of business. Due to that downward pressure, everyone in the supply chain has had to take a hard look at how to become more efficient, eliminate sources of waste and reduce the risk of costly mistakes.

While all the trades have taken their fair share of lumps over the past six years, I would argue framers are in the unenviable position of getting caught on both sides. We have to operate with a higher sense of urgency, responding to the general contractor's (GC) needs once the site is ready for installation, while having little to no control over material quality or delivery. If either the quality (e.g., incorrect take-offs, damaged material, insufficient quantities, etc.) or the delivery time is off, we're the first in line to hear the backlash.

More and more, GCs look to turnkey framing as a way to minimize that supply-side fragmentation and reduce waste and the potential for mistakes. Turnkey gives the builder or GC a single source to work with to get the project completed, eliminating the need for extra staff to manage coordination among various trades. For the entity providing turnkey framing, it has the ability to better control material usage and productivity loss.

In order for the turnkey approach to accomplish these goals, the entity providing

at a glance

- Inadequate communication can fragment the various trades working on a project and lead to costly mistakes and frustrating delays.
- GCs are looking to turnkey framing as a way to minimize that fragmentation and reduce waste and the potential for mistakes.
- The efficiencies of the turnkey approach with componentized framing make it the best solution going forward.



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the service has to coordinate the various trades in a more efficient manner. Thanks to significant advances in computer-aided design software, Building Information Modeling (BIM) makes better coordination possible. Through BIM, the turnkey provider can work through construction details and potential conflicts in virtual reality months in advance, as opposed to confronting them on the jobsite in real-time.

Using BIM, the turnkey provider can ensure electrical conduit, HVAC ductwork and plumbing are all routed and coordinated before the foundation is poured. Bearing locations, beams, connections and overall load path issues can be identified, discussed and resolved long before the first wall is erected. Web conferencing takes BIM to the next level, making it very easy and economical to bring everyone to the table to walk through the 3D building model together to discuss potential conflicts and collaborate on a solution.

In my mind, this is where componentized framing solutions, or what you are now calling “innovative framing,” (*SBC Magazine*, August 2014), truly shines. With componentized design, either the component manufacturer or the framer can be the turnkey provider. Designing the components, while simultaneously resolving all the issues outlined above, at the front end of the project opens the door for more creative design and more effective material usage.

Turnkey framing with components also has numerous jobsite advantages. On most jobsites, there isn't a lot of room for material storage. Manufactured components solve that problem through just-in-time delivery. By controlling both the framing and the material delivery, onsite coordination of labor

and installation equipment (e.g., cranes, forklifts, etc.) can be much more effective. Specialized bundling of componentized framing enables even more efficient installation.

Greater labor efficiency can be achieved by completing traditionally difficult framing tasks (like square and plum rough openings for doors and windows and correctly placed chase openings) in a factory-controlled environment instead of the field. Componentized framing also significantly reduces jobsite waste. For a single-family home, this may not seem like a huge deal, but on large multifamily and commercial projects, jobsite waste reduction can represent a significant cost savings.

After more than 40 years in the framing industry, I have seen our labor pool change dramatically. When I started, the framer did every aspect of the framing. Today, a lot of our labor pool specializes in only certain aspects of framing. As a result, it requires a lot more time to manage labor on a project. Potentially, the single most important advantage of componentized framing in today's market is the reduction in skilled labor required to install it.

Currently, one of the major factors in determining whether a building gets built is whether there is enough labor available to get the job done. That makes the efficiencies of the turnkey approach with componentized framing the best solution going forward. **SBC**

Kenny Shifflett owns Ace Carpentry in Manassas, VA, and has been in the framing industry for more than 40 years. He serves on NFC's Steering Committee and chairs the Council's Safety Subcommittee. For more information about the National Framers Council and the FrameSAFE program, visit framercouncil.org.

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by Sean D. Shields

Implementing What You Learned at BCMC 2014

Plan Where You Are Going

Gearing up for growth starts with deliberate steps.

“It comes down to doing the right thing...Your true success doesn’t come from how much money you make, but how you impact people’s lives in a positive way.”

[Bo Powers, Panel Truss Texas]

at a glance

- In order for a company to grow successfully, it needs to evaluate its current situation and costs accurately and be able to articulate what the company wants to grow into.
- To improve production areas, start with the “5S” approach: sort, straighten, scrub/sanitize, schedule and finally, score the result.
- The right people, the right customers, the right vendors, and most importantly, the right motives grow a successful business.

If you fail to prepare, you prepare to fail,” said Donnie Powers, President of Panel Truss Texas, Inc.

Powers was joined by Aaron Roush, General Manager of Villaume Industries, Inc., at BCMC to present their best practices for increasing production in an educational session entitled, “Gearing Up for Growth.” Their philosophy for running and growing a successful business came down to having four simple things: the right people, the right customers, the right vendors, and most importantly, the right motives.

The Right Everything

“In order to know if you have the ‘right’ everything, you need to have a short- and long-term plan to know where you want to grow to,” said Powers. “Those roadmaps will give you the criteria you need to evaluate what is right for your business.” Roush elaborated on this concept by pointing out that your direction and motivation will dictate the kind of culture you want to establish with your employees, which will then determine who fits and who doesn’t. “If you determine you don’t have the right people, make sure you’re developing a pipeline to find and train the right people,” said Roush. “Do you train the right people from within, or do you go to the local high school, technical college or university?”

“Choosing and developing relationships with the right vendors for you takes time and effort,” said Powers. “What are you doing personally to engage in that process to ensure you are successful?” Powers stressed it’s important to reevaluate those relationships on a continual basis, always asking the question, “What am I doing on a continual basis with my vendors to improve my business?” The same proactive approach is needed in establishing the company’s motivation. Powers explained, “As a leader, you need to not only be an example, but be able to articulate where you’re going, why you’re going there, and why it’s a good idea everyone follows you.”

Finally, developing a short- and long-term plan means evaluating the methods you are going to use to grow. Roush asked the question, “Are you going to go at it the same way you did the last time you tried, or are you going to try something new?” One intriguing idea was to contemplate partnering with a competitor. “Sometimes the best way to take on big challenges is to bring someone with you,” said Powers. He suggested possible benefits could be sharing a salesperson, sharing the large capital expense of a new saw or table, cutting lumber for each other, and even sharing truss designers. “Try to do as much as you can with as little debt as possible,” said Powers. “Debt is death!”

Continuous Improvement

Once you’ve developed your short- and long-term plans, and have a goal of where you want to eventually go, “it’s dependent on everyone in the company to strive for continuous improvement,” said Roush. Both presenters suggest first identifying

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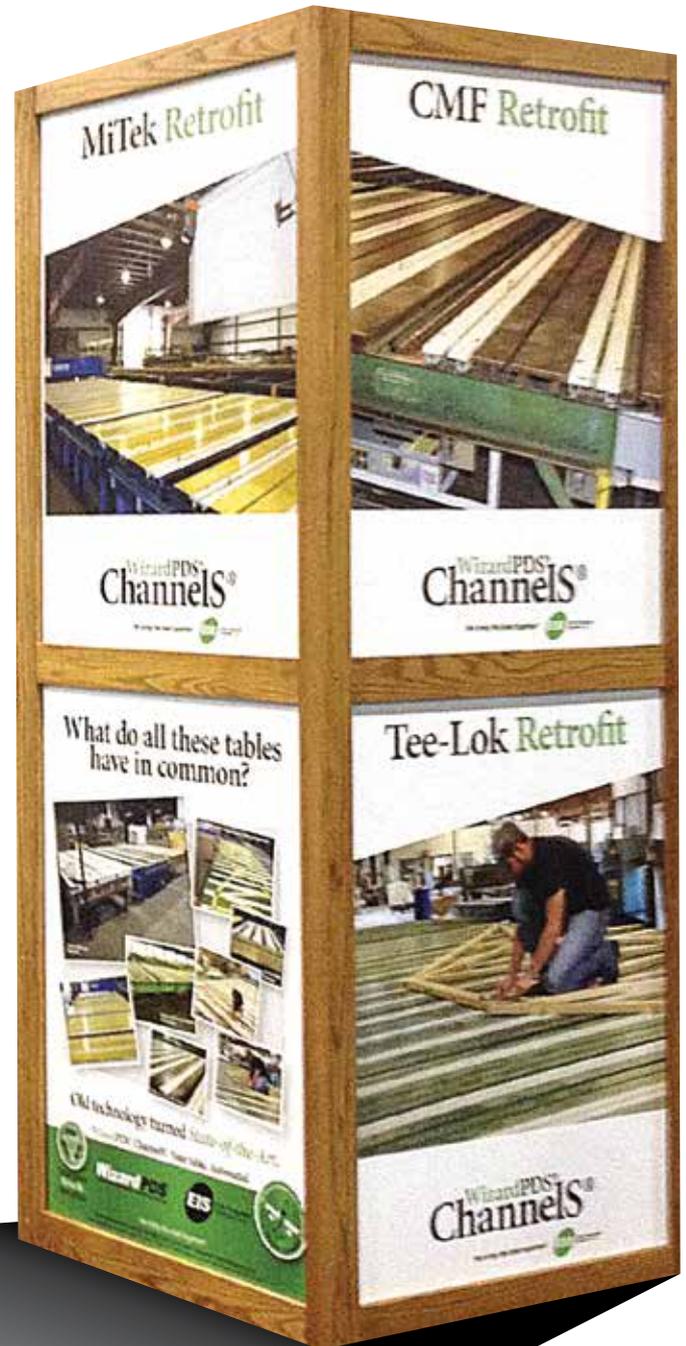
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Plan... • Continued from page 10

the seven types of waste in your organization: defects, over production (bottle-necks), too much inventory, over processing (too much material handling), efficient task motions, transportation, delivery wait times and repairs. Next, focus on how each area of waste will be uniquely reduced. "In production areas, start with the '5S' approach," said Roush, "sort, straighten, scrub/sanitize, schedule and finally, score the result."

Another key to ongoing improvement is defining what improvement looks like. "Continually define what is the next step to take," said Roush. As each step is reached, the improvement is evaluated and the next step is defined. "Defining and following through on your continuous improvement is just as important as having the right people or equipment," Powers said.

They both stressed that taking this step-by-step approach to improvement breaks change into manageable pieces. The evaluation helps ensure each step makes sense, given how the improvement occurred and what additional challenges were identified through the process. "Incremental change allows for savings to be realized from small, no-cost or low-cost bite-sized improvements over time," said Roush.

Pros & Cons of Automation

Powers and Roush concluded their presentation by walking through an example of how a company could evaluate whether to buy the latest automated single-blade saw. In this example, they assumed the typical residential roof used 3,021 board feet (BF) of 2x4 lumber. The automated single blade saw would take six man-hours to cut all of the necessary pieces, while it would take two conventional component saws 35 man-hours. At an average wage of \$10/hour, and assuming a cost of \$1/BF, total labor costs are reduced from 11.6 percent (\$350/\$3,021) versus 2 percent (\$60/\$3,021).

"Now, a 9.6 percent labor savings is likely on the extreme end, but if you reduce that to a more conservative number, say 5 percent, a company going through 2 million BF annually can realize a labor savings of close to \$100,000 per year," explained Powers.



When taking the "5S" approach to dealing with making your production areas more efficient, one idea to consider is creating Kaizen boards to organize tools.

Beyond labor savings, the automated single blade saw can also contribute material waste savings. In their example, the average waste for a conventional component saw is eight inches, but for an automated single blade saw, the average waste is 2.4 inches, giving a 5.6 inch waste savings per piece cut.

For the typical residential 3,021 BF roof, there were 564 pieces needed to construct the roof trusses, or an average length of 5.36 BF (3021/564). For the plant doing 2 million BF annually, that would represent 373,134 pieces cut for an annual material savings of 2,089,552 inches of 2x4. (373,134 X 5.6). The material savings would total 116,144 BF (2,089,552/12=174,130 lineal feet X 0.667). In this example,

they assumed an average price of \$400/m, for an annual material waste savings of \$46,458.

"Adding the labor savings (\$100,000) to the material savings (\$46,458) gives you a total savings in the first year at \$146,458," said Powers. "If the cost of a new automated single blade saw is \$200,000, then it would take less than a year and a half to recover your initial investment." (See graph below.)

They were quick to add that there are many additional factors each company needs to consider before running out and purchasing an automated saw. However, their example did drive home the type of evaluation that needs to be undertaken for any kind of capital expense. "You must know all your costs," said Roush. "If you're going to change something up, calculate how it will affect all the downstream aspects of your business so you can calculate your true return on investment."

Conclusion

Powers and Roush reiterated that, in order for a company to grow successfully, it needs to evaluate its current situation and costs accurately and be able to articulate what the company wants to become. Having a plan in place will help the company ascertain if it has the "right" people and resources to achieve its goals. Finally, by taking on growth in a step-by-step manner, the company's ability to evaluate its incremental success will be maximized, and it will be far easier to continually revise its short-term plan to navigate successfully into the future.

Bo Powers, a co-owner of Panel Truss Texas, added a powerful insight at the conclusion of the presentation for everyone to consider, "It comes down to doing the right thing. Treat your employees right. Treat your customers right, and nurture your relationships. Your true success doesn't come from how much money you make, but how you impact people's lives in a positive way." **SBC**

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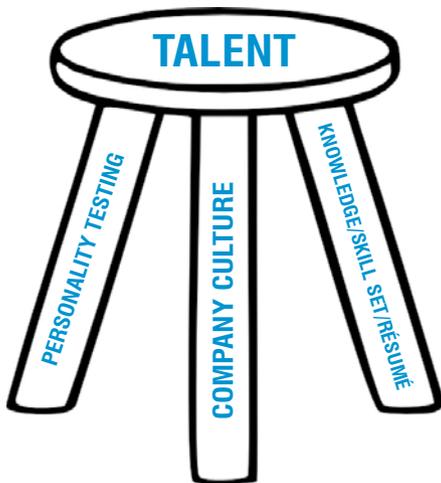
GEARING UP FOR GROWTH

by Lena Giakoumopoulos

Implementing What You Learned at BCMC 2014

Get the Right People & Keep Them

Successful hiring is about quality, not quantity.



Recruiting is still the most important issue, and all three of these things must work together to be successful.

You really only want to have A players joining your team," says John Herring, CEO of A-1 Roof Trusses in Fort Pierce, FL. Herring, a presenter in the "Bolstering Your Workforce: Beating the Brush for Talent," education sessions at BCMC, who strongly believes every company should have a system for bringing in the right staff and retaining them. Further, that system should be flexible enough to be refined and updated as a company grows and evolves. When presenting an overview of how to bolster the workforce, Herring sees it as a two-part process, "Finding the right people is the first part, and keeping the right people is the second part."

Of course, current market conditions, and attempts by companies to slowly move out of the recession, make this approach more challenging. Herring states, "in a tough market, it can be twice as difficult to find the right person." As a consequence, Herring suggests the focus should be on developing a system each company can continuously evolve in order to avoid becoming stagnant while the market improves.

In order to bring in qualified people, initially, companies need to define, write out and fine-tune a recruitment process. The recruitment process cannot be prepared just once for any company. It needs to be revisited and re-evaluated, in line with each company's procedures. This, in turn, should be improved and enhanced as the company grows and changes. At A-1 Roof Trusses, Herring says they constantly explore new avenues as part of their recruiting process.

Quality Hires Are Key – How to Bring in A Players

The current recruitment process at A-1 Roof Trusses begins with the initial participation in job fairs with local universities, applications, various types of tests (personality, intelligence and technical skills), a tour of the facility, and team interviews. It then entails bringing in candidates to join their training class over a six-month timeframe. Finally, when candidates graduate from the training, they are placed with a mentor for six months. This process takes time, but ultimately, "quality hires are key," emphasizes Herring. "Companies need disciplined hiring techniques that are non-negotiable!" He stresses, once a company has buy-in from its own staff, that investment adds to the entire process. Therefore, it's important the current staff believes in the system to bring in new talent.

Culture is Key – How to Get the Right People & Retain Them

Herring is a strong advocate of exhibiting the company culture right from the start. "Make your culture known to them," he says. This fosters the right behavior, and thus enhances the company culture. He insists this should be a vivid part of the recruitment process. Herring's golden rule to live by is, "develop a hiring process and keep fine-tuning it." He strongly believes bringing in dynamic talent to join the company should not be a fixed or unchanging process. It should not center only on a résumé and an interview, but rather it should be a system that needs to be developed, exam-

at a glance

- The focus should be on developing a system each company can continuously evolve in order to avoid becoming stagnant as the market improves.
- In order to bring in qualified people, initially, companies need to define, write out and fine-tune a recruitment process.
- You need to develop a pipeline of candidates and not wait for the need to arise.

"Companies need disciplined hiring techniques that are non-negotiable!"

[John Herring, A-1 Roof Trusses]

ined and re-examined systematically to embody the company's culture.

Herring maintains that there is a combination of complementary actions that need to be taken for a candidate to join the company. This includes the knowledge and skill set defined in the résumé, the presentation of the company culture, and finally the personality and testing for the ultimate "Job Fit." For A-1 Roof Trusses, the company's culture is most important and serves as the foundation for a successful process, whether experienced candidates or new trainees are joining the team.

A lengthy recruitment process can have its challenges, but the time spent should be considered a long-term investment for the company. Herring points out that, if "a candidate will not work hard to get the job, how do you expect the candidate to work hard when on the job?" Think of the time/costs that are spent when a wrong hire is made. The entire process has to begin again, and that's why the recruitment process should never be seen as a temporary solution or any type of quick fix for the company. A well-defined recruitment process will allow for filtering prospective candidates and seeing how much they are willing to invest in learning about your organization. You will get to see their personalities and watch their commitment. They will get to learn more about your organization and its culture and acquire a more substantive understanding of what the job entails.

Develop a Pipeline of Candidates

Herring's experience and insight into

the industry serves to facilitate the filtering process of prospective candidates. He suggests that, "you need to develop a pipeline of candidates" and not wait for the need to arise. Companies should prepare in advance. The "better the candidate, the better the results," he says. A-1 Roof Trusses seeks candidates where the goals of the recruitment process include finding smart individuals with the right profile, character and drive. All of these, in conjunction with the candidate passing the previous stages of the recruitment process, make for the A player Herring aims to bring to his company.

Herring supports his team during the recruiting cycles, which coincide with spring and fall college graduations, and he usually joins the team in the final group interview, contributing another level of quality control. He looks for "the red and yellow flags" that may come up. Here the focus is on getting good or better answers from candidates to their interview questions. According to Herring, he guides the team to attend to these until "all flags are green."

Act Now

Herring believes that, in order to bring in new talent to the industry, now is the time for companies to invest resources and get involved to groom and train new recruits. SBCA tools are available to facilitate companies in their recruiting cycles. Companies should take a proactive approach in developing a disciplined recruiting system to attract and keep the right staff. Contributing to moving the industry forward begins locally, from within each company, and, it begins now! **SBC**



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A photograph of a wooden workbench. In the foreground, there is a stack of papers, a pair of glasses, and a small glass of dark liquid. The background shows a wooden surface with a blue object. The lighting is warm and focused on the objects in the foreground.

For a short time at the end of each year the presses stop rolling and the saws stop cutting. We turn off the lights and pause from connecting lumber to connect with family and friends. During this season of reflection we want to thank you—for your friendships and partnerships through our industry's prosperity and its trials. We hope 2015 brings you happiness, new customers and stories of continued success.

Warm wishes to you and yours.



SILENT *Night*



Implementing What You Learned at BCMC 2014

Build an Effective Truss Design Dept.

Explore how to find, train and retain designers.

Bob Dayhoff, Director of Technical Operations for Shelter Systems Limited in Westminster, MD, has been working in the industry for a long time, and for many of those years, he has hired and trained truss design department personnel. During his BCMC education session entitled, “Tips for Hiring and Training Truss Designers,” Dayhoff promised attendees he would offer “golden nuggets” of information to take away for instant use at their companies. Let’s explore some of his insights.

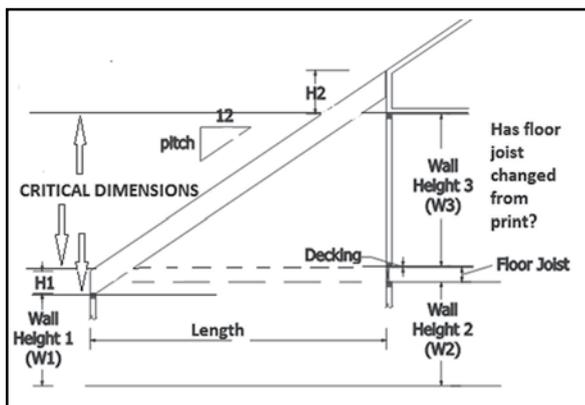


Figure 1. Example of a helpful detail on a truss placement diagram to verify that the correct plans were used.

Training & Retaining Truss Designers

Before a new truss designer designs his or her first truss, it’s a good idea to have technicians work as a helper on a truss production team. The goal is for the new hire to learn to build trusses from the paperwork that they will eventually send to the shop floor (unless they were hired from production). This type of cross training allows you to shift designers into builder/sawyer positions instead of having to lay them off, in case of a slowdown. When you take the time to properly train a designer, you want to have a well-planned strategy to not lose your investment if things slow down in your department.

It is also valuable to understand the personal characteristics, education and knowledge of your plant personnel because there is often talent there that is unexplored and unrealized. Applying both strategies above helps with any slowdowns or shifting design and production priorities in any given period of time, providing maximum customer service benefits.

Dayhoff mentioned that, in his experience, one of the more costly mistakes is when trusses are designed with the wrong heel height or pitch. Training designers to add helpful details, like those found in Figure 1, to the truss placement diagram has helped alleviate these mistakes.

To keep good technicians, Shelter Systems ties them to a quarterly bonus pool based on a percentage of design team profitability and considers that in their compensation evaluation. “Our metric is a percentage of profitability divided among the design team,” said Dayhoff.

He also found that training meetings, like those to review software updates, go better when paired with pizza in order to make gatherings around the board room table less formal. “The pizza helps start a meeting off right, and even seems to encourage more participation in the technical subjects being shared,” said Dayhoff. During these meetings, the company likes to double-dip by providing software training while also revisiting real-time situations that resulted in either a liability or back charge to the company. For example, Dayhoff said the agenda at a recent meeting included, “plat-

at a glance

- Before a new truss designer designs their first truss, it’s a good idea to have technicians work as a helper on a truss production team.
- Understand the personal characteristics, education and knowledge of your plant personnel because often talent is there that is unexplored and unrealized.
- Training a new designer is an ongoing process that takes time. When you have good designers trained, you will want to do everything you can to keep them employed with you.

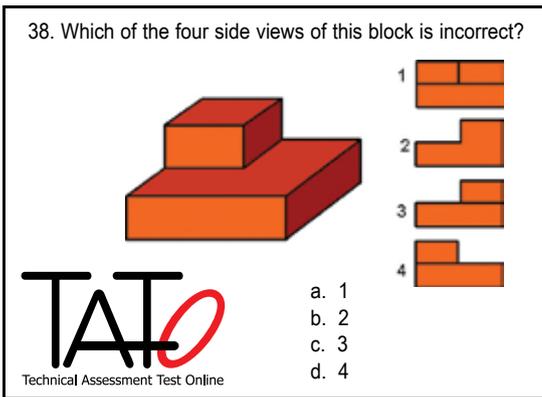


Figure 2: Example question from SBCA TATO test.

step is having a detailed job description and your minimum requirements in mind.” Sometimes, the best candidates are already employed by you. Bringing up designers from within your company has its advantages, including a knowledge of your operation, established work habits that fit your company’s culture and familiarity with your paperwork requirements. It develops loyal personnel by showing/providing a personal growth path that can be followed. Shelter Systems has also looked at interns for part-time positions during school, as well as summer jobs, which have developed into some full time opportunities.

Once a possible hire is found based on the job description, the question needs to be asked if the candidate fits your company’s culture (see page 14 for the article on John Herring’s presentation that includes more insight on developing company culture). Dayhoff stated that you would be remiss for hiring them, if the individual has all the qualities desired in a good designer, yet their personality or approach to work impedes the efforts of your current team.

Dayhoff uses the interview process to determine the candidate’s knowledge of construction/plan reading and math/geometry. SBCA’s Technical Assessment Test Online (TATO), for example, is one great way to assess an individual’s spatial awareness and understanding of basic design (see Figure 2).

He shared stories about potential hires who listed certain skills on their resumes, but when asked about their proficiencies, clearly were not as highly skilled as they appeared on paper. For example, one applicant stated on their résumé, “fluent in Spanish.” However, after asking the candidate about his ability to have a conversation in Spanish, he quickly clarified, “well almost,” which called into question the rest of his résumé.

Dayhoff suggested that CMs also consider asking potential hires for permission to view their social networking pages to understand their interests. “Knowing their passions can help you determine if this person will be upsetting or uplifting to your current team culture,” he explained. If you’re on the fence deciding between a couple of candidates, asking your software supplier for a second opinion can provide valuable insight.

Finally, Dayhoff stressed the importance of providing all designers with ongoing education. “I feel it takes six months to a year before a new designer develops the confidence and understanding needed in taking a truss design project from bidding to finished paperwork for a basic residential job and have it correctly processed in a timely fashion,” he said. “This includes making it through the critical back checking process.”

“Training a new designer is an ongoing process and takes time. So when you have valuable designers trained, you will want to do everything you can to keep them employed with you; they are your greatest assets.” **SBC**

ing minimums for top chord bearing trusses, reviewing the company’s default chord-size selection for load carrying members, and words to avoid using in bid proposals.”

Finding Truss Designers

With recent increases in building construction, attendees were anxious to learn where Dayhoff finds quality designers. He recommended, “the first

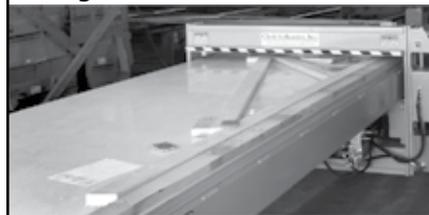
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GEARING UP FOR GROWTH

by Emily Patterson

Implementing What You Learned at BCMC 2014

The SCORE Advantage

Learn how to start SCORE and reap the benefits from day one.



SCORE includes the SBCA In-Plant Wood Truss QC program. For more information on why QC is so valuable, see page 24.

Editor's Note:

All specific pricing examples throughout this article are based on 2014 dues and program pricing, and are subject to change.

at a glance

- SCORE's focus on best practices and risk management helps protect the component business and saves CMs on precious training resources.
- In an effort to make the program and costs more understandable, SCORE certification requirements have been streamlined, while still focusing on industry best practices that matter most to CM customers.
- The new package pricing gives CMs the opportunity to meet SCORE requirements, at a reduced cost, and begin to reap the benefits from key SBCA programs and products.

SCORE—the structural building component industry's certification program. You've heard about it. Your plant may have even looked into the program a few years ago, but you've always wondered what it really takes (in terms of time and money) to become SCORE certified. You're not alone. Jess Lohse, President of Rocky Mountain Truss Co. and SBCA Marketing Committee Chair, shared those same questions, noting that, "While SCORE is a great way to leverage the industry best practices developed by the association, I think a lot of people kept wondering, 'Okay, what's in it for me and what is it going to cost?'"

Lohse sums up the value of SCORE for component manufacturers (CMs), saying, "it puts our money where our mouth is." SCORE's focus on best practices and risk management helps protect the component business and saves CMs on precious training resources.

In an effort to make the program and costs more understandable, in 2013, Lohse, SBCA staff and the Marketing Committee got to work re-crafting SCORE to streamline certification requirements while maintaining the focus on SBCA programs and products that matter most to CM customers. The result was a comprehensive SCORE program in which CMs participate in two stages (see Table 1) and can earn certification in one year.

Choose a Package

Let's walk through a simple example to illustrate exactly how SCORE participation works. For the sake of this example, we will focus on XYZ Truss, a small truss manufacturer with one plant. With total annual sales of \$4 million, XYZ Truss falls in the level 2



The plant is a member in good standing and has one year to work toward SCORE certification.

To begin the process, the plant purchases a SCORE package (see Tables 2 and 3 on page 22) or purchases the following individually:

- Access to TTT for all truss designers
- QC software and begins to track QC
- Jobsite Packages, which are sent with every truss delivery



The plant is a member in good standing and is compliant with:

- TTT Certification – Average TTT level for designers at a location must be 1.5 or higher
- QC Certification – Plant is SBCA In-Plant Wood Truss QC certified and submits quarterly data files for SBCA review
- Safety Certification – Plant meets requirements of either SBCA Operation Safety or a program reviewed and approved by SBCA staff
- Jobsite Packages – Plant purchases and sends with every truss delivery
- Continuing Education – Plant fulfills ongoing TTT requirements, which can include SBCA workshops and webinars, BCMC, SBCA online training programs, and other SBCA-approved programs
- Plant Tour – Plant hosts one plant tour or similar event per year

Table 1. Requirements for SCORE Member and SCORE Certified Status. Visit sbcindustry.com/score for details.

SBCA dues category (annual dues of \$864). XYZ Truss can purchase the SCORE Certification Program Package at \$2,040 for the year or \$170 per month (see Table 2 on page 22 for pricing levels). This package includes SBCA membership, as well as access to Truss Technician Training (TTT) online training, ongoing TTT designer recertification and SBCA In-Plant Wood Truss QC quarterly reviews. If the plant wants access to these SCORE requirements plus additional industry best practices programs, it can purchase the SCORE Certification Best Practice Program Package (see Table 3 on page 22).

In this example, XYZ Truss chooses the SCORE Certification Program Package. If the plant pays for the package by December 31, it can receive a five percent discount (\$102 savings, in this case) off of the \$2,040 price. With or without the five percent discount, the SCORE package cost comes in well below the \$2,284 the plant would pay for membership and to purchase the programs separately.

When the plant purchases a program or individually buys the products and training required for SCORE, the company signs a SCORE agreement, stating that the plant will abide by the program and plans to become certified within a year.

Once XYZ Truss commits to SCORE, the location is officially a SCORE Member. From day one, XYZ Truss can promote its SCORE Member status to employees, customers and in the company's marketing efforts. At his plant, Lohse is in the

process of implementing SCORE, and says employees show a lot of interest in the program. "In house, SCORE allows our production staff to feel a sense of pride," he said. "We're focusing on staff for now, but expect that message to boil over to customers next year."

Put SCORE into Practice

Now that it has purchased a SCORE package, XYZ Truss gets down to business. Management tasks key staff to implement SCORE at the plant and ensure it is SCORE certified within a year. These staff members start introducing SCORE throughout the plant.

The SCORE Certification Program Package XYZ Truss purchased includes access to TTT. Truss designers at the plant have already completed TTT Level I, so the plant's design manager makes a training schedule so that enough designers can complete and pass Level II and Level III, in order to meet the TTT location requirement. Per SCORE's restructuring, a plant's truss designers must have a combined TTT average of 1.5. For example, a plant with three truss designers—one at Level 1, one at Level II and one at Level III—would have a plant TTT average of 2, which would fulfill the SCORE requirement.

The TTT component of SCORE helps standardize truss designer training and saves CMs on valuable training time. "I can't begin to train new designers on my own as comprehensively

Continued on page 22



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SCORE Certification Program Package

Location Sales Volume	Per Month Package Price	Annual Price**	Current Individual Pricing of Programs Plus Dues
Less than \$1MM	\$ 100	\$ 1,200	\$ 1,624
\$1-5MM	\$ 170	\$ 2,040	\$ 2,284
\$5-10MM	\$ 250	\$ 3,000	\$ 3,388
\$10-15MM	\$ 365	\$ 4,380	\$ 5,032
\$15-20MM	\$ 485	\$ 5,820	\$ 6,700
\$20-30MM	\$ 650	\$ 7,800	\$ 9,160
\$30-40MM	\$ 875	\$ 10,500	\$ 12,448

Table 2. SCORE Certification Program Package Pricing (includes SBCA membership, access to Truss Technician Training (TTT) online training, ongoing TTT designer recertification and SBCA In-Plant Wood Truss QC quarterly reviews).

SCORE Certification Best Practice Program Package

Location Sales Volume	Per Month Package Price	Annual Price**	Current Individual Pricing of Programs Plus Dues
Less than \$1MM	\$ 220	\$ 2,640	\$ 4,228
\$1-5MM	\$ 300	\$ 3,600	\$ 5,092
\$5-10MM	\$ 400	\$ 4,800	\$ 6,532
\$10-15MM	\$ 500	\$ 6,000	\$ 8,680
\$15-20MM	\$ 625	\$ 7,500	\$ 10,840
\$20-30MM	\$ 775	\$ 9,300	\$ 14,032
\$30-40MM	\$ 1,000	\$ 12,000	\$ 18,292

Table 3. SCORE Certification Best Practice Program Package Pricing (includes SBCA membership, access to Truss Technician Training (TTT) online training, ongoing TTT designer recertification, SBCA In-Plant Wood Truss QC quarterly reviews, Operation Safety online training and quarterly review, In-Plant Basic Training, Truss Manufacturing Online (TMO) and Online Risk and Liability Management (ORisk)).

When he places the order, SBCA recommends that CMs consider including the Jobsite Package as a line item on customer invoices. Lohse says he's received positive feedback from CMs on this business practice noting, "It's a good way to pass on the cost, but more importantly, to protect your company by documenting that you provided information on proper handling, installing and bracing of our products."

Earn SCORE Certification

Over the next 12 months, the plant works toward fulfilling the SCORE requirements. If

The SCORE Advantage • Continued from page 21

as TTT does," said Lohse. Developed with input from CMs across the country, TTT presents industry best practice design and engineering fundamentals applicable to all truss designers.

The SCORE package also includes quarterly data reviews for SBCA In-Plant Wood Truss QC. The plant hadn't been participating in QC previously, so XYZ Truss purchases the SBCA In-Plant Wood Truss QC program for the member price of \$490. Management assigns staff to head up QC efforts, begin the online QC training and work with SBCA to submit quarterly data for review. Implementing QC is another opportunity to showcase the company's commitment to excellence.

"For CMs, this is a chance to not just say we're good, but there are third-party inspections and data reviews that bolster our commitment to being the very best at what we do," said Lohse. "SCORE gives my QC program real teeth and honest feedback I can look to that improves our overall product quality and ensures repeat business from our customers."

The plant then addresses the SCORE safety requirement. XYZ Truss doesn't have a full-fledged safety program in place, so management chooses to use the industry specific SBCA Operation Safety program, and the plant purchases the Operation Safety Collection for the member price of \$195. A location could use a different safety program, but the program must be reviewed and approved by SBCA staff.

Next, the plant evaluates its use of the SBCA/TPI Jobsite Package. The plant has been sending out Jobsite Packages, but management builds a double-check into its processes to ensure that a package is sent with every job. The plant manager notices that they're starting to run low on Jobsite Packages, so he places an order for 200 standard Jobsite Packages for \$890 at SBCA member pricing.

at any time XYZ Truss has questions, SBCA staff is just a phone call away. When the plant meets all of the conditions of SCORE, XYZ Truss contacts SBCA to review and confirm that the plant is SCORE certified.

Back to that first question Lohse heard from CMs, "Okay, what's it going to cost me?" All in all, the XYZ Truss plant earned its SCORE certification for about \$3,600 (see Table 4), 0.09 percent of the plant's \$4 million in sales. "It's a great value, especially for smaller plants," said Lohse, who hopes the simplified structure and new pricing will make SCORE more accessible to all CMs.

Lohse points out that the new package pricing gives CMs the opportunity to meet SCORE requirements, at a reduced cost, and begin to reap the benefits from the programs and products included in SCORE, noting, "Like a lot of other plants, our management and employees feel we build some of the best trusses around. SCORE is a way for us to show our commitment to producing quality trusses day in and day out—raising the bar and separating ourselves from our competition, both in our employees' eyes and our customers'." **SBC**

SCORE Costs for XYZ Truss

SCORE Certification Program Package	\$2,040
SBCA In-Plant Wood Truss QC	\$490
SBCA Operation Safety	\$195
200 Jobsite Packages	\$890
Total	\$3,615*
*Binders, books and exams for online training programs are purchased separately; quantities purchased depend on an individual CM location's needs.	

Table 4. SCORE Costs for XYZ Truss.

COMPONENT MANUFACTURERS

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Quality
doesn't just
happen
automatically.

The quality of the product you send to the jobsite has a significant impact on your bottom line. High quality designed and manufactured products eliminate the need for costly repairs or call backs, and build trust and respect with installers and your customers. Great craftsmanship can differentiate you from your competitors and, in price-competitive situations, can give you second looks on jobs. Your quality products also reduce headaches and hiccups. With field labor as tight as it is, your reputation for high quality products can make the difference in whether a builder chooses you over a competitor.

Unfortunately, quality doesn't just happen automatically. High quality is only attained through a constant commitment, from the top down, to monitoring and improving your production process and a dedication to implementing quality control (QC) best practices and procedures throughout your company. QC helps ensure you produce a consistent product where variation is managed to the greatest extent possible.

Variation is a natural part of component manufacturing. The important thing is to have a process in place that can show you on a regular basis if the variation occurring is acceptable, and whether or not it's self-induced (meaning, your equipment is to blame). Your approach to QC should then focus on providing an early warning for manufacturing machinery and production employee issues that may cause quality defects. In this article, we'll explore how targeted employee QC training can be beneficial to your company, and provide insight on how best to implement that training.

All Hands on Deck

In order to have an effective QC process, everyone in the company needs to be involved, not just managers. Here are examples of how each area of your plant participates in QC:

- Designers set the fabrication tolerances and optimize the design/lumber, while keeping in mind the ability of your assemblers to construct a particular design.
- Design departments can save costly re-dos and repairs downstream.
- Material receiving staff ensures that the material received is as specified (i.e., grade, moisture content, etc.).
- Sawyers verify that the material flowing through the assembly line is the proper grade and properly culled; they can even perform preliminary joint QC prior to sending the webs and chords to the production line.
- Assemblers double-check for good material in the plated area, replace lumber as needed, and concentrate on accurately placing plates and ensuring tight joints.
- Stackers verify that all plates are installed; visually check for any excessive member-to-member gaps, plate rotations over 10 degrees and plate embedment; and check for consistency in plate alignment between like trusses in a bundle.
- Drivers provide a final verification that the load being delivered is the proper one, the order is complete, and they ensure the product isn't damaged upon delivery.
- Managers follow through on all QC expectations. During walk-throughs of the plant, or finished goods in the yard, any QC issues they notice are tracked through to their source and addressed.

As this list makes clear, in every area of production, poor QC can cause real headaches and threaten the cost-effectiveness of your operations. So the first question is, where do you start?



Formalizing Your Approach to QC

Implementing a formal QC process doesn't have to be difficult, given you probably are doing some aspects of QC already and just not calling it QC. You already make minor adjustments throughout any given day, with the goal of getting trusses out the door as fast and efficiently as you can. A formal approach to QC complements that process and, ultimately, lets you improve production through gathering valuable management information that gives you the ability to more effectively evaluate and identify opportunities for processing and material through-put improvements.

At its most basic level, a formal QC process isolates a problem and puts a system in place to help you avoid repeating that problem. Isolating the problem starts by conducting in-plant truss inspections, which compare a finished truss to the truss design drawing (a.k.a. engineering drawing), its related joint details, and quality criteria in the building-code-referenced *ANSI/TPI 1* Chapter 3.

Focus on incremental improvements in the manufacturing process, not a wholesale change overnight. Establish benchmarks upon which to compare inspection results and measure improvement. Then focus on making those improvements in a step-by-step fashion. Schedule a few "toolbox" talks to address a simple problem uncovered by the inspections, and then evaluate how effective the trainings are (i.e., do problems persist, or do they disappear?). Sometimes, these kinds of informal interactions with employees can uncover underlying practices or production methods, such as incorrectly tacking plates, that contribute to the problem.

Like any new thing, installing a new machine for example, production may be affected while employees get used to doing inspections and making corrections. However, it's important to keep in mind the program isn't meant to diminish efficiency. In the end, the ultimate goal of implementing a formal QC process is to help you improve efficiency by reducing the amount of time spent on customer call backs and field repairs.

Take Advantage of QC Inspections

It can be advantageous to conduct QC inspections on various aspects of the production process. Management should then check the QC inspection records, note any discrepancies, and focus on ways to improve processes or procedures based on the inspection data. Periodically, it's also a good idea to have management walk the yard, perform a visual observation of trusses stored for shipment and run through a checklist to record any QC issues.

Based on observations made during the QC inspection process, you can more accurately identify key areas where there is a need to improve education and training of staff, repair or adjust machinery, or address the quality of the material you receive (and possibly negotiate a different approach to your raw material buying with your suppliers based on your material quality findings). Without that data collection and analysis, it's much harder to determine how and where to fix a recurrent production issue.

Setting regular achievable goals not only makes the program more effective, the success helps build employee engagement and teamwork. In the end, you want to establish a QC culture that encourages ongoing awareness, participation and feedback so that processes truly improve. You want your employees to know and embrace the fact that it's okay to find errors so they can be corrected. Without employee observations and feedback, errors don't get fixed, quality suffers, and you lose the opportunity to build that trust and respect with your customers.

What the QC Process Looks Like in Practice

Making an overt commitment to quality changes the focus of your employees. Don't believe me? Here's what several CMs have to say about their formal QC processes.

"If you measure the success of your company by how many board feet of components you produce, that will be the thing your employees focus on," said Dave Motter, Structural Engineer for Louws Truss in Ferndale, WA. "You have to accurately measure quality in order to convince your employees to focus on it."

"Having everyone aware and invested in the QC program means there's no question if something is 'close enough.' Through our QC program, everyone is aware of the tolerances allowed; there is no gray area, so everyone is focused on if it passes or not," said Steve Wangen, Design Manager at Gold Standard Truss in DeMotte, IN. "We have line monitors that watch all the QC issues, and if something out of tolerance gets through and is caught, our production guys know they're going to be fixing it the next day. So they take the time to do it right the first time."

"A formal QC program has helped our end line guys identify quality issues, and has given them a quantifiable process to send trusses back to the production line," said Terry Lillard, Plant Manager for Sun State Components in Chandler, AZ. "In turn, our production guys pay closer attention and fix problems immediately because they don't want trusses coming back to them. Because of the culture we've created through our QC program, our production guys are always looking at the condition of the wood in the plate area. They're all empowered to toss stuff out at any time. That puts more responsibility on our sawyers and pickers to not put bad lumber into the system in the first place."

Conclusion

SBCA has worked with component manufacturers across the country and taken the guess work out of how to implement a formal QC process in your facility. The SBCA In-Plant Wood Truss QC program (sbcindustry.com/qc) includes everything you need to train your employees on quality issues they should look for, how to conduct truss inspections, how to document each inspection, and best practices on how to benefit from the data collected. The best part is, it's about to get even easier to implement. The QC program is shifting to an online interface, which can be accessed by any computer or mobile device in your facility. Not only will it be simpler to input QC data from inspections, it will be easier for managers to access the cumulative data and quickly get a sense for areas where QC issues need to be addressed. **SBC**

Driver Training will be covered in the January/February issue.

TRUSS INDUSTRY STANDARD OF CARE ISSUES

by Scott D. Coffman, PE., SECB & Jim Vogt, PE.

PART 2

Editor's Note:

The purpose of this article series is to identify truss-related structural issues sometimes missed due to the day-in and day-out demands of truss design/production and the fragmented building design review and approval process. This series will explore issues in the building market that are not normally focused upon, and provide recommended best-practice guidance. As with Kirk Grundahl's article addressing communication challenges created by the deferred submittal process (*SBC Magazine*, November 2014), the objective is to raise awareness of these issues and, ultimately, improve overall quality of truss roof and floor system construction.

¹ All references to *ANSI/TPI 1-2007*.

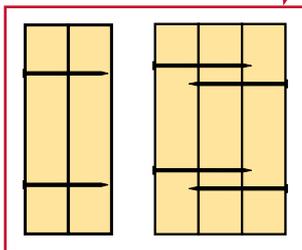
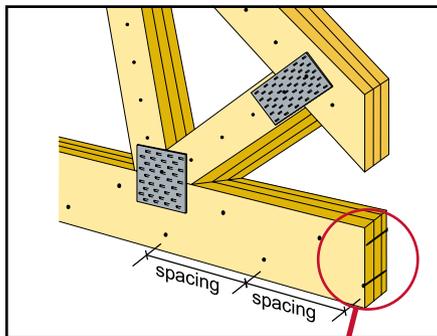


Figure 1. Built-up girder truss constructed by fastening multiple individual plies together.

ANSI/TPI 1, *National Design Standard for Metal Plate Connected Wood Truss Construction (TPI 1)*, is referenced in the building codes and provides information and specifications on the design and manufacture of metal plate connected wood trusses.¹ Chapter 2 of *TPI 1* identifies and clarifies responsibilities between various parties with respect to truss use in building construction. Specifically, responsibility for preparing each truss design drawing, when required, is assigned to a truss designer, or truss design engineer, depending on engineering exemption laws for residential construction. The responsibility for preparing the truss placement diagram (TPD), when required by the contract or construction document, is assigned to the truss manufacturer. Additionally, a truss manufacturer is responsible for preparing a truss submittal package, when required, to meet requirements detailed within Chapter 2.

Truss design drawings (TDD) are a critical component of a truss submittal package. These documents are typically presented on 8½ x 11 sheets of paper and summarize critical design and installation information not readily apparent to individuals outside the truss industry. It can be a challenge for a code official, building designer and/or contractor to review these documents and glean critical truss information. As the truss industry becomes aware of these challenges, it can improve how critical information is communicated and ultimately improve the quality of truss construction.

Section R502.11.4 and R802.10.1 of the *2012 International Residential Code® (IRC®)*, Section 2303.4.1.1 of the *2012 International Building Code® (IBC®)* and *TPI 1* Section 2.3.5.5 and 2.4.5.4 specify the minimum information each TDD must contain. The order this information is presented varies slightly between the three documents; however, the requirements are the same in each. The sidebar on page 27 includes the list of required information on truss design drawing as specified in Section 2.4.5.4 of *ANSI/TPI 1*.

The focus of this article is item (k) from Section 2.4.5.4 of *TPI 1*, Truss-to-Truss connections and Truss field assembly requirements. Unfortunately, these particular items are not always effectively communicated to the contractor or building designer and, in some instances, may even be disregarded or marginalized.

Truss-to-Truss Connection: Ply-to-Ply

TPI 1 permits girder trusses to be created by fastening multiple truss plies together (Section 7.5.5) (see Figure 1). Although *TPI 1* allows a maximum of five- (5) and six- (6) ply girders under specific, defined loading situations, many truss designers and truss design engineers limit girder truss design to four (4) plies or less. Fastener schedules for multi-ply girder trusses are generally displayed within the TDD and are separated for top chords, bottom chords, and webs. Occasionally, fasteners required to distribute loads equally between plies cannot be calculated by truss software, and in that event a caution or warning note is displayed on the TDD. An example of one such warning note reads:

"Special connection required to distribute bottom chord loads equally between all plies."

Based on *TPI 1* Section 2.3.5.5(k) and 2.4.5.4(k), the required truss ply-to-ply connection must be included on the TDD. Left unresolved, a truss manufacturer has not complied with all the requirements of the TDD notes included in *TPI 1* and the building code.

Truss-to-Truss Connection: Truss-to-Girder

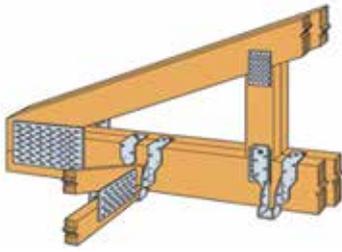


Figure 2. Girder truss supporting other trusses.

A common framing practice is to design and integrate a girder truss (carrying member) to support another truss or trusses (carried member) (see Figure 2). Per *TPI 1* Section 2.3.5.5(k) and 2.4.5.4(k), this connection must be included on the TDD. Most metal plate connected wood truss design software has the capability to analyze and identify a hanger or other connection device sufficient to transfer calculated gravity and uplift reaction loads from a supported truss. When this feature is active, the required hanger or connection device is specified on either the TDD for the supported truss or the girder truss. Some truss manufacturers may choose to deactivate this software feature because: 1) they may inventory and sell hangers and/or connection devices from a company different than supported by the software database, or 2) the truss manufacturer has been requested not to provide hanger/connection devices. When the hanger selection feature is deactivated, truss design software typically generates a note indicating this occurrence. An example of one such note reads:

“Hanger(s) or other connection device(s) shall be provided sufficient to support concentrated load(s) [value] lb. down and [value] lb. up at [location] on bottom chord. The design/selection of such connection device(s) is the responsibility of others.”

When a truss manufacturer provides hangers and connection devices for truss-to-girder connections, the hanger type(s), fasteners and their locations must be effectively communicated to the contractor. This is typically accomplished by including truss-to-girder connection information on the TPD. When

a truss manufacturer does not provide hangers and connection devices, many building designers prefer the software feature remain active to display a connector capable of load transfer. There are two primary reasons. First, *TPI 1* clearly assigns truss-to-truss **connection** design to the truss industry (truss designer and/or truss design engineer). *TPI 1* makes no provisions to limit this critical item to a summary of truss reactions or a connector supplier. Second, it helps ensure a connector device exists for calculated reactions, hanger and truss geometry, and *TPI 1* cross grain tension analysis; items not easily checked by parties outside the truss industry.

A dependence on TDD notes to communicate ply-to-ply and truss-to-girder connection requirements contributes to review oversights and/or insufficient installation information, as this critical information can easily be overlooked or misunderstood, given the large number of TDDs for a project.

Truss Field Assembly: Truss Field Splices

Manufacturing or shipping limitations sometimes require a truss profile to be fabricated in multiple pieces for field assembly. Additionally, a desired building appearance may be created using truss components as “fill” members. Specific applications include, but are not limited to: 1) “piggyback” or cap trusses; 2) field splice truss segments; and 3) valley framing. According to Section 2.3.5.5(k) and 2.4.5.4(k), these members shall be field assembled and connected together according to instructions provided on the TDD. There are times these instructions or diagrams fail to get into the field. The following are common examples:

Example 1:

The top chords of metal plate connected wood trusses installed at 24” o.c. or less are typically restrained and braced by a direct applied wood structural sheathing diaphragm such as plywood or OSB. “Piggyback” truss profiles, comprised of multiple truss components oriented parallel and stacked on top of each other,

2.4.5.4 Information on Truss Design Drawings

Truss design drawings shall include, at a minimum, the information specified below:

- (a) Building Code used for Design, unless specified on Cover/Truss Index Sheet.
- (b) Slope or depth, span and spacing.
- (c) Location of all joints and support locations.
- (d) Number of plies if greater than one.
- (e) Required bearing widths.
- (f) Design loads as applicable, including:
 - (1) Top Chord live load (for roof Trusses, this shall be the controlling case of live load or snow load);
 - (2) Top Chord dead load;
 - (3) Bottom Chord live load;
 - (4) Bottom Chord dead load;
 - (5) Additional loads and locations;
 - (6) Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the Truss loads); and
 - (7) Other lateral loads, including drag strut loads.
- (g) Adjustments to Wood Member and Metal Connector Plate design values for conditions of use.
- (h) Maximum reaction force and direction, including maximum uplift reaction forces where applicable.
- (i) Metal Connector Plate type, manufacturer, size, and thickness or gauge, and the dimensioned location of each Metal Connector Plate except where symmetrically located relative to the joint interface.
- (j) Size, species and grade for each Wood Member.
- (k) Truss-to-Truss connection and Truss field assembly requirements.
- (l) Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and total load and KCR as applicable.
- (m) Maximum axial tension and compression forces in the Truss members.
- (n) Fabrication tolerance per Section 6.4.10.
- (o) Required Permanent Individual Truss Member Restraint location and the method of Restraint/Bracing to be used per Section 2.4.3.

Continued on page 28

often result in the absence of direct applied sheathing along a portion of the supporting truss top chord. *TPI 1* Section 2.3.5.5(o) and 2.4.5.4(o) require TDDs to indicate permanent individual truss member restraint location and method of restraint bracing to be installed. One company's top chord (TC) purlin brace note for a piggyback supporting truss reads:

“Design assumes 4x2 (flat orientation) purlins at o.c. spacing indicated, fastened to truss TC w/ 2-10d nails.”

This note clearly identifies purlin spacing (i.e., lateral restraint) and a general required connection. However, it fails to indicate or reference diagonal bracing, required to resist purlin and truss chord buckling or racking. Nail diameter and length, critical to nail capacity, is missing. Additionally, piggyback truss connections to the base truss are absent.

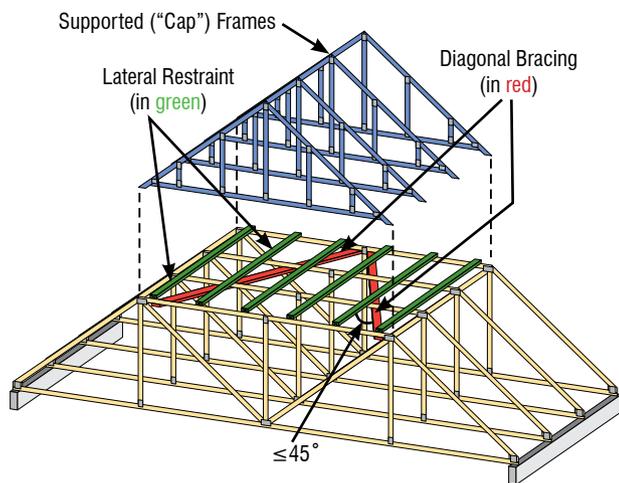


Figure 3. Typical “piggyback” assembly consisting of cap trusses, supporting trusses, top chord lateral restraint and diagonal bracing.

TPI 1 and the building code allow the use of standard industry details. This was intended to convey that each individual lateral restraint and diagonal bracing situation did not need a specific design, but rather the general prescriptive concepts included in *BCSI* could be used. Nevertheless, permanent individual truss member restraint/diagonal bracing must be installed.

Chapter B3 in the *Building Component Safety Information book (BCSI) – Guide to Good Practice for Handling, Installing, Restraining and Bracing of Metal Plate Connected Wood Trusses* and the *B3 Summary Sheet* provide the general prescriptive permanent restraint/diagonal bracing and reinforcement concepts for metal plate connected wood truss chord and web members, including piggyback truss installations (see Figure 3). Standard piggyback connection details are also typically available from truss design software providers.

The *B3 Summary Sheet* and/or the standard piggyback connection details should be part of the truss submittal package, and a note referencing these documents included on appropriate TDDs and the TPD(s), if provided, to help direct the contractor to properly brace truss elements and connect piggyback trusses.

Example 2:

Trusses too long or tall for manufacture and/or transport as a single component are often designed in two (2) or more parts and field spliced at the jobsite. For example, a scissor truss may be fabricated in two (2) halves symmetrical about the ridge (see Figure 4). Building designers and contractors should receive a TDD depicting the final in-service truss profile and associated splice connection details. A note should be placed on the TPD(s), if provided, to help direct the contractor to this important information. Where required by the registered design professional, the building official or the statutes of the jurisdiction in which the project is to be constructed, all field splice truss documents should bear the seal and signature of the truss design engineer.

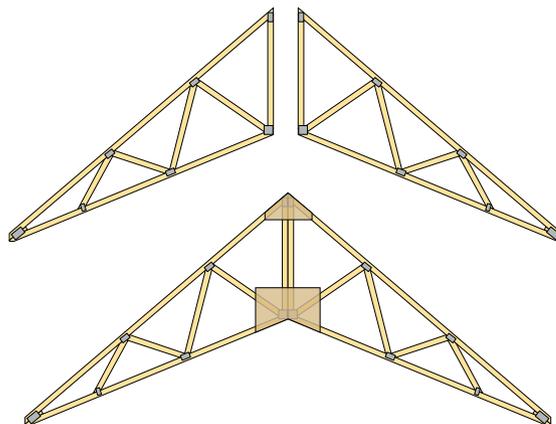


Figure 4. Example of a steeply pitched Scissors Truss requiring a specially designed field splice at the top and bottom peak. See TDD for splice details.

Example 3:

Final building appearance is sometimes created using a “valley set” comprised of truss members framed perpendicular to each other. Often, valley truss gravity and uplift loads are displayed on the output without identifying the appropriate connector. An example of a typical note provided on a TDD for a valley member is:

“Provide mechanical connection (by others) of truss to bearing plate capable of withstanding [value] lb. uplift at joint [location(s)]”

TPI 1 Section 2.3.5.5(k) and 2.4.5.4(k) require the connection information to be included on the TDD. Standard industry details for this application are typically available and should be referenced on appropriate TDD(s) and the TPD(s), if provided, to help direct the contractor to this important information. Standard industry details should be included within the truss submittal package to satisfy *TPI 1* and building code requirements. (See Figure 5 on page 30.)

Conclusion

TPI 1 defines a truss submittal package and identifies specific relevant truss items that should be provided within the package. Each package typically contains numerous 8½ x 11 sheets that encompass each truss design drawing for a

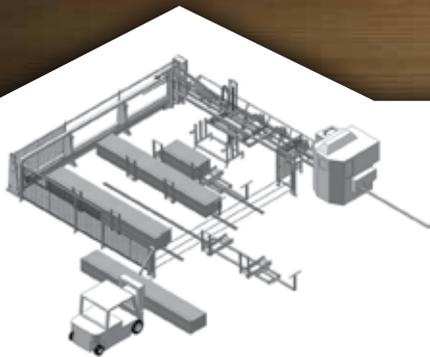
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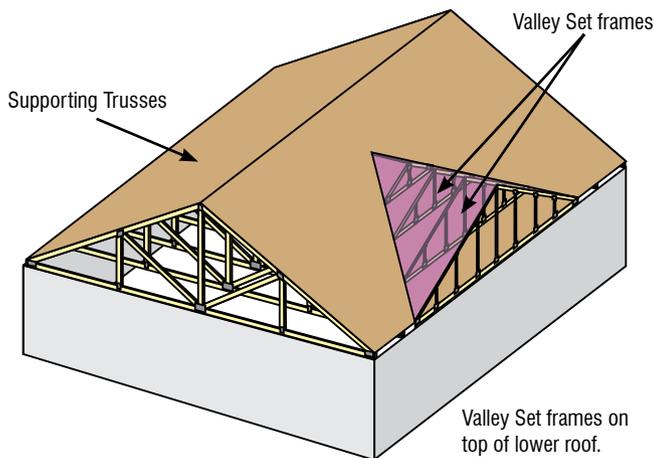


Figure 5. Example of roof system with dormer created with valley set frames.

...Standard of Care Issues • Continued from page 28

project. The truss industry expects building designers and contractors to read each drawing, grasp the method and information communicated, and effectively integrate or reconcile small font notes to ensure truss structural or performance integrity. This expectation must be met while coordinating trades, maintaining a project schedule, interacting with product suppliers, and complying with code-related issues. Accomplishing all tasks successfully is difficult at best. In light

of the fragmented aspects of a construction project that are generally created through the deferred submittal process, the truss industry can take the lead to improve the quality of truss construction through better communication.

This may require a paradigm shift in the method that critical items are presented to code officials, building designers, and contractors. This article begins the process—featuring truss-to-truss connections and truss field assembly requirements that are sometimes incomplete or missing in the building design and construction process. Each truss-to-truss connection must be designed and each warning and/or caution note highlighted for a truss submittal package to be truly complete. Providing this information and making sure it is effectively communicated to the contractor and building designer can only help to improve the quality of truss construction and minimize downstream construction defects. It is in everyone's interest to implement communication best practices because, if done well, it is guaranteed to lessen downstream issues. **SBC**

Scott Coffman has over 30 years in the wood truss and component industry and is a past committee member of TPI 1. He is currently employed by Construction Science and Engineering as a forensic engineer specializing in construction defects.

Jim Vogt is SBCA's Director of Technical Services and has over 25 years of experience in the industry.

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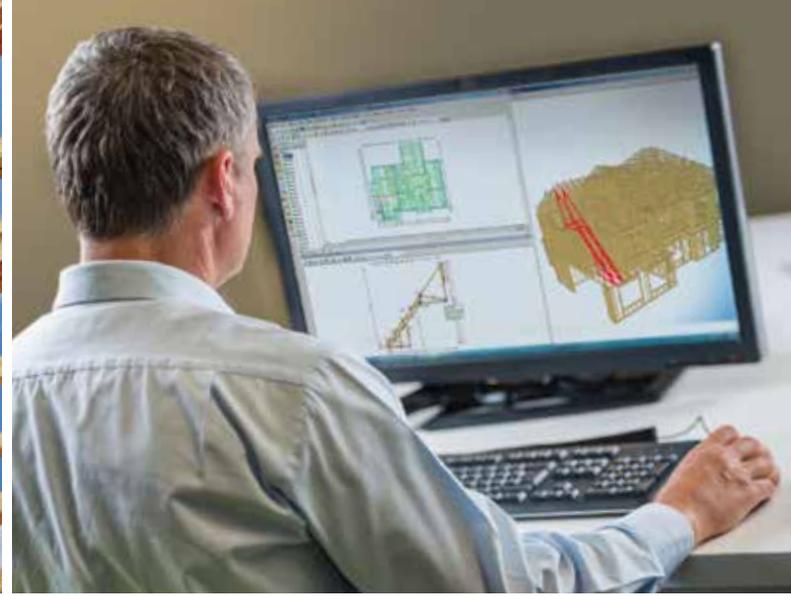
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