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May 2013

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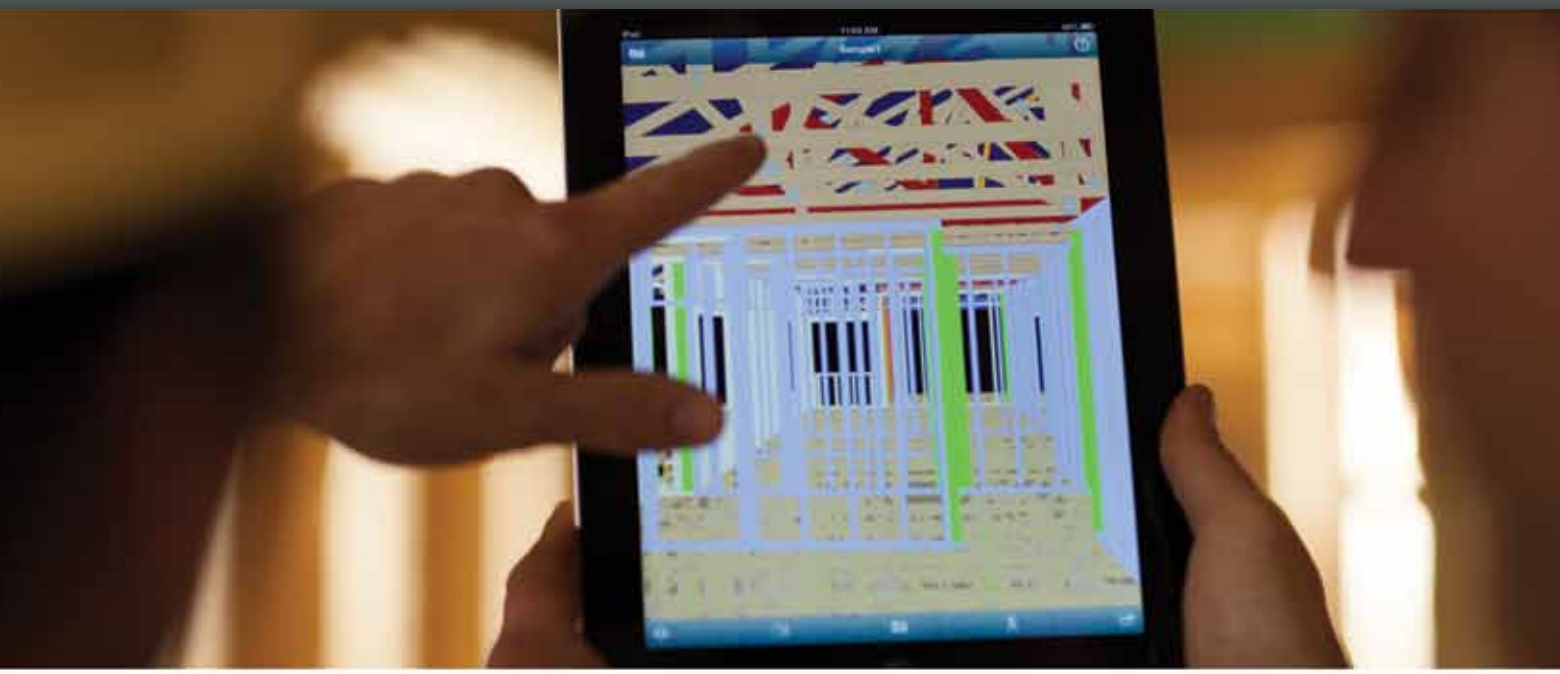

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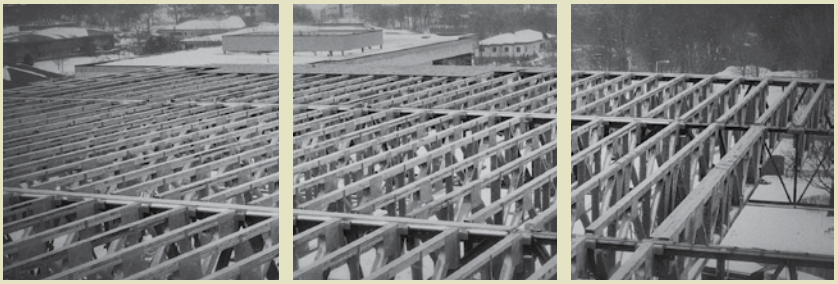

FLOOR TRUSS: AN ENDANGERED SPECIES?

How SBCA is Working to Preserve Floor Trusses in Ohio & Iowa

by Sean D Shields & Kirk Grundahl, P.E.

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QC: One Size Fits All

No matter your size, it's always a perfect fit

by Sean D. Shields

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Structural Building Components Association

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engineered wood products suppliers

Our supplier members provide services and expertise that can help you improve your business and your bottom line. This year, ***SBC Magazine*** will profile several aspects of the component manufacturing industry and highlight the supplier companies that serve those business segments.

This month, we focus on our industry's engineered wood product (EWP) suppliers. The products manufactured and sold by these suppliers create a virtual alphabet soup: OSB, LVL, SCL, CLT, PSL, etc. Made from wood fiber and proprietary adhesives, EWP products are ideal for sheathing, headers, footers, joists and other span applications where steel would otherwise be used. These suppliers are the leading producers of EWP in North America and can be relied upon to supply high-quality products.

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editor's message

by Scott Ward

Time for Us "Truss People" to Band Together

We need to band together and move forward with testing that demonstrates the predictability, quality and science behind the benefits of components.

A big thank you to everyone who participated in the February Open Quarterly Meeting (OQM). What an exciting time we had. While we tackle some challenging and important issues at these meetings, my favorite thing about an OQM is getting together with so many intelligent and passionate people in our industry. The latest OQM also spawned my idea for this article.

This issue of ***SBC Magazine*** focuses on engineering, design and testing of components, and the timing couldn't be more perfect. I recently had the opportunity to exhibit at a local home builders show. Not far from my table was a booth for a local independent building inspection group that several municipalities contract with to perform jobsite inspections. Being a little nosy, I decided to walk over and strike up a conversation. To my surprise, none of them had a copy of the new Southern Pine span tables or design value charts. I immediately emailed a copy to their smart phones. They were very appreciative and even agreed with me that contractors who use conventional framing methods would have to start complying with these new charts by June 1, or better yet, use components. It blew me away that the conversation went so well. Finally, a group of hard-nosed inspectors were on our side for a change! But wait, it was only day one of the show.

"Now is the time for those of us who are passionate about our industry to fight back. We need to band together and provide the needed member input and funding to move forward with testing that demonstrates the predictability, quality and science behind the benefits of components."

The very next day, I learned that these same inspectors were telling builders not to worry about the new design values and span charts in conventional framing. As an industry, we know that, from NAHB's perspective, the ALSC/SPIB Southern Pine design value effective date of June 1, is effectively optional until the local building department enforces those values, and it seemed that same message had made it to this show. According to one source, the inspectors had a meeting with other building officials and members of the home builders association. Apparently, the inspectors said that these changes only affect the "truss people," and new design values would not be enforced for builders and homeowners using conventional framing until the values are adopted into the building code. What a morale killer. The very issue we have been discussing in SBCA meetings was happening right before my eyes. If we don't create a united front now, I'm afraid that components and all of us "truss people" will have a huge disadvantage when compared (unfairly) to conventional framing methods.

Now is the time for those of us who are passionate about our industry to fight back. We need to band together and provide the member input and funding to move forward with testing that demonstrates the predictability, quality and science behind the benefits of components. After witnessing what happened at this home builders show, it appears that we are still in survival mode, not just in our own businesses but in our very own industry. We need to take the reins and work hard to get SBCA in the position to conduct the testing that shows structural building components result in a safer, more reliable, better quality, and more affordable structure. If we prove that components are the future of framing, we won't have to rely on outside sources to behave fairly.

Continued on page 6

at a glance

- From NAHB's perspective, the ALSC/SPIB Southern Pine design value effective date of June 1, 2013, is optional until local building departments enforce those values.
- Scott Ward shares a first-hand experience of the devaluing of engineering where the new lumber design values apply only to the "truss people."
- Engineered components result in a safer, more reliable, better quality, and more affordable structure; now we need to demonstrate definitive proof, and SBCRI was built for a time just like this.

Editor's Message • Continued from page 5

Our research center, SBC Research Institute (SBCRI), was built for this very purpose—to allow the industry to test and provide solid evidence on the benefits of component construction. It is our tool to use for instances just like this. SBCRI is sitting there waiting for us to create a better industry for each and every one of us.

I encourage you to stay involved in SBCA in the coming months. Your support, input and involvement is needed for our industry's success. With regards to testing, I truly believe that it will result in the next big revolution in our industry. Now is the time to be proactive and use the tools that we have in front of us. 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.

BCMC Build 2013 Partners with Operation FINALLY HOME!

BCMC Build kicks off its fourth year, with exciting announcements on efforts to frame a home for a deserving service member during the week of the BCMC show in San Antonio, TX. This year, BCMC Build will join with the Building Systems Council and Operation FINALLY HOME to build a home for a wounded U.S. veteran. To learn more and donate to this project, visit bcmcbuild.com. SBC

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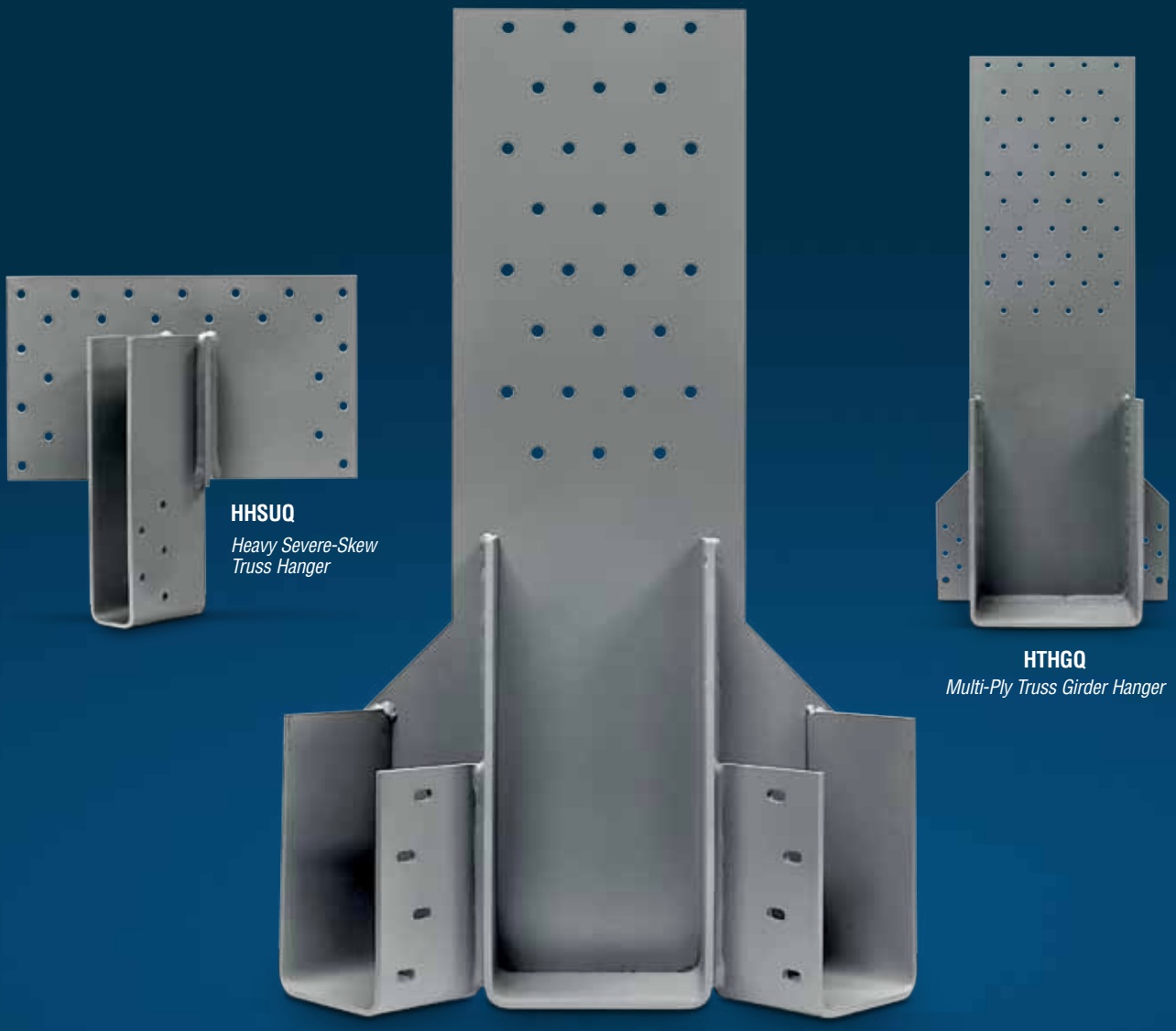

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exec's message

by Kirk Grundahl,
SBCA Executive Director

The Story Behind the Story

Engineering innovation is going to happen. If our industry isn't a part of it, we will end up producing a commodity.

Since starting Qualtim in 1989 and contracting to manage SBCA in 1992, I've witnessed the twists and turns of new ideas bumping into tradition. I also see a future that holds great promise for component manufacturers, as we continue to evolve our collective engineering acumen and utilize our ability to drive building construction innovation. However, at pivotal moments like now, it's important to reflect on the challenges we have faced in the past so we can seriously consider lessons learned and avoid history repeating itself and past mistakes.

Let's begin by looking at the immediate past. Unfortunately, over the past few years, we have witnessed many companies, run by very smart people, go out of business. These years have also forced a lot of changes for SBCA, BCMC, ***SBC Magazine*** and the SBC Research Institute (SBCRI). Very challenging decisions had to be made at our industry association level to create a successful side of the ledger as opposed to going out of business, as was the case for far too many association members. Change is always hard, and forced change can cause great discomfort because it is easy to assume that new and different actions in the market are not good.

Fortunately, the housing industry is making its way toward recovery. The components industry is finally getting off "life support," so we are beginning to see success at the association level through the changes that were forced upon us. The forced change, which has caused new thinking and new approaches to succeed, all occurring during a time of stress and need, has likewise created some discomfort. This discomfort in turn has led to anonymous rumors circulating about companies, suppliers, SBCA, SBCRI, Qualtim, DrJ (an affiliate to Qualtim) and individuals. This became clear in this online blog entry written by Greg Brooks, blog.lbmexec.com/2013/02/05/a-tangled-web/.

As with any information from anonymous sources, accuracy can be questionable at best. Fortunately, this article led to some good opportunities for people to talk through all the issues and get facts on the record at SBCA/SBCRI meetings, SBCA CM Roundtable discussions, and direct conversations with those who have first-hand knowledge of the actual facts. This also allowed us to share the great work taking place at SBCRI, our concerns about the accuracy of raw material design properties; and, the devaluation of engineered design when compared to stick framing's built-in economic advantage through the IRC.

Greg, being the honorable person that he is, was open to discussing various points brought up in his blog. His willingness to hear both sides of the story showed that he was committed to ensuring that he had all the facts he could gather. Greg processed all of this information, and while he obviously had to select key points to focus on, he reported his vantage point in this follow-up blog entry, blog.lbmexec.com/2013/03/31/the-next-insanely-great-thing-in-truss-design/.

By the way, if Greg's blog entries pique your interest, please give him a call and order a subscription. He provides great opinions and perspectives that help generate thought-provoking alternative points of view.

As noted above, SBCA also took on these high-profile issues through a series of letters and ***SBC Industry News*** articles to component manufacturers (refer to the online version of this article to access these documents). This gave SBCA an opportunity to lay out the facts and explain the subsequent challenges we faced given SBCRI was built in 2007, at precisely the start of the housing crisis. The goal of

at a glance

- ❑ The future holds great promise for component manufacturers, as we continue to evolve our collective engineering acumen.
- ❑ Greg Brooks' online blogs gave us an opportunity to share the great work taking place at SBCRI.
- ❑ Our industry is at a pivotal moment in its history with regard to the value of the engineering that goes into producing structural building components

SBCRI was to prepare our industry for 3-D structural component design, through testing, to ensure that we had the best possible understanding of the load paths and engineering resistance undergirding our industry.

In the end, this entire journey illustrated the commitment of so many in our industry to, as SBCA Past President Rip Rogers would say, "leave the wood pile a little higher and better than when we came to this campsite."

While many positives came out of this issue, as anyone who spoke with me during this time can attest to, it is frustrating to know the truth, yet hear of speculation circulating about agendas or motivations that simply weren't true. This is part of human nature, however, and will continue to occur, but it is important for everyone to have the opportunity to hear the facts. As always, if anyone wants to understand the motivation or the reasoning behind any decision that is attached to my name, I am always available and willing to talk—whether it's by phone, in person, or through an online video conference. That's one of the reasons behind the "Industry Conversations with Kirk." The goal is to give me, staff and SBCA members a chance to talk about a wide variety of current topics (see online version of this article for more information).

I believe our industry is at a pivotal moment in its history with regard to the value of the engineering that goes into producing structural building components. In order for our industry to grow, we must have accurate raw material design values, accurate buildings codes and skilled engineers who can fully utilize the 3D software available on the market. Our industry can and should consider itself the center of the universe when it comes to Framing the American Dream, and we should be the suppliers of the engineered structural framework for all "conventional light-frame construction" in North America and beyond. To do this, we clearly need to embrace engineering, building design, intellectual property development and engineering innovation. Otherwise in my opinion, component manufacturers will merely become commodity producers.

I recognize that innovation, building design and 3D engineering may seem overwhelming to our industry's smaller CMs. However, when you think about it, your highly capitalized suppliers should be willing to provide you with significant help in this regard, given you provide them with a consistent source of profit through the purchases you make. Your future success and growth is important to their future success and growth.

To that end, SBCA, SBCRI and our SBCA members are getting re-engaged in fundamental testing and engineering analysis to facilitate our industry's transformation through updating industry knowledge, creating industry market needs based code compliance Technical Evaluation Reports and revising ANSI/TPI 1. Association work, however, will always be supportive of, yet lag behind, the entrepreneurial nature of innovation. Given all of the foregoing, we are always interested in helping anyone take their creative juices and transform markets in highly innovative ways. This is precisely why we enjoy the work we do with SBCA, SBCRI and Qualtim. There is never a dull day. SBC

by Keith Hershey &
Jim Vogt P.E.

Powerful Tools Require Powerful Users – Designing with Today's Tools

Understand the strength and power in today's design programs and the user's demands.

Technology and industrial advancements have simplified and reduced the intellectual and physical demands on jobs in the structural building components industry. Whether it's the operator behind the saw, production staff setting up the table, or the designer in the office, computers have made the job faster and easier. Despite all of these advancements, it's important for component manufacturers (CMs) to be mindful of some of the important lessons that can get lost in the shuffle of technological improvements.

Question

The issue recently came up at our plant of a "knowledge gap" between relatively new staff and those who have worked in the industry for decades. What are some examples of this gap that CMs could use to train staff?

Answer

For those of us who have been in the truss industry a while, we have seen amazing advancements in the tools used to design and manufacture components. Truss design engines have improved so much that, in many cases, they appear to do all of the work for Truss Designers. Therein lies the problem. In the plant, CMs have migrated to computerized saws and setup stations to speed up the fabrication process. This has been a great advancement in the plant and allowed CMs to get operators up to speed quicker and increase production. The down side to all this technology is that operators have lost some of the knowledge and "tricks of the trade" that were learned and passed down in years past.

The same problem holds true in the design realm but to an even greater extent. Design programs automatically perform many of the tasks that designers have done for years, from optimizing and aligning webs, checking inventory, matching splices, loading girders, selecting hangers, and applying wind and snow loads. Just like the saws in the plant, this has sped up the design process drastically; however, the user must beware. Even with the best technology, garbage in still equals garbage out. With program advancements and automatic loading from the layout, Truss Designers can fall into the trap of believing that all they need to do is clear up whatever truss design issue is causing the truss not to work and move to the next truss. This could be referred to as the "Visine Method" because all the designer tries to do is get the red out of the analysis screen. Seventy percent to 80 percent of the time, this method works, but let's look an example where it doesn't.

Example

A building measures 80' from outside of bearing to outside of bearing. The 80' span is framed with two 20' mono roof trusses at each end (see Figure 1) and a 40' common roof truss in the center (see Figure 2). The interior end of the mono trusses and the 40' common trusses will share a bearing located 20' in from each outside wall. The 40' truss will have raised heels to match the depth of the monos at the common bearing. Unless special precautions are made, the design program may assume a 40' truss for the purposes of snow loading (see Figure 3) and not recognize that, when it is installed in the field, it is really an 80' truss over four bearings (see Figure 4). The

at a glance

- ❑ Applied loading take-offs are critical to truss design efficiencies.
- ❑ Communication between the Truss Designer and Truss Design Engineer is key to minimizing truss design inaccuracies.
- ❑ The SBCA Load Guide is a free tool that can help Building Designers and everyone involved in the truss design process ensure that the applied loads are correct.

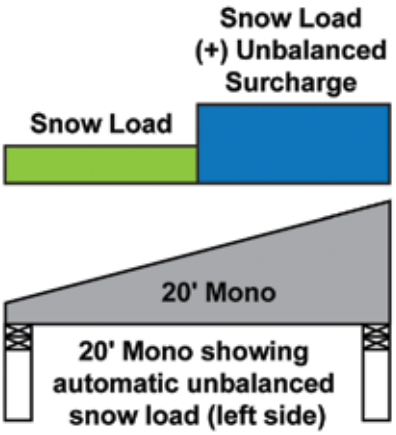

Figure 1.

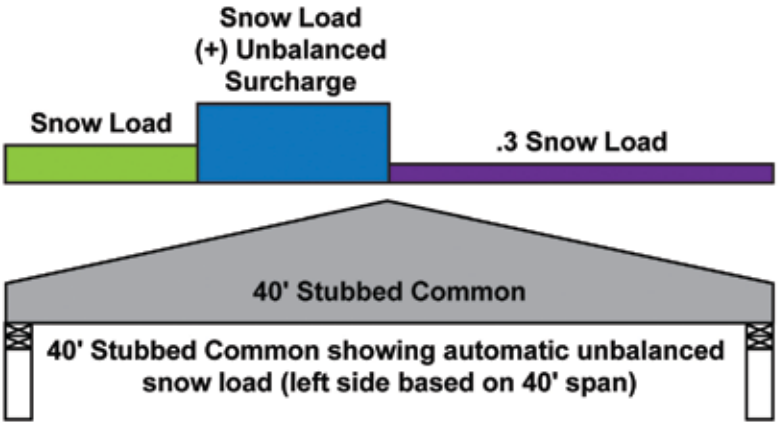

Figure 2.

20' monos will be treated as a two mono trusses combined into a 40' span.

When these drawings/design parameters are sent into the Truss Design Engineer for preparation and sealing, he or she will look at the truss as an individual component and seal the design as it was input by the Truss Designer. The end result may be that the 40' center portion of the truss will be under loaded because the surcharge due to unbalanced snow load will be based on a 40' span and not the actual 80'.

Conversely, the 20' monos may have a heavier than required snow load applied to them. The program may assume that the peak of the mono is at the peak of the truss and will apply an unbalanced load to the peak of the truss, whereas, in the actual installed condition, this load doesn't exist.

In order to design the trusses in this example correctly, the Truss Designer needs to have a good understanding of how the specific design software treats each special condition and the limitations on its ability to understand loading in the

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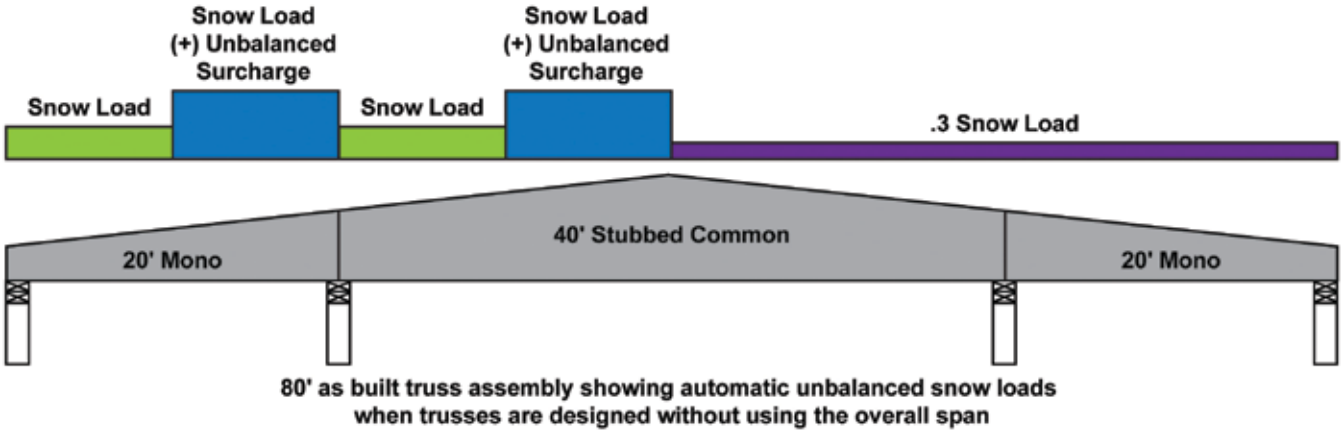

Figure 3.

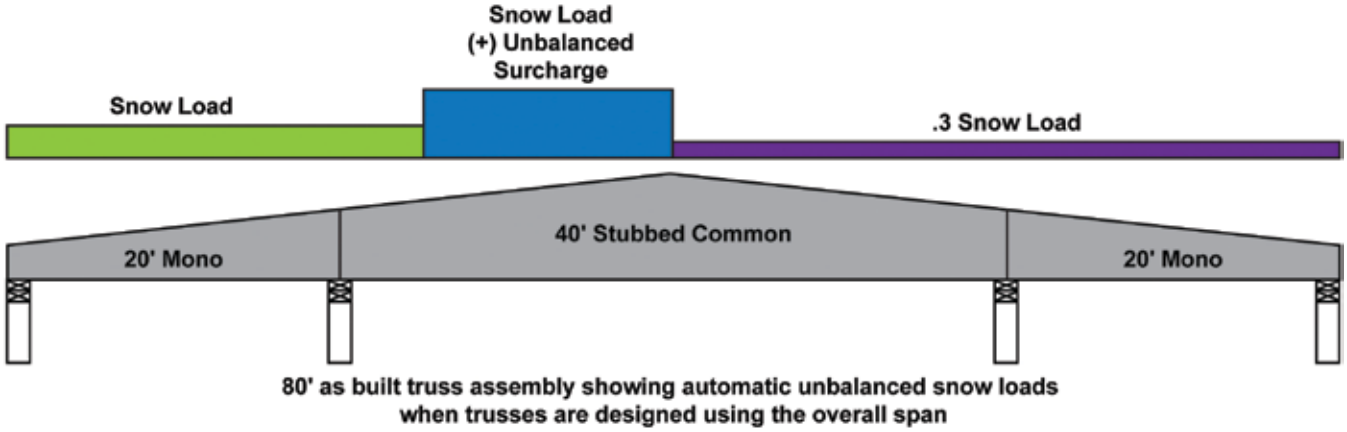

Figure 4.

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ANSI/TPI 1 Chapter 2 Definitions

Building: Structure used or intended for supporting or sheltering any use or occupancy.

Building Designer: Owner of the Building or the Person that Contracts with the Owner for the design of the Framing Structural System and/or who is responsible for the preparation of the Construction Documents. When mandated by the Legal Requirements, the Building Designer shall be a Registered Design Professional.

Construction Documents: Written, graphic and pictorial documents prepared or assembled for describing the design (including the Framing Structural System), location and physical characteristics of the elements of a Building necessary to obtain a Building Permit and construct a Building.

Truss Design Engineer: Person who is licensed to practice engineering as defined by the Legal Requirements of the Jurisdiction in which the Building is to be constructed and who supervises the preparation of the Truss Design Drawings.

Truss Designer: Person responsible for the preparation of the Truss Design Drawings.

Technical Q&A

Continued from page 5

context of auto-loading features. The software provider can most likely offer a "work around" solution, if it is determined that a direct design approach is not possible.

The Truss Design Engineer reviews the design parameters of each truss as an individual component and, in turn, prepares and seals the design. The responsibilities of the Truss Design Engineer and the Truss Designer are clearly defined in TPI 1 Chapter 2 (see sidebar). It's important to remember that the Truss Design Engineer relies upon the Truss Designer to take-off the proper loads from the building's Construction Documents. The component must be defined and the design parameters input correctly in order for the truss to be designed correctly.

The snow and wind loading sections in design programs are very powerful tools, if used properly. These programs include many different input settings that are used to calculate loads in conformance with the requirements of the building code. While it is the Building Designer's responsibility to determine and provide the correct information for each job, the Truss Designer needs to have a basic understanding of the loading conditions and the building design defined load path and how it relates to the job they are designing.

The technical department at each truss plant should have copies of the building codes for the areas in which the CM transacts business. They should also have a copy of ASCE-7 – Minimum Design Loads of Buildings and Other Structures. The SBCA Load Guide, sbcindustry.com/loads.php, is another excellent source of information. This spreadsheet is a loading code compliance reference tool that includes code-based equations that have been incorporated into load macros and calculators to check and verify the loads as defined by the Building Designer. Ideally, this tool is used by the Building Designer to provide the loading conditions for the project, which are then used to design the trusses. This information should be incorporated into training for all Truss Designers.

In addition to training, implementing a quality control (QC) back check process in the technical department is also crucial. This internal QC should not only review conformity to the Building Designer's Construction Documents but also ensure that the applied loads are what would normally be expected for a project in the given location. Fully understanding the capabilities and limitations of our industry's very powerful truss design software will help move jobs through the plant and avoid costly and time-consuming call backs or repairs. SBC

To pose a question for this column, call the SBCA technical department at 608-274-4849 or email technicalqa@sbcmag.info.

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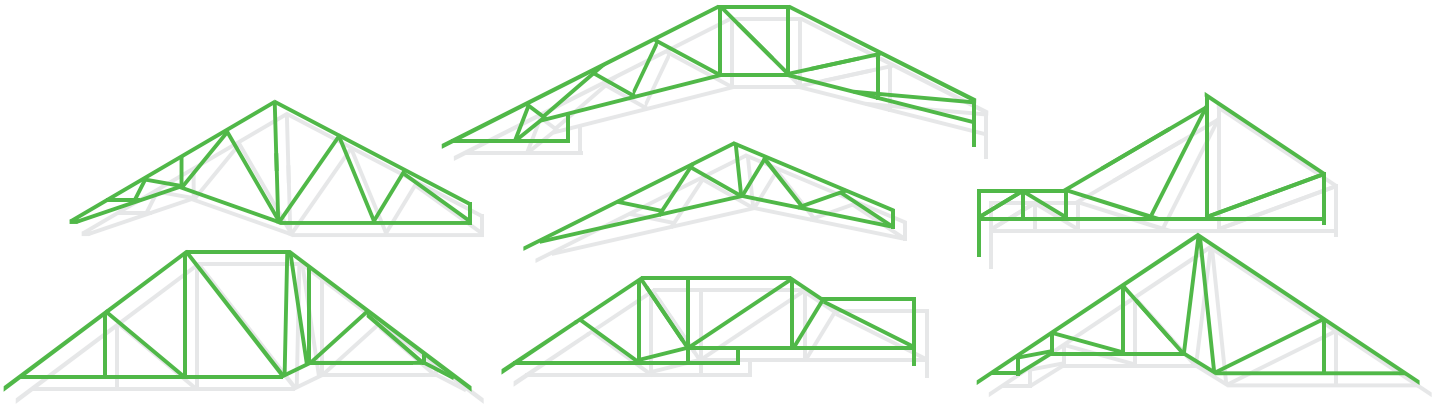

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How SBCA is Working to Preserve Floor Trusses in Ohio & Iowa

by Sean D Shields & Kirk Grundahl, P.E.

Here's a quick history lesson. In reviewing public documents surrounding the 2010 Final Action Hearing of the ICC with regard to proposals RB31-9/10 and RB87-9/10, one would gather the following information:

The American Wood Council (AWC) on behalf of solid wood and wood structural panel products; APA-The Engineered Wood Association (APA) on behalf of wood structural panel products, I-joists and composite structural lumber; and, the National Association of Homebuilders (NAHB) on behalf of builders, have submitted many building code proposals throughout the years advocating for their best interests.

Sean DeCrane, a Battalion Chief with the Cleveland, Ohio Fire Department and a representative of the International Association of Fire Fighters (IAFF) for the International Code Council (ICC) has been doing the same on behalf of firefighter safety.

In May 2010, AWC (a subsidiary of the American Forest & Paper Association (AF&PA)) and NAHB approached DeCrane and asked for his support to amend one of his proposals. The original code change proposal was AWC's RB31-9/10; the collaboration code change proposal was RB87-9/10 (copies of these proposals can be found in the online version of this article). Their collaborative proposal amended Section R501.3 of the 2012 IRC/IBC (see Figure 1) to mandate the application of ½ inch gypsum to floor assemblies, unless a sprinkler system is installed or the joists are made from solid-sawn lumber.

Damaging Code Provision

It's important to note that two organizations (SBCA & APA) focused on a more highly engineered use of wood fiber were not part of this group, nor were they privy to the private discussions regarding this proposal that were said to be facilitated by AWC at NAHB's headquarters. A quick look at the membership and mission of AWC (AF&PA) and NAHB gives insight into the agenda of each of these organizations in bringing this code proposal to DeCrane:

- NAHB does not want sprinklers to be mandated in homes due to the increased cost in time and materials it adds to the construction of a house. By excluding 2x10 solid sawn joists from the gypsum ceiling membrane requirement, builders retain a low-cost option for floors.
- The AWC had nothing to lose through this proposal; in fact, its membership was provided an effective code-mandated floor joist sales advantage in any region of the country that previously used unprotected floors, such as floors over basements.
- The fire service was being handed an easy victory. It had struggled for years in its push for mandatory sprinklers, fighting the political clout of NAHB and local Home Builder Associations (HBAs). This proposal was a perfect back-up plan to provide additional protection for the fire service, while having the full support of the homebuilders.

SBCA has continually advocated throughout the code change process that ½ inch regular gypsum (which is equivalent to a 15-minute fire protection membrane rating) should be used across all light-frame floor systems, including 2x10 applications. This is because the directly comparable 100 percent design load fire testing indicated that 2x10s perform similarly to open-web floor trusses (see ASTM E119 table on page 18). Furthermore, if the goal is to truly provide better protection for the fire service during a fire event, protecting everything makes the most sense.

Winners & Losers through Politics

Given this, why would the building code adopt the provision forwarded by NAHB and AWC through DeCrane? The simple answer is politics. The general public assumes model building code development is based on serving the public's best interest by applying the best science available to create the best possible construction product, all while meeting the building code's mission which states:

> **101.3 Intent.** The purpose of this code is to establish the minimum requirements to safeguard the public health, safety and general welfare through structural strength, means of egress facilities, stability, sanitation, adequate light and ventilation, energy conservation, and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

However, the building code is not a technical document serving this intent; it is actually a political document. We ended up with the R501.3 proposal (see Figure 1) being approved and adopted into the 2012 IRC/IBC because the strong political relationship DeCrane, AWC and NAHB have within the ICC enabled them to convince the committee that lightweight construction is bad under fire conditions.

SBCA and its members strongly believe in a key engineering and building code principle, which is to provide structural building component solutions that safeguard the public, while also serving the public's desire to create structures that are affordable and environmentally responsible. As the building code states, this also includes providing "safety to fire fighters during emergency operations."

However, in the case of this code provision, the fourth exception appears to intentionally make solid-sawn floor joists the clear economic winner against all its engineered product substitutes in the market, steel joists, engineered wood I-joists and floor trusses being the primary products currently used. The mantra appeared to be that while lightweight construction is bad, 2x10s are better. Yet, in looking at the ASTM E119 table, one can see that the actual fire performance of solid-sawn versus floor trusses is very similar (between 6-13 minutes).

The key problem with the ICC's code development environment is that the time constraint allows for political (relational) factors to trump other factors. Proponents and opponents of a proposal have only two minutes to explain highly complicated and technical subjects to a committee or an assembly that generally does not have a deep level of technical expertise on all the topics that make up the building code. It would be unreasonable to expect them to know everything. Consequently, the code development process relies upon two minute sound bites from experts like AWC, NAHB and the fire service.

> **R501.3** Fire protection of floors. Floor assemblies, not required elsewhere in this code to be fire resistance rated, shall be provided with a ½ inch gypsum wallboard membrane, 5/8 inch wood structural panel membrane, or equivalent on the underside of the floor framing member.
>
> Exceptions:
>
> 1. Floor assemblies located directly over a space protected by an automatic sprinkler system in accordance with Section P2904, NFPA13D, or other approved equivalent sprinkler system.
> 2. Floor assemblies located directly over a crawl space not intended for storage or fuel-fired appliances.
> 3. Portions of floor assemblies can be unprotected when complying with the following:
>
> 3.1 The aggregate area of the unprotected portions shall not exceed 80 square feet per story
>
> 3.2 Fire blocking in accordance with Section R302.11.1 shall be installed along the perimeter of the unprotected portion to separate the unprotected portion from the remainder of the floor assembly.
>
> **4. Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance** (emphasis added)**.**

Figure 1.

In this case, SBCA's arguments for a sound-science-based code provision that also met the goal, "to provide safety to fire fighters during emergency operations," were not successful in convincing the committee members to favor our proposal over the AWC/NAHB/DeCrane proposal.

Two Approaches

As local jurisdictions begin to adopt the 2012 IBC/IRC, SBCA has been working with component manufacturers across the country to convince the state/local authorities to take one of the following actions:

1. If fire fighter safety is the core issue, amend the code to require the application of a ½" gypsum wallboard membrane onto all unprotected floors assemblies; or,

2. Based on science and fairness, remove exception 4 of Section R501.3, or remove the entire section.

Continued on page 18

Test	Structural Member	Spacing (in o.c.)	Structural Failure (min : sec)	Loading (psf) (% Design Stress)
FM FC 211 (Factory Mutual Research, 1974)	7 1/4" Steel C-joist; 23/32" ply. w/vnl	24" o.c.	5:12	69.8 (100%)
FPL (R.H. White, 1983)	2 x 10; 23/32" ply	16" o.c.	5:30	79.2 (100%)
FPL (R.H. White, 1983)	2 x 10; 23/32" ply	16" o.c.	6:12	79.2 (100%)
FPL (R.H. White, 1983)	2 x 10; 23/32" ply	16" o.c.	6:18	79.2 (100%)
FPL (R.H. White, 1983)	2 x 10; 23/32" ply	16" o.c.	6:48	79.2 (100%)
FPL (R.H. White, 1983)	2 x 10; 23/32" ply	16" o.c.	7:30	79.2 (100%)
FM FC 208 (Factory Mutual Research, 1974)	7 1/4" Steel C-joist; 23/32" ply. w/vnl	24" o.c.	7:30	69.8 (100%)
FM FC 250 (Factory Mutual Research, 1977)	12" wood truss; 3/4" ply	24" o.c.	10:12	60.0 (100%)
NBS 421346 (2) (Son B., Fire Endurance Tests of Unprotected Wood-Floor Constructions for Single Family Residences: NBSIR 73-263, 1973)	2 x 10; 1/2" & 5/8" ply	16" o.c.	11:38	63.7 (100%)
NBS 421346 (4) (Son B., Fire Endurance Tests of Unprotected Wood-Floor Constructions for Single Family Residences: NBSIR 73-263, 1973)	2 x 10; 1/2" & 5/8" ply	16" o.c.	11:38	63.7 (100%)
FM FC 2 I 2 (Factory Mutual Research, 1974)	2 x 10; 23/32" ply w/cpt	24" o.c.	12:06	62.4 (100%)
FM FC 209 (Factory Mutual Research, 1974)	2 x 10; 23/32" ply w/vnl	24" o.c.	13:34	62.1 (100%)

ASTM E119 Assembly Tests at Full Design Load

ASTM Comparative Test Data Using 100% Design Load as the Common Denominator

Floor Truss: An Endangered Species?

Continued from page 17

In states like Maine, New Jersey and Pennsylvania, the fairness argument has succeeded in convincing code jurisdictions to either amend out the R501.3 provision entirely, or, in the case of Iowa City, IA, avoid adoption of the 2012 code altogether.

While SBCA believes that adding a 15 minute fire protection membrane to the underside of all unprotected floor joists is the best and fairest approach to providing safety to fire fighters, the added cost of doing so generally becomes problematic as it confronts the local political clout of HBAs.

The second approach is one of taking the fourth exception head-on and establishing the science of fire performance equivalency between sold-sawn floor joists and open-web floor trusses. To assist in this endeavor, the Qualtim/SBCRI Technical Evaluation Report (TER) process was deployed on behalf of SBCA. This TER entitled, Metal Plate Connected Wood Truss Floor Assemblies Demonstrating Equivalent Fire Performance per 2012 IRC Section R501.3, provides science behind the fire performance of solid-sawn floor joists and open-web floor joists.

In establishing equivalency, the TER uses well-known published and public domain ASTM E119 standard- based test data from the 1992 National Fire Protection Association's (NFPA) report, National Engineered Lightweight Construction Fire Research Project—Technical Report: Literature Search & Technical Analysis (NFPA Report) and is supported by the Underwriters Laboratory literature review that can be found in its report entitled "Full-Scale Floor System Field and Laboratory Fire Experiments." A full list of the supporting data and analysis that justifies the use of trusses as equivalent in unprotected fire performance to 2x10s can be found online here: sbcri.info/ter130202.

In particular, the TER looks at the data summarized in the ASTM E119 table, where all the testing uses this standardized fire test approach with the assembly loaded to full design load. As the TER points out, "these are the only unprotected fire endurance test results, which are currently in the public domain, that use a pure ASTM E119 standardized assembly test performed on a variety of floor assembly structural members using 100 percent design load." Further, the TER states, "this is the only set of publicly available data that uses a common denominator that allows for pure comparative performance assessment because all the test conditions are equivalent."

Based on the data contained in the ASTM E119 table, it is clear that the unprotected wood truss assembly performed (10 minutes, 12 seconds) within the range of the unprotected sold-sawn assemblies (5 minutes, 30 seconds to 13 minutes, 34 seconds). Since the fourth exception excludes, "Wood floor assemblies using dimension lumber or structural composite lumber equal to or greater than 2-inch by 10-inch nominal dimension, or other approved floor assemblies demonstrating equivalent fire performance," unprotected metal plate connected wood truss should be included in this exception.

Using the TER in Ohio

The Ohio Board of Building Standards (BBS) is the primary state agency responsible for reviewing and adopting the statewide building code. In 2011, the BBS approved and adopted the 2011 Residential Code of Ohio (RCO), which is based on the 2009 IECC and 2009 IRC, but also includes amendments based on IRC 2012 provisions, such as R501.3.

The 2011 RCO went into effect January 1, 2013.

SBCA was invited to participate in an educational meeting on January 16, 2013 of the Central Ohio Code Officials Association (COCOA) to review major changes to the RCO. In particular, the COCOA wanted to discuss Section R502.14 of the 2013 RCO, Residential Code of Ohio for One-, Two-, and Three-Family Dwellings (RCO), which requires certain floor assemblies to be separated from the space below, but also reviewed R501.3.

At this meeting, SBCA outlined the problems with the language contained in R501.3 that creates an unwarranted preference for floor joists made of solid-sawn lumber. SBCA also shared the fire performance data and analysis contained in the TER and discussed the benefits of applying a 15-minute gypsum barrier to all floor assemblies as the best alternative from a fire fighter safety perspective.

Using the TER in Iowa

On April 11, 2013, the City of Des Moines (IA) held a public hearing on adoption of the 2012 IBC/IRC building code. One of the primary topics of conversation was Section R501.3. Rick Parrino (Plum Building Systems) attended the meeting, and with the help of SBCA he presented the component industry's concerns regarding this code provision. Parrino shared the ASTM test data and engineering analysis contained in the TER that establishes fire-performance equivalency.

This was only the first of three meetings to be held before a final determination will be made on amendments to the 2012 IBC/IRC model code for Des Moines, but it was clear that at least three members of the board (a plumber, a builder and an HVAC professional) questioned the workability of section R501.3 overall, and responded positively to the industry's science based argument that floor trusses were equivalent in performance to 2x10s.

Conclusion

While this code provision was adopted into the 2012 IBC/IRC due to astute political maneuvering by AWC and NAHB, the SBCA TER makes a compelling, fact-based argument for why component manufacturers (CM) serving the Ohio and Iowa markets can deploy unprotected floor trusses in a manner that is equivalent to 2x10 joist construction with regards to fire performance. SBC

QC: One Size Fits All

by Sean D. Shields

When Goldilocks went to the bear's house, it took her a while to find something that fit her just right. Fortunately, whether you're a large manufacturer, a small one, or somewhere in between, a formal in-plant QC program is always a perfect fit. In this second article of our series looking at QC, we reached out to component manufacturers of all sizes and asked them about their experiences using the In-Plant WTCA QC program and TPI's third-party inspection services.

In particular, we asked them about the challenges they faced implementing the program, how they overcame them, and what tangible benefits they have witnessed now that their program is up and running.

Making the Transition to Formal QC

As the first article in this series discussed, the purpose of a formal QC program is to help ensure you produce a consistent product where quality variation is well managed. For instance, the In-Plant WTCA QC program focuses on constantly collecting key data so that you can manage your operations better and make targeted decisions on what areas to address with relation to QC. Without that data collection and analysis, it's much harder to determine correctly how and where to fix a recurrent production issue.

No matter your size, it's always a perfect fit

"Before we started using the In-Plant WTCA QC program, we had a decent in-house QC program," said Terry Lillard, Plant Manager for Sun State Components in Surprise, AZ. "However, we didn't have any overall coordination, and we didn't do regular inspections." So, what was the biggest challenge in making the transition? "Getting the right person in place to take responsibility for coordination," answered Lillard. "Once we had that person, the rest was pretty easy."

Proper data collection can be another challenge. "When we first started using the In-Plant WTCA QC Program 15 years ago, it was a bit more challenging because we couldn't pull all the data as easily as we can now with the capabilities in the software," said Dave Rocke, owner of Bear Creek Truss. "Today, the capabilities of the software make it so much easier."

Finally, timing can play a big role in the level of success you have with a formal QC program. "We started our company in late 2007, which was a huge challenge in and of itself, but we strove to get our WTCA In-Plant certification right out of the gates, " said Steve Wangen, Design Manager at Gold Standard Truss. "Given our name, Gold Standard Truss, we wanted to establish ourselves as a step above the rest, and the QC program was vital in helping us accomplish that."

In-Plant Inspection Basics

The most important aspect of a formal QC program is the in-plant inspection. At its most basic level, an in-plant truss inspection compares 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. The observations collected from these random inspections are key in helping you identify areas in your production process that may need to be addressed in order to reduce or eliminate product defects.

"We were fortunate in that we brought in experienced staff from all over, and most of them understood the advantages of using a formal QC program and having regular QC inspections," said Wangen. "Starting when we did, we had to establish our niche quickly and impress our customers right away, otherwise we weren't going to survive. The QC inspections helped ensure our product was impressive."

There are really only two main steps to in-plant truss inspection.

Step 1 is to perform a preliminary truss inspection of the chord and web members, plated joints and then the overall truss. The inspector should look at 6 key areas:

- Truss dimensions
- Lumber species, size and grade
- Plate size and gauge
- Plate rotation
- Plate embedment
- Wood member-to-member joint gaps

The preliminary inspection should also ensure that the truss matches what is specified on the truss design drawing.

Step 2 is to perform a detailed joint inspection. The purpose is to examine a specific joint in more detail to verify items that may not generally be noticed in a preliminary inspection covered in first step. The items to specifically address in a detailed joint inspection include:

- Plate rotation
- Midpoint location of the plate on the wood member joint
- Knots, wane, etc. in the plate area per wood member at a joint
- Number of teeth per member (if applicable)

During the detailed joint inspection, findings are compared to the Joint QC details.

In most instances, more than one joint will be inspected. The specific number of joints to inspect is outlined in TPI 1 Chapter 3, which states that a minimum of one critical joint (a joint with a joint stress index (JSI) of 0.80 or higher) per truss should be inspected, on average. In practice, more than one critical joint is inspected, since it provides greater feedback on the assembler's ability and consistency in accurately placing plates.

"We have one person doing in-plant inspection once a week. Our employees know that if something comes up it's going to get back to them, so they've gotten good at policing themselves," said Rocke. "We've also used TPI to do our third-party inspection process because it's required by the building code for the jobs we do. We've stuck with TPI because they're at the forefront of the third-party QC inspection process for the truss industry."

The Tangible Benefits of QC

Make no mistake, implementing a formal QC program takes a commitment of time, energy and resources (though not as much as you may think). However, in talking with component manufacturers who have a formal QC program, the tangible benefits far outweigh the investment. It all starts with the customer.

"The work we put into our QC program translates directly to our customers. They comment on how nice our trusses are; how good they look and how well they fit," said Wangen. "We don't have customer callbacks attributed to mistakes made in the production process."

Beyond a happy customer, the QC culture developed by a formal program has significant impacts on the production efficiency and employee pride. "WTCA's In-Plant QC program helped us fine tune some aspects of our production process," said Lillard. "We use roller gantries, and the QC program made us more cognizant of checking plate placement and embedment, particularly on the back side. It's also helped our end line guys identify quality issues and has given them

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parting shots

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

A good headline and photo draw in the reader's interest, but in reality, this is a very scary photo. This news item on the home page of MSN.com caught the attention of Steven Spradlin, President of Capital Structures in Fort Smith, AR. Most notably, this is a great real-world jobsite example of framer engineering that doesn't comply with construction site safety requirements. To put it in Spradlin's words, "Holy crap, someone call OSHA!" (This is what he wrote, so it's probably a paraphrase of what he actually said.)

This photo illustrates a key reason for all CMs to educate their local markets on the challenge of implementing a rational fall protection program on a stick-built site. Photos like this are great talking points, particularly if CMs talk to their local OSHA office. Discussions about examples like this can help level the playing field between conventional and component construction.

SBCA has created a Step-By-Step Process for Fall Protection & Trusses, which includes a customizable template for the structural building components industry and outlines the specific steps to properly erect a truss system. Chapter 11 of the BCSI book and the B11 Summary Sheet also provide guidance to framing crews on how to assess fall hazards while installing trusses on residential construction jobsites. For more information, visit sbcindustry.com/fp and sbcindustry.com/bcsi.php. SBC

QC: One Size Fits All

Continued from page 21

a quantifiable process to send trusses back to the production line. In turn, our production guys pay closer attention and fix problems immediately because they don't want trusses coming back to them."

"Having everyone aware and invested in the QC program means there's no question if something is 'close enough.' Through the program, everyone is aware of the tolerances allowed; there is no gray area, so everyone is focused on if it passes or not," said Wangen. Echoing Lillard's comments, he added, "we have line monitors that watch all the QC issues, and if something out of tolerance gets built and fails inspection, our production guys know they're going to be fixing it before it leaves the yard. So they take the time to do it right the first time."

"Our QC helps us identify employees we can trust to take responsibility for the production process," said Santiago. "It allows us an opportunity to empower employees to take pride in the ownership of our product. They have the authority to evaluate material and discard it if they think it will create a QC issue. When in doubt, throw it out."

Lillard said virtually the same thing, "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." Lillard added that he's worked at a number of plants over the years, but he's never taken more wood out of the system than he does at Sun State Components. "Fortunately, it all ends up getting used somewhere eventually."

One additional benefit of having a formal QC program in place is the inherent training built into the process. In the hands-on training you provide to your employees, they learn how build a truss; a formal QC program enhances that training. "QC exposes your production guys to the tolerances of truss design and explains why member gaps in joints, rolled teeth and insufficiently embedded plates are a big deal," said Dave Motter, Chair of SBCA QC Committee.

Making an overt commitment to quality also changes the focus of your employees. "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 Motter. "You have to accurately measure quality in order to convince your employees to focus on it. The In-Plant WTCA QC program helps you do that."In talking with component manufacturers who utilize a formal QC program, that focus on quality fostered employee's sense of pride in the product they manufactured.

Peace of Mind

The bottom line is this process builds trust in the quality and code compliance you have for the final product you deliver to your customers. "It is so seldom that we find problems that need to be fixed now," said Rocke. "As an owner, that gives me great peace of mind."

Whether you're a big operation or a small one, the real benefits of having happy customers and an efficient production process make the investment in a formal QC program a wise, and comforting decision. SBC

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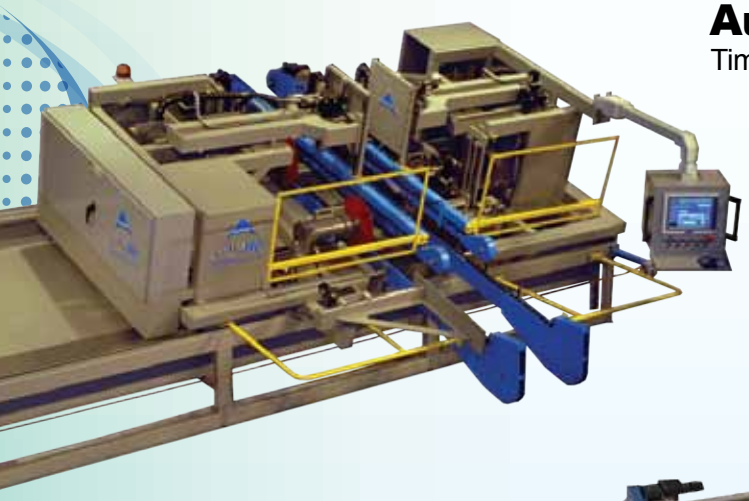

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