STRUCTURAL BUILDING COMPONENTS™

THE FUTURE OF FRAMING

December 2013

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

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editor's message

by Scott Ward

Emerging from the Tunnel

BCMC was a gathering of optimists.

I see a light at the end of the tunnel! I don't know about you, but I was tired of being in the trenches. After slogging through year after year for the past six, it was such a huge relief to show up in San Antonio with a feeling of hope for the coming year. What made it even better was that almost everyone I talked to at BCMC this year felt about the same.

left to right: Scott and Ellie Ward, Mike Ruede and Tim Rouch.

Indeed, the sense of optimism was palpable everywhere you looked on the BCMC show floor. (I mean, look at the smiles on our faces!)

Instead of the past few years where we were focusing on what we could be or should be doing, this year we were talking about what we are actually doing. Everyone seemed to have plenty of work on their books, and a popular topic of conversation was how large our backlogs are getting. I know in our market in the South, multifamily is really picking up strong, and even the tract builders are picking up the pace.

This shift in perception, backed up by a steady growth in business, presented a real momentum changer, both for the BCMC show and for the industry was a whole. The first place it was most evident was in the attitudes of the exhibitors. I talked to several of them, and they all had positive things to say about the mood of the show attendees and the conversations they had with potential customers.

This year marked a return of equipment to the show floor and vendors weren't shy about bringing their flashiest, high-tech offerings to wow the crowds. It was a good thing they brought their "A" game, because plenty of component manufacturers showed up looking to purchase. One exhibitor remarked that while in past years everyone seemed crowded around the used-equipment booths, this year the attendees flocked to the newest and brightest.

The best indicator of hope for the coming year is the fact that not only did attendees look and discuss, they also made purchases. Several suppliers expressed surprise and satisfaction at the amount of equipment they sold at the show.

Beyond the exhibits, I think everyone, including myself, was floored by the educational sessions this year. The session evaluations indicated the BCMC Committee hit a home run in choosing the topics they did. As further proof, some of the sessions were standing-room only, including the session on optimization I attended (a good summary of that session can be found on page 16). Session attendees were also treated to a thought-provoking session on lumber grading (page 17), and a valuable perspective on the value of a good relationship with your building officials (page 18). Attendance at the Economic Forecast, which traditionally is good, was record-setting with over 210 crammed into the room to hear the sage words of Jim Dunn, Chair of the Oklahoma City Branch Board of the Federal Reserve Bank of Kansas City.

Continued on page 6

at a glance

- ❑ A renewed sense of optimism was everywhere you looked on the BCMC show floor.
- ❑ For the first time in six years, BCMC was exciting, encouraging and fun! Everyone was smiling.
- ❑ The CM Roundtable is where the issues that will define our industry going forward are raised and hashed out. The next CM Roundtable is in Tucson. I guarantee it is worth the investment to attend.

Editor's Message

Continued from page 5

As I reflect back on all that I saw and heard during my stay in San Antonio, the thing that struck me the most was the sense that our industry is at a pivot point. While the improving housing market is a definite positive for all of us, it does create some real challenges: finding enough trainable employees, capturing economic value for the engineering we do, keeping ahead of raw material price increases, and understanding regulatory changes, to name just a few.

This moment is a great opportunity for our industry, and for our trade association, SBCA, to shine. The SBCA Board and its committees are working diligently to develop and offer solutions that can help component manufacturers address these issues head on and experience success. At the same time, the Board is very much focused on the relationship-building that has proven so vital to the growth and vitality of our industry.

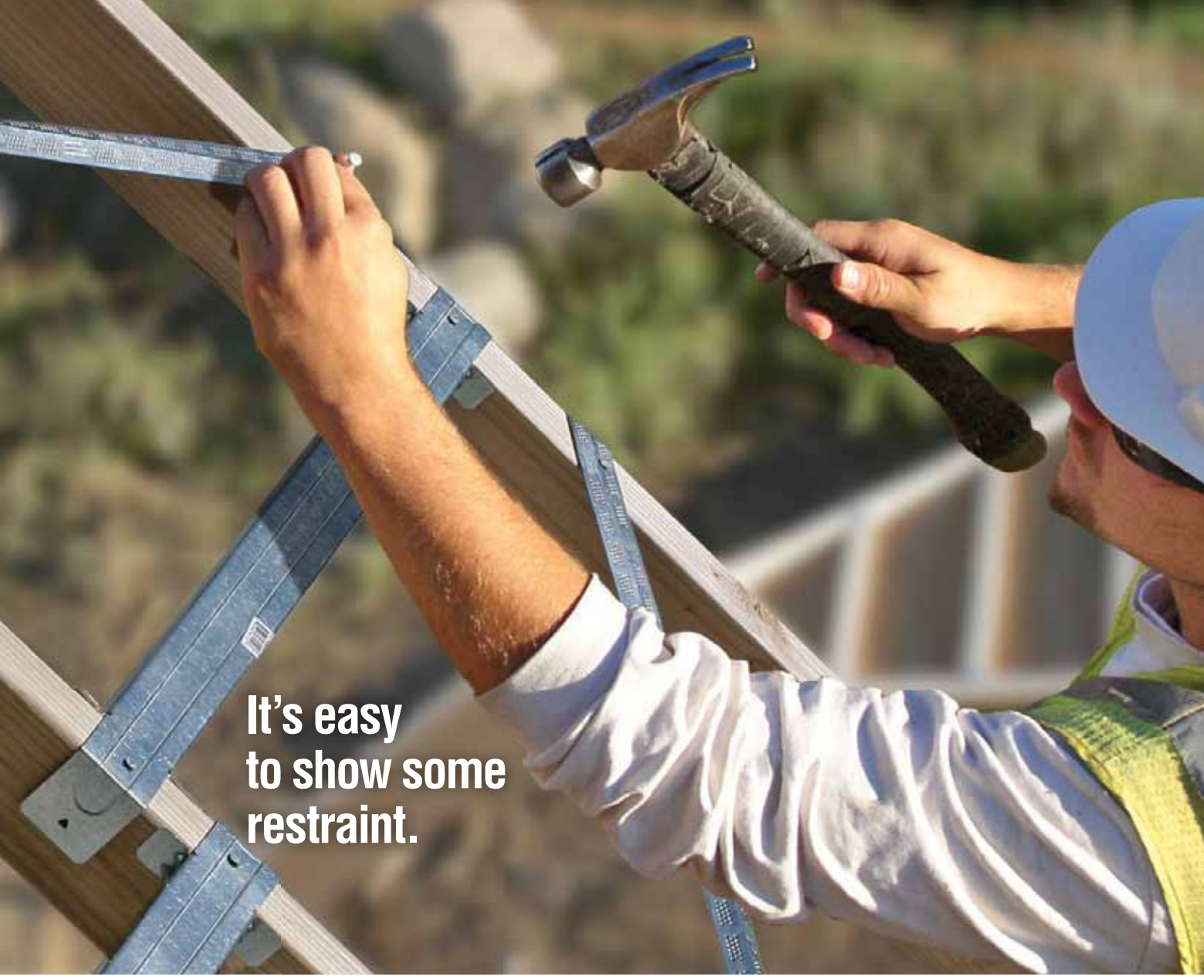
That's why I really want to encourage you to get involved in SBCA. Kick the tires. Attend the upcoming Open Quarterly Meeting (OQM) in Tucson, AZ (see below for more details). Experience and participate in the Component Manufacturers Roundtable. Just as all those who attended the packed roundtable at BCMC found, it is where the issues that will define our industry going forward are raised and hashed out. I guarantee it is worth the investment to attend.

This year's BCMC made it clear to me there is a light at the end of the tunnel we have been traveling the past six years. Together, we can emerge from that tunnel with a united purpose and focus that will benefit all of our businesses in a material way. 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.

Mark your calendar for these other important dates in 2014:

- SBC Legislative Conference & SBCA Board Meeting: May 7-8 in Washington, DC
- Open Quarterly Meeting: July 22-23 in Madison, WI
- Building Component Manufacturers Conference: October 8-10 in Charlotte, NC



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exec's message

by Kirk Grundahl, P.E.,
SBCA Executive Director

Change Is Such Hard Work
Part IV of the "You Don't Know What You Don't Know Series"

"Knowledge comes, but wisdom lingers. It may not be difficult to store up in the mind a vast quantity of facts within a comparatively short time, but the ability to form judgments requires the severe discipline of hard work and the tempering heat of experience and maturity."

—Calvin Coolidge

No one can predict the future. However, we can positively influence our future through creative ideas that inspire us to imagine new opportunities and leave the status quo in the rear view mirror. I believe this is a critical competency in today's world, because standing still is simply not a viable option. As one gets older, there is a new and more focused appreciation for the fact that life does not last forever like it seemed to when we were youngsters. Back then, life was an eternity, and the key goal was becoming an adult as quickly as possible. The reality of mortality is even more poignant to me after a 58-year-old first cousin and a 77-year-old business associate died in the same week. We have witnessed many of our industry's elder statesmen pass recently as well.

With a bit of reflection, one arrives at the following conclusions very quickly: If I wait for someone else to accomplish something within the timeframe I expect, I am two things—dependent and insane. Further, this fosters a sense of urgency to make a difference today. This urgency is not compatible with sugar-coating issues in the hope that the problem will take care of itself; business or personal agendas where "what's in it for me" is the default mode of operation; the societal push to be politically correct versus straightforward and honest; or, with any type of political development process (i.e., the building code, seeking a legislative solution, etc.).

I will be the first to admit that my personality type is NOT passive by nature, and I can be a real challenge to deal with, particularly when my belief system has been developed through a great deal of sifting and winnowing of facts, testing and analysis. Further, I admit my patience level is not high for any type of political process when there is positive forward progress to be made that will make everyone in the structural components industry better today. I would argue the cost of missed opportunities is just too high to have much patience for activities intended to maintain the status quo.

The Center of the Universe

Some may consider the following statement a bit provoking: I sincerely believe the center of the universe for building design and engineering, structural component creativity and installation efficiency should firmly reside within the "truss and wall panel industry." Appropriately seized today, the potential for great value creation going forward is available to everyone affiliated with our industry. Conversely, a great opportunity can be lost if we allow "status quoers," or a lack of a sense of urgency, to creep into our industry.

The capabilities of our industry's software in the following areas are dramatic. We have the ability to integrate the building's "shell coordinate geometry" and understand all the interactions of all the framing elements in the building's structural envelope and all structural planes to create engineering and new product opportunities. We can quickly fix architectural plans and provide accurate and quick building material take-offs. We possess the capability of accurately placing all the structural resisting elements in a position to be economically and efficiently designed so that engineered resistance solutions are the preferred choice.

Our industry is moving systematically toward the ability to provide even more sophisticated engineering. This means all snow, wind, seismic and dead loads can be automatically applied in a wide variety of load combinations so that the best possible

at a glance

- ❑ The truss industry's innovative products and software form the link between new science-based discoveries and their application.
- ❑ The mission of any professional engineering endeavor is to deploy innovative materials, designs or methods of construction that meet or exceed all regulations, protect the consumer and preserve free and unfettered competition as the rule of trade.

resistance design can result. This leads us to accurate knowledge of the flow of loads and where they exist in the 3D shell.

Attaining this more detailed understanding should lead our industry to more accurate and cost-effective roof truss, wall and floor truss/I-joist designs because the correct loads get placed in the proper location, and design is based on actual loading conditions, not tradition-based assumptions. For instance, snow drift loads are accurately applied to the trusses that need to carry these loads at the precise location where the snow has the potential to drift.

Huge amounts of monetary investments have been made in CAD, engineering and truss business management software by Cherokee, Eagle Metal, ITW, Keymark, MiTek and Simpson. The sole purpose of this investment is to serve and grow our structural component manufacturing industry well, so that your businesses grow well in turn.

Supporting Our Industry's Engineering

I believe in our industry's engineering acumen and the engineers that comprise the backbone of our industry, as I have seen their performance up close and personal. They have a challenging job day-in and day-out. Truss and wall panel framing design and construction is done effectively and cost-efficiently because of it. Further, I trust the engineering intellect of all our TPI membership and all the truss design engineers that work for component manufacturers and independently in our industry. Finally, I trust the testing performed by SBCRI, though I will admit, I have a bit of a bias on that assessment.

I also believe our truss designers and truss design engineers are all consummate professionals who desire to undertake great and innovative work every day. That is why I am deeply bothered by what appears to be a growing number of engineers outside our industry, and engineers in general, that believe they are better engineering professionals than those that reside within our industry. There appears to be a growing belief that proprietary intellectual property developed by our industry needs to be vetted by a select few "superior" professional engineering committees or "superior" individual professional engineers. This strongly suggests that the day-in-and-day-out professional engineer in our industry is somehow inferior or should be subservient to this self-ordained superior knowledge.

In my view, the goal of these "superior" engineers is to maintain the status quo. In reality embracing this type of belief system severely reduces that value of the individual engineer and the value of engineering in general. Anyone can easily be a follower, which is certainly a path of least resistance as it is easy to say "I just followed what all the 'superior knowledge guys' said to do."

It also begs a few thoughts:

1. Does an individual engineer have a right to own his ideas and intellectual property, or do the "superior" professional engineering committees or "superior knowledge engineers" hold greater value?
2. Is truss, I-joist and wall panel design considered challenging or unsophisticated engineering?
3. Are all professional engineers created equal, or are some legally superior to others based upon the university they attended, the degree they hold, or the state they live in?
4. Does the building code or building law of the land provide minimum fire, engineering and building design requirements, or does it exclusively define what can be engineering innovation, creativity and ingenuity?
5. Do we desire an engineering culture based upon the liberty of an individual professional engineer to innovate and take personal responsibility, or do we prefer a more restrictive and bureaucratic culture of a select few calling all the shots?

Differing beliefs will lead to differing answers to these questions, which, in turn, can cause conflict not easily resolved through compromise. I happen to believe that all the engineers in the truss plate and structural building component industry think deeply about our industry every day, create great industry standards of care and are highly innovative by nature. I reflect upon some of this industry's early pioneers and current leaders who prove my point: Cal Juriett, Bill McAlpine, Carroll Sanford, George Eberle, John Meeks, Stan Suddarth, Mike Reeder, Don Percival, Sherm Nelson, Don Sharp, Ed Callahan, Dorothy Lynch, Tom Albani, Carlos Rionda, Tony Arce, Scott Carroll, Charlie Hoover, Karl Bickel, Dave Brakeman, Mike Triche, Brad Cameron, Steve Cabler, Norm Scheel, Tom Zgraggen, Dave Wert, Scott Miller, Gaby Redwanly, Dan Wheat, Steve Cramer, Dave Motter, Paul Johnson, Steve Kennedy, Ray Yu, Mike Pellock, Joe Kannapell, Bob Shupe, Stan Koehlinger, Gary Sweatt, Pat McGuire, Tim Riegel, Jim Meade, Mike Kozlowski, Johnny Drozdek, Chris Dudek, John Gruber and Ken Pagano, to quickly name a few. I suspect that I have missed several, and for that I apologize.

Looking to the Future

Through testing at SBCRI, we have proven that what everyone thinks they can count on, and are getting from a variety of standardized test methods or building code requirements, may be wrong. I think the truss industry engineers do great engineering and make great engineering judgments with the data they have available. They use standards as they are intended to be used: as a pointer to one of many approaches that can make innovative engineering evolve. I believe that most in our industry are about engineering innovation in the tradition of our industry's founders, not blind followers, needing to be told what to do and when to do it. They generally do not embrace a status quo mentality.

So what does this all mean? The value of innovative engineering and the creation of innovative products, product improvements and software form the link between new science-based discoveries and their application. This is what drives true value creation. It means the mission of any professional engineering endeavor is to deploy an innovative material, design or method of construction in a manner that meets all regulations, protects the consumer and preserves "free and unfettered competition as the rule of trade." SBC

by Frankie Ferrero, E.I.T.

The Hidden Costs of Optimization, Part I

Avoid errors when the reactions of a truss exceed the capacity of bearing.

Optimizing truss jobs is intended to lead to a reduction in lineal feet of lumber used in a project, but that reduction in lumber may make the trusses' ability to distribute forces through connections more critical. It's important to understand how the computer software performs optimization. Without that knowledge, there can be unintended consequences to optimization, which can result in hidden costs on a project.

Question

How can a Truss Designer avoid system design errors such as when bearings are undersized?

Answer

The Truss Designer needs to understand the assumptions and analysis methods of the software and the loading requirements of *ASCE-07: Minimum Design Loads for Buildings and Other Structures*. The following example shows issues that can arise from relying too heavily on computer analysis without taking into account ASCE-07 in the context of the automated loading and applied load assumptions that computer programs use when designing and optimizing trusses.

Example: Reactions of Truss Exceed Capacity of Bearing

Girder trusses generally consume the heaviest applied loads, which are then distributed to bearing locations. These types of trusses are frequently made into two- or three-ply trusses to help withstand the member forces generated. When analyzing a girder truss, the Truss Designer needs to keep in mind the assumptions the computer program makes, in order to ensure that the truss and its bearing conditions are adequate. On a Truss Design Drawing, the required bearing width indicates the minimum bearing width required for the truss, based on the lumber used in the truss per the truss manufacturer's inventoried species, grades and sizes of the truss lumber. The Truss Designer does not have the same control over the lumber that is used for the bearing condition (e.g., wall top plate, steel beam, etc.). There are instances where the bearing area of the truss is sufficient, given the size of the bearing, but insufficient based on the bearing capacity of the actual bearing surface that the truss will rest on in the finished building.

The minimum required bearing width is calculated by dividing the maximum reaction force at the bearing by the adjusted compression stress of the lumber. For trusses bearing on the narrow or wide face of a truss chord, the compression perpendicular to grain ($F_{c\perp}$) is used. The **Technical Q&A** in the April 2007 issue of ***SBC*** addressed minimum required bearing and provided the following example problem:

> ***The end of a bottom chord bearing, three-ply roof girder truss bears on top of a 2x4 exterior wood wall in a single-family residence. The bottom chords of the girder consist of 2400f – 1.8E 2x10 Southern Pine Lumber, and the top wall plate is No 2 SPF. The maximum reaction force is 12,000 lbs. What is the minimum required bearing for this truss and the wall plate?***

at a glance

- When analyzing a girder truss, the Truss Designer needs to keep in mind the assumptions the truss analysis program makes regarding reaction capacities.
- It is the Building Designer's responsibility to verify the capacity of the bearing surface, but the Truss Designer must ensure that the truss-to-bearing connection has a chance of being made without crushing.
- The article provides a series of concepts to use if a truss needs to be designed without knowing the bearing surface type and its feasibility of providing adequate support for the trusses.

The Minimum Required Bearing Area (A) = Reaction Force (R) ÷ the Adjusted Compression Perpendicular to Grain Stress (Fc⊥adj)
i.e., Areq. = R ÷ Fc⊥adj

For the Girder Truss:

R = 12,000 lbs
Fc⊥adj = Fc⊥ x CM x Ct x Ci x Cb,

where:
Fc⊥ = 805 lbs/in² (from Table 4C Footnotes of NDS Supplement for 2400f – 1.8E Southern Pine),
CM, Ct and Ci = 1.0 and Cb = 1.0, since the bearing wall is located within 3 inches from the end of the truss.[1]

Therefore:

Areq = 12,000 lbs ÷ (805 lbs/in² x 1.0 x 1.0 x 1.0 x 1.0) = 14.91 in²
Since Areq = the width of the truss x length of bearing (**L**b), and the width of this girder truss is 4.5" (i.e., 3 x 1.5"), the minimum required **L**b is **L**b = 14.91 in² ÷ 4.5"

Lb = 3.31" < 3.5" (i.e., width of 2x4 wall), therefore OK

For the Top Wall Plate:

R = 12,000 lbs
Fc⊥adj = Fc⊥ x CM x Ct x Ci x Cb,

where:

Fc⊥ = 425 lbs/ in²
(from Table 4A of NDS Supplement for Spruce-Pine-Fir)
CM, Ct and Ci = 1.0 and Cb = 1.0833 (i.e., (4.5 + 0.375)/4.5, assuming that the girder truss is located at least 3 inches from the end of the plate, from NDS 3.10.4, equation 3.10-2)

Therefore:

Areq = 12,000 lbs ÷ (425 lbs/in² x 1.0 x 1.0 x 1.0 x 1.0833) = 26.06 in²
Lb = 26.06 in² ÷ 3.5" (i.e., the width of the plate)
Lb = 7.45" > 4.5" (i.e., the width of the girder truss), therefore NG

[1] CM, Ct, Ci, and Cb are adjustment factors and should be used as defined by NDS Table 4.3.1.

Species (Fc⊥)	Plate Size	Bearing Area Factor, C_b	Bearing Plate Increase Factor, C_{plate} [2]	No. of Truss Plys (assumes each ply is 1½" thick)			
				1	2	3	4
Southern Pine[3] (565 psi)	2x4	Yes[4]	Yes[5]	4,375	7,875	11,375	14,001
		Yes[4]	No	3,708	6,674	9,640	11,865
		No	Yes[5]	3,500	7,001	10,501	14,001
		No	No	2,966	5,933	8,899	11,865
	2x6	Yes[4]	Yes[5]	6,876	12,376	17,876	22,001
		Yes[4]	No	5,827	10,488	15,149	18,645
		No	Yes[5]	5,500	11,001	16,501	22,001
		No	No	4,661	9,323	13,984	18,645
Douglas Fir-Larch (625 psi)	2x4	Yes[4]	Yes[5]	4,840	8,712	12,584	15,488
		Yes[4]	No	4,102	7,383	10,664	13,125
		No	Yes[5]	3,872	7,744	11,616	15,488
		No	No	3,281	6,563	9,844	13,125
	2x6	Yes[4]	Yes[5]	7,605	13,690	19,774	24,338
		Yes[4]	No	6,445	11,602	16,758	20,625
		No	Yes[5]	6,084	12,169	18,253	24,338
		No	No	5,156	10,313	15,469	20,625
Spruce-Pine-Fir (425 psi)	2x4	Yes[4]	Yes[5]	3,291	5,924	8,557	10,532
		Yes[4]	No	2,789	5,020	7,252	8,925
		No	Yes[5]	2,633	5,266	7,899	10,532
		No	No	2,231	4,463	6,694	8,925
	2x6	Yes[4]	Yes[5]	5,172	9,309	13,446	16,550
		Yes[4]	No	4,383	7,889	11,395	14,025
		No	Yes[5]	4,137	8,275	12,412	16,550
		No	No	3,506	7,013	10,519	14,025
Hem-Fir (405 psi)	2x4	Yes[4]	Yes[5]	3,136	5,645	8,154	10,036
		Yes[4]	No	2,658	4,784	6,910	8,505
		No	Yes[5]	2,509	5,019	7,527	10,036
		No	No	2,126	4,253	6,379	8,505
	2x6	Yes[4]	Yes[5]	4,929	8,871	12,814	15,771
		Yes[4]	No	4,177	7,518	10,859	13,365
		No	Yes[5]	3,942	7,886	11,828	15,771
		No	No	3,341	6,683	10,024	13,365
Spruce-Pine-Fir-South (335 psi)	2x4	Yes[4]	Yes[5]	2,594	4,669	6,745	8,301
		Yes[4]	No	2,198	3,957	5,716	7,035
		No	Yes[5]	2,076	4,151	6,226	8,301
		No	No	1,759	3,518	5,276	7,035
	2x6	Yes[4]	Yes[5]	4,077	7,337	10,599	13,045
		Yes[4]	No	3,455	6,218	8,982	11,055
		No	Yes[5]	3,262	6,523	9,783	13,045
		No	No	2,764	5,528	8,291	11,055

[2] Column added since April 2007 TQ&A due to approved Bearing Plate Increase Factor in ANSI / TPI 1.
[3] Reaction values may be increased by 1.168 if lumber plate is Dense Select Structural, Dense No. 1 or Dense No. 2.
[4] Use the reaction in this row if the truss is located at least 3" from the end of the lumber plate.
[5] Use the reaction in this row if the nearest edge of the truss plate is no farther than ¼" from the lumber edge common to both the 1½" wide bearing face and the plated face. Truss plates must be on each adjacent normal face.

The example indicates that the 2x4 wall provides adequate bearing length for the truss, but it is insufficient in terms of the bearing capacity of the top plate. Since the truss design only evaluates the materials in the truss, the Truss Design Drawing for this girder would indicate that 3.5" of bearing is sufficient. However, crushing in the top plate of the wall will most likely occur, unless the wall is increased to 2x6 and a lumber species with a higher Fc⊥ is used.

This table provides the maximum truss reaction load based on the allowable perpendicular to grain bearing capacities of selected species of lumber commonly used in wall top plates. The reaction forces are derived for both 2x4 and 2x6 wall widths, as well as with and without the Cb, and Cplate factors. The reaction values are based on Cm, Ct, and Ci = 1.0, and assumes that the truss bears on the full width of the lumber plate.

Continued on page 14

THE LIGHT OF THE HOLIDAYS

TURNS

HOUSES

INTO

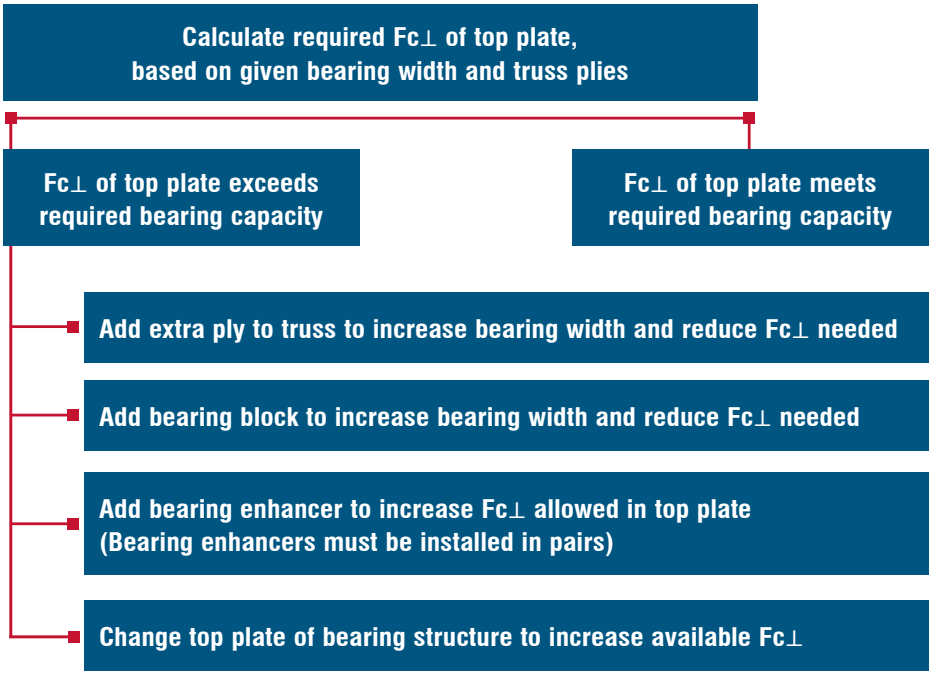
HOMES.

Friends, this has been an unbelievable year. A year of rebuilding frameworks and reinforcing our partnerships. During this holiday season, we've been reflecting on the triumphs of the last 12 months, and we know we have you to thank for so much of it. Many more opportunities will come knocking in 2014, and you can be sure we will remain committed to your success.

We hope, as you're spending time with the people who matter to you most, that your celebrations are lit up by the joy of a memorable year and the promise of what's to come.

Warmest wishes from your friends at MiTek.

MiTek®



Technical Q&A

Continued from page 11

While it is the Building Designer's responsibility to verify the capacity of the bearing surface, the Truss Designer must ensure that the truss-to-bearing surface connection can be made without crushing. For instance, while a two-ply girder can be analyzed without failure on the computer screen, the reactions at the bearings may be so great that the required bearing capacity cannot feasibly be achieved.

A common setting that Truss Designers can specify in the software is to automatically upgrade the material of the bearing to the material of the bottom chord of the truss. While this can be helpful when designing with specific grades of lumber, the setting needs to be used cautiously when designing with machine stress rated (MSR) lumber, due to its higher Fc⊥ design values. Likewise, it's important to remember that MSR is not typically used for top plates of wall assemblies and related bearing members in actual building construction. If trusses are designed prior to knowing the bearing material, or if the bearing material is unknown, using a table similar to the one on page 11 can help Truss Designers verify that the resulting reaction is feasible. With the aid and availability of a wide variety of bearing enhancers, an engineered steel fixture designed to increase the effective width of the truss to reduce the required Fc⊥ of the top plate, higher reactions can be achieved than with the truss alone.

If any truss (girders typically are the greatest concern) is designed without verifying that the capacity of the bearing surface is feasible given the materials used, the analysis using the flowchart above needs to be completed for the truss.

While a two-ply girder may pass analysis, it may still need to become a three-ply in order to obtain the reactions needed for connections, or it may need to be designed using bearing enhancers. While a third ply adds cost to a project because an extra truss will need to be built and shipped, it is more affordable than trying to fix the issue after the fact. It is critical that the Truss Designer understand his or her scope of responsibility and how the trusses interact with the rest of the structure. This will ensure a safe structural system that resists loads as designed without unanticipated crushing.

See an upcoming issue for another optimization example that examines when loads are missing from structural fascia. SBC

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

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The Question: Optimize or Not?

Presenters:
Rich Ackley, Latco Truss
Dave Motter, Louws Truss
Javan Yoder, Stark Truss

Building a stout truss used to be seen as a good thing; now it means you are likely going to lose out to your competitors. Thanks to changes in technology and software capabilities, a component's strength and performance is no longer tied to how much wood is in it, but rather, how well it is designed for the loads it needs to resist. However, beyond truss optimization, presenters of this session argued that "optimization" truly applies to a component manufacturer's (CMs) entire operation.

What Is Optimization?

Three presenters shared three different views on what optimization means to their companies. It is a safe bet that optimization can be defined in as many ways as there are CMs because the word means a different thing to each individual. For the purposes of this presentation, however, optimization was discussed as a way of thinking about project management. The speakers focused on the various ways in which an entire project could be streamlined, or optimized, to achieve the most beneficial result for the manufacturer.

"The greatest benefit doesn't necessarily mean lowest cost," said Javan Yoder. "It could mean the result that made the customer the most happy, or the result that manufactured the product the swiftest, or produced the highest quality and reliability." They argued that in order to optimize a project, a manufacturer has to evaluate how to save time and/or materials with the design; save time and potential QC errors during production; and, coordinate optimal packaging and delivery method.

"Ultimately, in order to optimize, you need to be able to look at the entire process and identify where your bottleneck is," said Dave Motter. "Your pinch-point, whether it's design, production or delivery, is the area where improvement will have the most dramatic impact." By way of example, Motter points to understanding the relationship between truss heights and both your production table limitations and your wide-load transportation permit limits to optimize the height the trusses during design.

> "Optimization and costing methods vary greatly, but it is always a lively and valuable discussion that makes people think." —Session Evaluation Comment

Deciding Where to Optimize

It goes without saying that keeping an eye on the big picture isn't easy. "There isn't one person who touches everything, so good communication is the first key," said Motter. "There is also a cost associated with analyzing every facet of your business to identify

opportunities to optimize the process." This means choosing to optimize is an investment, sometimes an investment yields a huge return, sometimes it doesn't.

Just as the word optimize means different things, presenters acknowledged that everyone figures things out differently. "Some plants look exclusively at their operations from a board-foot-to-cost ratio," said Rich Ackley, "and there is nothing wrong with that if it truly captures what is going on with your operations. For us, we go with a lineal-feet-to-square-footage ratio." Ackley's company customized their software to compute the ratio on every job. Ackley explained through example that while a ratio of .538 is optimal, it's very difficult to attain. Whereas a ratio of .578 may be flagged as being high, so the design would be reevaluated.

For Motter's operations, they optimize their delivery by producing, packaging, and transporting their truss packages in the order in which they are installed on the jobsite. Being in the Pacific Northwest region, roof trusses are crane delivered on the top plate, so stacking the trusses in the order of installation makes his customers very happy. "The downside is that if there is a design that isn't approved, the whole project can get held up," said Motter. "But you have to weigh that against the benefit of exceeding your customer's expectations."

Deciding When to Optimize

If you've done the analysis, and identified where optimization can have the greatest impact on your operations, the presenters suggested you aren't done yet. There is still the matter of deciding when to employ it. "Some companies optimize their design before the bid process so they can offer the lowest price possible to be competitive with their competition," said Ackley. "On the other hand, we don't optimize until after getting the bid so that we capture the value of our truss design optimization as additional profit."

In deciding when to optimize, you have to acknowledge the strengths and weaknesses of your employees. "Not all your designers may be skilled at optimizing a truss layout," said Yoder. "So you have to decide if you are going to ask all your designers to optimize, or potentially hire or appoint someone to optimize every project." If that one person becomes a bottleneck, you may decide to optimize only projects that hold promise to yield significant results.

"It can also depend on the materials you have in stock," said Ackley. "If you are designing using only the materials you have on hand, you are optimizing your material throughput and production."

There are many opportunities for CMs to optimize their entire process, and it's not just limited to truss design or lean manufacturing concepts; these three presenters argue it is much broader than that.

Design Values: Getting to Reliable Lumber

Presenters:
Dan Holland,
Clearspan Components
John Branstetter,
Vaagen Brothers Lumber

"Wood is an organic resource, prone to great variability." This earth shattering observation was at the heart of Dan Holland's comments during the "Lumber: Getting Reliable Design Values" presentation. Okay, the observation itself is not profound, but many in the audience agreed that his conclusions based on that fact have wide ranging ramifications for the future of the structural component manufacturing industry.

How Strong Is a 2x4?

At its core, the components industry purchases lumber design values. It is those values that are input into the design software to construct the layout of each component. However, Holland argues most CMs don't know the actual design values of the lumber they are using to build their products: "Unlike laminated beam or I-joist manufacturers, who test their material and know the properties of the product they put out the door, truss manufacturers appear comfortable letting someone else tell them the strength of their product."

To understand why this is both a problem and an opportunity for CMs, he asked the simple question, "How strong is a #2 2x4?" Using Southern Yellow Pine (SYP) as an example, Holland pointed out that within any bunk of 2x4s, the allowable variance in visually graded SYP could result in sticks ranging from 1050 Fb to 2400 Fb, a difference of 128 percent. "The unfortunate consequence of this is the manufacturer must assume all the pieces in a bunk have the same conservative, low-end value," said Holland. "That's leaving a lot of strength on the table."

Continued on page 18

"I'm sure Dan Holland has received an industry award before, and he now deserves another. What a fantastic visionary and leader."

—Session Evaluation Comment

Lumber • Continued from page 17

Visual Grading Is Broken

"The primary point is that visually graded lumber, particularly Southern Pine, is inappropriate for what our industry does," argues Holland. This is because the CM purchases design values, but doesn't know the actual design values of what they purchased. There are two consequences to this fact: (1) CMs can underutilize a majority of the lumber they own; (2) If they purchase lumber from a mill logging predominantly from a plantation forest, they may be getting lower design value material than is assumed by the visual grading process.

"With the recent devaluation of Southern Pine, this is particularly true," said Holland. "Because the entire Southern Pine resource is lumped together, and downgraded as a result, there is a lot of lumber from particular lumber mills with much higher design properties." Holland is quick to point out that while SYP is the lumber he is most familiar with, the concept and assumptions behind visual grading make this a problem regardless of the species.

Machine Rated Lumber

The good news is that CMs have an alternative to purchasing visually graded lumber. "Machine Stress Rated (MSR) and Machine Evaluated Lumber (MEL) are resources that have been on the market for decades, and represent a viable alternative to this problem," said Branstetter. "Each stick of MSR-MEL lumber is run through a machine and non-destructively evaluated and graded based on its Modulus of Elasticity ("E") and bending (Fb) performance correlations."

Based on Holland's earlier observations, the benefits of MSR-MEL are readily clear: the design values of each stick are measured and as such more well-known. "Reliability should matter to our industry," said Holland. "We produce a highly-engineered product that relies on the design values of the lumber resources. We should be very concerned about the capacity of the products we are putting out the door."

Beyond the obvious issues of product liability, there is the more tangible benefit of fully utilizing what you pay for. The reliability of MSR-MEL allows CMs to design with greater precision and effectiveness. This, in turn, increases the value of the engineering that is accomplished.

Don't Reinvent the Wheel

Holland argues that there is a great opportunity for CMs, particularly in the SYP region to capitalize on brokenness of the status quo. "Machine grading equipment is not nearly as expensive or as bulky as it once was," said Holland. "You don't have to reinvent the wheel in order to take control of this situation."

The potential exists for CMs, like Holland, to install their own machine grading equipment, purchase visually graded lumber, and then test that lumber themselves. By testing, the CM can know the design values of each stick of lumber and have the ability to fully utilize those known design values in their products. "With 128 percent variability or more allowed within a bunk of lumber, there is the potential to harness a great deal of value," said Holland.

Take a Step Back

A machine grading machine certainly may not be the answer for every CM. However, Holland would argue that sticking with the current visual grading system isn't necessarily in the best interest of a CM or our industry overall: "What it takes is for a CM to think outside of the norms they are accustomed to. By taking a step back from the current system and looking at the lumber buying process with a fresh perspective, it is easier to ask the question: Is this the best way we can be doing this?"

Teaming Up with Your Local Building Officials

Presenters:
Kirk Grundahl, P.E., SBCA
Rick Parrino,
Plum Building Systems

Building codes have a profound impact on your business. Beyond the obvious way in which they currently govern a building's method of construction, building codes can both drive and, alternately, stifle innovation within the market. From energy codes that encourage new truss and wall panel solutions to fire codes that create a competitive disadvantage for floor trusses, it behooves component manufacturers to pay close attention to building code changes, work with SBCA staff through the code change process, and, ultimately, develop increasingly stronger relationships with the code officials charged with adopting and enforcing them.

SBC Industry Based on Code Compliance

The building code gives authority to the building official to act as the final approval authority. In that role, the building official is the sole arbiter of any code provision that is not completely clear in its intent. When the code is not perfectly clear, which is often the situation, the law provides for discretion to interpret the code, adopt policies and procedures to clarify

Continued on page 20

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104.1 General. The building official is hereby authorized and directed to enforce the provisions of this code. The building official shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

Officials • Continued from page 18

unclear provisions of the code and make determinations regarding code compliance (see box above right).

The primary purpose of the language in Section 104.1 is to enforce the provisions of the code. "This language may appear benign," said Kirk Grundahl. "However, it is vitally important for CMs to understand it does not say, 'to enforce the building official's opinion of what he/she likes or does not like,'" Rather, it states, "Any interpretations, policies and procedures shall be in compliance with the intent and purpose of this code."

One of the key roles of the plan review process is to confirm that the structural design and implementation of that design is done in accordance with the minimums established in the code.

"This 'professional sealed engineering approved for construction' approach is the foundation of our industry's truss and wall panel design and manufacturing business model," said Grundahl. "It is what allows our industry to provide innovative engineered-connection and structural framing solutions to our builder customers."

Grundahl further emphasized, "Engineers are professional practitioners applying scientific knowledge, mathematics, and ingenuity to develop solutions for technical problems, while considering the limitations imposed by practicality, regulation, safety and cost." In other words, the engineers working in the structural components industry serve as the link between scientific discoveries and knowledge of our physical laws, and their real world application to address humanity's need for shelter and desire for a higher quality of life.

Relationships Matter

Given all that is riding on the code official's approval, it makes sense to put considerable effort into building strong relationships with them. "We have found that building officials can be our biggest advocates in the market, and our best source of information on potential changes to the code that may affect our business," said Rick Parrino.

When code jurisdictions in and around Des Moines, IA began considering adoption of the International Code Council's 2012 International Residential Code (IRC), Parrino actually got a heads up from a few of the building officials he had fostered relationships with over the years. "They contacted me and let me know when they were going to consider particular provisions of the code," said Parrino. "That was important because it allowed me to know when to show up and advocate our industry's position on the scientific inaccuracy of the gypsum requirement on unprotected floor truss assemblies, which provide 2x10 joists a big competitive advantage."

That provision would have created a serious economic hardship for all component manufacturers serving markets around Des Moines with floor trusses and I-joists. Beyond receiving the alert, Parrino's relationship with his building officials also put weight behind his arguments against the provision. "I wouldn't say my words alone caused them to amend out the provision, but it certainly helped a lot," said Parrino.

Relationships Take Effort

As with every other aspect of your business, building the relationships you trust and rely on takes time and mutually positive experiences. "You have to plan way ahead," said Parrino. "You have to prove you are committed to their process and attend their meetings and speak at their conferences." Parrino points out that you never know what's going to come up at a code official meeting. "For instance, recently I was at a meeting and out of the blue the issue of drawing up plans was raised. They noticed I was in the room and turned to me as a resource." As a result, they asked him to put together a roundtable to discuss what details should and shouldn't be required to go on building plans.

In this case, not only is Parrino at the table in establishing guidelines for an integral part of his business, he's helping to create the table of contents. In addition to attending the building official meetings and giving educational presentations at their conferences, at the core it's about being a credible and reliable resource. "It's tied to doing things the right way," explained Parrino. "If they know you, and they trust you and the way you do things, they come to rely on you for answers. That's the real benefit."

"This was extremely informative on how to deal with code compliance and code officials, both in the short term and long term."

—Session Evaluation Comment

It's a Two-Way Relationship

"Last week I had a building official call me up to tell me he had driven past a jobsite, and even though he wasn't sure if the roof trusses were mine he knew they were a customer of ours, and wanted to warn me he saw some serious installation issues," said Parrino. "The trusses were bowing and he was warning me in case I wanted to take photos to cover ourselves from downstream problems."

Good relationships like that can be a two-way street lined with benefits. In that same vein, Parrino was contacted by another building official to help them put together training for newly hired officials. "They asked me if I could supply them with the truss layouts, which also gave me a chance to give them some of our BCSI booklets," said Parrino. Through that effort, he ensured that trusses, and more importantly, proper truss inspection, was a part of the new building official's training.

As Parrino strives to provide innovative component solutions to meet his customers' needs while striving to build and grow his business, having building officials who know and accept component framing holds great value as construction labor shortages push the framing industry even further toward full componentization. SBC

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BCMC attendees brought their athletic skills to the BCMC show in San Antonio. For the second time, David Mitchell took first place in the BCMC Build 5K Run. This year's show floor also included a basketball court and a number of contests. Kevin Johnson won the free throw shooting contest, Dan Schooler took first place in the game of T-R-U-S-S (played just like HORSE), and Jason Padilla won the three-point contest. SBC

Award Winners Honored at BCMC

Congratulations to the following award recipients, who were recognized at BCMC.

- Dick Bowman Industry Enthusiast Award – Joe Kannapell, MiTek USA, Inc.
- SBCA Hall of Fame – Jack Dermer, American Truss Systems, Inc.
- SBC Industry Leadership Award – Tom Manenti, MiTek Industries, Inc.
- #1 SBCA Component Manufacturer Membership Recruiter – Gary Weaver
- #1 SBCA Supplier Membership Recruiter – Rob Heri
- #1 SBCA Recruiting Chapter – Truss Manufacturers Association of Texas (TMAT)

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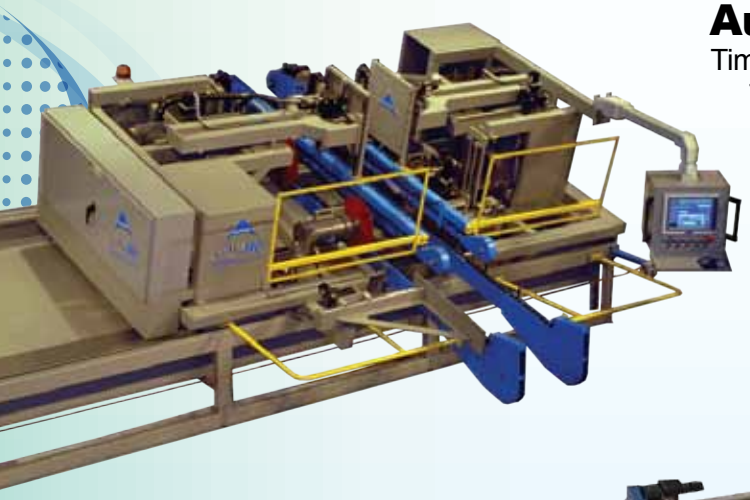

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