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April 2010

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Modeling TRUSSES in SBC™ RESEARCH INSTITUTE

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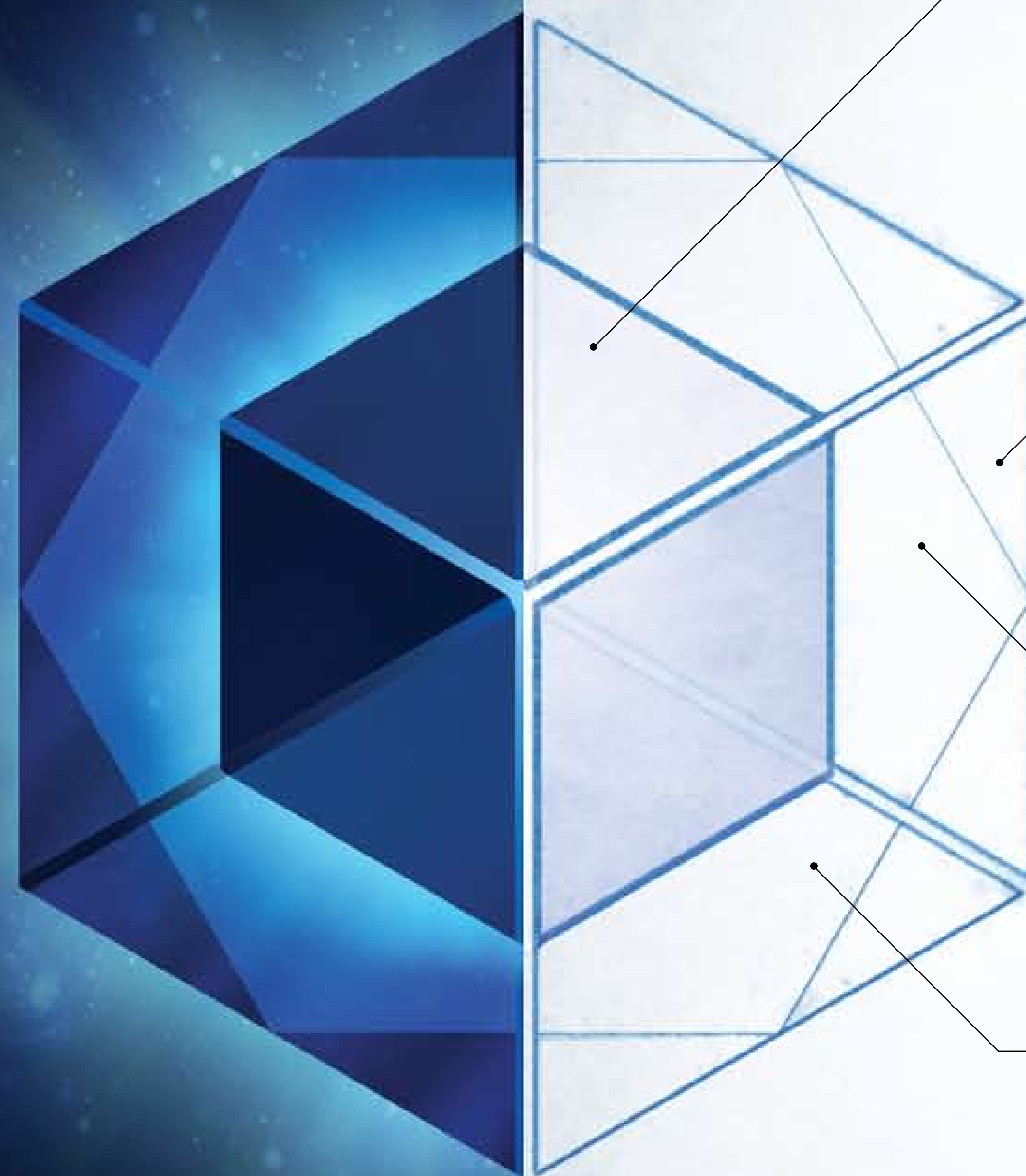

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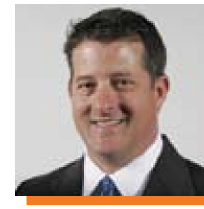
contents

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.



Editor's Message

Refined Test Methods + Component Testing = Increased Market Share

by Steven Spradlin

We've got new data from truss modeling and market research!

I hope you've been able to keep up with the progress being made in the Structural Building Components Research Institute (SBCRI) over the last year. The bulk of the industry testing we've done to date has focused on refining our testing methods.

One example is the "WB" fixture discussed in the November 2009 issue that allows us to measure load paths through webs. Another is the pulley device introduced in the Jan/Feb 2010 issue that helps with even load distribution. While these advances probably seem insignificant taken on their own, they're adding up to substantial improvements in our testing process. System modeling is the next big project we're tackling, which we feature on page 12.

If I had to describe my ideal testing scenario, it would involve testing stick framing that complies with the building code against component systems. I believe that today's stick framing falls well short of components in terms of connections and bracing. Now I understand why the incremental improvements we've made to the testing process are so important. Web force testing, equal distribution of loads and accurate modeling will help tremendously in this type of testing! I'm sure there are various products and framing methods in your market that if tested in SBCRI, could lead to increased market share of your products.

Especially coming off of a very volatile time for the building industry, the more data we can gather and reference as business owners, the better decisions we will make.

On the topic of market share, something new is happening with ***SBC Magazine***. Remember back in 2003 when the International Trade Commission (ITC) wrote a report about the market share of wood building components from 1997 to 2002? For years we have used it as the basis for gauging annual gross industry sales. Then in 2004, we combined this data with information in our database to create component sales by state. Each year since, we've taken these statistics to Washington, DC to emphasize the size and importance of the component manufacturing industry to legislators and other government organizations. I've found them very helpful because it's a single page snapshot of the revenues, number of employees and number of component manufacturers in Arkansas.

Hey Steve, do the math—2002 was eight years ago, you're saying. I know! The industry has changed a lot since then. We hit an unprecedented growth spurt and then experienced a major contraction in the last couple years. That's why we've made it a priority to clean it up, add to it and make the data more current.

At press time, we're just finalizing the details of ***SBC's*** new market research division, Market Analysis Service (MAS). Especially coming off of a very volatile time for the building industry, the more data we can gather and reference as business owners, the better decisions we will make. I'm sure you've appreciated having good, solid data at your disposal in the last couple years. I'm very excited about the MAS from ***SBC Magazine***, because it will make us smarter.

Continued on page 8

at a glance

- In the last year SBCRI testing has helped us measure web forces, equalize load distribution and develop computerized truss models.
- Get critical market data from SBC's new Market Analysis Service.

Editor's Message

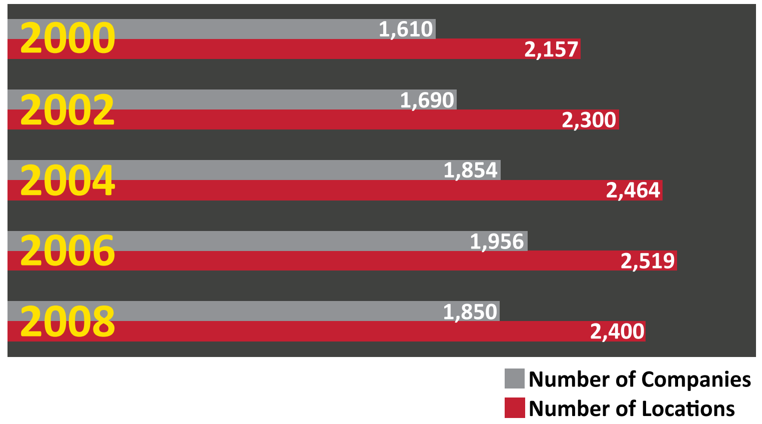
Continued from page 7

Today's industry market share data combines statistics from the U.S. Census Bureau, SBCA's Financial Performance Survey, the ITC report and NAHB Research Center to estimate annual sales, employment data and details about the market share of all building components.

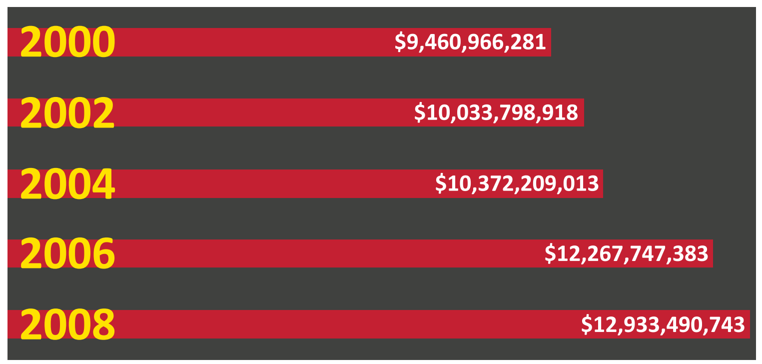
How can you get the new data? We have prepared a free sample of our high level data, which is posted on the SBC Legislative website: www.sbcleg.com/statistics.php. I encourage you to view this report at your leisure. I included a couple of representative charts at right. If you like what you see and what to know more about how you can get a more in-depth data analysis of the markets you serve and your own set of customized data, contact Libby at lmaurer@qualtim.com. I am certain you will find the depth of information we now have available valuable in your business planning. **SBC**

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

Total Number of Structural Building Components Manufacturing Companies & Locations 2000-2008



Total Structural Building Components Industry Sales 2000-2008



Count 'Em: 5 New Things from BCMC!

BCMC is shaking it up this year! Check out these new and exciting opportunities.

1. **Show floor education.** Exhibitors will have the opportunity to host an educational session in their booth or in communities (shared space) on the show floor. Visit www.bcmcshow.com/learnconnect.php for more information on this program and to see an example of a "BCMC Community."

2. **Join us for BCMC Build 2010!** As part of our Building Community, Making Connections theme, we've volunteered to partner with Habitat for Humanity to fund and build a single family home. We have commitments from these Founding Sponsors (as of March 12, 2010):
   - Clearspan Components, Inc.
   - Eagle Metal Products
   - Hundegger USA, L.C.
   - iLevel by Weyerhaeuser
   - ITW Building Components Group
   - MiTek Industries, Inc.
   - NUCONSTEEL, a Nucor Co.
   - Pratt Industries, Inc.
   - ProBuild
   - Robbins Manufacturing Company
   - SBCA – Arizona
   - SBCA – Illinois
   - Shelter Systems Limited
   - SL Laser Systems LP
   - Stock Building Supply
   - Simpson Strong-Tie Co.
   - South Florida WTCA
   - Truss Manufacturers Association of Texas
   - USP Structural Connectors
   - WTCA Ohio Chapter Association

   Contact Melanie Birkeland (mbirkeland@qualtim.com) to make a commitment to help fund or participate in BCMC Build.

3. **Reduced hotel rates.** The Westin and Hilton hotels have agreed to drop their room rate and also offer free Internet in the guest rooms! The reduced rate is $169 a night. We also have rooms available at the Omni hotel. Housing for BCMC will be available soon.

4. **Be our fan!** Join your peers and become a fan of BCMC on Facebook! Be the first to get the latest news and updates. Go to www.bcmcshow.com/facebook to become a BCMC fan!

5. **Chicken soup for the component industry.** Could we ever use it! The BCMC Committee has selected Roger Crawford as the kick-off speaker (his story was featured in the original book, *Chicken Soup for the Soul*), Mark Vitner with Wells Fargo for the economic forecast speaker, and the following breakout session topics:
   - Risk Management
   - Lean Manufacturing
   - Design
   - Preventative Maintenance
   - Train-the-Trainer
   - Business Training

We look forward to seeing you at this year's show! For more information, visit our website at www.bcmcshow.com. **SBC**

Technical Q & A

2009 IRC Sprinkler Location Requirements

by Larry Wainright

Find out if your state is adopting or rejecting new residential sprinkler requirements.

at a glance

- Even if code mandated, automatic sprinklers for one- and two-family dwellings are not required to be installed in every area of the dwelling. With some restrictions, attic spaces, crawl spaces, concealed spaces, closets, pantries, bathrooms, garages, carports, exterior porches and other unheated entry areas do not require fire sprinklers.
- When in doubt about the required location of fire sprinklers, contact your local building official.

Question

The 2009 International Residential Code (IRC) requires sprinklers to be installed in all one- and two-family dwellings built after January 1, 2011. What areas of the house need to be covered by the automatic sprinkler system? Does the attic space need to be sprinklered for example? What about crawlspaces or unfinished areas of the basement?

Answer

The debate over requirements for sprinkler installations in all new one- and two-family dwellings is ongoing. Although the provision for mandating automatic fire sprinklers is included in the 2009 IRC and is expected to remain in the 2012 IRC, some states and local jurisdictions are retaining the provision and some are removing it when they adopt the national model code locally. These jurisdictions are debating the merits of automatic sprinkler systems for increased life safety versus the cost of installing these systems. To date, the states that have adopted the 2009 IRC as their model code are split; some are adopting the requirements and others are striking them from the local adoption. (Visit www.sbcindustry.com/sprinkler.php to see if your state has adopted them.) Further, a number of states are taking legislative action to further restrict the implementation of the fire sprinkler requirements. For instance, Florida, New Hampshire, Nevada, Mississippi and Iowa all have bills pending in their respective legislatures that would prohibit state and local jurisdictions from requiring installation of fire sprinklers in new or existing one- or two-family residential dwellings or residential buildings that contain up to four dwelling units.

Regardless, California, New Hampshire, Vermont and Pennsylvania have adopted the IRC language and other states will certainly join them, so it is important to understand the requirements. The specific provision from the 2009 IRC states:

> **R313.2 One- and two-family dwellings automatic fire systems.** Effective January 1, 2011, an automatic residential fire sprinkler system shall be installed in one- and two-family *dwellings*.
>
> > **Exception:** An automatic residential fire sprinkler system shall not be required for *additions* or *alterations* to existing buildings that are not already provided with an automatic residential sprinkler system.
>
> **R313.2.1 Design and installation.** Automatic residential fire sprinkler systems shall be designed and installed in accordance with Section P2904 or NFPA (National Fire Protection Association) 13D.

As indicated in section R313.2.1, the requirements for the design and installation of the sprinkler systems, including the required locations are found in Section P2904 of the 2009 IRC or NFPA 13D. The provisions in both of these documents are similar, so we will use Section P2904 as the basis of this discussion.

There are several spaces within a one- or two-story building that are exempt from the sprinkler requirement:

- Attic spaces, unless they contain fuel-fired equipment such as a furnace or a hot water heater. If the space does contain fuel-fired equipment, then a single sprinkler head must be installed above the equipment. The remainder of the area does not require additional sprinklers.
- Crawl spaces have the same requirements as attic spaces. Sprinklers are not required unless they contain fuel-fired equipment; if so, only a single sprinkler head above the equipment is required.
- Normally unoccupied concealed spaces follow the same rules as attics and crawl spaces. An example is the space between the top and bottom chords of a truss that has a floor above and a ceiling below. The same applies to joists or conventional framing. Another example of an unoccupied concealed space is walled off areas where there is no access except for maintenance purposes.
- Closets and pantries with gypsum wallboard finished walls and ceiling and an area not greater than 24 sq ft where the smallest dimension is not greater than 3'.
- Bathrooms with an area not greater than 55 sq ft.
- Garages, carports, exterior porches and unheated entry areas that are adjacent to an exterior door such as a mud room or breezeway.

All areas not listed in this list of exemptions are required to have automatic sprinkler systems installed. If you are in doubt as to whether an area is exempt from the sprinkler requirement, always consult with your local building official. SBC

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

Modeling TRUSSES in SBC RESEARCH INSTITUTE

by SBCRI Staff

Recently we've updated you on some exciting new testing happening in the Structural Building Components Research Institute (SBCRI). Our latest work involves using computer modeling software to show how a truss or system of trusses will behave under given loading conditions and comparing it to the system test data we are generating. This article is a review of three different set-ups tested in SBCRI and modeled using finite element analysis (FEA) software.

Why Model?

Using an off-the-shelf FEA modeling and research-oriented FEA program that we have been working with, the user inputs the details of a truss assembly into the software, and a 3D image drawn to scale is created. When various loads are "applied," the software outputs force, deflections and reactions at designated points along the assembly.

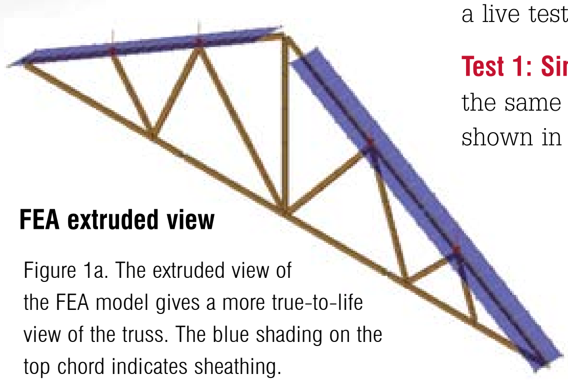
Why are we investing the resources and time to establish this FEA modeling approach when assemblies could just as easily be subjected to *real* SBCRI tests? In three words, flexibility and cost savings. Through modeling, our goal is to streamline test set-ups, define aspects of component assembly performance, expand our test design capabilities and model the load through an accurate assessment of stiffness and resistance. This takes a great deal of effort because we've discovered that very little calibration between engineering models and real world performance has been done in light frame construction. A good example of this is our tests of IRC shear wall performance on a 12'x30' building in SBCRI. We believe we can define the "judgment factor"[1] that the IRC Ad Hoc Wall Bracing (ICC-AHWB) Committee used to arrive at IRC braced wall panel design values. (Watch for an article on this topic in a future issue of ***SBC***.)

In the future when our modeling becomes more precise, it will reduce the need for conducting live tests in SBCRI. Of course, there will always be the need for calibration testing as materials change and as we modify current models. In the short-term, the value of the FEA modeling will be optimizing the bracing recommendations in BCSI. Manually testing each assembly within BCSI would be cost-prohibitive. The modeling knowledge we develop today will greatly benefit tomorrow's BCSI bracing recommendations. Eventually we hope to replace temporary restraint/bracing with permanent restraint/bracing, which will reduce framing labor and material costs.

Modeling Approach

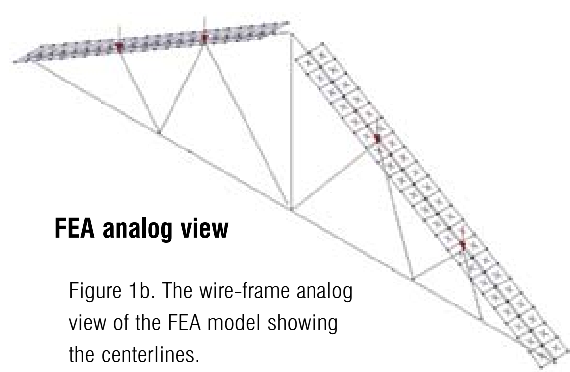
The approach we've taken is to compare FEA data to that of a live test. The idea is to refine FEA calibrations by testing, modeling, then testing and modeling over and over again. A model is said to be accurate when the error rates (when compared to a live test) are consistent across multiple tests.

Test 1: Single Truss Set-Up — Test 1 compared data from a live single truss test to the same single truss test conducted in FEA. The truss was a 39' common truss as shown in Figures 1a and 1b (below).



FEA extruded view

Figure 1a. The extruded view of the FEA model gives a more true-to-life view of the truss. The blue shading on the top chord indicates sheathing.



FEA analog view

Figure 1b. The wire-frame analog view of the FEA model showing the centerlines.

[1] From the article at The Story Behind the 2009 IRC Wall Bracing Provisions (Part: 2: New Wind Bracing Requirements) Jay H Crandell, P. E, and Zeno Martin, P. E Spring 2009 *Wood Design Focus*.

Load was applied through four defined joints, and the FEA and live tests each measured the reactions at each end of the truss (in pounds) and deflection from axial forces (in inches). Table 1a shows the left and right end reactions. Comparing the FEA model to the live test, you can see that the reactions are very similar. We interpret this to mean that the material properties for both the truss plates and the lumber are accurate.

	Point Load	Right End Reaction	Left End Reaction
Test Average	375 lbs	749 lbs	752 lbs
FEA Model	375 lbs	753 lbs	747 lbs

Table 1a: Total point load and end reactions for the single truss test.

Figures 1c and 1d depict FEA models showing the axial forces and the resultant deflection, respectively. Table 1b reports the deflection measured at each of four joints. The % Error column shows that the error rate for the test conducted on the FEA model compared to the live test.

Continued on page 14

FEA extruded view

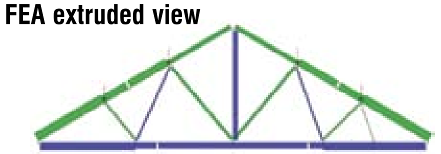


Figure 1c. The extruded view shows compression and tension forces.

FEA analog view

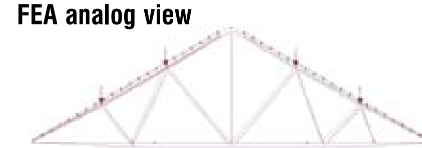


Figure 1d. The analog view shows actual deflection.

	JT 1 Deflection	% Error	JT 2 Deflection	% Error	JT 3 Deflection	% Error	JT 3 Deflection	% Error
Test Average	-0.110 in	-	-0.151 in	-	-0.151 in	-	-0.131 in	-
FEA Model	-0.101 in	8.4%	-0.138 in	8.5%	-0.145 in	3.8%	-0.136 in	-3.9%

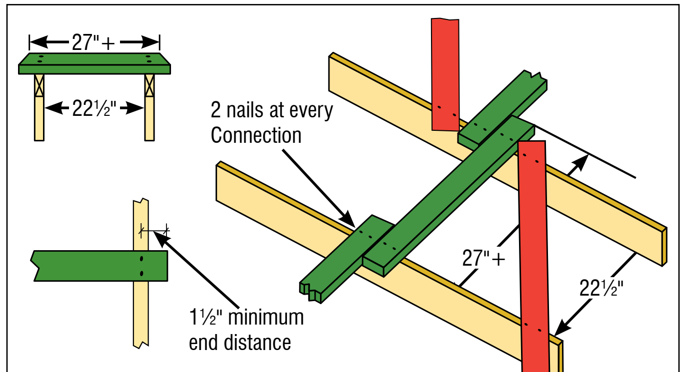
Table 1b: Deflection at each of four joints and the percent error between the live and FEA tests.

Modeling Trusses in SBCRI

Continued from page 13

As shown in Table 1b on page 13, the FEA model predicts performance within 10%. Given that the raw material variability we are working with can be up to 15% or more, this is a very good foundation to work from. We plan to further refine it even more in the future.

Test 2: 5-Truss Setup – BCSI Bracing — In Test 2, we worked with a full-scale truss assembly. The five-truss assembly measured 39' and was sheathed with 15/32" OSB. The purpose of this test was to begin our assessment of the bracing methods recommended in BCSI-B2. Only the center truss in the assembly was loaded at each of four joints per the loads noted in Table 2a. The bottom chord had lateral restraint bracing (see detail below), at 1/3 the span or 13-foot spacing. Three diagonals were placed between the lateral bracing.



Option 1 Detail Short Member Temporary Lateral Restraint Installed on Top of Trusses from the BCSI booklet, Figure B2-25, p. 24.

Figure 2a is the FEA model for the five-truss assembly with OSB sheathing applied. Figure 2b is the analog view of the same system. As in Test 1, the FEA and live tests measured the reactions at each end of the assembly and the axial force deflection. The right and left end reactions are captured in Tables 2b and 2c respectively. Note the discrepancies in both tables between the FEA and live tests.

Joint 1 Load	Joint 2 Load	Joint 3 Load	Joint 4 Load
376	389	382	353

Table 2a. Point loads at each of 4 given joints.

	TR-1	TR-2	TR-3	TR-4	TR-5
Test Average	130	146	187	166	119
FEA Model	66	23	571	17	69

Table 2b. End reactions at the **right end** of each of the five trusses.

	TR-1	TR-2	TR-3	TR-4	TR-5
Test Average	134	156	177	156	132
FEA Model	-27	2	808	-2	-25

Table 2c. End reactions at the **left end** of each of the five trusses.

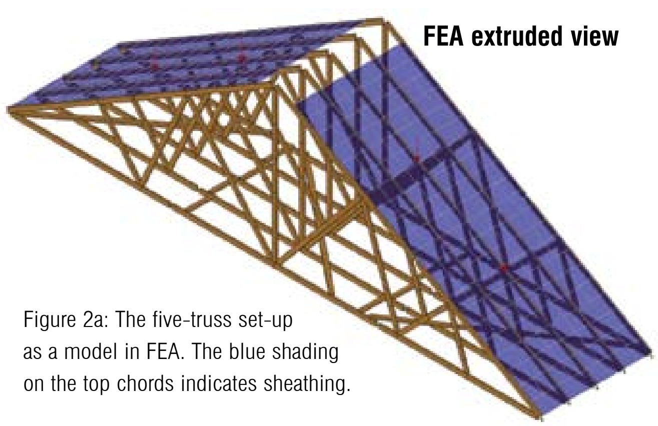


Figure 2a: The five-truss set-up as a model in FEA. The blue shading on the top chords indicates sheathing.

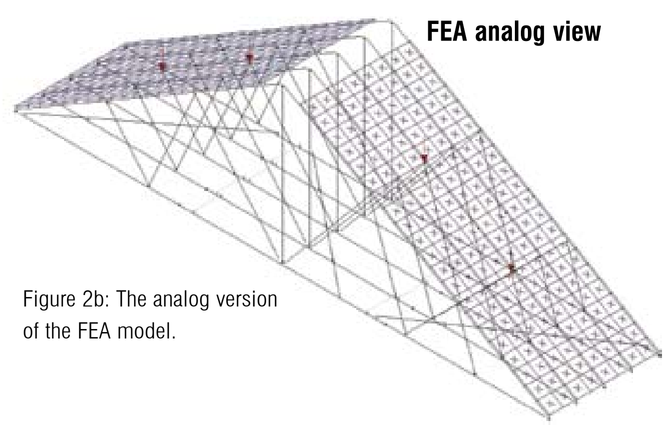


Figure 2b: The analog version of the FEA model.

We have identified two reasons for this result. The sheathing provides great stiffness at the heel of the truss and allows load distribution across the entire heel. The FEA model is not calibrated to predict this load distribution. The bottom plate that the trusses sit on is also a load distribution device that spreads load to the right and left, again something the FEA model is not calibrated to predict.

Hence our task becomes understanding how to isolate each individual element of stiffness that is causing this distribution and figure out how to incorporate the stiffness-induced load path into the model without distorting the successful modeling outcomes for the single truss above. Simple in concept, a challenge to do in practice. But this work is important because the model must predict well if we expect it to predict BCSI bracing optimization well.

Similar to Test 1, Figures 2c and 2d depict FEA models showing the axial forces and the resultant deflection, respectively. Table 2d reports the deflection measured at each of four joints of the center truss. The % Error column shows that the error rate for the test conducted on the FEA model compared to the live test. Note that compared to the deflection measured in Test 1, the percent error in this test is far greater.

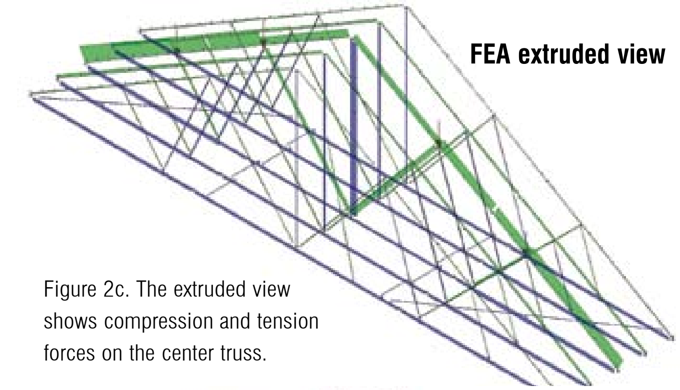


Figure 2c. The extruded view shows compression and tension forces on the center truss.

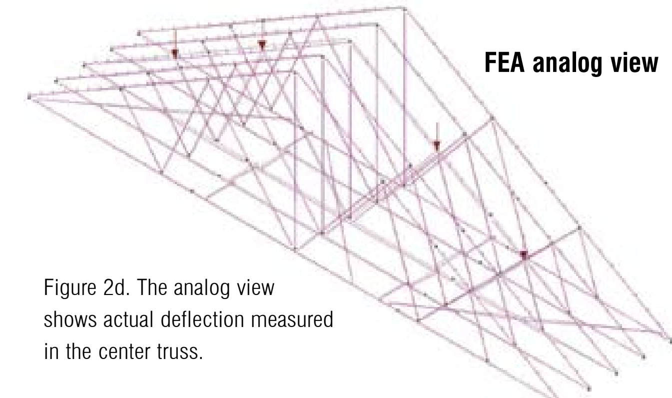


Figure 2d. The analog view shows actual deflection measured in the center truss.

TR-1 Deflection	% Error	TR-2 Deflection	% Error	TR-3 Deflection	% Error	TR-4 Deflection	% Error	TR-5 Deflection	% Error
-0.014	-	-0.027	-	-0.051	-	-0.022	-	-0.018	-
-0.017	-20.6%	-0.027	-1.9%	-0.057	-11.1%	-0.027	-24.4%	-0.017	6.6%

Table 2d. Deflection and error rate for each of the five trusses.

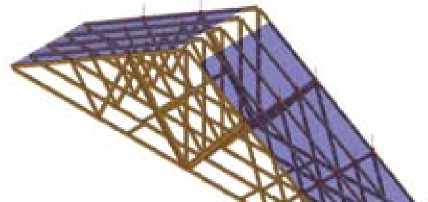
We have a very good sense for why the error rate is higher. For one, we have not calibrated single truss design models to system performance. To do this we need to understand sheathing stiffness properties and how the sheathing transfers load perpendicular to trusses. The same holds true for understanding how lateral restraints and diagonal bracing transfers load to trusses.

Each of these conditions need to be isolated and a generalized stiffness property created (i.e., for the nails, truss plates, sheathing, etc.) to calibrate our model to field performance. In the past we haven't had the data to do this; SBCRI is just now creating it for our industry.

Test 3: 5-Truss Setup – Web Bracing — The final test we'll report on measured web axial forces to understand more about our truss design models and web member bracing using the WB-3 device built in SBCRI. (For more information about WB-3, view p. 14 in the November 2009 issue of ***SBC***.) The assembly dimensions were identical to those in Test 2, and the assembly was fully sheathed with 15/32" OSB.

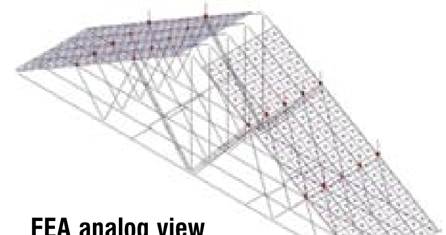
Load was applied to all five trusses at the four points on each truss as noted in Figures 3a and 3b on page 16. WB3 was attached to web 4 of the center truss as shown in Figure 3c, also on page 16.

Continued on page 17



FEA extruded view

Figure 3a. The extruded view of the assembly.



FEA analog view

Figure 3b. The analog view clearly shows the point loads applied in each truss.

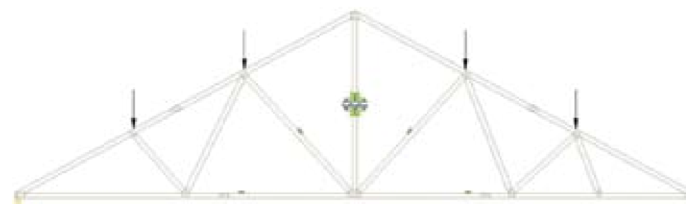


Figure 3c. The center truss with WB3 attached to web 4.

	TR-1	TR-2	TR-3	TR-4	TR-5
Test	822	785	697	683	894
FEA Model	700	861	778	750	828

Table 3a. End reactions at the **right end** of each of the five trusses.

	TR-1	TR-2	TR-3	TR-4	TR-5
Test	799	706	607	768	734
FEA Model	730	812	436	850	818

Table 3b. End reactions at the **left end** of each of the five trusses.

TR-1 Deflection	% Error	TR-2 Deflection	% Error	TR-3 Deflection	% Error	TR-4 Deflection	% Error	TR-5 Deflection	% Error
0.172	-	0.182	-	0.173	-	0.187	-	0.185	-
0.150	12.9%	0.149	18.0%	0.136	21.6%	0.150	19.8%	0.165	10.9%

Table 3c. Deflection and error rate for each of the five trusses.

Modeling Trusses in SBCRI

Continued from page 15

As in Tests 1 and 2, the FEA and live tests measured the reactions at each end of the assembly and the axial force deflection. The right and left end reactions are captured in Tables 3a and 3b respectively. Table 3c reports the deflection measured at each of five trusses. Note the % Error column as compared to the results in Table 2d. Finally, Table 3d shows the results from the WB-3 device attached to the fourth web of the center truss. The FEA model under-predicted the axial force that was found in the WB3 by 35%. FEA also under-predicted the vertical deflection in the test by 20%.

The error of the web axial force estimate are for all the reasons defined above and also include the fact that we do not know very much about the behavior of truss plates as they transfer load through sheathing to the top chord through the joint and into the web member. As discussed above, each stiffness condition needs to be isolated and generalized stiffness properties created to calibrate our model to field performance.

SBCRI Staff Thoughts

The modeling and live tests presented in this article are just the beginning of our modeling work. Our goal is to refine these models using assembly tests similar to those shown here so that we are confident in their accuracy. Then we will begin to model and test the bracing recommendations in BCSI to optimize bracing practices.

While it has taken valuable time and resources to do this work, we firmly believe we need to have a good grasp of system testing, system/load path performance, the current state of model prediction of single trusses and truss systems.

We have derived a tremendous amount of knowledge about building performance through modeling work, which has been essential to our goal of advancing the industry. While there are many different testing approaches we could have taken, we have chosen the path that has exposed the big picture of building performance. SBC

	Web 4 Axial Force
Test Tension	994
FEA Tension	641
% Error	35.53%

Table 3d. Axial force measurements recorded with the WB-3 device fixed to web 4 of the center truss.

The Changing Landscape of Softwood Lumber Supply: the beetle

by Kirk Grundahl & Libby Maurer

In January we reported that component manufacturers should carefully watch softwood lumber supply and prices throughout 2010 and 2011. In this article, we'll take a closer look at an issue that has already significantly impacted our industry's supply of softwood lumber: the Mountain Pine Beetle (MPB).

This "bark beetle" infests the bark of certain pine species—the lodgepole, jack, ponderosa and western white pine. Once it burrows into a tree's bark, it cuts off its food supply and the tree is left to die. In the last five or so years, tremendous outbreaks of the beetle in British Columbia have infected thousands of acres of pine trees.

While burrowing through the bark of the pine species, the MPB leaves behind a blue fungus stain that cuts off water and nutrient flow to the rest of the tree. The BC Ministry of Forestry reports that newly attacked trees turn red about one year after infestation, and can stay in this stage for two to four years before turning grey and losing their needles.[1]

High Capacity Harvest

Despite being infested by the pine beetle, much of the affected lumber meets current grading standards for structural uses, according to the U.S. Department of Agriculture. Natural Resources Canada concurs[2]: "Canadian scientists have carefully studied and tested the properties of beetle-killed wood. The wood is structurally sound...It is as strong as non-beetle killed wood and is used in everything from framing in residential construction to furniture-making." The catch is harvesting infested stands early to protect the remaining healthy trees.

To that end, the BC government has responded by allowing for increased harvesting of infested forests. As early as 2004, BC's Ministry of Forests and Range authorized increased cut level of up to 27 percent beyond allocations in infested forests. This allows landowners to clear out killed trees while the timber is still viable for processing into structural lumber.

Keeping up with the harvest of beetle-killed trees not only salvages the wood, but it also may be the most effective way of preventing the beetle's spread. Cutting stands of infested trees is one thing, keeping up with processing it is another. As you read this, many hectares of pine lay idle in forests all across BC. What's more, producers have curtailed production since 2007, hesitant to oversupply a weak U.S. housing market. The longer dead trees stand, the less likely they can be used for dimension lumber. Some fear that today's surplus will inevitably become tomorrow's shortage.

Quick Take:

- An outbreak of a beetle species native to North America has killed thousands of acres of Canadian pine trees. British Columbia is the biggest target.
- The beetle threatens about 16.5 million hectares (40.7 million acres) in Canada and 2.5 million hectares (6.2 million acres) in the U.S.
- Canadian foresters are racing to harvest the infected trees to minimize losses and protect healthy trees. But a slow U.S. housing market has caused producers to slow production, reducing the chance of using affected logs for dimension lumber.
- Our industry relies heavily on Canadian softwood lumber; the U.S. imports roughly one-third of its annual stock from Canada. Historically, about 50 percent is harvested in BC.
- Experts estimate that the effects of the beetle epidemic will peak around 2015 and will continue to kill trees at a very high rate until 2025.
- Keep a close eye on lumber prices as homebuilding improves, and watch for alternative products to make their way into the market.

Quality of Beetle-Killed Lumber

What happens to beetle-killed wood? The stock that isn't suitable for commercial lumber grades is sold for paper, pulp or use in engineered wood products. The stock that has not been compromised is mill processed and graded as usual.

Component manufacturers in general have reported that lumber from mills processing beetle-killed wood has changed in terms of the quality they've grown to expect from SPF producing regions. This has raised their cull rates.

The concerns of CMs based on our conversations include:

- They have increased their scrutiny of incoming lumber to ensure that the quality is consistent.
- They are more focused on managing their cull rates so that lumber costs do not go out of control.
- They are looking for other sources of supply where quality and performance are more dependable.

The big concern is that there is not enough alternative supply to go around. They are aware that a swift rebound in housing starts (to one million units for instance) will exacerbate the supply problem.

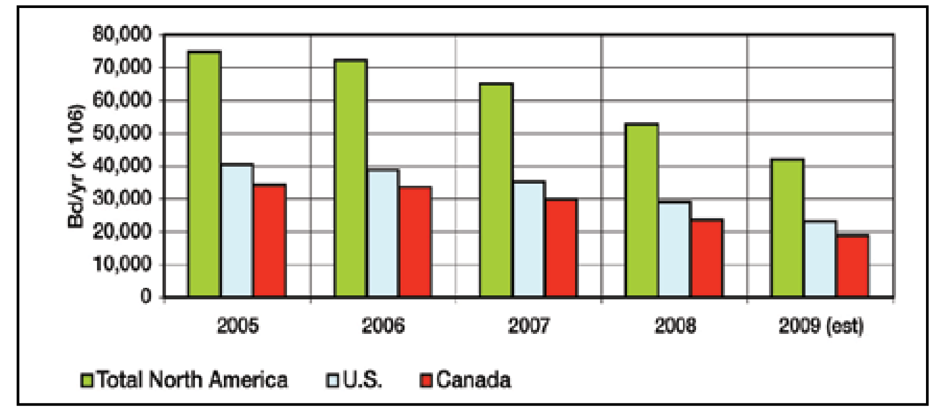


Table 1. North American Softwood Lumber Production. (Source: WWPA, Council of Forest Industries-Canada)

	Full Year 2008	11 months YTD 2009	11 months YTD 2008	% Chg.	Nov-09	Oct-09	Nov-08	M to M %	Y to Y%	3rd Qtr-09	3rd Qtr-08	% Chg
U.S. Lumber Shipments	29,154	21,468	27,509	-22.0%	1,672	1,977	1,938	-15.4%	-13.8%	5,994	7,474	-19.8%
Plus: Imports	12,681	8,170	11,938	-31.6%	712	771	943	-7.7%	-24.6%	2,320	3,144	-26.2%
Less: Exports	(1,024)	(898)	(958)	-6.3%	(97)	(102)	(77)	-4.9%	25.3%	(252)	(276)	-8.8%
Apparent Consumption	40,810	28,740	38,488	-25.3%	2,286	2,646	2,804	-13.6%	-18.5%	8,063	10,341	-22.0%

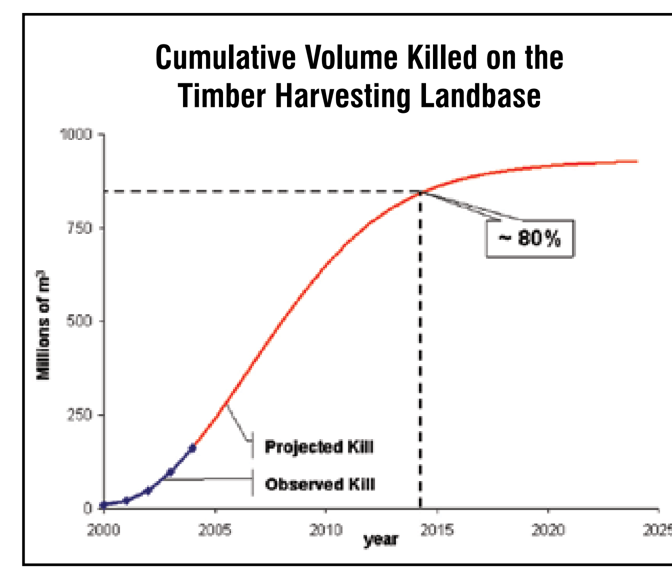
Table 2. U.S. Softwood Lumber Consumption (million board feet). (Source: WWPA Lumber Track, February 2010)

Surplus Now, Shortage Later?

According to its Mountain Pine Beetle Action Plan, the BC Ministry of Forests reports that out of a total 1.8 billion cubic meters (762 billion board feet) of inventory of merchantable lodgepole pine, the beetle epidemic has killed over 400 million cubic meters (169 billion board feet) or 22 percent.[3]

To put this in perspective, the U.S. market consumed about 40 billion board feet (bbf) of softwood lumber in 2008. Assuming that U.S. consumption has historically been between 40 and 60 bbf (and that all the wood killed is recovered for dimension lumber), it would supply the U.S. market for 2.8 to 4.2 years. (See Tables 1 and 2 above.)

The same report estimates that the merchantable pine supply could further be reduced by 60 percent by 2013 for a total loss of 80 percent. Under this scenario, the supply in inventory will increase to a range of 10 or 15 years. The destruction to come in the next 5 years is shown on this graph. Continued on page 20



Source: British Columbia Ministry of Forests and Range (April 2009). www.for.gov.bc.ca/hre/bcmpb/cumulative/Summary.htm

[1] British Columbia Ministry of Forests and Range (May 2009). *Infestation Information*. www.for.gov.bc.ca/hfp/mountain_pine_beetle/facts.htm#responding

[2] Natural Resources Canada (2010). *Sea to Sky Story: Mountain Pine Beetle*. www.gsc.nrcan.gc.ca/org/vancouver/seamer/facfic/pdf/mpb-dpp_e.pdf

[3] British Columbia Ministry of Forests and Range. *British Columbia's Mountain Pine Beetle Action Plan 2006-2011*. www.for.gov.bc.ca/hfp/mountain_pine_beetle/actionplan/2006/Beetle_Action_Plan.pdf

Softwood Lumber Supply

Continued from page 19

Any decline in the available supply from Canada will lead our industry to a net shortage of lumber, if the other lumber producing regions of North America (i.e., Eastern Canada, U.S. South and West) cannot make up the difference.

Though much of the beetle wood is usable for dimension lumber, a portion of infected timber is not salvageable. In these cases, the lumber may be suitable for OSB or other engineered wood production. Fiber is also being diverted for use in alternative products. (See sidebar on facing page for examples of new wood products.)

Impact of Beetle Epidemic in Canada, U.S.

	Million hectares	Million acres	Approx board feet*
British Columbia	14.5	39	117,000,000,000
Alberta	2	5	15,000,000,000
U.S. West	2.5	6	18,000,000,000
Total Affected Area	**19**	**50**	**150,000,000,000**

*Using 3,000 bd ft/acre as a rough estimate

The total affected area of BC is estimated at 14.5 million hectares, or 39 million acres. In a province where pine has traditionally accounted for roughly 30 percent of its annual lumber production, this is a significant area. The beetle's spread to neighboring Alberta and the U.S. which puts an additional 8 million hectares (11 million acres) of forest at risk. [Source: Natural Resources Canada (2010). *Sea to Sky Story: Mountain Pine Beetle*. www.gsc.nrcan.gc.ca/org/vancouver/seamer/facfic/pdf/mpb-dpp_e.pdf]

Beetle Epidemic Not Sole Factor in Reducing Supply

That's right; the beetle may not be the only wrench in lumber supply for the U.S. construction market. According to an article in the Vancouver Sun[4], Canadian softwood lumber exports to China are up 135 percent year-over-year for the first nine months of 2009. Canadian producers say the downturn in the U.S. market forced them to seek trade with other countries, and China was a willing customer. Stay tuned for the next part of this series for details on what Canada's wood exports to China means for the U.S. lumber market. SBC

[4] Hamilton, Gordon. "Lumber Back as B.C.'s Hot Commodity." *Vancouver Sun,* Feb 19, 2010.

Beetle Epidemic Tied to Mild Winters over Last 50 Years

You may be surprised to learn that the MPB is native to the pine stands in North America. At one time it was seen as more of a help than a hindrance, attacking weak, older forests and encouraging young, healthy forests. Then why the outbreak?

It is attributed in part to mild winters in Canada over the last fifty years, allowing the beetle to survive the winter and go on to colonize new trees in the spring. It takes winter temperatures consistently below -35° to -40° C for several days to kill off large portions of the beetle population. Additionally, hot and dry summers leave pine drought-stressed and more susceptible to beetle attack.

A report by Environment Canada and the University of British Columbia states Canada has warmed an average of 1.3° C over the past fifty years, approximately twice the global average. On its website, the British Columbia Ministry of Environment states, "...slightly warmer winters have contributed to the devastating mountain pine beetle infestation in the B.C. interior."

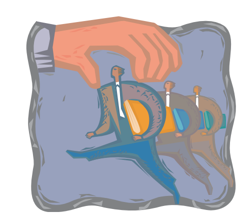
The epidemic has also spread into Alberta and U.S. forests. The beetle can be found in 12 western American states, and even Mexico.

Sources: Natural Resources Canada, *From Impacts to Adaptation: Canada in a Changing Climate* 2007. www./adaptation.nrcan.gc.ca/assess/2007/ch8/2_e.php • Environment Canada and University of British Columbia, Bizikova L., T. Neale and I. Burton (2008). *Canadian Communities' Guidebook for Adaptation to Climate Change*. www.forestry.ubc.ca/LinkClick.aspx?fileticket=xsexCSatHjo%3D&tabid=2455&mid=5415&language=en-US • British Columbia Ministry of Forests and Range (Feb. 2008). *Frequently Asked Questions*. www.for.gov.bc.ca/hfp/mountain_pine_beetle/faq.htm

Bug Problem Makes Way for Innovative Products

Faced with losing more than three-quarters of its pine supply in the next five years, the BC timber industry is developing alternative uses for its wood. For example, students in a University of BC graduate program cooked up a mix of concrete and chipped wood. "Beetlecrete" looks like wood but has the strength properties of concrete. The developers hope to market the building material in earthquake-prone areas. [Source: Hopper, Tristin. "Pine Beetle Wood Spurs Innovation." *BC Business,* Feb. 3, 2010.]

The use of wood in bioenergy is also on the rise. In 2008, British Columbia launched its Bioenergy Strategy initiative to convert waste into clean energy. "There is an abundance of bioenergy opportunities, such as using biomass created out of the mountain pine beetle outbreak that can stimulate investment and economic diversification while producing clean energy," said BC Premier Gordon Campbell. Within the next decade, the Province plans to increase its use of wood waste in generating energy. If there is a higher economic value for this end use, it is certain to have an impact on the supply of lumber in the future. [Source: *New Bioenergy Strategy Advances Innovation* (Jan. 31, 2008). www.energyplan.gov.bc.ca/bioenergy/PDF/2008OTP0017-000129.pdf]



Parting Shots

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

SBCA member Rocky Mountain Truss Co (Havre, MT) recently hosted a class of students for a tour of its truss plant. The tour was part of a hands-on learning program that teaches kids about building construction. Jesse Lohse, general manager, explained the North Central Montana Youth Build program helps at-risk students complete their high school diplomas while learning the valuable trade skills. "During the fall semester they do classroom work. In the spring they build two houses in a modular style," he said. The components are then shipped to a local Indian reservation, where the kids help assemble them. The finished homes are eventually occupied by residents of the reservation.

"It was a great opportunity for the kids to see how an important part of a house is built," said Steve Newbury, Program Instructor for Youth Build. Lohse said, "It's not about having a high school diploma for us. It's about showing up on time and knowing about our trade." SBC

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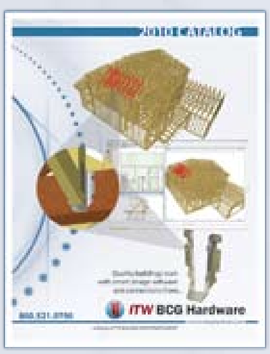

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