CM Found Not at Fault in Negligence Case

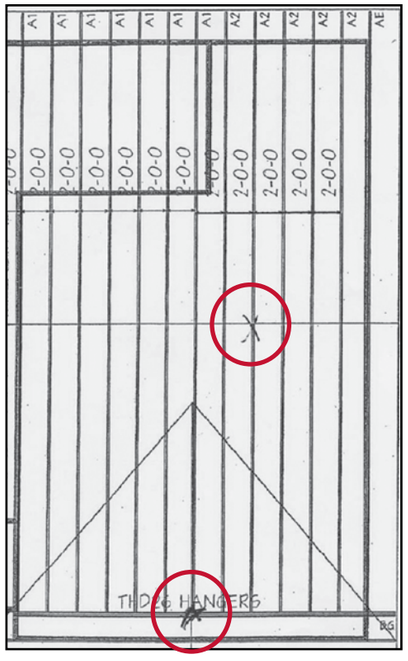
SBCRI Provides Testing Services to Disprove Product Defect Claims

by Kirk Grundahl, P.E. & Libby Maurer

Top chord lateral restraint is visible in the photos above.

Without the ability to perform proprietary testing in SBCRI, the outcome of this case could have been much different.

Truss collapses and the accidents that result from them can be devastating. When a case goes into litigation, proving negligence can become a matter of one expert opinion versus an opposing expert opinion. Thankfully, modern science and technology help us generate data to make compelling cases to either prove or disprove allegations in a court of law. In the same way the medical field uses DNA testing, the building industry now has SBCRI to provide facts to determine what really took place in the event of a product claim against structural building components or relating to frame construction of a particular project. This very real case demonstrates SBCRI's power and effectiveness.



Worker 1 was positioned at the ridge of the truss (top circle in red). Worker 2 (lower circle in red) was installing carried trusses with 3-16d nails through the single ply girder bottom chord. (It was intended to be a 2-ply girder, and the second ply was going to be added later.) When truss A2 fell straight down to the ground, Worker 1 fell with it and died.

The Accident

A three-man framing crew was setting roof trusses at the jobsite of a new single family home in the Midwest. One man was nailing in top chord lateral restraint near the ridge of a truss, while the other two men end-nailed the truss to the wall on one end and the girder truss on the other end, while also walking on the bottom chord to install top chord lateral restraint. While the men moved to the next truss in the sequence, truss "A2" fell and the worker on the ridge also fell roughly 20' to the concrete garage floor below. He died on impact.

Additional relevant facts:

- The truss system was braced better than most (see bracing in photos above).
- Hangers were not used to attach the common trusses to the girder truss spanning the garage walls. Three 16d nails were used to attach each carried truss over the garage to the girder.
- The trusses were built with #2 Southern Pine chords. Truss A2 fell to the concrete floor and broke at two visible knots along the bottom chord.
- Worker 1, positioned at the truss ridge, weighed approximately 240 lbs.
- The truss manufacturer provided an SBCA jobsite package with the truss delivery.
- The BCSI documents delivered in the jobsite package state on several occasions that appropriate hangers should be used in accordance with the truss manufacturer's instructions prior to truss installation. (See sidebar for specific language.)

Warning Language Found in BCSI

The fact that Heartland sent an SBCA Jobsite Package with its truss delivery was critical in this case. SBCA recommends that component manufacturers send—at minimum—a standard SBCA jobsite package with each delivery. It contains these *BCSI* documents: Jobsite Package Cover Sheet, Checklist for Handling & Installing Trusses, *BCSI-B1, BCSI-B2, BCSI-B3* and *BCSI-B4*. Among other important safety warnings, they contain language informing the framer to be certain that hangers are properly installed before installing the trusses, including:

- "Refer to the Construction Documents or the Truss Placement Diagram (if/when required by Contract) for the hanger locations. Hangers shall be correctly attached. Refer to hanger manufacturer's specifications for installation information."
- "All anchors, hangers, tie-downs, and bearing ledgers that are part of the supporting structure shall be accurately and properly placed and permanently attached before Truss erection, installation begins. Properly connect the Truss to each support."
- "Warning! The structure is not structurally sound, stable or safe until all the hardware, restraints and Bracing are properly installed."
- "Are all required hangers, angle clips, tie-downs, and restraint/bracing materials onsite and located where they will be readily accessible when needed? Obtain all materials or parts prior to starting the Truss erection process. Do not attempt to 'make do' without all required materials. Jobsite safety has no room for shortcuts."

The Suit Against Heartland

The victim's wife and family sued Heartland Wood Products, the truss manufacturer, for negligence. The victim worked for his father's construction company and was also framing his own new house at the time of the accident.

The Plaintiffs alleged that the truss that failed was "in a defective condition [and] unreasonably dangerous when put to a reasonably anticipated use at the time it was designed, manufactured, sold and distributed by [Heartland]." In addition, the Plaintiff alleged that the truss was not designed or manufactured with adequate strength, and that Heartland failed to properly inspect it before use.

The Plaintiff also sued Heartland for product defect, claiming that the roof truss was "defective and [in an] unreasonably dangerous condition in that it did not have adequate strength for its reasonable foreseeable use due to the excessive amount and size of knots in the wood." They alleged that the truss failed because the knots along the bottom chord (see photo below) weakened the truss, broke and caused the truss to fall to the ground.

The Plaintiff sought damages exceeding $2 million.

Continued on page 18

Below: Truss A2 cracked in the bottom chord. The Plaintiff's expert alleged a knot in the same location broke and caused the collapse.

Jobsite photo shows spot where truss pulled away from nails and fell away from the girder truss. SBCRI's challenge was to construct a set-up that precisely replicated the jobsite conditions and what was the likely occurrence and result.

CM Found Not at Fault in Negligence Case

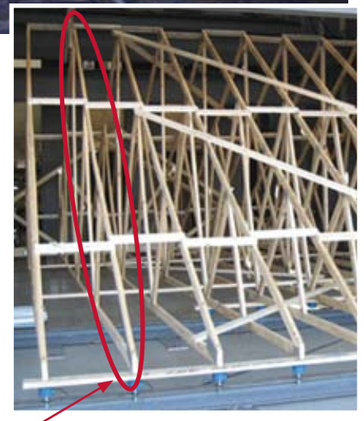
Continued from page 17

Defendant Heartland Wood Products sought SBCRI's testing services to define the facts of the case: 1) The truss falling in the manner that it did, straight down to the ground, was not a typical truss falling mode during the installation process, and 2) even if the bottom chord broke at a knot, as alleged by the Plaintiff, the truss would not fall in the manner that it did.

Based on knowledge of structural engineering and pictures Robert MacGillivray (President of Heartland) took at the jobsite after the accident, he knew the Plaintiff's allegations could not be correct. The challenge, however, was providing definitive proof that would convince a jury.

Having owned Heartland since 1993, MacGillivray has sent a Jobsite Package with every truss order. "I saw a near-collapse in a horse barn once [before I owned a truss company]. The trusses had not been braced properly. I wondered if the truss supplier had protected itself by providing proper safety guidelines. I've never forgotten it," he said. The experience made such an impression on him that he insisted on protecting his own company. "People tend to think this will NEVER happen to them, but that's the reason it's so important. It can happen and you better be protected when it does." He knew that being able to prove the framing company had received a Jobsite Package was one of the keys to convincing the jury his company was not negligent.

Certain that his company was not liable for the accident and that it protected itself with a Jobsite Package, MacGillivray was not afraid to go to trial. In fact, he welcomed it. "I'm a firm believer that the truss industry has good documentation and I felt like we ought to stand behind it. I knew we didn't do anything wrong. I knew we were going to be absolved of any wrong doing."



The A2 truss that broke in the field

SBCRI Test Plan

To disprove the negligence claim, SBCRI defined a test plan to determine the likelihood of an accident if trusses were installed in accordance with standard industry practice as outlined in BCSI. The goal was to create an exact replica of the jobsite scene in the lab.

The roof system was assembled with the three truss types in the home. The one girder truss (BG) 24'-4" long with a 8-12 pitch was set first and properly braced (in accordance with standard industry practice) to the ground.

Next, seven 3-point bearing common trusses (A1) 39'-½" long with a 7-12 pitch and three 2-point bearing common trusses (A2) 39'-½" long with a 7-12 pitch were set and properly restrained. (See photos above.)

SBCRI performed three tests to single out the cause of the failure and to demonstrate what happens when the common trusses were secured with hangers to the girder truss as intended. Each test was filmed so that the results could be shown to the jury.

Continued on page 20

CM Found Not at Fault in Negligence Case

Continued from page 19

Test 1:

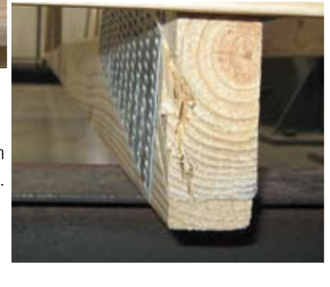
This was an exact replication of the conditions in the field. The second A2 common truss was end nailed into a girder and was not secured with a hanger. SBCRI used three lab staff to simulate the actual worker loads that were applied in the field to recreate the jobsite scene.

SBCRI lab staff members were used to simulate loads on A2.

During the test, the truss fell straight down from the girder truss. It was then clear exactly what had happened on the jobsite—the wood at the heel of the truss had split due to nail edge distance, and then pulled away from the 3-16d girder nails. The truss failed just like it failed in the field. The test showed that the failure occurred because of the missing hanger that should have been used to attach A2 to the girder.

A2 fails when the truss pulls out from the two end nails girder during Test 1. No hanger is present. Compare to jobsite failure in photo below.

Damage to the actual truss on the jobsite. It shows splitting at the end of the bottom chord.

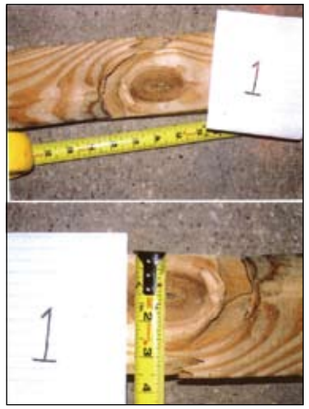


The end of truss A2 used in SBCRI shows splitting.

Test 2:

The goal of the second test was to show that if the trusses had been installed properly—with hangers installed before end-nailing the trusses to the girder—there was no possible way A2 could have fallen as a result of a lumber knot or two breaking in the bottom chord. The Plaintiffs brought in an expert to give testimony in support of the evidence.

The expert testified that "a combination of the knot and the cross-grain in and around the knot contributed to the cause of truss failure." He said that had the bottom chord been constructed from a piece of wood without cross-grain and without strength reducing characteristics, the truss would not have failed. He also believed the bottom chord failed first and then initated the full failure.



Photos of expert witness exhibits submitted as evidence during the trial.

To disprove the expert's testimony, the bottom chord of A2 went through a series of "modifications" at two different locations in the bottom chord, each representing a knot in the original truss.

First, the trusses were properly installed and braced per *BCSI*.

Next, three men were positioned at the top of the truss (as shown in photo above), representing three times the load at the peak of the truss on the jobsite. Two additional men stood on each bearing end of the truss. This is where they stood on the jobsite when installing temporary bracing. With the load of five men on the truss, it did not fail.

Then to simulate the broken knot area, a hole was cut in the bottom chord of A2. The same five men climbed onto the truss. No failure.

Then a cut was made through the bottom chord of the first "knot" and loaded with five men. No failure.

Finally, the bottom chord was cut all the way through at the "knot." Again, the truss did not fail.

The process of creating a hole, making cuts straight through the chord, and loading the truss with five men was repeated to simulate the second knot in the bottom chord. As with the previous set of tests, the truss did not fail. In each of the cases, the truss never failed to support the load that was applied to it.

Tests & Jobsite Package Hold Up in Court

Heartland's attorneys presented video and pictures from the SBCRI tests to the jury. The clear visuals from the tests and the summarized results created a very real-life picture of how the accident on the jobsite occurred.

In his testimony, the Plaintiff (owner of the framing company) acknowledged having received the SBCA Jobsite Package. In fact, he noted he'd seen it on other Heartland jobs too. "I wasn't surprised. There was no way he could deny it," MacGillivray said.

The jury deliberated for less than 40 minutes before reaching their verdict: 11 to 1 in favor of Heartland. "Our duty to inform is paramount in this industry," said MacGillivray. "This and SBCRI testing quite frankly saved my company in this case. Both were crucial elements in allowing the facts to speak clearly for us in this case." They found the Plaintiff and the Deceased each 50% at fault.

MacGillivray hopes component manufacturers will learn from his experience. "SBCA has done a very thorough job in describing the recommended safety practices. We need to use the tools available to us. It's tragic that a man died on this job. There's no doubt in my mind he would still be alive today had the crew followed the recommendations in BCSI and common sense carried truss/girder framing practices." SBC

STRUCTURAL BUILDING
COMPONENTS™
THE FUTURE OF FRAMING

www.sbcmag.info

Dear Reader:

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 of structural building components to ensure growth and continuity, and to be the information conduit by staying abreast of leading-edge issues. SBC will take a leadership role on behalf of the component industry in disseminating technical and marketplace information, and will maintain advisory committees consisting of the most knowledgeable professionals in the industry. The opinions expressed in SBC are those of the authors and those quoted solely, and are not necessarily the opinions of any affiliated association (SBCA) .

Truss Publications, Inc.

6300 Enterprise Lane • Suite 200 • Madison, WI 53719
608/310-6706 phone • 608/271-7006 fax
www.sbcmag.info • admgr@sbcmag.info