Truss Technology in Building:

Crane Equipment & Proper Truss Handling

by Sean D. Shields

Coming in January 2006, a new TTB document will show proper truss hoisting and crane rigging techniques for jobsite employees and crane operators.

Sing along with me! *Broken, split wood webs and badly cracked top chords, connector plate damage and contractor discord. Nasty-word phone calls and mislaiden blame, these are a few of my favorite things...*

Okay, for those of you with Julie Andrew's voice ringing in your head, I sincerely apologize. Given the rapid approach of this holiday season, the song and words seem oddly appropriate. Not only because of its connection to winter and choral concerts given by children, but because of the fact that jobsite damage to your products never seems to take a proper holiday.


Truss Technology IN BUILDING

DRAFT

SPANISH TEXT TO BE ADDED

Crane Use & Proper Truss Handling

RESPONSIBILITY

KEY CONSIDERATIONS

CRANE SIZE

CRANE SET UP AND INSPECTION

SPECIAL CONSIDERATIONS

LOAD POSITIONING & MOVEMENT

One of the ways in which this damage occurs is through the mishandling of components using inadequate rigging and crane equipment and improper truss hoisting techniques. However, unless you own and operate the crane, addressing this issue directly can be complicated. A good first step toward mitigating this type of damage is to provide building contractors and jobsite foreman information on the right way to hoist trusses into place.

That information can now be found in WTCA's new **Truss Technology in Building** (TTB) entitled *Crane Use & Proper Truss Handling.* As the introduction to this TTB states,

> Once trusses are delivered to the jobsite, they are generally hoisted into place utilizing a crane and rigging. Inadequate or improperly used hoisting equipment can result in damage to truss members and/or connector plates. This document provides very basic guidelines to help avoid this type of damage.

at a glance

- A new **Truss Technology in Building** document developed by WTCA due to members' requests demonstrates proper truss hoisting techniques on the jobsite.
- Although the document gives recommendations for the handling of trusses, it is important to note that the general operation of any mobile crane *must* comply with OSHA standards.
- The TTB's section on Load Positions, Movement & Rigging presents techniques that are likely to reduce crane damage to trusses.

Overview

Fortunately, the Occupational Safety & Health Administration (OSHA) has long had regulations on the books regarding the use of mobile cranes—those that can either move under their own power or are attached to a mobile source such as a truck or rail car. This TTB indicates first and foremost, any operation of a mobile crane should comply with OSHA standards. It also makes clear that, unless specified otherwise through a contract, the crane operator and/or building contractor is responsible for all crane equipment used on the jobsite.

The key factors we will consider are stated plainly at the beginning of the document:

- Always obtain the correct crane size, never exceed load capacity.
- Always properly stabilize the crane onsite.
- Always use proper rigging equipment.

Continued on page 68

Crane Equipment & Proper Truss Handling

Continued from page 66

- Special hoisting equipment is needed for trusses longer than 30' in length.
- Crane operator and ground crew need to know basic hand signals.

Each of these factors is then discussed at greater length through subsequent sections of the document.

Crane Size, Set Up & Use

The first factor that must be considered is the size of crane necessary to safely lift components from their delivery location on the jobsite to their position above the building top plate. The TTB states:

> Crane size should be determined with consideration for both size and weight of the trusses to be hoisted, as well as the total distance from the safest jobsite footing of the crane to the farthest point of truss delivery. Crane equipment, load capacity, and use should comply with OSHA standards [Subpart N, 29 CFR 1926.550. See **Support Docs** at www.sbcmag.info for the full standard.]

Crane manufacturers provide load capacity information for their equipment, and it is the responsibility of the crane operator to be aware of whether a crane's load capacity is capable of safely lifting the required load.

Just as important as crane size is the manner in which it is set up on the jobsite. Instability can cause the crane to topple, which can not only inflict significant damage to the building under construction, it can also cause serious injury or fatality to workers on the jobsite. Several other factors, including possible obstructions and ground conditions, need to be considered when setting up a crane. The document states:

> It is essential the crane is properly stabilized, physical obstructions to movement are accounted for, and proximity of electrical power lines is known. The crane footing area should be level, firm, properly graded, free from obstruction, and drained to prevent tipping. Outriggers should always be extended and used in accordance with crane manufacturer's recommendations. Place blocking under outrigger pads to reduce PSI loads on outriggers. The relationship of the load weight, angle of boom, and of the hoisting process must be considered to prevent tipping. Crane set up should comply with standards established by the American Society of Mechanical Engineers [ASME/ANSI B30.5-2004].

The American Society of Mechanical Engineers has published standards like the one referenced above on mobile cranes since 1884. This particular standard is referenced not only by OSHA, but by most state regulations governing mobile cranes.

The TTB also makes specific reference to some extraordinary conditions that affect the set up and operation of crane equipment like adverse weather conditions and proximity to power lines and airports. Regarding weather, it states:

> Use Special Care in Adverse Weather Conditions. Buildings under construction become more dangerous when constructed in high wind conditions. Lightening can also pose a serious risk. It is the responsibility of the Crane Operator or Project Manager to recognize adverse weather conditions and take prompt and appropriate action to ensure safety.

Load Positions, Movement & Rigging

As a component manufacturer, this section provides the "meat and potatoes" of the document. While all the other sections are extremely important from a jobsite safety and liability perspective, this is the aspect of crane use that generally causes damage to your products. Most of the information in this section is already contained in the *Building Component Safety Information* booklet (BSCI 1-03), with a few important additions.

Crane Equipment & Proper Truss Handling

Continued from page 66

In reference to load positioning, the document recommends minimizing hoisting distance by locating the required load as close to the building as possible. In addition to a reference to OSHA standards governing load movement, it provides specific warnings regarding truss banding, which should not be used as rigging equipment. Choosing and utilizing the proper rigging equipment is just as important as selecting the appropriate crane size.

> Use materials such as slings, chains, cables and nylon straps of sufficient strength to carry the weight of the truss or truss bundle. Use slings, taglines and spreader bars properly to avoid damage to the metal connector plates and truss lumber. All rigging equipment and use should comply with OSHA regulations [Subpart H, 29 CFR 1926.251. See **Support Docs** at www.sbcmag.info for the full standard.] .

Not only is the material and type of rigging important, so is its use in connection with components. One important addition to the information in BSCI 1-03 is the inclusion of new illustrations and warnings about not lifting trusses by the peak and only using closed loop attachments to the top chord when connecting hoisting devices (see Figure 1 on page 71).

The document also includes illustrations on proper rigging equipment and connection points based on the overall length of the truss being lifted. For instance:

> For trusses up to 30' use a minimum of two pick-points at top chord joints spaced 1/2 the truss length apart. Keep line angle to 60° or less. For trusses between 30' and 60' use spreader bar 1/2 to 2/3 truss length. Attach truss to the spreader bar with lines that slope inward or "toe-in," as shown. Lines that "toe-out" can cause the truss to buckle. For trusses over 60' use spreader bar 2/3 to 3/4 truss length. The spreader bar prevents lateral bending and should be attached to top chords and webs at 10' intervals. Locate the spreader bar at or above mid-height of the truss to prevent overturning.

Long-Span Truss Alternative

While not addressed in TTB *Crane Use & Proper Truss Handling,* the next revision of BCSI 1-03 will include information on this subject recently published in the TTB called *Long-Span Trusses*. That document states:

> Long span trusses, 60' or greater in length, pose significant risk to installers. The dimensions and weight of an individual long span truss can create instability, buckling and collapse of the truss if it is not handled, installed and braced properly.

As a consequence, the alternate five-step process for assembly, hoisting and installation of long-span trusses outlined in *Long-Span Trusses* should be followed.

Basic Hand Signals

Finally, *Crane Use & Proper Truss Handling* includes illustrations and descriptions of the basic hand signals that crane operators, and those assisting in the hoisting of trusses, should know and use to ensure safe load movement. These hand signals cover raising, lowering, extending and retracting the boom; hoisting and lowering a load; and, moving slowly, stop and emergency stop.

A Gift that Keeps Giving

Give building contractors and their framers their own copy of *Crane Use & Proper Truss Handling.* It can help to reduce the amount of damage done to your products on the jobsite due to the use of inadequate crane and rigging equipment or improper hoisting techniques.

So instead, you can start singing with gusto: *Bright, shiny crane booms and nylon strap rigging. Whole, sturdy trusses, no cracks, splits or sagging. Happy contractors, no trips to court rooms, these are a few of my favorite things...* SBC

For more details about Crane Use & Proper Truss Handling, log on to www.woodtruss.com today.

RIGGING EQUIPMENT

Use materials such as slings, chains, cables and nylon straps of sufficient strength to carry the weight of the truss or truss bundle. Use slings, taglines and spreader bars properly to avoid damage to the metal connector plates and truss lumber. All rigging equipment and use should comply with OSHA regulations [Subpart H, 29 CFR 1926.251].

HOISTING TRUSSES

WARNING! Avoid Lateral Bending When Hoisting Trusses

WARNING! Do not lift trusses by the peak. (1. & 2.)

WARNING! Connect lifting devices to the truss top chord with only closed loop attachments. (2. & 3.)

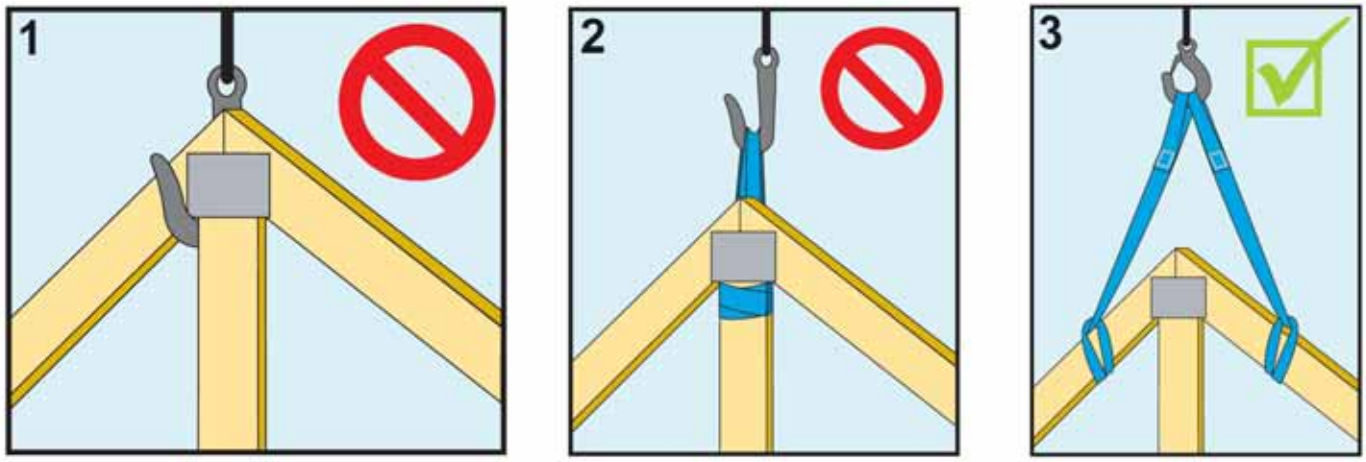

Figure 1. Information on Rigging Equipment and Hoisting Trusses from WTCA's new *Crane Use & Proper Truss Handling* TTB.

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 of the affiliated associations (SBCC, WTCA, SCDA & STCA) .

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