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Madison, WI 53719
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editor's message

by Rick Parrino

Grooming Leaders for Tomorrow Takes Effort Today

SBCA "Emerging Leaders" program looks to the future.

Sometimes I just can't believe how fast the years go by. In 1984, my grandfather got me a job stacking trusses at the company he had worked at for the previous 35 years, Edward Hines Lumber in St. Charles, IL. My brother also worked there, and I can still remember complaining to him after a long day of moving those heavy trusses off the assembly line. If you had told me then that, one day, I'd be managing a truss plant and serving on the SBCA Board, I would have laughed at you. Yet, here I am.

I continually remind myself that I didn't end up here without a lot of help and guidance from others in this industry. Bear with me for a bit. I want to share with you a little of my past, in order to illustrate how important it is to make connections, build friendships and, ultimately, reap the benefits of giving back. It's what makes this industry so great.

For example, at Edward Hines, I became good friends with one of the designers. There were several years that we lived a few doors away from each other and we raised our kids together. His passion for the truss industry rubbed off on me. I worked nights, and when I needed help with dimensions, or information for a set-up, he worked late and always helped me out. That was about the time that I figured out trusses were the future of framing buildings. I remember telling my wife we could do things with trusses we could never do with stick framing. She laughed and said everyone hates prefab houses—and so the challenge began.

By 1993, I moved to New England to take a job with Truss Tech and started to get somewhat serious about the idea of a career. That's one of the funny things about this industry; when you're young, it's easy to think of your job as just a job until you find something better. However, there are so many career opportunities in the truss business that will allow you to make a good living. Unlike a lot of other professions, it doesn't matter what your work, education or socioeconomic background is; all that matters is how willing you are to roll up your sleeves and get the job done. The more you apply yourself and fill a need, the more valuable you become, and the more opportunities you have to take on even greater responsibility and make a career of it.

My boss at Truss Tech understood I couldn't learn everything I needed to know by staying put in the truss plant. He encouraged me to attend the SBCA – Northeast Chapter meetings. I remember meeting Lee Vulgaris (a Past President of SBCA) and really enjoying the relationships I was able to form with the guys who attended those meetings. They offered me a much broader perspective of the truss business and gave me an appreciation for the entrepreneurial spirit of our industry. In 1993, I attended my first BCMC show. That event nearly blew my mind.

Eventually, I found I missed the Midwest and took a job offer at Imperial Components. There I got to work for Don Hershey (another SBCA Past President; read more about his many contributions to the industry in the March 2012 issue of ***SBC Magazine***), and became good friends with his son, Keith Hershey, when he was forced to share a room with me at a BCMC show. Keith now helps run our SBC Research Institute (SBCRI) in Madison, WI, and I have valued our friendship over the years.

After Imperial, I guess I decided to settle down and took a job with Plum Building Systems here in Iowa. I don't remember if staying at Plum was the long-term plan

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at a glance

- In order to illustrate how important it is to make connections, build friendships and, ultimately, reap the benefits of giving back, Rick shares his past experiences and influencers.
- Rick became the leader he is today through being led by others who had a long-term vision for the companies he was a part of, and for the industry as a whole.
- The SBCA Board is currently considering the development of an "Emerging Leaders" program to give our industry's next generation of leaders an opportunity to begin networking with each other today.

going into it, but I certainly don't regret having stayed all this time. My boss also strongly encouraged me to seek advice and gather best practices outside the confines of our plant. He saw SBCA (known as WTCA back then) as a way to get to know other component manufacturers and learn about how they solved the problems I was facing in our plant.

I remember Roger Gibbs (yes, another SBCA Past President) called me up and asked me to attend a meeting of the Iowa Truss Manufacturer's Association (ITMA). I quickly became friends with Roger and Ray Noonan (to know more about Ray and his family's story, read the Sept/Oct 2013 issue of ***SBC Magazine***), and they gently strong-armed me into serving on ITMA's Board. It was through that involvement (and Roger's persistent encouragement) that I started getting involved in the national affairs of the truss industry through SBCA.

When I first started serving on the board, SBCA's leadership was pretty well established. All I had to do was listen, soak it all in and help out anywhere I could. Those guys passed on a great deal of personal knowledge, and they inspired me to become better. If I look at the list of SBCA Presidents who have served since I joined the board, I can't help but be amazed at my good fortune for having had the pleasure of working with some of the smartest and most generous people in our industry. These leaders shared their life passion with us so that we could all become better component manufacturers.

Hopefully, by now, you can appreciate that I did not become a leader in my company, and a leader in the organization, through either chance or on my own. I was led by others who had a long-term vision for the companies I was a part of, and for the industry as a whole. Those men in my life saw my work ethic and my drive, they took me under their wings, and they helped mold me into the man I am today. It took a lot of my own hard work, but I couldn't have achieved what I have without their guidance and faith. I feel fortunate today to still have the ability to work with forward-thinking leaders like our owners here at Gilcrest/Jewett Lumber. They continue to encourage me to build relationships outside our company and participate in our association.

When I look at our industry today, I can't help but feel a little troubled at the seeming lack of young(ish) people being groomed for leadership—in their companies, in the SBCA chapters and nationally. It is my hope today's leaders start identifying and shepherding these individuals. That is why the SBCA Board is considering the development of an "Emerging Leaders" program. We want to create an opportunity for our industry's next generation of leaders to begin networking with each other today. It will be a chance for them to learn more about our industry's past, while also getting tied into its future at the same time.

Much like my journey, participants in this "Emerging Leaders" program will get a chance to interact with our current leaders and get a broader perspective on the industry and the trends that will determine where it will be when they take over the reins. If you haven't thought about who you want to groom to take your place, today is the day to start. If you've already thought about it, or better yet, been actively engaged in mentoring them, consider getting them involved in this "Emerging Leaders" program. It will make them a better leader in your company, and it will make the industry stronger as a whole. **SBC**

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framer viewpoint

by Kenny Shifflett, NFC Steering Committee

Addressing Industry Standards Development

A new subcommittee begins work on behalf of framers.

As a member of the National Framers Council (NFC) Steering Committee, my goal is to look at our industry from the framer's point of view and how to serve framers' long-term best interests. This includes pursuing concepts that have not been dealt with in depth and investigating topics that need to be brought to the attention of the building community. I'm excited to introduce a Standards Development Subcommittee of the NFC, featuring representatives in the fields of component manufacturing, engineering, general contracting and framing. Countless widely accepted codes, both those in law and in practice, govern the building industry; however, there are few published findings available for professionals to reference that include standards for materials when framed, framing tolerances, and expectations of both.

Though still in its infancy, the subcommittee's goals are to begin outlining framing practices performed every day where tolerances and known good performance have not been reviewed in detail, answer questions about differences in applications, and address those applications requiring judgment calls. The list of practices includes:

- Standard framing details
- Job readiness
- Storage and handling of materials
- Shrinkage and expansion in wood construction
- Accepted tolerances in sheathing expansion and contraction
- Effects of moisture content on the structure
- Gravity load induced movement
- Floor and ceiling crowns and differential movement
- Stud crowning, bowing and wall plumbness
- Mold and moisture

The list of topics is not limited and will grow in time because each framing area has many details that only become apparent when you focus on the nitty gritty of an issue.

Similar to the structure of NFC's **FrameSAFE** program, the Standards Development Subcommittee intends to research and compile all the relevant industry information pertaining to each topic. The subcommittee will look "through the eyes of a framer," provide step-by-step implementation guidelines and options, and test any gaps found where testing would add understanding. Then the council will publish its findings, opinions and best practice checklists on the standard approaches, along with associated implementation tolerances, to ensure successful applications. NFC benefits from the diversity of its current membership, and every sector of the industry will be included to ensure the work done is reviewed using all points of view.

NFC is not the first to explore this topic area. Literature is available from various organizations and building experts around the nation. A simple Google search provides all kinds of content from builder forums on framing approaches and their internal tolerances, to independent research reports on lumber and sheathing properties, including, but not limited to, temperature, moisture content, treatment, and storage considerations. While many of these report findings are based on a specific goal and objective, very few have viewed construction site performance as framers do and

at a glance

- ❑ There are many published installation guides available for product-specific applications, but few account for framing tolerances when dissimilar materials are integrated into the overall building and the expectations for overall performance.
- ❑ NFC's Standards Development Subcommittee will begin outlining framing practices performed everyday where tolerances and known good performance have not been detailed in depth.
- ❑ The subcommittee will take a "through the eyes of a framer" point of view and provide step-by-step implementation guidelines and options.

fewer have developed a series of application considerations to account for jobsite challenges. Reliable sources are scattered amongst word-of-mouth practitioner knowledge and individual framing company best practices, checklists and publications.

This is not to say there aren't extremely thorough reports from proven leaders in the industry. The National Association of Home Builders (NAHB) offers a course in "Building Codes, Standards and Guidelines"[1] covering, in its words, "performance guidelines" to ensure quality construction. NAHB also released the "Residential Construction Performance Guidelines Homeowner Reference" in 2000. This was an effort to define acceptable levels of quality, while addressing the needs of both homeowners and builders. The analysis contained in the publication was created and reviewed by hundreds in the building community, and the content is specific to common questions of construction quality.

NFC plans to take the best information in the market and use it as a starting point, and from there, address the questions that haven't been answered. How much has a structure moved from winter to spring months? What can a builder assume with respect to foundation and framing movement from winter to summer, given frost and changes to the moisture content of the building materials? Furthermore, what is an acceptable amount of movement in that time frame?

The key to understanding these questions starts at a micro level; every piece of material used in building has its own set of unique properties whose performance needs to be compatible with the other materials to which it is attached or adjacent. Dissimilar materials may work fine in isolation, but may perform in unexpected ways when applied as framed. Most importantly, each member of a construction team must meet in harmony to build a structure true to its blueprint. Given an increasing number of units built with a wide variety of conventional stick framing methods, factory-assembled components, manufactured connection methods, and the innovative materials needed to meet or improve upon the changing building and energy code requirements, standardized best practice development is vital to support quality across the industry.

David Kent Ballast, AIA, CSI, understands the importance of standards development. Ballast is a registered architect and owner of Architectural Research Consulting. His business focuses on applied research, technical advice, and specifications for architects, interior designers, and others in the construction industry. Ballast has published numerous books, and is most well-known for authoring the *Handbook of Construction Tolerances*.[2]

Ballast writes in the 2007 version of his handbook, "Interestingly, there are still many construction tolerances that do not exist as industry standards. Although many can be derived from combined individual and accumulated tolerances, the various trade associations need to continue work on setting realistic and enforceable standards for both tolerances and uniform measurement protocols."

NFC will do its part to facilitate standardized sets of best framing practices for our industry and those who support its evolution and growth. Current accepted construction tolerances were established over time with many considered standard practice based on years of experience and what is practical. Others are based on standards published by specific industries only focused on a given product line application approach with the goal of making installation simple, of sound quality, and cost effective. The Standards Development Subcommittee members come from diverse backgrounds. In the long run, the finished standardized approaches will serve the best interests of everyone involved in the framing process from architects to engineers, suppliers to contractors, and to the worker who ultimately needs to get the job done. SBC

resources:

- **NAHB**: nahb.org/page.aspx/category/sectionID=223
- **BCSI:** sbcindustry.com/bcsi
- **APA Resource Library:** apawood.org/resource-library
- **AWC** (ASD, LRFD, Fire, NDS, SDPWS, WFCM, etc.)**:** awc.org
- **SBCA Technical Resources:** sbcindustry.com/technical

Kenny Shifflett owns Ace Carpentry in Manassas, VA, and has been in the framing industry for more than 40 years. He serves on NFC's Steering Committee and chairs the Council's Safety Subcommittee. For more information about the National Framers Council and the FrameSAFE program, visit framerscouncil.org.

[1] nahb.org/generic.aspx?sectionID=224&genericContentID=144002

[2] Ballast, David K. 2007, *Handbook of Construction Tolerances,* John Wiley & Sons, Hoboken, NJ.

In Pursuit of a Better Performing Truss

Figure 1. The roof of the Maharishi University student union and dining hall included a Kalash, an opening that crowned the top of the building.

by Emily Patterson

When it comes to getting the right structural building components for a project, cost isn't everything, but how do you convince the building designer? Communication is key, says David Mitchell, Operations Manager with Engineered Building Design (EBD) in Washington, IA. When he gets the opportunity to discuss a project with an architect or engineer, Mitchell works to provide specifiers with the knowledge they need to use the proper product for the application. Done well, this revised thinking can result in a more cost-effective component and labor solution. "You can help them understand our product better and the implementation of a design change," Mitchell explains. "The cost of the individual component isn't really the issue at hand. We want to give you a better performing truss for the application."

"The cost of the individual component isn't really the issue at hand. We want to give you a better performing truss for the application."

Choosing a Raw Material

One way EBD goes about building a better performing truss is with the raw material it uses. More than 20 years ago when the company first opened its doors, EBD chose to almost exclusively use MSR lumber. The decision just made good business sense, says Mitchell. "Using MSR was what our competition was doing. We evaluated and decided to do the same," he said. "MSR helps us make sure we're putting out a top-quality product."

The company's lumber choice worked then and continues to give EBD a benefit it can offer customers in the form of greater design flexibility. In addition to working with specifiers to get the full potential out of its truss designs, the company has even surprised a fellow component manufacturer now and then. "Years ago, another truss manufacturer asked us, 'How do you make that design work?'" recalled Mitchell. "I told him we designed to the loading and deflection criteria using better MSR."

Pushing Design Limits

Focusing on custom residential projects as its bread and butter, EBD strives to meet the ever-growing design complexity of the single-family home. For example, Mitchell says he sees more and more buildings that try to incorporate scissors and trays into hip roof systems. "Sometimes you have to work hard at your designs to make something structurally sound," he said. EBD also uses the more reliable design values of MSR to reduce the amount of web bracing and web restraint, when possible.

About 20 percent of the company's business consists of larger multi-family and commercial projects, which can press design limits even further. On multi-family floor truss projects, EBD's designers encounter some especially long spans that push floor truss span-to-depth boundaries. "Sometimes architects and engineers overspan floor trusses," said Mitchell. "You have to go back to them and let them know there can be performance issues, they should consider narrowing the spacing, and the reasons why. MSR helps us make some of those longer spans work using the existing expected spacing, while meeting the deflection and L over D criteria." He also noted that using higher lumber grades helps prevent his designers from having to use double chords in certain instances.

Fitting Trusses in Maharishi Vedic Architecture

The company encountered some unique design challenges when it got the job to design and manufacture trusses for a student union and dining hall for the Maharishi University of Management in Fairfield, IA. The contractor, who specializes in more complicated projects, had some needs outside of the usual large, educational structure. The building was designed according to the principles of Maharishi Vedic architecture, which lays out specific guidelines for the proportion, orientation and placement of rooms and the building itself, along with other design criteria that address the building's relationship to the land surrounding the structure and using natural and nontoxic construction materials (see Figure 1).

Trusses were a practical choice for the project, given that components can be accurately designed to a specific set of loading and load path conditions. EBD supplied the roof and floor trusses for the student union and dining hall. Constructed of 22' tall scissors trusses, the roof included a Kalash, an opening that crowned the top of the building. "Because of the size and shape of the trusses, with a clerestory and huge scissors trusses, MSR was important—number one, because of its strength values, and number two, because you also want the reliability of the design values."

Continued on page 12

clerestory:

In architecture, clerestory (lit. clear storey, also clearstory, clearstorey, or overstorey) are any high windows above eye level. The purpose is admit light, fresh air, or both. Historically, clerestory denoted an upper level of a Roman basilica or of the nave of a Romanesque or Gothic church, the walls of which rise above the rooflines of the lower aisles and are pierced with windows.

Figure 2. A 53' girder truss supported a second-floor walkway in the building.

In Pursuit of a Better Performing Truss

Continued from page 11

In addition to the roof and floors, EBD designed other portions of the building out of components. A 53' girder truss supported a second-floor walkway in the building (see Figure 2). The risers in the auditorium were even built out of trusses with a 150 lb. live load, so that the area underneath could be used for storage.

Assembling and getting the components to the jobsite also posed some interesting challenges. The customer asked if the trusses could be field spliced at the jobsite. After evaluating the site, weather forecast and schedule, EBD determined that the jobsite conditions weren't conducive for field splicing. The company chose to use the much more reliable setting in the truss yard and field spliced the trusses with a press purchased especially for the project.

Continued on page 14

"Sometimes architects and engineers overspan floor trusses. You have to go back to them and let them know there can be performance issues, they should consider narrowing the spacing, and the reasons why. MSR helps us make some of those longer spans work using the existing expected spacing, while meeting the deflection and L over D criteria."

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Figure 3. A house mover transported the trusses approximately 30 miles from EBD's truss plant to the jobsite.

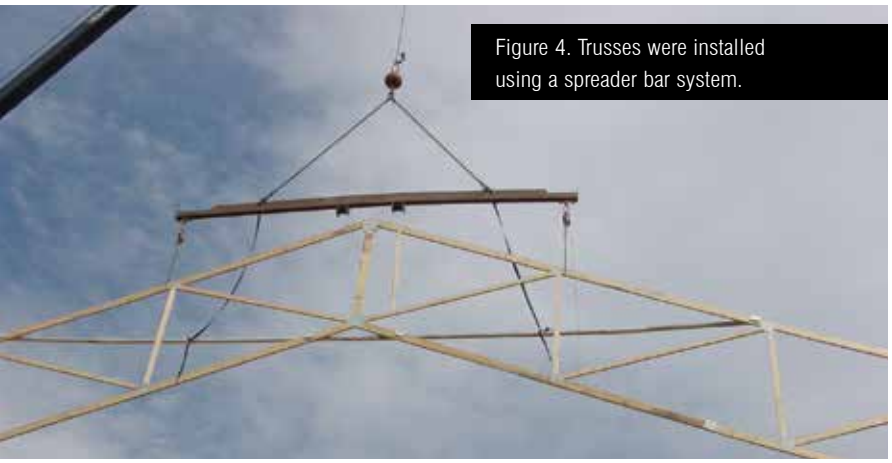

Figure 4. Trusses were installed using a spreader bar system.

In Pursuit...

Continued from page 12

Due to the size of the components once they were spliced, a house mover transported the components to the jobsite (see Figure 3). While this isn't the way EBD's components are typically delivered, Mitchell said the house mover had the right equipment for the job. "They literally walked the load down the road, and did things like turn the back axels as needed to avoid an obstruction," he explained.

Plenty of preparation led up to installation on the jobsite, with EBD taking part in multiple planning meetings. "The project team had several meetings leading up to installation, to make sure we were on the same page with the design, and then to figure out what we're supplying and how they're going to install," said Mitchell. During that process, EBD recommended a spreader system to help with installation (see Figure 4).

Mitchell says the project is a good example of how, at EBD, "We build a lot of complex stuff." The company's pursuit of building a better performing truss paid off, with the company later working with the university again on a sustainable living center project. SBC

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TRUSS INDUSTRY STANDARD OF CARE ISSUES

by Scott D. Coffman, P.E., SECB & Jim Vogt, P.E.

PART 4

Truss industry standard of care items are contained throughout *ANSI/TPI 1,*[1] *The National Standard for Metal Plate Connected Wood Truss Construction.* The focus of this article is *ANSI/TPI 1* Chapter 2, Section 2.3.5.1 and companion Section 2.4.5.1, which require a truss designer to prepare truss design drawings (TDD) based on design criteria and requirements set forth in the construction documents. The truss industry should expect to get this information from the building designer (BD), which may include the building owner, contractor or a registered design professional (RDP). Particularly when there is an RDP for the building, the design community expects the truss industry to design components that conform to the truss framing plan and specified design parameters within the construction documents, unless instructed otherwise in writing.

No matter who the BD is, it is important that the design parameters used by the component manufacturer (CM) in the design, manufacture and placement of the components for the building are fully defined in writing. The ideal situation is that this information is reviewed and approved by the BD. In circumstances where this is not possible, the CM has, at the very least, defined all the conditions and/or set forth all the assumptions they used in the design in writing and the opportunity to make changes prior to manufacturing the trusses has been given.

Contractors and owners often request a truss manufacturer to review construction documents for a project and "optimize" the truss package. Common practices employed by a truss designer may include modifying truss spans, framing orientation, bearing locations, the number of truss plies, and lumber size. Although this may reduce the overall truss package cost, it can result in load paths not intended by the BD, or create other unintended consequences given that the truss design is focused on the individual component. Some common optimization examples, where the BD review and approval process was not as thorough as required by *ANSI/TPI 1,* that have contributed to field issues and related unintended consequences include:

1. A hip roof girder truss and several step-down trusses were eliminated by using an interior wall to support end jack trusses. Unfortunately, the wall framing members were not designed to support truss end jack reactions, lateral loads or uplift forces, and no foundation was installed below the interior wall.
2. A hip roof girder truss was relocated to create uniform end jack framing for the entire project. A header above an opening, rather than the original column within the wall framing, supported the new girder truss location. The header, jack studs and foundation were not designed to support the concentrated load from the hip girder reaction.
3. A girder truss was changed from the specified 3-ply to a 2-ply because the truss designer could get a 2-ply to "work." The BD specified a 3-ply girder to minimize the relative deflection between the hip girder truss and adjacent step-down truss, to accommodate the bearing width of the specified wall size, and to obtain the uplift capacity of the specified tie-down connector.

Editor's Note:

The purpose of this article series is to identify truss-related structural issues sometimes missed due to the day-in and day-out demands of truss design/production and the fragmented building design review and approval process. This series will explore issues in the building market that are not normally focused upon, and provide recommended best-practice guidance. As with the previous articles (November and December 2014, and March 2015), the objective is to raise awareness of these issues and, ultimately, improve overall quality of truss roof and floor system construction.

[1] References to *ANSI/TPI 1-2007*

4. Stubbed truss components were shown in the construction documents by the BD supported by an interior wall. The truss designer replaced the stubbed truss members with additional main body truss components and a girder truss supporting one end. The wall framing at the girder bearing locations was not designed to support the girder truss reaction points, a continuous load path from the girder truss to foundation was absent, and a thickened footing was not present for the girder truss reaction.

5. A steel beam and the supported wood wall framing were replaced with a 2-ply wall girder truss. Lateral loads about the girder truss minor axis (i.e., 3" dimension) were not investigated, exterior wall sheathing was insufficiently supported and fastened, minimum wall insulation thickness was not satisfied, and girder truss elements were cut for plumbing and electrical.

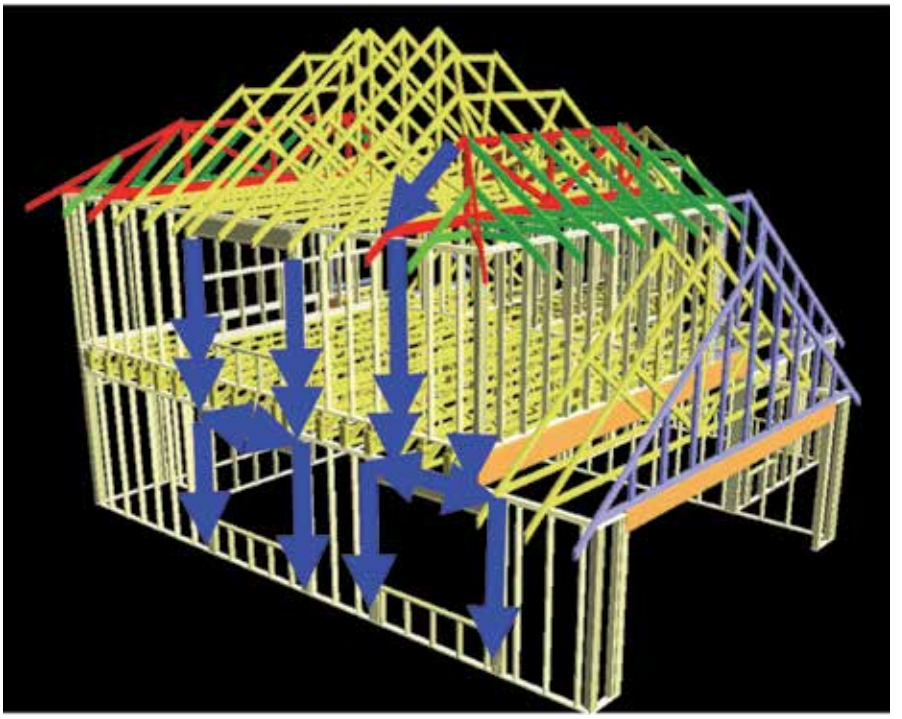

Figure 1. Revising truss placement without receiving written approval from the Building Designer can adversely affect the intended flow of loads through the building.

6. A BD framed a 60' wide building with two mono roof trusses having a top chord overhang to the ridge. A double wall provided interior truss bearing. The BD intended to have gypsum installed to the truss end vertical to obtain a fire rated assembly. The truss supplier designed one 60' truss with no interior support locations. The truss placed additional load to exterior walls and prevented gypsum installation.

7. A truss designer eliminated foundation piers by replacing a solid sawn wood floor system with floor trusses and engineered wood beams spanning between piers. The foundation footing size was not increased for the additional floor area supported, which contributed to differential settlement.

8. A BD used engineered beams within wood wall framing around the building perimeter to support floor trusses. A truss designer eliminated the beams in the "tall" building and extended floor trusses across the wall. The modification conflicted with the intent of the BD to minimize the effects of wood shrinkage and provide a solid beam member for exterior framing members.

9. A truss designer proposed to eliminate all interior bearing support with clear span trusses for a multi-level building. The increased floor truss depth resulted in an overall building height that exceeded the story height that the building code allowed for the type of construction and building occupancy.

These "real-life" truss package optimization examples demonstrate how a limited viewpoint of the overall project may result in code violations, building serviceability and/or structural integrity issues and potential unintended life/safety problems. Many of these issues may not be readily apparent and may manifest themselves after the building has been placed into service.

ANSI/TPI 1 states:

> The Contractor, after reviewing and/or approving the Truss Submittal Package, shall forward the Truss Submittal Package for review by the Building Designer [or the Registered Design Professional for the Building] and the Contractor shall not proceed with the truss installation until the Truss Submittal Package has been reviewed by the Building Designer [or Registered Design Professional for the Building].[2]

The CM generally provides a significant number of 8½" x 11" sheets of paper, and the law expects the contractor or the contractor's personnel to review and approve the information these documents contain. To the extent the CM can help the contractor with implementation, this provides the opportunity to develop a strong working relationship. Any initiative that the truss manufacturer and truss designer can take with respect to contacting the BD and obtaining written approval for modifications prior to deviating from the construction documents is a huge benefit in preventing unintended consequences like those presented above. Additionally, the intended owner of the trusses or contractor must alert the

Continued on page 20

[2] See Part 1 of this series in the November 2014 issue of *SBC Magazine:* sbcmag.info/article/2014/truss-industry-standard-care-issues-part-1.

Truss Industry Standard of Care Issues

Continued from page 19

truss manufacturer and truss designer to be aware of and consider that the construction documents he/she is working from have already been approved and permits issued by local code enforcement and foundation work commenced. Often in this case, any optimization must be limited to the truss itself, unless the BD, truss owner and/or the contractor has solicited assistance during the preliminary phase of building design.

Many construction documents contain detailed specifications for the implementation of wood trusses. It is the responsibility of the owner or BD to provide detailed instructions and considerations in the construction documents per *ANSI/TPI 1* as follows:

2.3.1.2 Registered Design Professional Designation.

The Owner shall engage and designate on the Building Permit application the Registered Design Professional for the Building, if the Building Designer is required to be a Registered Design Professional.

2.3.2.1 Construction Documents.

The Construction Documents shall be prepared by the Building Designer and shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in detail that such documents conform to the Legal Requirements, including the Building Code.

2.3.2.4 Required Information in the Construction Documents.

The Building Designer, through the Construction Documents, shall provide information sufficiently accurate and reliable to be used for facilitating the supply of the Structural Elements and other information for developing the design of the Trusses for the Building, and shall provide the following:

2.3.2.3 Review Submittal Packages.

The Building Designer shall review the Truss Submittal Package for compatibility with the Building design. All such submittals shall include a notation indicating that they have been reviewed and whether or not they have been found to be in general conformance with the design of the Building.

ANSI/TPI 1 helps the truss manufacturer and truss designer with the following counsel:

2.3.6.1 Truss Design Criteria and Requirements.

The Truss Manufacturer shall obtain the Truss design criteria and requirements from the Construction Documents.

2.3.5.1 Preparation of Truss Design Drawings.

The Truss Designer is responsible for the preparation of the Truss Design Drawings based on the Truss design criteria and requirements set forth in the Construction Documents or as otherwise set forth in writing by the Building Designer as supplied to the Truss Designer by the Contractor through the Truss Manufacturer.

2.3.6.3 Alternate Truss Designs.

If an alternative or partial set of Truss design(s) is proposed by either the Truss Manufacturer or the Truss Designer, such alternative set of design(s) shall be sent to and reviewed by the Building Designer for the Building prior to manufacturing. Where the Legal Requirements mandate a Registered Design Professional for buildings, these alternative set of design(s) do not require the seal of the Truss Designer until accepted by the Building Designer, whereupon these alternative Truss Design Drawings shall be sealed by the Truss Designer.

2.3.6.6 Special Application Conditions.

The Truss Manufacturer shall be allowed to provide detail drawings to the Contractor to document special application conditions.

2.3.6.7 Truss Submittal Packages.

Where required by the Construction Documents or Contract, Legal Requirements or the Building Official, the Truss Manufacturer shall provide the appropriate Truss Submittal Package to one or more of the following: Building Official; Building Designer and/or Contractor for review and/or approval per Section 2.3.4.2.

2.3.6.8 Reliance on Construction Documents.

The Truss Manufacturer shall be permitted to rely on the accuracy and completeness of information furnished in the Construction Documents or otherwise furnished in writing by the Building Designer and/or Contractor.

There are times, however, where business relationships and contractual obligations do not allow for robust communication. Truss manufacturers and truss designers must consider this and be very clear about communicating the decisions and assumptions that they have made in the design of the trusses and related components. Poor communication of changes due to the fragmented nature of contracts and who owns the trusses, and the fact that a review and approval process did not take place, is the leading cause of unintended consequences in the field.

Where it is in the truss industry's control to do so, it must begin the process of ensuring truss design and installation information is conveyed to the contractor and building designer in a clear and concise manner. Obviously, the best way to do this is to eliminate the fragmented silo process encouraged by deferred submittals and contracts. However, this is a paradigm shift that will not change in the short-term, given current traditions and challenges related to exempt structures. To the extent the CM can help the contractor or owner with implementation, this provides the opportunity to develop a strong working relationship and support services that can set any CM apart. The goal is that this "extra" service creates a loyal customer who finds that, without this service, the components purchased have far less value. SBC

Scott Coffman has over 30 years in the wood truss and component industry and is a past committee member of TPI 1. He is currently employed by Construction Science and Engineering as a forensic engineer specializing in construction defects.

Jim Vogt is SBCA's Director of Technical Services and has over 25 years of experience in the industry.

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Photo courtesy of the Salem Times-Register (Salem, VA).

A True Southern Gentleman

Remembering Al James

William "Al" James passed away at the age of 87 on February 26, 2015.

by Sean D. Shields

When Al James shuttered his business in March 2013, his thoughts were not about the company he started 53 years earlier, they were about his employees. In the midst of the tragic ending to his life's work, a local newspaper covering the event reported, "...the main thing on his mind was helping Timber Truss Housing Systems' 50 employees find other jobs." Al's focus on his "family" of employees is one of the things that defined him, both as a man and as an employer. His friends, customers and competitors describe Al James as "innovative," "generous" and a "true southern gentleman."

Building a Legacy

James' father was a homebuilder, but after serving in the U.S. Air Force, Al went to the University of Virginia and graduated with a degree in accounting. According to friend and Truss Housing Systems' longtime VP of Operations, Paul Emanuelson, early after graduation, James found himself wondering what kind of product everyone would want and need. While on vacation in Florida in the late 1950s, he discovered his answer: roof trusses. "He saw some of the earliest trusses being installed and soon opened what was probably the first truss operation in the state of Virginia out of his carport," said Emanuelson.

In 1960, James started Timber Truss Housing Systems in Roanoke, VA. His company focused on providing the complete packaged home. His company generated original house plans and then made all of the components necessary to build them, from floor and roof trusses and wall panels to windows, doors and trim. These "TrussMark Homes" became very popular, and Al added a showroom to his facility to give prospective buyers the opportunity to modify a home to make it their own.

At its height, Timber Truss Housing Systems had two manufacturing facilities, a 132,000 sq. ft. facility in Salem, VA, and another 70,000 sq. ft. facility in Orange, VA, along with sales offices in Lynchburg, Christiansburg and Smith Mountain Lake, VA. Before the downturn, 270 employees were on the company's payroll. It was a considerable "family" for Al to provide for, but by all accounts, he did it with great joy.

"TrussMark Homes" became very popular, and Al added a showroom to his facility to give prospective buyers the opportunity to modify a home to make it their own.

generous

"Al was one of my most **faithful** and honest mentors over the 20 years I knew him. He was a fine man, a **wonderful** friend and a true industry **leader**." —SCOTT WARD

innovative

"Al was a **great** guy to work for and one of the most **honest**. All his employees thought so." —PAUL EMANUELSON

Innovative

"I first met Al James at a Gang-Nail seminar in Miami, FL, in 1967. At that time, Al was already leading the industry with innovative thinking, pricing methodology and production techniques," said Bob Ward, a longtime friend and owner and founder of Southern Components in Shreveport, LA. His son, Scott Ward, remembers walking through Al's plant as a young man. "Al's plant was the first I had ever visited outside of our own. I was mesmerized. It was truly an awesome facility. He owned the concept of true teamwork and taught me how important it was to be engaged in all aspects of the operation," said Scott Ward.

According to Emanuelson, James was never content with the status quo. "Every piece of machinery we had in the plant was modified in some way to make things either more efficient or safer for the employees," he said. One good example was an Intelligent Building Systems (Truswal) wall panel line he was interested in installing in the plant. "Tommy Wood invited Al up to take a look at the equipment. It was already an advanced machine because it adjusted to the height of the wall, but Al wanted to take it further," said Emanuelson. Instead of buying the machine, James invested time and financial resources into helping Wood create a cutting-edge prototype.

"The funny thing about that line is that we didn't end up with the prototype because it was flipped from how our production line ran," remembered Emanuelson. "Tommy sold the first machine to someone else, and we ended up with the second one."

The production line was the area where James' desire to innovate was most evident. "Material handling was a big deal. It was all about minimizing the number of people who touched the product and making it as safe as possible," said Emanuelson. All the lumber was brought in on small trains. The sawyer could order the lumber they needed ahead of the job, and it would arrive just in time for it to be cut. After the plates were embedded on the gantry tables, automated rollers ensured the finished trusses left the building and T-Lok stackers bundled the jobs with minimal handling by employees. "The plant was set up so that lumber and plates came in on one end of the building, and finished product exited the other end."

"For people who were fortunate enough to have visited his operation in Virginia, they would have seen one of the premier truss plants in the nation," said Bob Ward.

Generous

Al James was known for being generous in many different ways. He was generous with his time. He served on the board of a local bank and served in his local church, Northminster Presbyterian. He also spent a lot of time with his "family" of employees. "It was typical to see Al walking around the plant, interacting with the employees," said Emanuelson. "It wasn't until we grew really big (270 employees) and had a lot of turnover with temporary employees that Al didn't know every person's name and their story." That approach made an impression on a young Scott Ward: "His soft-spoken, mild-mannered personality was somehow regal when he strolled through his plant. His employees seemed to really love him and admire him for his ability to connect with them."

He was generous with his facility was well. The Timber Truss Housing Systems facility in Salem, VA, was built on an old Air Force training facility. Behind the production facility was an old airplane landing strip. Years ago, a remote-controlled airplane club started using the strip to land their model planes. "Al not only let them use the property, but he took the occa-

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A True Southern Gentleman

Continued from page 23

sional wayward plane in stride when it got away from the operator and flew into our facility," said Emanuelson.

He was also generous with his financial resources, both with his employees and with his customers. "Most of his employees knew he had a really big heart," said Emanuelson. "If they really needed help, they knew they could go to Al and talk to him about it." The same was true for his customers. At Al's funeral, a number of his past customers showed up to pay their respects. "Many of them attributed Al's willingness to work with them on paying their invoices to helping them survive the downturn," said Emanuelson. "One of Al's favorite things was to throw an annual Christmas Party for all the employees. He also always gave Christmas bonuses, which I know was a rare thing in our industry."

True Southern Gentleman

James was also known for being very open with other component manufacturers about the solutions he used to address common problems in the industry. He was involved in the early years of the Truss Plate Institute (TPI) and the Wood Truss Council of America (now SBCA), and was even willing to share ideas with his competitors. "Al was always gracious and generous to share ideas, and perfectly fit the description of a true southern gentlemen. He maintained those values throughout his life, and I will always remember him fondly as a true industry icon," said Bob Ward.

"Al's approach to problem solving in the plant was to bring the affected employees into a brainstorming session and try to collectively work out a way through," said Emanuelson. "He also confronted issues with honesty." Emaneulson remembered a time when there was a rumor circulating amongst the employees that James was considering selling the company. It coincided with Al giving a tour to a group of people, something he did somewhat regularly.

After the group left, a few employees asked him whether the rumor was true. James pointed at the facility and asked, "What do you see?" The employees gave various answers, but not the one Al was looking for. Finally, a bit exasperated, he replied, "People. My responsibility is for all of those people; they are my family." He then asked, "What would I do if I sold this company?" He listed off the typical answers: travel, buy stuff, live the easy life. In the end, he told them none of those options appealed to him more than running his plant.

Al's care for his employees inspired great loyalty. When he closed the plant in 2013, there were a handful of employees who had been with him for 42 years, and several others who had worked for the company more than 30 years. "Al was a great guy to work for and one of the most honest. All his employees thought so," Emanuelson said.

Conclusion

Timber Truss Housing Systems was a victim of bad luck (the completion of the facility in Orange, VA, was delayed by two years, due to the discovery of potential artifacts, and opened in 2006 instead of 2004) and the sudden and prolonged downturn of the housing industry.

On the last day the business was open, the local paper reported James to have said, "We have a great staff of people here. They are losing their jobs. We truly regret we have to go out of business. It hurts a lot." It's a testament to Al and his character that his focus was on the impact the company's closing had on others instead of himself.

"Al was one of my most faithful and honest mentors over the 20 years I knew him. He was a fine man, a wonderful friend and a true industry leader. I will really miss my friend Al James," said Scott Ward. Emanuelson echoed Scott's thoughts saying, "To a lot of us, he was a very good mentor and a valuable friend."

"All of those who had the benefit of his friendship will certainly attest that this industry is better because of him. He will be missed," said Bob Ward. SBC

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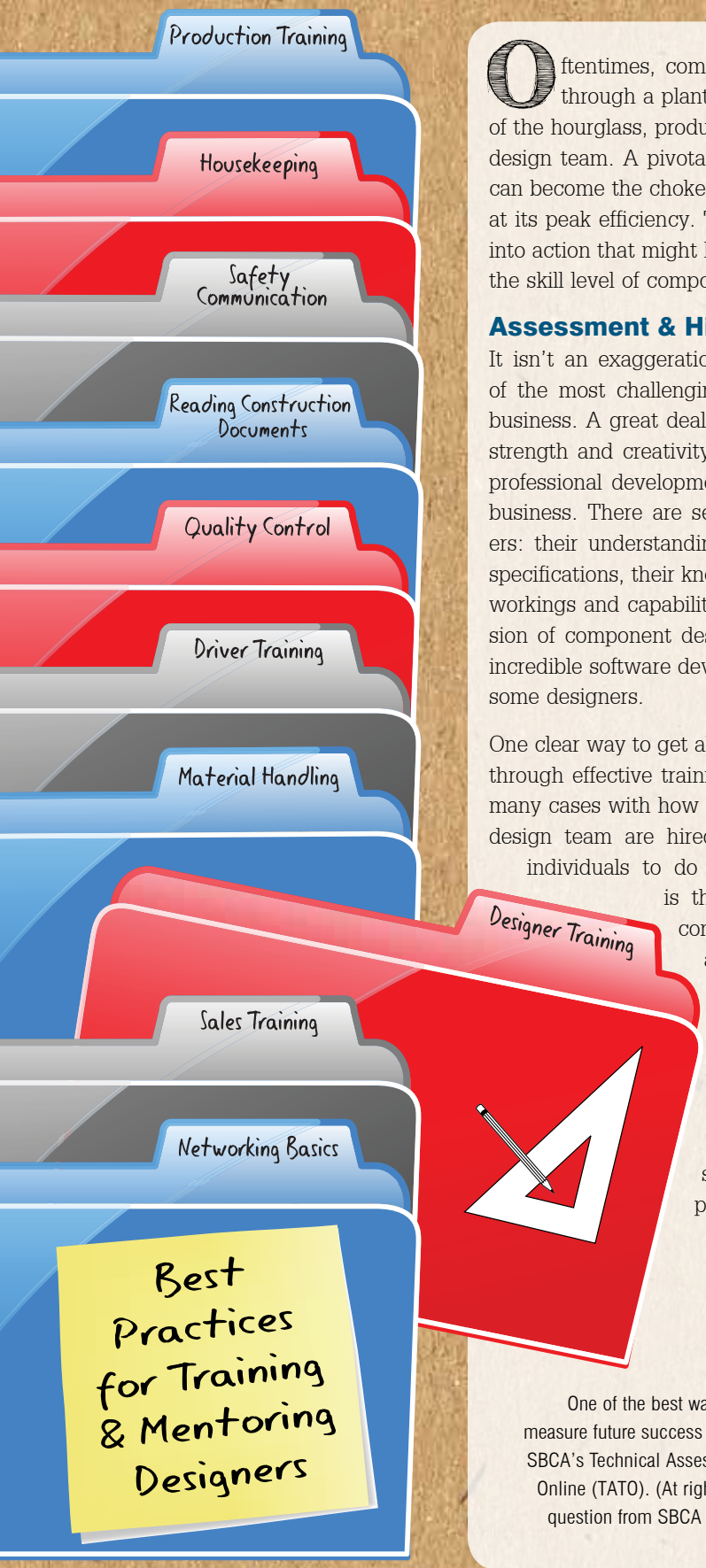
TOP 10 Employee Training Tools

by Ben Hershey & Sean D. Shields



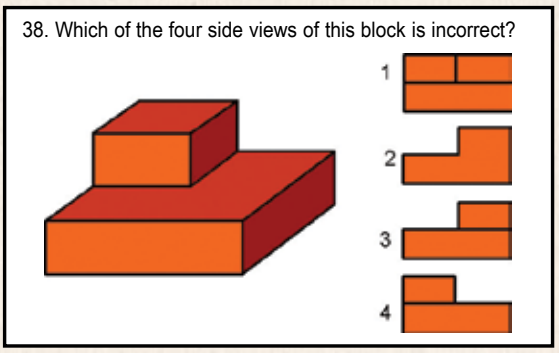
Oftentimes, component manufacturers (CMs) may describe the flow of work through a plant as if it relates to an hourglass. They picture sales as the top of the hourglass, production as the bottom, and that slim funnel in the center as the design team. A pivotal part of the operation and the segment of the business that can become the choke point of throughput, the design department needs to operate at its peak efficiency. That said, this article will provide some best practices to put into action that might help CMs open up that slim funnel of productivity, or increase the skill level of component designers.

Assessment & Hiring

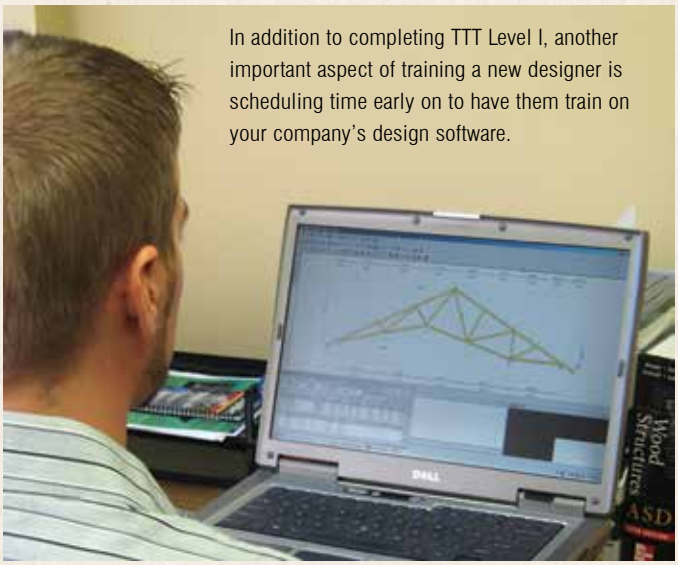
It isn't an exaggeration to say that effective component designer training is one of the most challenging and important aspects of the component manufacturing business. A great deal of the value CMs provide to their customers relies upon the strength and creativity of their design work. Effective training, and the continued professional development of component designers, is therefore a key to any CM's business. There are several aspects of the success of today's component designers: their understanding of framing in the field, their understanding of plans and specifications, their knowledge of truss design, and their comprehension of the inner workings and capabilities of today's component design software. Since the conversion of component design software from DOS to Windows, the industry has seen incredible software developments that can, in some cases, far exceed the skill set of some designers.

One clear way to get ahead of the game is through effective training, and it starts in many cases with how members of a CM's design team are hired. Hiring the right individuals to do component design is the first step. Some companies might use a math or geometry test to assess skills, but one of the best ways to really measure future success is by using SBCA's Technical Assessment Test Online (TATO). Developed by SBCA with help from a number of CMs across the country, this test asks the right questions to give an employer a good idea of the aptitude and understanding of the prospective candidate. Once an individual is properly assessed and then hired, the real training begins.

TATO
Technical Assessment Test Online



One of the best ways to really measure future success is by using SBCA's Technical Assessment Test Online (TATO). (At right: Example question from SBCA TATO test.)



In addition to completing TTT Level I, another important aspect of training a new designer is scheduling time early on to have them train on your company's design software.

Mentoring & Initial Skills Training

A good best practice for a new hire is to pair them with one of your best designers, or someone who has been with the company for several years and can effectively communicate the company's expectations, culture and approach to design. It might also be good for these two to be located close to each other during this initial training stage to encourage greater communication. As a side note: one of the growing trends in today's offices outside the components industry is to have offices where there are no cubicles and no walls, just shared work spaces. In that type of environment, it would be easier to have a trainee directly across from or adjacent to your lead designer, much like what is possible in the production area. This approach can also help make sure your new designer is able to quickly get answers to questions and stay on task.

Another important part of a designer's initial training is to have them go through Level I of SBCA's Truss Technician Training (TTT). Since TTT can be taken online, and is relatively intuitive, new designers easily use this training to fill in breaks in the action, or during a designated training period. Level I of TTT is an introduction for wood component design technicians developed to help these individuals understand the design and engineering fundamentals of metal plate connected trusses. During the training, trainees perform calculations, solve problems, review presentations, and respond to interactive quiz questions interspersed throughout the sections (see sidebar for TTT Level I sections).

Also developed by SBCA with the help of numerous CMs, TTT Level I covers important industry design standards and factors affecting truss fabrication, from design to installation, and is an effective way to prepare designers for the Level I Certification Exam. It's important to note there is also a slimmer version of Level I called Truss Basics. Truss Basics has less technical and time-intensive math and load development sections. This makes it ideal for estimators, salespeople and anyone else who needs to understand truss design procedures but will not be performing truss design.

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TTT Level I Sections

- Terminology
- Design Responsibilities
- Truss Math
- Design Principles
- Truss Materials
- Load Development
- Truss Design, Manufacture & Installation
- Connections
- Truss Design Drawings

TTT Level II Sections

- Truss Math
- Design Principles
- Load Distributions
- Building Codes and Load Types
- Snow and Rain Loads
- Wind and Seismic Loads
- Connections
- Design Issues

TTT Level III Sections

- Truss Repairs
- Truss Design Concepts
- Practical Design – includes wind, seismic and snow design issues
- Sprinklers & Trusses
- Forensic Investigation
- Insurance & Liability Avoidance
- Introduction to the Latest Version of *ANSI/TPI 1*
- Permanent Bracing

Upon completing TTT Level I, the designer will have a stronger understanding of the truss design and manufacturing process, the application of trusses, basic math, trigonometry and load development as it relates to truss design. It's a good idea to have the Level I exam taken shortly after the course is completed so material is fresh in the designer's mind. Not only will the designer then have a certificate to frame on the wall, but they can get a "TTT Level I Certified" seal to use on placement drawings, which can be one effective way to communicate to customers a company's commitment to training.

Again, there is a twofold process in having a new individual work with a lead designer, one is the training aspect, and the other is mentorship in the company's culture and the expecta-

Continued on page 28

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Top 10 Employee Training Tools

Continued from page 27

tions of customers. This can be very important in establishing a long-term, committed relationship with each new designer.

Design Software Training

Another very important aspect of training is with the design software. A CM's design software supplier is the best resource to handle this kind of training. After an individual has been hired and partnered with a mentor, another important early step is to contact the supplier and schedule a time for their field technical software trainer to be onsite to provide training. Many times, companies fail to do this until a few weeks after the designer is hired, and it is a scramble to schedule the field technical trainer.

It's not a bad idea for CMs to give their software supplier a heads up as soon as they know they are in the final stages of hiring a designer. While an initial training is very important, it shouldn't stop there. Software suppliers can provide regular training sessions online and in local group sessions, and CMs will find it well worth the time investment to take advantage of these continuing education opportunities.

In addition, many of the software suppliers also provide online training modules, offering possibly the fastest path for turning a new hire into a productive designer. This kind of orientation takes the designer-in-training approach through a sequenced series of modules replicating the most efficient process through the software for creating a job, designing the structure, creating an accurate cost estimate, and sending the correct files to production. Truss manufacturers may even enhance their estimating and design process by using these learning modules to help their designers take full advantage of their software supplier's latest and greatest versions.

Needless to say, this approach even applies to experienced designers. The refresher is never a bad thing, and who knows what little tip or trick anyone might pick up. There is a lot of information in the design software programs, and no two designers are going to know every aspect of the program.

Advanced Training

So what is the logical progression of training after these first few steps? It can depend heavily on the company and what they want to accomplish with a particular designer. However, once a designer has reached Level I certification, and has shown proficiency in basic truss design concepts, moving on to Level II of TTT is usually warranted (this typically happens between six months to a year after hire).

Level II covers advanced concepts for math and load development for live, dead, snow, rain and wind loads. Designers review component industry referenced standards like *ANSI/TPI 1, ASCE-7 Design Loads for Buildings and Other Structures,* and the *National Design Specification (NDS) for Wood Construction*. During Level II, designers are asked to perform calculations, solve problems, review presentations and respond to interactive quiz questions interspersed throughout the sections (see sidebar on page 27 for TTT Level II sections). Developed by SBCA with the guidance of several CMs from around the U.S., the purpose of Level II is to advance designers' knowledge base and understanding of advanced design formulas, load development and building code compliance, all while increasing their familiarity with current industry technical resources.

Finally, for advanced designers and structural engineers, there is Level III of TTT. Level III provides discussion and background of current technical issues. Each presentation is developed by a different industry professional and examines specific technical design considerations. Level III participants are given the opportunity to elevate their understanding of this highly specialized industry and receive answers to unresolved technical questions. Topics cover fundamental/theoretical design considerations and then how to apply these in the real world, the business risk associated with designing trusses, serviceability issues, and understanding and applying the building code to expand business growth opportunities (see sidebar on page 27 for TTT Level III sections).

Training Beyond the Trainer

For all three TTT certification programs, there is an annual recertification program that allows a designer to stay up-to-date on his or her certification. To aid in this recertification, one best practice is to have less experienced designers go out with a lead designer (or a sales manager/sales rep or production manager) and help give a Component Technology Workshop (CTW) to a local group of framers, building officials or specifiers. SBCA has developed numerous CTW presentations covering a broad array of topics. Participating in these presentations can be a great way to further train designers and expose them to marketplace issues, while also giving them an opportunity to present material they have already learned.

Another good best practice for some companies is to have a design team meeting once a week that focuses on providing brief training opportunities. These trainings can sometimes be hosted by other suppliers such as EWP or hanger companies, or maybe cover some aspect of the code that needs to be discussed. Sometimes new terminology or expectations are coming out of the architect/engineering community that need to be reviewed by the whole design team. Technical articles from ***SBC Magazine*** can also be a good source for training when they shed light on changes occurring within the industry.

The Bottom Line

Designer training should never stop. Between reading blueprints, staying abreast of new terminology from architects and engineers, staying on top of changes in software programs, and back checking the work product of other designers, there is a constant stream of opportunities to learn and grow. Every CM should want their design team to stay abreast of this learning so they can provide the customer with the engineering value upon which our industry depends and thrives. **SBC**

Ben Hershey is a Past President of SBCA and Owner of 4Ward Consulting Group – Experts in Lean Management & Manufacturing. Sales Training will be covered in the May issue.

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parting shots

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In March, SBCA undertook *ASTM E119** floor assembly fire testing at NGC Testing Services in Buffalo, NY. Separate, unprotected floor assemblies were constructed of 2x10s, I-joists and floor trusses with and without splice plates. Each assembly was loaded to create a member at its full design stress and then subjected to controlled fire conditions. The two fire test photos show a floor truss assembly near the end of (top photo) and immediately after (middle photo) the fire test. These tests provide great insight into IRC's R501.3 code provision.

Many thanks to C.B. Clay, Jake McElwee, Travis Daniel and Tim Jones (bottom photo, pictured left to right) at ProBuild, Villa Rica, GA for building the floor trusses for this testing. SBC

**ASTM E119 Standard Test Methods for Fire Tests of Building Construction and Materials*

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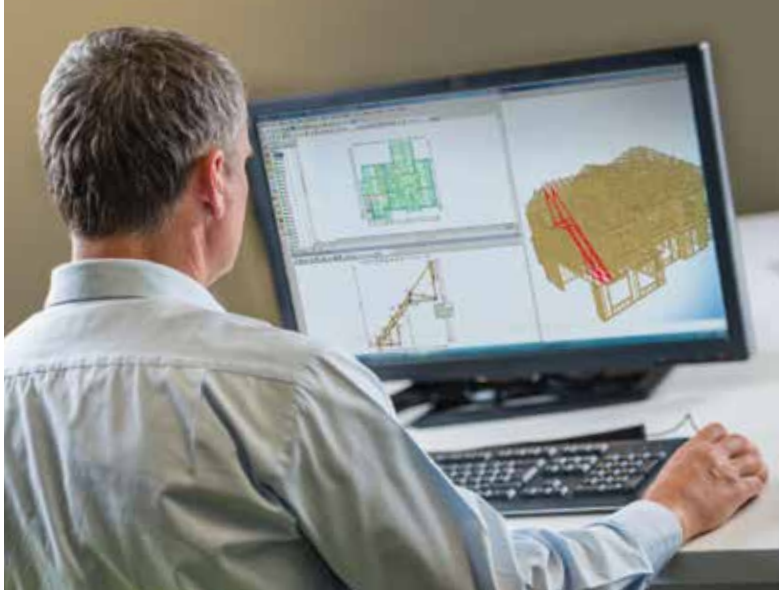

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