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Knowledge is Power


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"Achieving Total Quality Management" by Kirk Grundahl

In this issue we are focusing on quality assurance. As we approach the new millennium, quality assurance has become "total quality management," where the organizational approach is on a commitment to continuous im-provement in every aspect of the business. This means that you are never finished implementing quality systems. There is always another aspect of the business or system to scrutinize and target for efficiency or cost improvement.

To realize those business enhancements, a host of tools are available—statistical process control, cause and effect diagrams or simple brainstorming, just to name a few. Ideas on how to improve a process must come from all levels since it is usually the worker doing the job that knows best how the system is actually performing. One of the keys to gaining employee involvement is having the ability to quantify or measure the system's performance. Once the measurements are made, the results can be used as a baseline to develop a continuous improvement process. The output of a good quality control system will be a visual or graphic representation of the system that allows you to easily determine whether the process you are measuring is in or out of control and whether the latest trend is toward improvement or problems. In many cases, histograms or line charts are used to monitor and visually describe the quality system that is in place.

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However, quality management is not a magic carpet ride with no pain and no disruption. It takes a commitment of resources—namely time, money and people—to continuously im-prove a company. In particular, it takes a commitment of company owners to recognize the importance of quality management and commit to it. Every company that implements a quality management program can recount horror stories and disappointments. But once the company matures in the process, management soon realizes that they cannot survive in today's economy without it.

The WTCA Quality Assurance Committee has embraced the quality management process with a program that actually quantifies quality and provides graphical output to allow for simple review of quality performance. The company can then make corrections if the process is going out of control and can implement additional improvements for the baseline performance that is

established. The approach we are taking is to provide factual information so that truss plants can make continuous improvements.

We have talked about the quality assurance program within WTCA for a long time and have recently been implementing ***WTCA QC*** as a way of promoting quality control among our membership. We are excited about the results we have seen so far from users of the program. People are seeing cost and value improvements in their operations, which is the fundamental goal of quality control.

THOUGHTS FROM OUTSIDE OUR INDUSTRY

In a letter from Steven H. Schultz, CCS, of Computerized Structural Design, Incorporated, he states:

Our involvement with the national technical committees has reinforced our views on the importance of recognizing accepted standards for design, manufacture and installation of building products . . . it is very important for architects and engineers to require certification of building manufacturers, in project specifications, to ensure quality materials and workmanship.

In our investigation of improving specifications for projects using wood trusses, we discovered that there currently is no national quality control certification for the design and manufacture of wood trusses. In our failure investigation work, we have also found problems with improper installation of wood trusses. We also find that there currently is no recognized certification of installers of wood trusses. The lack of national standards and certification for wood truss manufacturers and installers weakens the decision to use the wood truss design from both an owner's point of view and from the designer's point of view, relative to professional liability exposure.

We understand that the Truss Plate Institute (TPI) is attempting to implement a qualification program for manufacturers of metal plate connected wood trusses, but to date has only certified about 10% of the known truss manufacturers [this is a TPI Quality Control Program]. We strongly encourage the wood truss industry to establish and implement a quality control certification program for the design, manufacture and installation of wood trusses. This can only strengthen your industry and aid in the wider use and specification of trusses . . .

This letter certainly implies that specifiers are looking for ways to "specify into their projects" products that meet a given level of quality that they can trust. This certainly seems to be an opportunity to create value.

If the above is positive reinforcement, there is also the negative side as well. In an article entitled "Wood Truss Failure, Murphy's Law in Action" by W.T. "Dusty" Yaxley, P.E., and Carl E. Gilmore, P.E., they state the following:

In Florida wood truss failures are reported to be the leading cause of construction site injury and damage claims.

Most of these construction failures are blamed on improper erection techniques. However, our investigations have often found truss material or fabrication defects to be the initial trigger mechanism of most failures. True, failure to follow bracing guidelines may contribute to the extent of damage, but the proximate cause in the high proportion of cases was fabrication errors. Our investigations have found "material selection" to be the most often ignored starting mechanism for wood truss failures.

Design:

For final safety factor cannot anticipate such defects as poor materials and slipshod workmanship which include:

- *Inaccurate design information provided by the fabricator.*
- *Use of substandard material.*
- *Use of poorly pressed or missing connector plates...*

To the extent these defects are present they will reduce the safety of structural components. In combination, they will often assure failure or impending failure.

Material Selection:

Wood is specified by size and grade. Therefore the fabricator must stock many combinations. While size is obvious, grade is determined on the basis of the combination of many natural process defects.

Wood is purchased in graded lots and is, therefore, stockpiled according to grade. However, a fact often overlooked is current grading rules allow up to 5% below grade material to be included. (This means one piece in 20 may be substandard for the grade indicated.)

Further, after a piece has been cut, the location of acceptable in-grade characteristics often render it unfit for use in that piece of the component.

Examples include:

- *Knots in the connection area.*
- *Undersized material in the connection area.*
- *Splits and checks, especially in top and bottom chords.*

A proper quality assurance program must include reasonable inspection by a knowledgeable person who will reject material which falls into the above category. This is an effort which clearly slows production and harms apparent profitability.

Assembly:

Assembly is the process of placing and aligning wood components into their final position, installing the correct truss plates in their proper position over the connections and fully pressing the plates into the wood.

A proper quality assurance program will address defects in the assembly phase including:

- *Rejection or replacement of wood components which are ill-fitting or display detrimental defects.*
- *Missing, improperly sized and misplaced plates.*
- *Inadequate embedment of connector plates.*
- *Missing reinforcement requirements in a tension splice.*

Summary:

In conclusion, it is our option that wood truss collapses are not really the result of a single bracing defect, but rather the result of a combination of defects brought about by poor quality control, coupled with erection cornercutting. However, a single "failure trigger" is often substandard material selection, as well as those bracing elements which amplify the damage.

A careful investigation will often disclose a substandard flaw, usually at the bottom of the collapse waiting for the persistent investigator to identify

As one can see by this article, it reinforces the fact that investigators will be looking for truss defects on which to pin a bracing-related truss collapse. With a thorough quality assurance program, the industry will be able to mitigate some of its liability because trusses will consistently meet the prevailing manufacturing standards.

These thoughts represent a perception of truss industry quality and quality assurance. We now have a tool that can aid in changing these types of perceptions.

Goals of the Quality Assurance Program

- *To provide an in-plant quality assurance procedure that is quantitative and can be implemented in a truss plant so that all plants are using the same quality assurance program throughout the nation.*
- *To provide a uniform procedure with which to evaluate*
- *the quality performance of all truss plants. This procedure should be unbiased and without subjectivity.*
- *To provide a uniform procedure that all third party quality assurance inspection programs can use to monitor a truss plant's quality performance, objectively and quantifiably.*
- *To develop quality-monitoring systems for use throughout a truss plant, including engineering, sales take-offs and installation of trusses at the job sites. This is the long-range goal.*

SBC HOME PAGE

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