

► **TOP TIPS** What you might not know about hardware

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Rural Builder

Management Magazine for Rural Contractors

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**PRODUCT
PROFILE:**

Foundation
Products

p. 12

LIABILITY INSURANCE

Do you *REALLY* need it?

SPECIAL SECTION:

METAL
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Check our website at
www.ruralbuilder.com

The what and the how, all in a nice package

EVERY ISSUE we try to pack the most information into one little package that promises to help builders work better

and more profitably. Sometimes it's a hit, sometimes a miss, but I think this one hit the nail on the head. From the

question of whether liability insurance is necessary, to foundation options, and the latest news about metal building systems, we've covered a lot of ground.

You'll notice a definite bend towards metal buildings this time around because it includes our annual *Metal Builder* section. Although it's a special emphasis this issue, because our surveys indicate that many of our rural builder readers are involved in either post frame and/or metal building systems, we are renewing our commitment to offer more news about both in future issues.

Also in this issue we're introducing what we plan as a long-term commitment to providing you even more knowledge with our Top Tips column. We'll be featuring a new product topic each issue with tips on how to get the most out of those products based on how they were designed. We started with door hardware.

Meanwhile, our graphic designer, Nicole, has been tweaking the look of *Rural Builder* over the past few months to present all the information in a nice looking package. We aren't like those big fancy magazines that spend months debating redesigns. We just do it. I hope you like the changes. I certainly do.

Finally, we're already looking ahead to our annual *Rural Builder Source Book*. It comes out in August. We're looking for nice projects to feature—both post frame and metal building systems. If your project is selected, we will feature it in the *Source Book* and we'll send you some 'bragging rights' materials you can post on your website and use in your advertising materials. You'll find more details on page 28. **RB**

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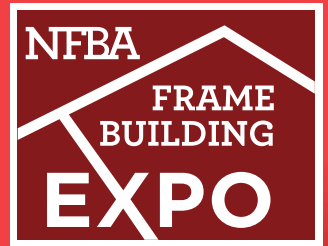
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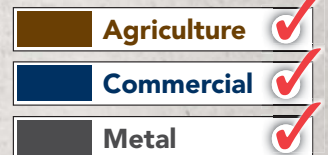
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Liability insurance

Is it really necessary?

SOMEONE SLIPS ON THE ICY FRONT STOOP OF YOUR HOME. Your injured visitor sues but your liability is covered by your homeowners insurance.

The ultimate irony, however, might be if you're building a home (or other structure) and not protected when someone is injured.

For homeowners, potential liabilities are easy to comprehend: a neighbor slips and falls on your walk, is bitten by your dog, or needs a new fence when your tree topples over. But for builders, potential liabilities are multiplied many times over.

During construction, builders are liable to protect visitors, property, and their own crews from harm. After construction, builders are liable for the safe performance of the structures and systems they construct. And at all times, builders are employers who are liable for their employment practices.

"On average in the United States," reports president Tom Knight of ComplyAbility, a provider of employee training materials based in Lawrence, Kansas, "an employee sues an employer once every 81 seconds. That works out to a one-in-three chance that someday you'll be sued."

But where do you turn for help? "Not the agent who provides your homeowners and auto insurance," counsels Loretta Worters, vice president of the Insurance Information Institute, an industry-sponsored information clearinghouse based in New York. "Go to an agency that provides commercial insurance policies. Many agencies also have specialists in various industries, including construction."

Nevertheless, liability insurance is not an excuse for builders to relax. "It's not like, 'Since I have this policy I don't have to worry anymore because, no matter what I do, I'm covered,'" continues Worters. "You should have a business plan, of which one element is insurance. Your overall goal is to 'manage' your risks, which involves much more than just buying insurance. Insurance fits into your business plan by covering your worst-case scenario."

Knight, who for 30 years served as president of the National Frame Building Association, agrees that "every small business is exposed to risks—and most small builders are just one lawsuit away from being shut down."

For that reason, adds Worters, "Asking 'What's the right amount of liability insurance to have?' is like asking, 'What would happen to my business if disaster struck?' And yet many new or smaller businesses wonder if insurance is even necessary."



Asking 'What's the right amount of liability insurance to have?' is like asking, 'What would happen to my business if disaster struck?'

A Multitude of Risks

The necessity of a well-conceived risk management plan with adequate insurance coverage becomes clearer when potential liabilities are spelled out. To help builders through the maze of possible risks, the Associated General Contractors has formulated an insurance checklist that enumerates nearly a dozen coverages that builders might consider.

These include workers compensation policies to cover employees' lost wages due to job-related accidents, plus employers liability insurance to protect against employee lawsuits ranging from wrongful termination to unlawful discrimination and sexual harassment. "Employees tend to think that employee lawsuits won't happen to them, just as they think their employees will never steal from them," observes Worters. "Yet it can happen in any business."

Common allegations made in employee lawsuits include claims of sexual harassment, discrimination, wrongful termination, breach of employment contract, negligent evaluation, failure to employ or promote, wrongful discipline, deprivation of career opportunity, wrongful infliction of emotional distress, and mismanagement of employee benefit plans.

"The best response is not just to buy insurance," advises Worters, "but to have an effective and legal hiring program, post your policies throughout the workplace, have an employee handbook, show employees what to do if sexually harassed or discriminated against by a supervisor, tell supervisors what behaviors are impermissible—and document everything, including what you do to prevent and resolve disputes."

In addition to covering employer liability, a commercial general liability policy can protect builders against claims arising from construction operations, defective products, explosions, collapses, damage to underground utilities, pollution, breath-

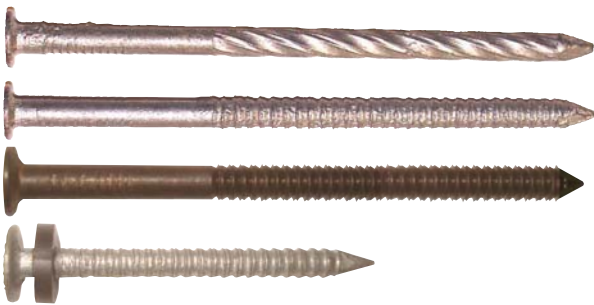
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able dust and mold, and other causes. Further, professional liability insurance offers protection should builders be sued for faulty workmanship or failure to fulfill the building contract.

Builders are expected, notes Worters, “to have a certain expertise. So you can be sued if a customer claims you’ve been negligent through an error or omission. Medical malpractice is an analogous situation. Commercial insurance agencies have developed specialized policies that respond to the risks characteristic of particular professions and services.”

Further coverage can be obtained through umbrella liability (sometimes called excess liability) insurance. As Worters explains, “With property risks you can put a replacement value on damaged or destroyed property. But with a catastrophic accident, there’s no way to predict the resulting damages. Umbrella liability insurance kicks in when damages exceed what your general liability, professional liability, and auto liability will pay.”

While builders can be sued for damages incurred by others, they also risk damage to their own property during a construction project. Through builders risk insurance (sometimes called an installation floater) a contractor can recoup losses to building materials and fixtures caused by fire, wind, flood, earthquake, sinkholes, water seepage, freezing, pollution, transportation accidents, theft, vandalism, or the negligence of others. Similarly, an equipment floater can protect against damage to expensive construction equipment.

A business auto policy is important for all builders. And the Associated General Contractors also describes various miscellaneous coverages such as directors and officers liability insurance. Such policies protect past, present, and future company officials against claims arising from actions they may have taken in their corporate capacities. Today, even an alleged misstatement can prompt a lawsuit.

The association further recommends that all policies require the insurer to provide the builder at least 60 days’ notice of cancellation or non-renewal. “Nevertheless,” Worters points out, “even though the standard form of liability policy covers only injuries and damages that you or your authorized employee first come to know about within the policy period, the insurer is obligated to continue on that claim beyond the policy period.”

Having a Plan

The nature of any builder’s risks and the insurance coverages needed will vary. A risk profile questionnaire from the Associated General Contractors lists nearly 50 items, including: ownership structure, corporate structure, type of contractor, payroll, revenue, subcontracts, joint ventures, acquisitions, divestitures, vehicles, equipment, operations underground or near water, demolition or blasting operations, asbestos or mold exposure, distribution or fabrication of building components, building materials, hazardous materials, and first-aid facilities.

“Your insurance needs will also change as your company changes,” advises Worters. “So stay in regular contact with your insurance agent. Let your agent know when you purchase more equipment, increase your workforce, or make other changes.”

Yet even as agents need to stay abreast of their clients’ changing needs, adds Worters, “as a client, you can help build a good relationship with your agent by taking the time to understand your coverages. The building business is fast-paced and some builders might not want to take the time. But if you understand your current coverages, you’ll be better able to understand how they may need to change as your company grows.”

Worters acknowledges the advantage of working with an agent who has gotten to know your business. “But though you may feel a loyalty to your agent,” she adds, “it’s also expected that clients will do their due diligence and check around. The insurance industry is all about service. Are claims settled quickly? Has a particular insurance company had a lot of recent losses so that its rates have gone up?”

On the other hand, Worters counsels, builders should avoid the trap of simply choosing the lowest-priced policies which provide only the minimum coverage the company can get by with. “Furthermore,” she says, “fight the temptation to cut your insurance costs when times are tough, because that’s when your business is actually most vulnerable to being shut down if someone sues you or you have a catastrophe.”

At all times, states Knight, maintaining appropriate insurance coverages is not only the right thing to do. “If you want to get a job,” he points out, “many customers or building owners, particularly for projects with higher dollar amounts, want to know if you’re properly insured. And if you want to get a loan, perhaps to buy new equipment or cover the cost of building materials until you get paid, lenders also want to know if you’re covered.”

Knight’s company, ComplyAbility, provides online training materials to help companies comply with federal and state employment regulations and to train employees in following the necessary procedures. “Through training,” he explains, “you can reduce your loss experiences and, thus, reduce your costs for insurance such as workers compensation and employer practices liability coverage.”

This illustrates, believes Knight, an important point about having a well-conceived and well-executed risk management plan. “Some builders may think that such a plan—with all its policies, procedures, training, and documentation—will slow them down and cost them money. But managing your risks actually saves you time and money through fewer accidents and less downtime.”

Then too, continues Worters, “Good liability risk management can reduce the chances that your business will be sued in the first place—though it can never eliminate the risk entirely, which is why you need insurance.”

The underlying principle on which good risk management is founded, Worters concludes, should be simple to grasp. “Everyone has a duty to take reasonable care that his or her actions don’t injure others. That applies to businesses. Not repairing a scaffold, not lighting a dark stairway, not training your crews how to do their jobs safely and legally, not giving them directions for safely handling tools or materials—is costly to everyone, yourself included.” **RB**

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Sealant

A Critical Step in Metal Roofing

BY MARK MULLINS, FABRAL
Applications Engineer | Product Training Manager



THE IMPORTANCE OF THE ROLE OF SEALANT IN METAL ROOFING CANNOT BE STRESSED ENOUGH. One common myth when working with exposed fastener panels is that the combination of gravity and a 12" end lap is enough to prevent water from infiltrating the facility. This is a mistake.

THE PROBLEM: Leaving the Building Exposed to Moisture Damage

I have examined many open framed structures with multiple end laps. The nesting of the panels actually creates a siphon that will wick water into the end lap and in many cases, enter the building. This causes several issues: water can get into the building and cause damage to nearby items. Water will get trapped in the end lap and possibly causing pre-mature corrosion. Even if water doesn't get all the way to the top edge of the lower sheet, if it gets to the shank of the end lap fasteners, it can drip around the fastener because there is no sealing washer between the sheets. The biggest issue is that the purlin directly under the end lap rots due to the moisture. This will, in turn, lead to fasteners backing out pre-maturely and allowing even more water to get to the purlins.

THE SOLUTION: Easy, Low-Cost Preventive Measures

An easy and effective way to prevent this is the addition of an end lap sealant tape or gun grade sealant applied between the two sheets at the end lap. I recommend a butyl sealant that will maintain the seal while allowing the panels to expand and contract. This prevents the infiltration of moisture and ensures your buildings stays weather tight.

The sealant must be placed below the location of the fasteners to prevent water entry around the fastener shank. Other places to consider for sealant with metal roofing is between closures and the metal panels and any place where there is metal on metal such as gable trim to panels and sidewall trim to panels. Ridge cap laps are particularly susceptible to water entry because they are almost flat.

THE RESULTS: No Call Backs and Repeat Business

This relatively quick and economical method prevents expensive and time-consuming call backs. As a former installer, I understand the importance of completing a project without having to go back and repair portions of a roof or wall that was not installed properly the first time. It's hard to maintain a successful business if this is a frequent issue as it affects profitability and maintaining a positive reputation. Repeat business is dependent on word-of-mouth and this only comes from previous customers having a positive experience with your company. Please refer to the installation instructions from your panel manufacturer for a complete and proper installation.

For more information on sealants e-mail questions to:
Fabral.com/askMark.

supplier news

BY RURAL BUILDER STAFF



Schweiss Doors plays visible role in LEED Silver Ontario project

Twenty large glass doors from Schweiss Doors have received a lot of notice in Newmarket, Ontario, Canada. The bi-fold lift-strap/auto-latch glass doors play a prominent role in the construction of the award-winning Municipal Operations Centre.

Rarely does a public facility of this type, which serves as the city's centralized equipment facility, receive much notice from architects and the public, but this one is LEED-Silver certified (the first of its kind in Canada) and has won other accolades and awards.

Research and design alone for this \$20.2 million, 65,000 square foot facility took about a year.

Thanks in part to the doors from Schweiss, 92 percent of the occupied spaces have daylight and exterior views. The design has demonstrated an energy reduction of 44 percent compared with a similar facility under the model of National Energy Code for Buildings.

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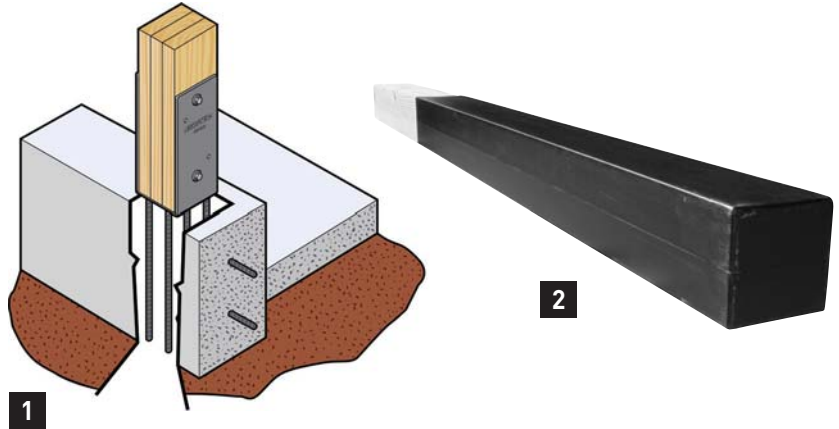
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product profile

BY RURAL BUILDER STAFF

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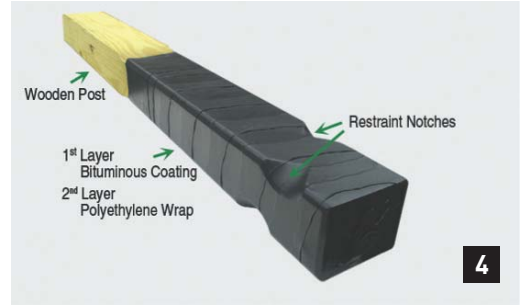
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3. POST PROTECTOR / CIRCLE 107

Post Protector is a slide-on barrier system, delivering serious post decay protection. Post Protector tackles post longevity concerns by eliminating both soil/concrete-to-post contact and chemical migration. Post Protector retains the simplicity, affordability, speed and strength of typical post-in-ground construction technique. Horizontal perimeter ribs, in conjunction with provided hardware yield substantial post uplift protection, and best of all, installation is a snap. It's simple: by keeping soil out and treatment in, Post Protector dramatically improves post-frame foundations.



4. PLANET SAVER INDUSTRIES / CIRCLE 108

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BY RURAL BUILDER STAFF

**INNOVATION
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At this year's annual meeting of the Metal Building Manufacturers Association, Dale Nelson of Roof Hugger Inc. was named the winner of the 2014 Innovation Award.

His project submission is to undertake side-by-side performance testing, using applicable code

referenced standards of metal roofing and TPO roofing, to see which product stands up better.

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MBMA Annual Report
available for
free download

Metal building systems now account for over 50 percent of new low-rise, non-residential buildings in the U.S., according to Tom Gilligan, incoming chairman of the Metal Building Manufacturers Association. The MBMA has played a role in that success and has just released its 2014 Annual Report, which highlights some of its recent work.

The report, titled *First Choice*, offers information on the technical research, sustainability innovations, industry advocacy, safety preparation and educational programs the association has undertaken over the past year. It is now available for free download at www.mbma.com.

MBMA continues its leadership in the industry with a number of new and continuing research projects in 2015. These projects are often undertaken in coordination with major universities and engineering schools throughout North America, and include topics such as seismic performance (see page 30 for related article), wind loads, structural performance and connection design. MBMA is also working on several new educational resources to go along with its existing design guides and manuals.

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- Safety review and recognition program for builders
- Building of the Year Awards program
- *OSHA Compliance Guide*
- Access to building code e-library
- Frame Building Expo attendee discounts

I'm a SUPPLIER.

What NFBA offerings are specifically for suppliers?

- Leads through the nfba.org "Supplier Marketplace" directory
- A listing in the *Frame Building News* directory of suppliers
- Free technical, safety, and legal advice
- Safety review and recognition program for suppliers
- Inside knowledge and forecasts on post-frame products
- Frame Building Expo exhibitor discounts

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RURAL BUILDER

HALL OF FAME 2015

INDUCTEES

Three new members of the Rural Builder Hall of Fame were inducted at the 2015 Frame Building Expo in Louisville. As tradition, Rural Builder oversees the nominations and balloting process, with inducted Hall of Fame members selecting new members to join them. Following are the new inductees.

LARRY EDEMA

Wick Buildings, Mazomanie, Wisconsin



The Grand Rapids, Michigan native did not originally plan a career in sales, but when he took a break from his studies in business and pre-dental at Grand Rapids Community College, he never looked back.

His first stop enroute to his ultimate career was real estate.

“After I got my realtors license, I worked for a big firm in Grand Rapids. I was selling real estate back when interest rates were 22 and 23 percent. That was a tough sell,” he said.

He left real estate for good when he went to work as sales manager for an existing general contractor who was selling post frame and steel/block building packages in the Grand Rapids area. Twenty-four years ago he saw an ad for Wick Buildings, and he has been with the company since, just recently stepping up to National Sales Manager.

The post-frame industry at Wick resonated with Edema. “There are several things I enjoy about the job,” he said. “You work with so many people, customers. It’s not the same person every time; every job is different, every job is unique. And along the way you get to meet other people in the industry, like the Lesters and Mortons and the FBI’s you work with and become friends with.”

His work with the National Frame Building Association is where he fostered those friendships. He started with the Michigan Chapter of the organization, serving as its president from three years, then moved to the national board where he served as Board Chair in 2011 and 2012. He is currently serving as Past Chair as well as Chair of the Governance Committee.

He is proudest of his assistance in promoting the Post Frame Marketing Initiative, serving as PFMI funding chair. “It was basically four of us: Kevin Wiggam (Wiggam Lumber), Ken Gieseke (McElroy Metal), John Hill (Lester Buildings) and myself who were on that committee. That was really the start of the PFMI Initiative in November 2007. To see where that has come today, what the funding has accomplished in research and reaching out to the architects, we’re proud of that,” he explained.

In his 30 years around post frame he said he has witnessed many positive changes. “I’m not old enough to have seen the round poles they used to build with, but just going from the square 4x6s and 6x6s to today where we have laminated columns and computer pricing, it’s just amazing. [Pricing] used to be done all by hand and now it’s all computer-priced. We have a program at Wick where we can generate a sales drawing in less than a minute just by placing things into a pricing program and hitting the drawing button.”

In his time off Edema enjoys traveling the U.S. with his wife of 29 years, Terri, and playing golf. He is the father of two sons, Tyler and Alex, and a daughter, Haylie.

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JAMES T. "TOM" KNIGHT

Knight Enterprises Ltd.



James T. "Tom" Knight is the owner of Knight Enterprises Ltd., the umbrella company for two businesses known in the post-frame world: BizPortz and ComplyAbilty.

Prior to being introduced to post frame, Knight was a college student spending his summers in construction.

"When I was in college, I spent my summers building concrete farm silos," he said. He graduated from the University of Kansas in 1971 after studying journalism, personnel management and marketing, and from Washburn Law School in Topeka, Kansas in 1974 with a Juris Doctor degree.

His summer silo building experiences led him to send his resume to silo and farm equipment companies in search for his career. "I was hired right out of law school by the Farm and Industrial Equipment Institute out of Chicago. I was their Director of Government Relations," he said. "I also represented the International Silo Association which back in those days was

a pretty large organization."

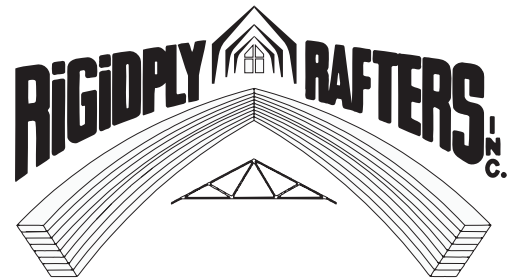
In the late 1970s he was introduced to a fledging organization then called the National Frame Builders Association.

"At the time I was working on a government project in wage and labor laws for the Institute," he said. "Leo Souder [a post-frame builder from Wisconsin] got wind of that project and he contacted me to see if the post-frame industry could be included in that legislation effort," he said.

Souder also invited him to attend the Farm Builders Show, a very successful show organized and managed by the parent company of *Farm Building News* (later renamed *Rural Builder*).

"So I went to that show and I met with Leo Souder and Barry Bahler (another post-frame trail blazer and then president of the NFBA). One thing led to another and Barry said [the NFBA was] really struggling and he asked if I would be interested in managing that organization. At the time I was quite excited about that. I thought this was a big organization. I was looking at the show and it was a pretty big show at the time."

What he soon learned was that the show did not belong to the NFBA, which only had 30 members and no money when he



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Circle Reader Service #382

BY SHARON THATCHER

started in 1979.

He was employed by the NFBA for the next 30 years to help it grow into an organization with over 600 members and a worth of nearly a million dollars. He led the organization to develop its own annual trade and education event. He was the first editor of its official publication, *Frame Building News*, and he ultimately led negotiations with the owner of the Farm Builders Show (then called the Rural Builder Show) to combine efforts and create what is known today as the Frame Building Expo. Along the way, he helped to establish the infrastructure of the organization as it transformed from a small but avid group of builders and suppliers into one that included research and testing that would diversify the organization beyond its pole barn roots.

While no longer working for the NFBA, Knight continues to embrace the post-frame industry through Knight Enterprises, helping builders to create profitable businesses of their own.

When not working, Knight enjoys playing golf. He and his wife Michele raised two daughters, Ashley and Alyssa.

DOUGLAS G. OVERHULTS, PH.D., P.E.

University of Kentucky at Princeton



Douglas G. Overhults knew early that he wanted to become an engineer. That he could combine his farm upbringing, however, with engineering was a happy revelation.

“I didn’t even know there was an agricultural engineering discipline,” he said. He discovered the field in his first year of college and soon followed the road less traveled.

Upon finishing his master’s degree in 1972 he began working for the University of Kentucky Cooperative Extension Service. “I worked for about five years to decide if this is what I wanted to do,” he said. “I decided I did, and I took off four years to go to the University of Nebraska.”

He returned to Kentucky in 1982 with a Ph.D. in hand and a greatly expanded knowledge of livestock production facilities.

Much of his work has concentrated on swine and poultry barn environments. More recently his focus has been energy costs and efficiency related to heating and cooling of farm buildings, as well as ammonia and dust emissions.

Overhults has seen first hand how the frame-building industry has made significant advances, elevating its status. “But there’s still lots of work yet to be done,” he said, adding, “I think it’s still a challenge to get farmers or potential building owners to think through the function of a building before they start thinking about how big the posts are or where the 2x4s go. I run into that quite often where someone has built a facility and then there are problems that become difficult and expensive to solve once the building is built.”

Helping to change the design thought process is a challenge, but it’s one Overhults enjoys, along with the diversity offered through the Cooperative Extension Service. “I really enjoy working with people, whether they’re builders or farmers or county extension agents, I like trying to help them solve problems and help bring science to the people who put it into practice.”

Overhults, active in the American Society of Agricultural and Biological Engineers, enjoys riding road bikes in his spare time and averages 1,500 miles a year. His ultimate goal is to accumulate 25,000 miles, which is equivalent to once around the world.

He and his wife, Elaine, have a son, Wesley.

Rural Builder Hall of Fame: 1982-2015

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1982	Ed Bahler	1988	Bill Uphoff	1994	Karl Brickl	2001	Kifile Gebremedhin	2009	Ray Bucklin
1982	John Pedersen	1988	Calvin Baird	1995	Donald Bender	2002	Barry Bahler	2009	Tom Wick
1982	Marvin Hall	1988	Bill Bickert	1995	Paul Hinshaw	2002	Larry D. Jacobson	2009	Eugene Thiede
1982	Russell Lehe	1989	Doug Deniston	1995	Virgil Hartje	2002	Rich Paul, Jr.	2010	Robert Brisky
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1983	Bob Rowe	1989	Jim Frame	1996	Dick Zimmerman	2003	Ron Sutton	2010	Daniel Hindman, Ph.D.
1983	Walt Keller	1989	Jon Schwichtenberg	1996	Roger Oimoen	2003	Steve Mikkelson	2011	Kenneth K. Kistler
1984	Art Muehling	1990	Ben Klauer	1997	Clyde Wynn	2004	Jerry Wille	2011	Rick Bragg
1984	Carl Kroh	1990	Bill McMahon	1997	Gary Anderson	2004	Leo Shirek	2011	L. Bynum Driggers
1984	Freemon Borkholder	1990	Brian Holmes	1997	Randy Wanta	2004	Vince Draper	2012	John R. Darrah
1984	George Squires	1990	Frank Lessiter	1998	Gerald Riskowski	2005	Bill Koenig	2012	Steve Eversole
1984	Jim Picha	1991	George Eberle	1998	Jim Peters	2005	Bob Lee	2012	Ted L. Funk
1985	B. G. Perkins	1991	H.B. Manbeck	1998	Robert L. Skaggs	2005	Earl Erickson	2013	Dwayne Borkholder
1985	Ben Boehler	1991	Leo Souder	1998	Tom Boston	2006	Pat Murphy	2013	Stephen Pohl
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1986	Bruce McKenzie	1992	Pete Loveland	1999	David Kammel	2007	Glen Thomsen	2014	Al Geisthardt
1986	Don Farris	1993	Henry Getz	2000	Pat McGuire	2007	Bill Thul	2014	Rick Stowell
1986	Pete Kohl	1993	Neil Meador	2000	Robert Graves	2007	Steve Hoff	2015	Larry Edema
1987	Dave Maupin	1993	Thomas 'Tem' McElroy	2000	Robert Resch	2008	Gerald Richardson	2015	James T. Knight
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Hardware help

What you might not know about proper selection and installation

YOU CAN BUY the best door on the market but if it isn't installed properly, it won't last as long as it was designed. *Rural Builder* went to suppliers of hardware to get their top tips for proper selection and installation based on their own products. For more tips, check with each supplier for product-specific details.

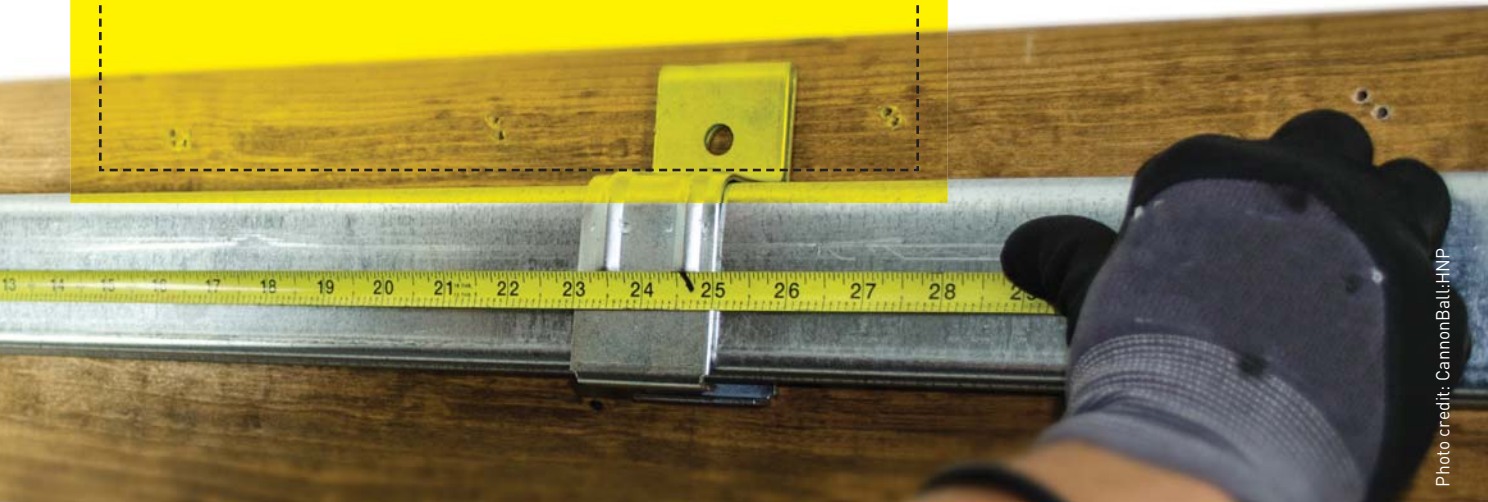


Photo credit: CannonBall:HNP

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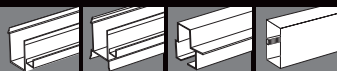


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1. Be aware of code requirements

Building code requirements. The Americans with Disabilities Act led to the consensus requirements found in ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities. This standard has been adopted by the vast majority of jurisdictions through the International Code Council model building codes. This standard affects all the hardware in a building, not simply the threshold height.

Fire-rated door assembly requirements. The 2013 edition of NFPA 80 includes 13 criteria for the inspection and testing of fire-rated door assemblies, including the requirement for self-closing (closer device or spring hinges) and self-latching in the closed position.

Fire-rated door hardware requirements. When hardware is installed on fire doors, it must be fire exit hardware, which is listed for both panic and fire protection. This hardware will not include the mechanical dogging function, which provides the ability to keep the latch retracted mechanically. – Plyco

2. Know the customer's intended use


The customer needs to understand the features and functionality of the hardware choices available – and then make informed decisions based on their own product needs. Many hardware failures come from unintended misuse, stemming from a lack of understanding of what's available for purchase. Taking

the time to discuss the specifics of the customer's intended use of the product, and the setting in which the product will be used, can directly affect which hardware options are chosen to best suit their purposes. – CannonBall:HNP

Grade 1 hardware may be well worth the extra cost in some cases, but Grade 3 might be fine in others. Grade 3 bored locks are tested to 200,000 cycles, Grade 2 bored locks are tested to 400,000 cycles and Grade 1 bored locks are tested to 1,000,000 cycles. – Plyco

3. Size matters

It is very important to know door size and how much the door will be used. Is that side of the building typically subjected to high winds? Common mistakes are focusing too much on budget.




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Sliding doors have to withstand heavy use and wind. Call-backs can take up time and cause concerns, so use the strongest door needed for a particular application from the start so the owner is completely satisfied with the end product. – **MWI Components**



Photo credit:
National Hardware

4. Measure, measure, measure

You buy a door and you buy a system and you discover your hardware system is too short. We typically recommend a 3-inch overlap total, so if you have a 12-foot opening you would have an extra 3 inches. Make sure your measurements are correct before installation. – **National Hardware**

When planning for a new sliding door there should be enough track to hold the door in the open position without obstructing the opening. For example, a 10 foot wide opening requires 20 foot of track, so that when the door is opened to the left, it fully clears the opening. Track comes in various lengths, typically 6-, 8-, 10-, 12- and 20-feet, and sections can be welded together or joined with joint brackets to make the required length. Sliding doors should always be sized larger than the opening itself. This is called “lap” and typically is no smaller than 4 inches. This allowance for lap is required in order for the guide or stay rollers to work properly at the bottom of the door. Example: 10-foot wide opening would have a minimum 10 foot 4 inch door (2-inch lap on either side of door). – **Richards-Wilcox**

5. Know the weight of the door you'll need

The weight of the door is critical because that determines the type of hardware you use. Buying hardware designed for a lighter door will cause excess wear on the trolleys and on the rail when installed on a heavier door.

Not only do you need the correct rollers and track and hardware for a heavy door but the door system that you use is really critical. Some people use all-wood door systems and basically what that means is they use a wood frame and then install metal on the front. That can work for lighter doors but once you get into a heavier door, 500-800 pounds or more it's really critical to alter the materials you use for that door. – **National Hardware**

6. Pay attention to the wind

If you're in the Midwest or in the Plains and there's a lot of wind, you want [the frame] to be strong. Steel is going to be a lot stronger than wood, and it's not going to rot. So we would recommend an all-steel frame for larger, commercial style doors. – **National Hardware**

7. Don't take shortcuts

Just installing basic accessories can make or break the door you are putting on. For example the accessories you put on the bottom of the door, such as a stair roller, basically keeps the door from pulling away from the barn. This is critical. A lot of people may not put on the stair roller. They may take a shortcut and say, 'I don't need it,' but

if you have high wind, that door can pull away from the barn. There have been instances of doors being ripped off because there wasn't a stair roller. Something else for wind-related problems are guide rails. When used, your bottom guide is engaged in this guide rail system and it prevents excess damages, especially in wind. A big mistake is not using the right accessories for excessive wind. – **National Hardware**

Hanger Mounting for Sliding Doors:

Door hangers are usually sold in pairs (two per door) to ensure correct ordering and installation. Proper mounting of hanger trucks is critical to protect the sliding door system and extend its life. It is very important that each door leaf have only two hangers (attachment points) regardless of the size of the door. Attaching more than two hanger trucks on a single door can create a fulcrum or “teeter totter” effect and cause the track and hangers to wear unevenly, damage the door, or even make it difficult to operate the door properly. – **Richards-Wilcox**

For more information from CannonBall:HNP, circle 110; MWI Components, circle 111; National Hardware, circle 112; Plyco, circle 113; Richards-Wilcox, circle 114.



Photo credit: MWI Components

Ostrich Syndrome

Don't ignore the standards for treated timbers

I HAVE A VERY DEAR FRIEND WHO TENDS TO AVOID POSSIBLY CHALLENGING SITUATIONS, BY PRETENDING THEY DIDN'T OCCUR. This is known as the 'Ostrich Syndrome'.

Post-frame, as an industry sometimes suffers from some of the same ailment.

I present, for your entertainment pleasure, International Building Code (IBC) Section 1807.3.1, which may very well be both the most important and most ignored standard for post-frame construction which is spelled out by the Code.

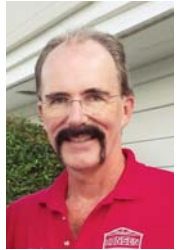
The American Wood Preservers Association (AWPA) addresses in Section UC4 wood which is pressure preservative treated for "Ground Contact." The "UC" is short for "Use Class."

UC4A is designated for "General Use." This is

"Wood and wood-based materials used in contact with the ground, fresh water, or other situations favorable to deterioration." Examples are fence posts, deck posts, guardrail posts, structural lumber, timbers and utility posts located in regions of low natural potential for wood decay and insect attack.

UC4B is for "Heavy Duty." This is "Wood and wood-based material used in contact with the ground either in severe environments, such as horticultural sites, in climates with a high potential for deterioration, in critically important components such as utility poles, building poles and permanent wood foundations, and wood used in salt water splash zones."

Neither of these clearly identifies which degree



Mike Momb is technical director for Hansen Pole Buildings, LLC of Browns Valley, Minnesota. His daily post-frame blog, as well as his weekly "Ask the Pole Barn Guru" column can be followed at www.hansenpolebuildings.com/blog/.

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behind the hammer

BY MIKE MOMB

of pressure treating should be utilized for structural in-ground use to support a post frame (pole) building. I've gone so far as to call the AWPA and asked specifically what treatment levels should be used in post-frame building columns. At best, I've been unable to get a straight answer, from those who should be the experts.

When the first IBC was published in 2000, Section 1805.7.1.2 stated, "Wood poles shall be treated in accordance with AWPA C2 or C4." This language remained the same in the 2003 IBC.

The AWPA C2 and C4 standards have since been withdrawn, therefore are no longer applicable or referenced standards in later editions of the Code.

In the 2006 IBC, however, things changed. Section 1805.7.1 states, "Wood poles shall be treated in accordance with AWPA U1 for sawn timber posts (Commodity Specification A, Use

Category 4B)." In the 2009 IBC (and repeated for the 2012 edition), the language remained the same; however, the referenced section of the Code is now 1807.3.

Post-frame buildings are widely constructed in every state in the United States. Due to this prevalence, it shouldn't be any problem to walk into any local lumber yard or Big Box store in American and have properly treated posts available.

Sadly, this is not the case. My employer purchases treated lumber all across the country. In too many areas, especially in the South where wood should be highly treated, UC4B treated timbers are available by special order only!

The lumberyards' typical response to having only UC4A treated timbers is something like: "This is what all of the pole barn builders use." Many of the building officials in these areas do not

have a better response, they just don't know any different.

And this is not a problem limited to pressure treaters, lumberyards and building officials.

Today in writing this article, I visited the website of a well-known post-frame building company. On their website, ".40 CCA treatment is standard, .60 CCA treatment are optional."

For those who are not in the know, .40 CCA happens to be UC4A and does not meet the requirements of the Code.

One of the major concerns of potential purchasers of post-frame buildings is: "How long are the posts going to last?" There is a proliferation of concern as to the longevity of pressure preservative treated timbers, which may be very well founded.

Our own industry reinforces this fear with a variety of options to either isolate the columns from the encasement or to keep

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Circle Reader Service #463

the columns entirely out of the ground.

An end can and should be put to our industry's Ostrich Syndrome, and here are some of the steps:

- Communicate with potential post-frame building purchasers. An educated purchaser is a good purchaser. Post longevity is something customers can sink their teeth into. Whether providing a DIY kit package or constructing a turnkey project, sell UC4B columns and explain why.
- Post-frame builders – besides educating consumers, educate lumber suppliers. Not only refuse to use non-Code conforming columns, but demand your supplier inventory materials which actually meet Code requirements.

Competitors very possibly have no understanding of the differences in treat-

ing or what meets Code. Educate them by bringing them up to your level. The playing surface gets levelled and the post-frame purchasing public gets a better end product, no matter whom they order from. I personally don't like to say ill about anyone else in our industry. But if the competitor won't step up and do it right, don't be afraid to call them out.

- Lumberyards and Big Boxes – our industry wants to do the job as it should be. Put away the attitude of: "They'll buy what we inventory so why should we change?" Spend the few extra dollars to buy and inventory treated timbers which meet the actual end use. Twist the arms of the wholesalers and pressure treaters who are your suppliers, be demanding—you are the customer and it is up to them to supply what you want and need.

Afraid to be the first to upgrade?

Don't be. Get the word out and post frame builders and DIYers will beat a path to your door. The competition will either upgrade or lose customers.

- Pressure Treaters – here is another case of Ostrich Syndrome. For any pressure treater who is treating timbers to a UC-4A level and actually believes they are being used for landscaping – I have a fabulous deal on a bridge. Pull your heads out and go to treating a minimum of UC-4B for any timber which could be used for post-frame construction.

Post-frame construction is a growing industry we should all be proud to be members of. The more we show the purchasing public we care about what we provide, the better light we and our buildings will be viewed in. **RB**



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3. Project details (size, type of building, location, specific products used like doors, windows, insulation, fasteners, and the manufacturer or supplier); name of the general contractor, name of the architect (if applicable).

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Photo Credit : Sukup Steel Buildings

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MBMA-sponsored research looks into how metal buildings react to seismic activity, leading to possible building code changes

The demand for safer buildings that aren't prone to topple in face of natural disaster continues to motivate engineers in the metal building industry. Jerry Hatch, P.E., offers *Rural Builder* readers an update on research projects that the Metal Building Manufacturers Association sponsors, specifically in the area of seismic testing. Hatch is manager of engineering development for NCI Building Systems, and also serves as chairman of the MBMA Technical Committee.

Q: For several years, work has been done to document how metal buildings react to seismic activity. What was the motivating factor behind this testing?

A: In the Northridge earthquake in 1994, many types of damage were observed that seismic engineers had not anticipated, and an effort began to understand why these things happened. The federal government, through FEMA, funded several research projects to study what was observed and prepare design procedures to preclude reoccurrence. These new procedures were first introduced into the International Building Code (IBC) 2000 version. Researchers have long been able to model building behavior after damage has occurred. The IBC2000 building code brought this into the mainstream of engineering practice. The industry's goal has changed from designing to prevent *any* damage, to designing to prevent *collapse* for seismic loading.

At the time that IBC 2000 was introduced, few construction types had the necessary research to comply with modeling post-damage behavior for a large earthquake. Based on their insights, the developers of IBC2000 included approximations for many building types to fill the gap as industry professionals began to understand and implement the

new requirements included in the metal building industry. The code writers' expectation is that each industry would have performed the research to understand how their respective materials behave as damage occurs and to develop modeling techniques. The metal building industry has been performing related research since 2000. Once our research has reached a critical mass then we will make proposals for introduction of the latest research into the building codes. Other industries conducting research include laminated wood, concrete and masonry, and we would expect this research to continue over the decades as ways to improve modeling behavior for extreme earthquakes are learned.

Q: How long has the project been ongoing?

A: MBMA has been sponsoring research since the IBC2000 building code was released in 2000, so at some level, this work has been ongoing for 15 years. This is the first building code that explicitly requires analysis past the elastic limit for when elements start bending, buckling and yielding.

Q: Who are the principle parties involved?

A: Dr. Vahid Meimand [senior engineer, NBM Technologies, Inc.] has been involved in modeling the

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effects of earthquakes with regards to elements that cause buildings to collapse. MBMA has conducted research to understand when elements start buckling, yielding and bending. Dr. Chia Ming Uang at the University of California San Diego was the principal investigator for the testing effort. Dr. Lee Shoemaker [director of research and engineering, MBMA] is involved with the wind load provisions for low-rise and all-heights building.

Q: Has the testing changed its focus since it began?

A: For decades, the metal building industry designed for linear elastic behavior, but the very latest code requirements dic-

tate a change in that approach. Engineers are expected to understand what happens after the frame elements start bending, buckling and yielding during a seismic event. This is new technology to the engineering community. However, the frames will look very similar as to previous ones. Assessments, including shake table tests, have been made to understand how structures will behave once bending and buckling come into play. Dr. Vahid Meimand has been working to model this behavior, numerically, with a finite element program. Once he is able to model this behavior for the shake table tests, modeling of frames with other configuration will begin. Then, statistical analysis will be performed to demonstrate a margin of safety against collapse.

Q: What beneficial changes do you see on the horizon?

A: Metal buildings are very resistant to the effects of earthquakes, in that they are low rise and light weight. Buildings that are most likely to see differences in resistance are the tilt wall and buildings clad with brick or masonry. Research demonstrating a margin of safety related to collapse is done on all metal buildings, which has never been done before. This research also paves the way for 3D design, which most agree to be the wave of the future for the building industry. 3D design has several benefits for building owners. The first benefit is that, prior to the building being built, the

builder will be able to do geographical “walk through.” 2D design presents a variety of stability issues, and 3D design analysis is the only way to accurately design for these issues in an efficient way.

Q: Have any products been developed as a result of this research?

A: Brad Fletcher (with Atlas Steel) introduced a new product that provides improved performance that will make HSS design more effective and easier. The product, ASTM 1085 HSS, covers cold-formed welded carbon steel HSS for welded or bolted construction. An important element is the development of a minimum value for yield stress. Previous products have had a different yield stress num-



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ber that is dependent on factors including size and shape, but the minimum specified yield stress for the new product is 50ksi for all shapes and sizes, which simplifies the process. These advancements make the product lighter, less expensive, and stronger for the consumer.

Q: Have the tests resulted in any recommendations for code changes?

A: The building codes currently have two different methods for numerically determining the effects of wind on

buildings. Each method gives different answers. The first method is based on research of buildings up to 60 feet. The second method is based on buildings 200 feet and taller, but also claims to address shorter buildings. MBMA would like to see a transition between the methods that brings the two together, eliminating the conflicting code requirements with respect to wind loading.

The engineering industry continues to learn from experience, and its efforts to better understand the effects of the Northridge earthquake serves as a good example. FEMA-sponsored research will help to prevent the reoccurrence of collapsed buildings, as its methods have been updated each revision of the IBC codes. The next code version will be introduced in 2016. The metal building industry is very interested to stay on the forefront of current research and experience.

Research on wind and seismic elements is useful to manufacturers because it helps to build a more reliable product that fits the needs of manufacturers in an economical fashion.

Q: What has the testing revealed so far?

A: With regards to seismic research, MBMA is working on areas of the moment frames that improve performance of the frame during an earthquake. Research will be done to understand when collapsing will occur. It has been difficult to research this topic, as we are not aware of metal buildings that have collapsed during an earthquake. Masonry has fallen off of a metal building and Dr. Justin Marshall at Auburn University is working with an NSF grant to give guidance on better masonry connections.

MBMA is currently mid-way through our research on moment frame behavior subjected to earthquakes, and so far, testing has shown that most damage occurs at the rafters adjacent to the column, column knee area and the column base plates. Each of these connection types can be thought of as releasing the energy imparted by the earthquake and in

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turn, this energy dissipation is associated with damage to the frame. We have performed a number of rafter buckling tests to better understand and model inelastic behavior in these three areas. The ultimate goal is to document what we have learned about frame behavior in earthquakes and establish margins of safety against collapse. So that while portions of a building might incur significant and costly damage, the building would not collapse, thereby increasing the structure's safety. Once we have the opportunity to fully execute inelastic modeling, we'll better be able to target specific areas, or elements, for further attention.

Despite the significant advances made in this field of study, there is still much to learn regarding wind and seismic effects on buildings. Research will be done on how environmental loading affects buildings while the building codes will continue to be updated based on research and experience.

Q: Why is 2016 an important year for the research project in seismic testing?

A: 2016 is expected to be a big year for research because updates to IBC and ASCE7, with respect to seismic loading and behavior [were scheduled to be] introduced at the FEMA Building Seismic Safety Council colloquium in San Francisco on February 11. This will give MBMA insight on the rounds of updates to the 2016 codes for seismic loading. The codes will reflect the latest research that is being done in 2015 and 2016. Research in 2016 will also bring an incremental increase in the seismic and wind loading technology.

Q: What other areas of testing has MBMA been involved in?

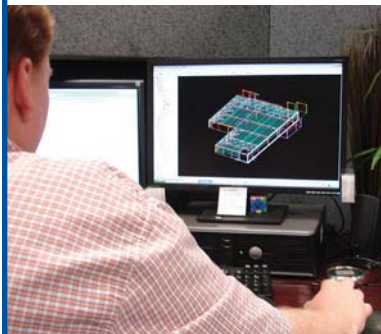
A: MBMA has been working to have the codes updated with better snow load information and John Keating, of NCI Building Systems, has led these efforts along with Scott Russell of NUCOR. Currently, ASCE7 has a snow load map of the entire country, and approximately 25 states supersede

the ASCE7 snow load map with their own, so an effort is being made to consolidate this information. MBMA has been helping to orchestrate this project with the Applied Technology Council, the ASCE and Dr. Michael

O'Rourke (of Rensselaer Polytechnic Institute) – who has authored most of the snow load provisions in ASCE. According to O'Rourke, more data collection is also needed to complete the snow load maps. **RB**

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BY RURAL BUILDER STAFF

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Erect-A-Tube designs, engineers and manufactures electric bi-fold doors, bottom rolling doors, aircraft T-hangars and clear span hangars for the general aviation and business jet markets. Utilizing the structural qualities of HSS tubing, a bridge-truss design was developed, providing minimal



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PERKA HYBRID BUILDINGS / CIRCLE 132

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SUKUP STEEL BUILDINGS / CIRCLE 134

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Don't fly by the seat of your pants

Everything You Need to Know *Before* You Build an Aircraft Hangar



Photo credit: Erect-A-Tube.

PRE-ENGINEERED METAL BUILDINGS ARE A POPULAR CHOICE FOR AIRPORT HANGARS, BUT NOT JUST ANY METAL BUILDING IS THE RIGHT CHOICE. *Rural Builder* turned to Erect-A-Tube, a company that designs and fabricates general aviation facilities of all sizes, for tips on how to help your customers make the right decision.

ALL METAL BUILDINGS ARE NOT CREATED EQUAL

The pre-engineered building market is very homogeneous. Although most metal buildings may look the same from the outside, unless you really inspect each manufacturer's product, it will be difficult to determine the quality differences

between products. As with most purchases, it pays to understand the differences. Once the hangar purchase is made, any sacrifice in quality becomes apparent and lives on throughout the life of the product. Making the right choice returns dividends for many years through reliability, product longevity and ease of operation.

STEP ONE

The first step to getting the best fit for a given situation is to determine the size and number of aircraft to be stored. This will dictate the number and size of door openings. The hangar door has its own set of criteria in order to properly integrate into the building.

HANGAR SPECIFICATIONS: NESTED OR STANDARD?

Once you know how many and the size of aircraft to be stored, you can establish the hangar specifications. With a nested hangar, the overall length of the hangar is reduced, potentially saving on taxi lanes and ramps. For standard configuration, also called "stacked," the hangar is narrow but longer, requiring longer taxi lanes on both sides of the hangar. Both configurations are used when housing multiple planes with individual access.

Another option is a clear span unit, which can be sized for one or more planes in a given space. The amount of clear floor area will dictate the amount of storage area. Familiarity with the types of structural framing and the installation of the secondary members (i.e. wall girts) will result in the maximum floor storage space. The two types of structural framing commonly used in pre-engineered buildings are the tapered rigid frame and the open-webbed truss with straight column.

CHOOSING THE RIGHT DOOR

The hangar door is what differentiates an aircraft hangar from a typical metal building. It is the most significant piece of equipment that makes a building function properly as a hangar

for aircraft. Whether bottom-rolling doors or electric bi-fold doors are selected, each has its own specific requirements that will affect how the hangar project is designed.

1. Bottom rolling doors

There are two types of doors in this category. The first is a sliding door. This door system is supported from the top via a trolley that is inserted into a track system. The bottom of the door is guided through a series of intermittent door guides secured to the floor in the door opening. This is the same door system that is used on agricultural barn doors.

The second type, which is preferred, is the bottom-rolling door. This door system is designed with the weight of the door panels on the bottom rollers. The door system rolls on an embedded track and is guided by door guides at the top. A quality bottom-rolling door system should have door rollers that are eight inches in diameter. The larger the door roller, the easier the door will move. In addition, there should be ample weather stripping around all sides of each door panel.

Bottom rolling doors have specific requirements in order to work smoothly. It is important to control the building deflection or movement within the tolerances of the top guides. It is also important to have an adequate foundation for the door track.

2. Electric bi-fold doors

The electric bi-fold door system is the most economical for hangars with door openings under 80 feet wide and 20 feet clear height. All the extra components required for bottom-rolling doors, such as the additional foundation requirements, the door pockets, the bottom track system and the header/soffit above the door, by far offset the cost of the electric operator.

Electric bi-fold doors are designed to act as a movable wall system while still capable of handling various wind conditions in the closed position. The door system is attached to the header system with several hinge pick-up points. When in the closed position, the door is latched to the vertical door columns and utilizes a cane bolt pin at the center of the door that drops into a socket embedded in the foundation.

The location of the door operators, their features and how they attach vary by manufacturer. Some operators are mounted on the door truss, while others are mounted on the doorframe. In either case, there should be considerations given to the location of the operator and evaluation to the design features of each model such as:

- What are the electrical requirements?
- Are the door operators pre-wired to the push button station?
- What safety factors are incorporated?
- Are the door motor and gearbox integrated to provide a direct-drive system?



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- Does the door operator have safety shields for protection of moving parts?
- Is there a safety override switch?
- Do you need to step over operator components when entering the hangar?
- What is the designed safety factor of the lift cables?

CHECKLIST FOR SUCCESS

Your research should include obtaining answers to the following important questions (Note: These are areas where some manufacturers attempt to reduce their costs while potentially sacrificing quality.)

- ☑ What are the exact building dimensions?
- ☑ What is the clear wing depth dimension?
- ☑ What is the clear tail bay width dimension?
- ☑ What is the clear overall unit dimension?
- ☑ Is the eave the correct height to provide the proper clearance for the hangar door?
- ☑ Whose hangar door is the building manufacturer supplying?
- ☑ Who is responsible if the door and building do not align properly?
- ☑ How is the door being supported?
- ☑ What is the size of the door jamb column?
- ☑ Where is the hangar door operator mounted?
- ☑ How much weather stripping is provided by the door manufacturer? Where is it located?
- ☑ What are the specifications of the walk door used in the hangar door?
- ☑ What structural components are used in fabricating the hangar door?
- ☑ Does the hangar door require diaphragm action from the sheets to hold the door together?
- ☑ How many wall girts and partition girts are included in the building price?
- ☑ What is the lap length of the roof purlins?
- ☑ How many bolts are used for the purlin connections?
- ☑ Are clips provided to prevent the roof purlin from rolling?
- ☑ What is the tensile strength of the exterior wall and roof sheeting?
- ☑ How many anchor bolts per column?
- ☑ What is the sheeting warranty?
- ☑ What is the paint warranty?
- ☑ Can the structure stand alone without the need of diaphragm action from the exterior sheets?

THE FOUNDATION

A local engineer is recommended to design the foundation for your aircraft hangar. The local engineer is familiar with local building codes, soil conditions and is generally required to inspect and oversee the foundation installation process. In order to design an appropriate foundation, the following information is considered:

- Topography of site
- Geotechnical data
- Column reactions
- Anchor bolt layout
- Stamp and seal of a state professional engineer

SLOPING THE FLOORS

Keeping water away from the building is a key element in any building process, including aircraft hangars. Airport engineers recommend the ramp slope away from the building be a minimum of 1 percent or a maximum of 2 percent on grade. This allows the water to drain away from the building yet still enables the pilot to move the aircraft into the hangar easily. **RB**

For even more tips and details, you can download the guide, "Everything You Need to Know Before you Buy or Build an Aircraft Hangar" from www.erec-a-tube.com.



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The peculiar thing about a roof-only steel building

More costly than a 4-wall building: how to explain that to your customers

KINGS WERE CROWNED because of it and cultures have been defined by it; history's been made by it and wars have been started because of it; it's shaped the borders of nations and today, TV Shows marvel at what we can do with it; we're talking about engineering. Throughout history, the sometimes costly battle between form and function has been waged from the prehistoric grassland to the Great Pyramids and temples of antiquity and yes, even to your customers' farm or ranch.

About the only thing that's obvious when it comes to engineering is that nothing is obvious. It's a mysterious occupation that makes no sense to the rest of us—like philosophy or calculus or doggie daycare. But the fact that your time-honored tradition of building has been around for thousands of years, the fact that the Pyramids and the Parthenon are still standing, is an indication that, maybe there's something to all this engineering nonsense.

Perhaps one of the most nonsensical engineering wonders that your customer is going to encounter on his ranch or farm or even in his backyard is the 'roof-only' structure—and why it should cost more than a building with four walls, doors and windows.

Perhaps your client has hay to store, a tractor to keep out of the elements; maybe he needs a carport or a place for outdoor gatherings, parties or concessions. A roof-only structure seems like the logical solution. And it is, for sure, but people are surprised to learn that these structures are often quoted by contractors like you and steel building companies for more money than a complete walled or sheeted structure. But why, they ask?

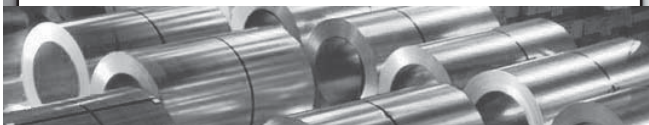
The answer you can tell them, in a nutshell, is engineering.

The main force buildings are designed to resist is wind. Sure, it feels great to have a warm breeze on a hot day and wind is the reason trees rustle in the evenings and seasons change—but all the sweet and endearing qualities of nature's gentle drafts are like a roaring tempest of destruction to an engineer.

The last thing an engineer (or occupant) wants is for the building to collapse to the ground. The second to the last thing an engineer wants is for the building to take flight like the house in the Wizard of Oz. This is precisely what can happen with a roof-only structure.

If you've ever witnessed the destruction caused by a tornado, you've probably seen many buildings with the roofs ripped right off the walls. Because of a pesky scientific property called, 'energy transference,' when wind hits the side of a wall, the wall doesn't stop the force of the wind. It takes the energy

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and throws some of it towards the ground and some of it up towards the eave (or overhang), creating a wedge of force that can rip the roof system right off the walls like popping a can of Pillsbury biscuits.

This transference of energy happens within the ‘walls’ of a roof-only building, as well. But how, they ask? There isn’t a wall to transfer this destructive wind energy anywhere!

But, there is, there definitely is. As wind rushes into the tunnel created by the roof-only structure it speeds up faster than the air which exists outside the structure and it creates more pressure under the roof than what is above it.

When this accelerated, high pressure air collides with a wall of slower air, the energy is transferred down and up in much the same way it is when it hits the sheeted wall and it could easily pop the top off the building with the startling force of that can of biscuits—if it isn’t engineered properly.

The way engineers compensate for this energy transference is to do a couple things, which aren’t exactly obvious. First is, they’ll likely design the roof rafters to be slightly thicker. For instance, a roof assembly that might require an eight inch member beam on a walled or sheeted building could require a 10 or 12 inch beam on a roof-only building. This means, more material.

The space between the purlins (the secondary roof framing bars that help support the roof) might also need to be reduced. In some areas, a building that might require four and a half feet of spacing between these beams on a walled or sheeted building might require that the framing pieces be placed just a yard apart, instead, on a roof-only building. This means that your customer is going to need more purlins for the span of the building—this means they’re going to need more materials.

But something has to hold this fortified roof to the ground, which is, really, where you want this building to stay. This is done with the rigid frames (or columns), which give the roof-only building its height; the pieces of the frame that extend from the foundation to the roof, basically.

The same engineering rules apply to these pieces, as well. The depth and mass of the supporting columns needs to be increased which means more material will be needed, and not by a nominal amount. A sheeted side wall has interior beams called girts, which are fabricated out of lighter gauge metal and consequently cost less. The skeleton of the wall interior is supported by these lighter gauge girts and even the wall sheet, itself, which helps keep the building standing or prevent it from flying away.

The whole purpose of a roof-only structure is to have unobstructed entry to the shelter from all sides—so the last thing your customer wants is to fill up the area between the columns with support beams. This means that more support is needed from fewer columns—and this means more material.

Does this mean that a roof-only structure isn’t the smartest way to go? Absolutely not. Indeed, there are ways you can help your customer cut costs in a roof-only construction that can help to balance some of the increased cost of a roof-only building. Your customer probably won’t need to regulate the tempera-



Special engineering considerations have to be taken for roof-only steel buildings.
Armstrong Steel Buildings photo

ture in a building with no walls so the insulation and the interior walls needed for insulation won’t be included.

Of course your customer is going to want to see within the shelter, but because natural light will be illuminating the structure most of the time, he won’t need a lot of lighting fixtures, if he needs any at all. Also, if the customer is simply going to be using the building for hay storage, agriculture equipment, or a car port, they probably won’t need a complete foundation floor—which can amount to as much as 50 percent or more of a walled building’s cost. You might suggest he opts for a pier-only foundation system which, essentially, is a series of small concrete blocks supporting the columns and connecting the building to the ground, thereby using less concrete and requiring less engineering.

The benefits of a building with unobstructed walls are many. There’s pretty much only one benefit of an accurately engineered building—the fact that it won’t fail, collapse, or jet off to some other part of your customer’s property. And even though there’s only the one benefit, it’s kind of the most important one.

Finally, here’s the big take-away from all this. Some steel building sales people and even some contractors are going to tell your customers that a roof-only structure is going to cost him less than a sheeted building. This should be a huge red flag for your customer. It means they don’t understand the basics of engineering. I get it—as I said, not a lot of people do, but that doesn’t make it ideal, or even OK.

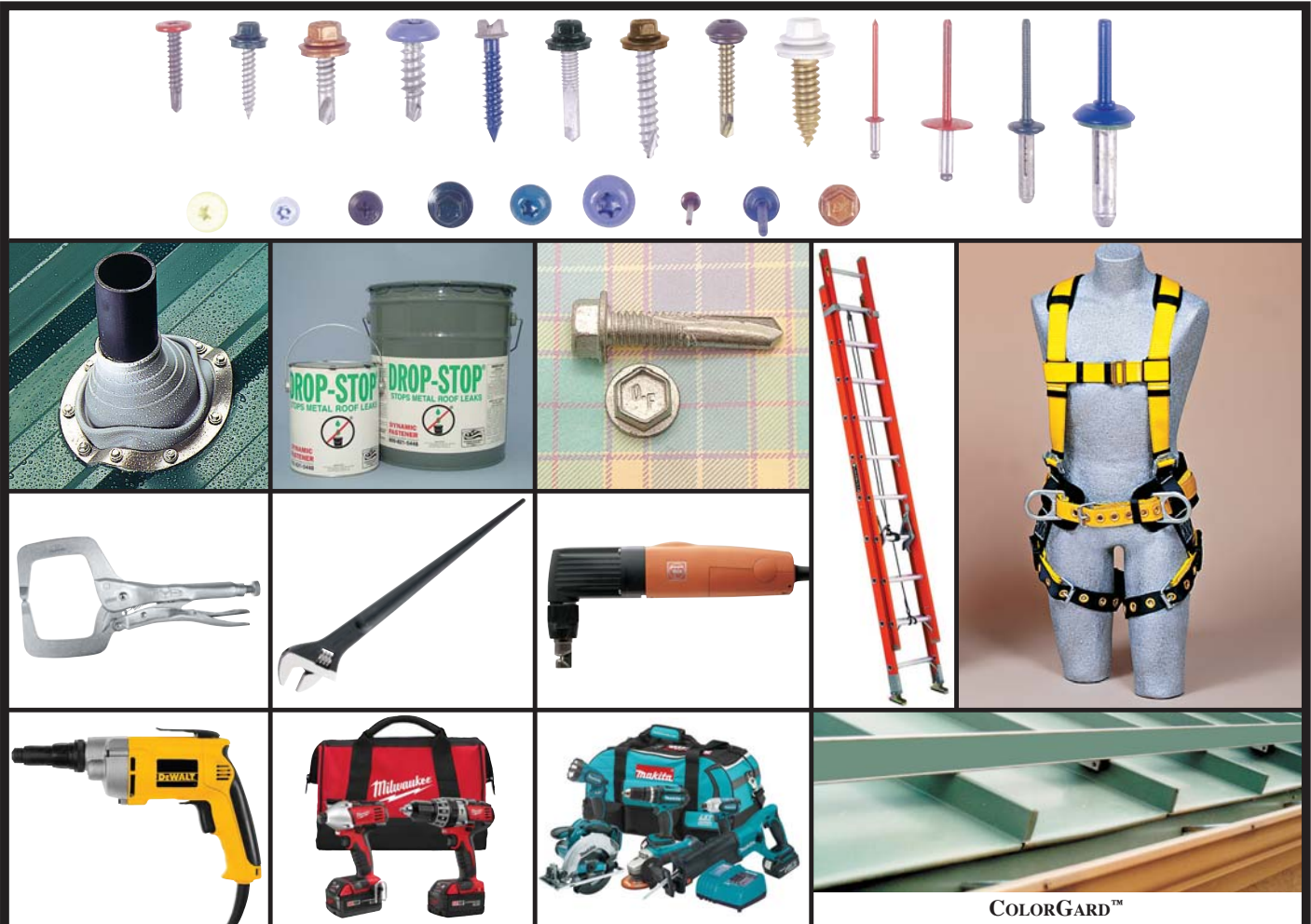
A good steel building company with an in-house engineering department is going to provide a quote for a more expensive and more accurately engineered roof-only building for the reasons I detailed previously. A great one is going to give you the higher quote and continue to explain how your customer might be able to save money in other ways, too. We can all agree, engineer or not, your customer doesn’t want his roof taking off and he doesn’t want his budget to, either. **RB**

Eric Beavers is Chief Operating Officer for Armstrong Steel Buildings.

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