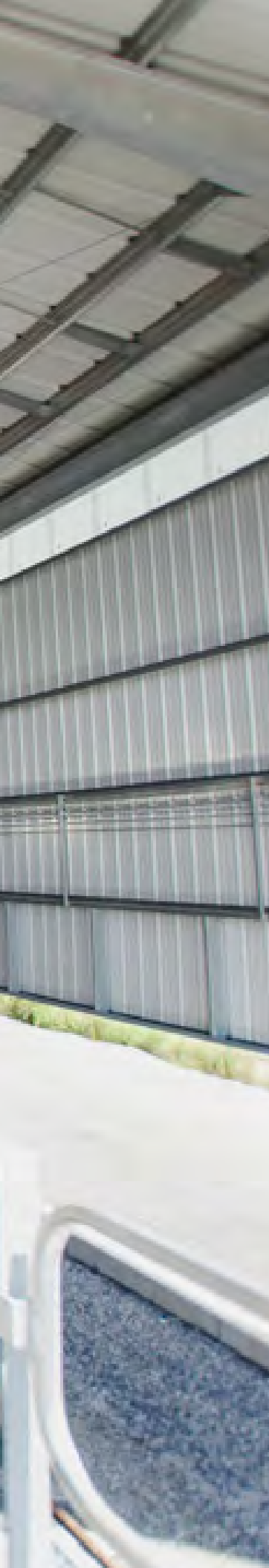


**2017**  
ANNUAL REPORT

# Accelerating the Building Process







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## About MBMA

Founded in 1956, MBMA serves manufacturers and suppliers as it works to promote the metal building systems industry. For over 60 years, its membership has supplied high-quality buildings for use in commercial, retail, office, industrial, institutional and other end-uses. The association provides a wealth of useful information on its website, [MBMA.com](http://MBMA.com), for anyone who works with or is interested in metal building systems. Resources include technical materials, research reports, and design guides.

## Chairman's Message

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# Broaden Your Horizons

In my years as a member of MBMA, I have learned so much. In the past few years, being involved on the Board of Directors and spending two years as MBMA's chairman, I can't begin to tell you how much value this volunteer involvement has meant to my company. I learn so much from every MBMA encounter that I then take back to my management team and to all my employees. We are a better company as a result.

That knowledge leads me to offer a suggestion to you. You may not realize it, but there is truly a place for everyone in MBMA. What can you do? We're growing very quickly and need more committee members, fresh insights, and new ideas. As you read this document, look at all of the committee reports and see how many things are happening that are truly industry change agents. Ask yourself ... "who from our company should be representing our firm on each of these committees?" Make a commitment to engage your team in committee work in 2018. I know you have people on your team who are up-and-comers—the next generation of leaders; people who are rising to the top. Their involvement in committees is far more valuable than a training program or a management seminar. Your future leaders will actually rub elbows with the most influential leaders in the industry. They will meet and meld with presidents of companies, and get to know Hall of Famers-in-the-making. Their contacts can reach a whole new level and they can only come away being better employees.



Brad Curtis, MBMA Chairman

Don't let your busy schedule keep you from spending your time wisely by building your team's involvement with MBMA. Don't be isolated in the walls of your company or the patterns of the past. Broaden your horizons—and your employees' potential—by getting active in MBMA.

As MBMA starts work on an important strategic plan update in 2018, you can have a particularly meaningful voice. Let's fight the big battles together.

# MBMA Management

MBMA has been managed by Thomas Associates, Inc. since 1956. Thomas is one of the longest-running success stories among association management firms in the United States. It has an extensive and diverse technical team that can support the codes, standards, and research goals of its various client associations. Such synergy allows it to expand research capabilities and bring in human resources that enhance the technical strength of MBMA.

## General Managers

John H. Addington  
Daniel J. Walker, PE

## Director of Research and Engineering

W. Lee Shoemaker, Ph.D., PE

## Director of Architectural Services

Jay D. Johnson, LEED AP

## Senior Staff Engineer

Vincent E. Sagan, PE

## Client Services Administrator

Jennifer M. Oblock

## Engineering Administrative Assistant

Constance R. Notter



# Management Perspective

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Dan Walker, PE, MBMA General Manager

## Success Breeds Success

I'm glad to report that more and more people are learning about metal building systems due to MBMA's concentrated social media program. Focusing our efforts on LinkedIn, Twitter and YouTube, we have reached thousands more people than ever before. And through that effort, we have been receiving inquiries, speaking opportunities, media attention and new members. We are reaching audiences we haven't ever been able to reach before; and that's clearly due to our communications efforts and our members engaging with us and sharing our content. Many thanks to the MBMA social media subcommittee members who are pushing our news out to so many hundreds of relevant groups and thousands of followers each week. Their efforts have made a great difference.

I'm also pleased to report that MBMA achieved more membership growth in 2017 than in recent years, as we welcomed six new companies. Our primary growth has come in the Associate member/supplier area. The more visible we are in social media, in traditional media and as guest speakers, the more companies are learning about the association and want to be a part of it. Their enthusiasm is proof-positive that there is tremendous value in MBMA membership—and that there is strength in numbers.

I am also very excited to report to you that, beginning in 2018, MBMA will be co-branding each of our new manuals and technical guides. Our branding partner will be the International Code Council. The confidence that the ICC is placing in us represents the quality of what we bring to the table. We are confident that having the MBMA and ICC logos on the cover of the metal building guides we produce will enhance the perception and position of metal buildings in the greater marketplace. We are proud to be co-branding our technical materials with such a reputable and respected organization.

I affirm Brad Curtis' comments in his opening remarks in this annual report. Our association is successful because of YOU—the members. However, we need new faces, ideas and energy to continue our forward momentum. Please call me to discuss how you and others in your company can get involved in our research, committees, industry events and more. We welcome you to get involved so that we can achieve even greater goals.





# Committee Accomplishments

## Together We Do More



MBMA's seismic behavior research will expand the limits for which metal building frame systems are considered appropriate in seismic regions. We will drive the methodology for designing metal building frames into its next generation.

MBMA's development of new acoustical data completes a design trifecta by allowing MBMA to promote fire, energy, and acoustical data that are highly valued by designers.

MBMA completed the *Contractors Energy Guide for Metal Building Systems*, available for download on the MBMA website.

MBMA's upcoming, revised *Seismic Design Guide for Metal Building Systems* will help promote our structures as the safe and dependable seismic load support systems that we in the industry know them to be.

MBMA's industry-wide Environmental Product Declarations are now available for primary framing, secondary framing, and wall and roof panels.

MBMA completed comprehensive COMcheck examples that illustrate how to comply using this nationally recognized energy compliance software.

MBMA's external product testing of rod-brace-to-web-connection anchorage indicates that typical industry connections in this area have significantly greater strength than we predicted.

MBMA's purlin-to-sheathing connections research will help us better understand and quantify the horizontal force transfer between purlins and standing seam roof panels, which is significant in roof/purlin stability.

MBMA's *Fire Resistance Design Guide for Metal Building Systems* was updated to the 2018 IBC and added new MBMA-rated assemblies.



# Accreditation Committee



Chuck Haslebacher, Committee Chair

## Accreditation Sets Gold Standard for MBS Industry

The AC472 accreditation program is a high-impact quality assurance initiative that sets the pace for the industry. It is this commitment to quality and excellence that helps make metal building systems the best choice for low-rise commercial buildings.

Administered through the International Accreditation Service (IAS), the program requires regular inspections of metal building manufacturing facilities. The program involves:

- Establishing quality assurance standards for metal building systems manufacturers
- Evaluating metal building systems vendors, involving both their capabilities and products
- Initiating processes and procedures that proactively assess quality and eliminate errors
- Auditing of each accredited company's quality assurance procedures and product quality standards
- Increasing quality awareness among employees within each accredited company

The program is based on the requirements of Chapter 17 of the International Building Code and provides code officials with a means to approve the inspection program of manufacturers involved in the fabrication of metal building systems. MBMA's Accreditation Committee works closely with IAS to monitor and assess the program and its value. AC472 benefits building owners, contractors and developers and lends a high level of credibility to all accredited building system manufacturers.

### Enhancing the Future

In 2016, the Metal Building Contractors & Erectors Association (MBCEA) also began working directly with IAS and with MBMA to encourage the concept of accreditation for metal building erectors. They were instrumental in supporting the introduction of AC478: IAS Accreditation Criteria for Inspection Practices for Metal Building Assemblers. MBMA is proud to assist MBCEA in communicating the value of contractor accreditation.

AC478 requires that firms that assemble metal buildings to have management and inspection systems in place to enhance quality, safety, and full code compliance. The assemblers are evaluated across multiple areas, including erection/construction practices, training, management systems, personnel qualifications, and compliance with project specifications.

In conjunction with accreditation, MBMA is continuing to sponsor random ultrasonic testing of complete joint penetration groove welds to evaluate quality (and factors that affect quality), to better assess the appropriateness of the requirements in Chapter N of the AISC Specification.

# RECREATION & FITNESS



**Quantifying Sustainability:**  
How metal buildings are meeting the demands of the modern design and construction industry.

## MBMA Getting Things Done!

### Social Media



**1,004**  
followers

**111,507**  
impressions



**635**  
followers

**198,321**  
impressions



**180**  
subscribers

**12,502**  
views

### Traditional Media

**130**  
articles



**WHY METAL BUILDING SYSTEMS?**  
with W. Lee Shoemaker, PhD, PE  
MBMA Director of Research and Engineering



"Metal buildings use less resources, they're quick to site, they give the owner what they want very quickly..."

Marci S. Uihlein, P.E., M.ASCE, Assoc. AIA  
University of Illinois at Urbana-Champaign  
School of Architecture

## PHASING IN GROWTH

A dealership successfully grows with a metal building expansion

by Dan Walker, PE

The economy crashed, car sales were down and the automotive industry was hurting. This was the state of the industry in 2010 when Deacon's Chrysler, Jeep, Ram, and Dodge dealerships in Madison Heights, Ohio, was awarded Chrysler International's new FCA Group-Deacon's Automobiles to sign a term agreement requiring the Deacon family to build a new building or close its doors. The dealership, which the Deacons purchased in 1983, had operated under various automotive companies and other owners in the previous 27 years.

"This was a gamble and not an easy decision for us," says Jim Deacon, the current owner. "I had only been able to see what we could economically build. I took a lot of planning and involvement from the city and Chrysler, but we somehow came up in time during construction. The finished building looks great, and people tell me all the time how it improved the look of the area."

Deacon's requirements were to keep his store open during construction, build according to budget, and meet design guidelines from the village and Chrysler dealerships. Jim Deacon, with partner, Smith Construction, Cleveland, proposed using a metal building system to meet these and other criteria. The decision was made to complete construction in three phases and completely demolish the original concrete block structure. Smith worked with the design-build general contractor that selected the metal building. Carney Construction Group LLC, Wallingford, Ohio.

Smith says, "With the change of project scope to include replacement of the existing service bays, the need for long clear-span bays came into play. In our experience, metal building structures are ideally suited to these requirements."

"Once the need for the clear-span was recognized in the project, it made sense to incorporate the metal building structure for the entire building in order to gain the economic advantages of a single structure."

Part of the agreement and more generous attention paid also buffer between the dealership. This also

## Fire Resistance Design For Metal Building Systems

Part I – Fire Resistance Design Basics

**MBMA**  
METAL BUILDING MANUFACTURERS ASSOCIATION  
Research | Leadership | Education

Presented by:  
Nestor Iwankiw, P.E., S.E., Ph.D.  
Senior Engineer  
Jensen Hughes

# Communications Committee



Craig Edwards, Committee Chair

## Expanding the Conversation

MBMA's mission is to "enhance and elevate the perception of metal building systems as a high quality, adaptable, durable, building construction approach which produces economy, speed to market and single-source control."

Our committee is using communication and marketing expertise to help educate and inform our target audiences. How do we do it?

### Video Production

We have developed an extensive series of audio-visual materials for use by anyone. These resources are available to you on our YouTube channel, MBMA Media. You are welcome to share these resources with clients, developers, employees, local student groups, code officials, architects and more.

### Social Media

We have also developed a robust social media presence in 2017, which is clearly helping to elevate the perception of the industry. Thousands of people are seeing our posts and we are getting queries from many types of people who were previously unaware of the industry or our association. We are excited about expanding this program further in 2018.

### Communication Materials

We continue to provide a wide variety of traditional communications support materials, available to print or to share in an electronic format. Again, all are available

for your use. These range from article reprints to case studies, to research reports. Feel free to contact MBMA to learn about all available materials and to recommend new ones as well.

### Traditional Media

We recognize that some companies and associations have redirected their communications budgets toward social media, vastly reducing their press release development and article pitches to traditional print media sources. MBMA's leadership has shown the foresight to continue to engage with reporters and editors nationwide and to invest in all types of communications to help us comprehensively spread the message.

We hope you'll take time to learn why MBMA can be your go-to source for knowledge, research, education and growth. Here's how to stay connected:



[Tinyurl.com/FollowMBMA](https://www.tinyurl.com/FollowMBMA)



[@LearnAboutMBMA](https://twitter.com/LearnAboutMBMA)



[youtube.com/MBMAmedia](https://www.youtube.com/MBMAmedia)

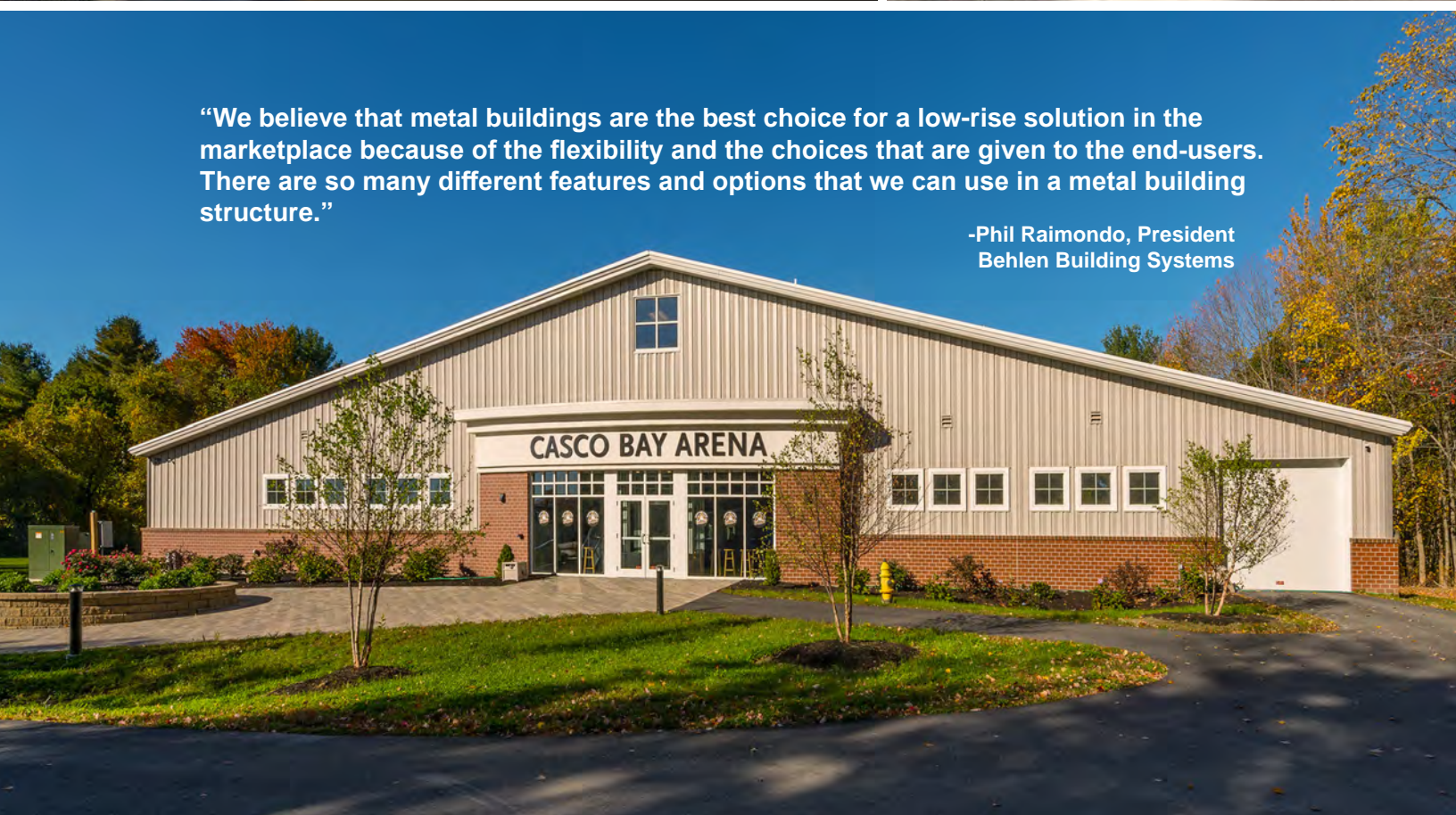


[MBMA.com](https://www.MBMA.com)



**“We believe that metal buildings are the best choice for a low-rise solution in the marketplace because of the flexibility and the choices that are given to the end-users. There are so many different features and options that we can use in a metal building structure.”**

**-Phil Raimondo, President  
Behlen Building Systems**



# Education Committee

## Reaching Out to Practicing Professionals and Students Alike

MBMA's Education Committee is very proactive and helping to expand the knowledge and understanding of metal buildings and how they impact the American commercial economy. Our efforts remain directed at important items such as:

1. Expanding the university capstone course for engineering and architecture students at universities across the nation
2. Changing perceptions by providing webinars and seminars for design professionals
3. Recording and making available continuing education courses for practicing engineers and architects

### Capstone Course

MBMA's Dr. Lee Shoemaker has been reaching out to more universities across the country. Several professors attended the Faculty Capstone Course meeting in August 2017. They were:

- Dr. Richard Welcher – University of Arkansas
- Dr. Chris Ferraro – University of Florida
- Dr. Larry Fahnstock – University of Illinois at Urbana-Champaign
- Dr. John Judd – University of Wyoming
- Dr. Ron Ziemian – Bucknell University (previous MBMA Capstone participant)

### Webinars

MBMA continues to add webinars for continuing education credits. The following have been created or nearly completed this year:

1. The Benefits of Metal Building Systems from a Whole Building Perspective
2. Metal Buildings 101
3. Skycalc – Daylighting Design for Metal Building Systems
4. Being the Engineer of Record for Metal Building Projects

### YouTube Videos

Thirteen informative and education videos are now available on the MBMA YouTube channel at [www.youtube.com/MBMAmedia](http://www.youtube.com/MBMAmedia).



Jerry Hatch, PE, Committee Chair

### MBMA Design Seminar - Recorded Presentations

Design seminar presentations were recorded and made available to metal building engineers. These help to provide technical information to engineers who did not attend the MBMA Technical Committee meetings. Topics include:

1. New Shear Resistance Provisions in AISC 360 – Dr. Don White
2. Design of PJP Welded Connections – Dr. Pat McManus
3. Joist and Deck Tools – Mr. David Samuelson
4. Design Considerations for Buildings with Overhead Cranes – Mr. Darren McGonigle
5. Design of Jambs for Rolling Doors – Mr. Jerry Hatch, PE

### Educational Face-to-Face or Online Meetings

The following programs were presented and shared with engineers across America:

- Metal Building Inspection Manual, METALCON
- Special Inspections Roundtable, National Coalition of Structural Engineers Associations
- Industry/Academic Capstone Model Program, SEI Structures Congress
- Being the Engineer of Record on a Metal Building Project, Structural Engineers Association of Ohio
- Metal Building Inspections, Commonwealth Building Officials
- IAS AC 472/478 Metal Building Accreditation Programs, Nevada Organization of Building Officials
- Comparison of Metal and Non-Metal Retrofit Systems, METALCON
- Hurricane Harvey Update, NCI Continuing Education Seminar
- Metal Building Systems, University of Wisconsin – Platteville

**“Metal buildings are a great choice for a low-rise building today because of the opportunities. From an architectural standpoint to economies of scale, to installation time. It just gives more opportunities to an architect to show a professionally delivered building in a timely and economical fashion.”**

**-Robert Tiffin, Strategic Accounts Division  
Silvercoat Lamination**





## Energy Committee

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# Enhancing Codes and Educating Designers

Throughout 2017, the MBMA Energy Committee continued to monitor and participate in the energy codes and standards process. This year, code proposals were addressed to update the 2015 IECC to the 2018 version. In addition, the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) published an addendum to the 2016 edition of ASHRAE Standard 90.1.

### Education Planning Material Development

Our committee finished work on the *Contractors Energy Guide for Metal Building Systems*. The guide is a resource on the MBMA website. Written in layman's terms, it contains pertinent energy code information and describes how to design a metal building to meet energy codes and to service customer demands for lower operational costs.

MBMA completed comprehensive COMcheck examples that illustrate how to comply using the nationally recognized energy compliance software. In addition the MBMA YouTube channel now includes the Energy Code Compliance for Metal Building Systems webinar series to address the topic of COMcheck.

The committee completed a comprehensive test project to determine the acoustical performance of the now common, highly insulated metal building wall and roof assemblies. This information is important for designers who wish to use metal buildings for schools, churches, and offices to meet the LEED v4 and other high-performance specifications. Members of the Energy Committee defined four roof assemblies and 15 wall assemblies for acoustical testing that provided third-party test results the whole industry can use.



Rick Haws, PE, Committee Chair

The development of the acoustical data completes the design trifecta by allowing MBMA to promote fire, energy, and acoustical data that is highly sought out by designers, and will allow metal buildings to remain competitive with other building types.

MBMA is also helping to fund the Oak Ridge National Lab (ORNL) Roof Savings Calculator update. Fourteen other industry associations and the Department of Energy (DOE) are involved. The focus is to update the calculation methods used by the DOE through their online Cool Roof Savings Calculator, which can be used to show the long-term cost savings for specifying a cool roof.

MBMA held its annual Energy Workshop, which included helpful presentations on a variety of energy issues that impact metal buildings. In 2018, we will continue to keep a strong presence in the IECC and ASHRAE 90.1 code bodies, and work with our industry partners. We will also conduct a hygrothermal analysis to develop best practices to prevent condensation in buildings that are more heavily insulated and where air leakage has been reduced.



# Fire & Insurance Committee

## Focusing on Providing Resources

The mission of the Fire & Insurance Committee is to encourage fair and equitable treatment of metal building systems by regulators, fire and building codes, insurance and insurance regulating and rating organizations, underwriters, and re-insurance firms. Here is a summary of our primary achievements:

- We provided technical assistance for metal building fire protection and building insurance to MBMA members and other decision makers. Twenty-five percent of all technical inquiries received by the MBMA office involve fire protection issues.
- We updated the *MBMA Fire Resistance Design Guide for Metal Building Systems* to the 2018 IBC and added new MBMA-rated assemblies. We provided an introduction to several key IBC Chapter 26 fire protection requirements for foam plastic insulation, and created new sections pertaining to photovoltaic systems on metal building system roofs and the expansion of the practical application range of rated assemblies.
- We addressed photovoltaic systems on metal building roofs. In coordination with the UL Non-Combustible Roof Group (whose members include MBMA, testing laboratories, solar panel manufacturers, and panel-mounting system manufacturers), the committee continues to work toward adding testing exemptions in UL standards and the International Building Code (IBC).
- We performed analyses to incorporate additional roof insulation systems such as filled cavity and liner systems through engineering studies, testing, and collaboration with industry partners. This included developing revised details for the ceiling-support in the roof-ceiling and head-of-wall assemblies requiring additional insulation. This work is being done with cooperation from MBMA's industry partners at MBCEA.

### Moving Forward in 2018

In 2018, the Fire & Insurance Committee will continue moving forward. Here are two major goals:

1. Maintain and update existing MBMA fire-rated assemblies, working to incorporate more roof insulation systems such as new filled cavity and liner systems. This will be accomplished through engineering studies, testing, and in collaboration with MBMA's industry partners.



Andy Jaworski, PE, Committee Chair

2. Work to change testing standards to recognize non-combustible roofs with solar panel installations and add testing exemptions in the UL Standards and the IBC through the UL Non-Combustible Roof Group. This work will create opportunities for MBMA members because it helps recognize the good performance of metal roofs with solar panels installed, when compared to conventional roofs with solar panels.

In addition, with the technical content of the *MBMA Fire Resistance Design Guide for Metal Building Systems* updated in 2017, the committee will now publish the updated guide.

Other new projects include:

- The revision and update of the existing MBMA Fire and Insurance bulletins to make them current and correct because of changes in the International Building Code, energy codes, and standard industry practices.
- The Innovation Award, Metal Building Hail Resistance, which will perform testing and analysis of hail damage on metal roof panels, developing a document defining functional damage vs. cosmetic damage.
- Expanding fire protection options for metal building frames by developing a tool to easily determine the W/D parameter, which is necessary to select an appropriate spray-applied fire protection system. We will also determine typical W/D values for metal building system frame configurations.

“I believe metal buildings are the best choice for construction in our markets, because our approach to construction allows contractors to be very competitive around sustainable, renewable products.”

- Chuck Haslebacher, President  
Varco Pruden



# Safety Committee

## Setting Higher Expectations for Safety: At Work and at Home

The MBMA Safety Committee continues to work to establish the metal building industry as a leader in safe workplace practices. Participation on the committee is open to all members, so don't be afraid to get involved and start sharing best practices with your industry peers.

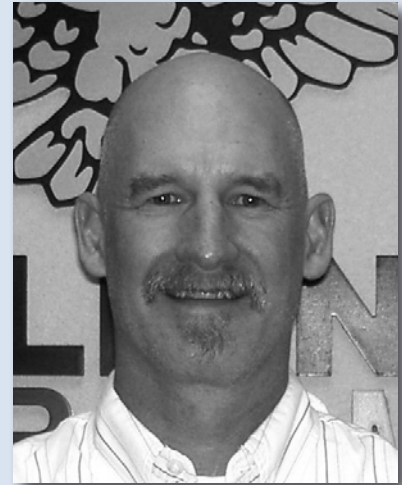
By focusing on safety and best practices, member companies benefit from tangible results such as:

- Protecting employees by creating a safer environment at work and home
- Fewer lost work days and restricted duty assignments
- Less exposure when receiving OSHA audits
- Reduced insurance premiums at renewal
- Improved morale and productivity

The MBMA Safety Committee also continues to produce quality training programs and provide idea-sharing opportunities by holding a popular and engaging annual safety workshop. This event focuses on building leadership skills and sharing best practices among MBMA member companies. In addition to the workshop, the committee holds safety training webinars every other month that are free and open to all MBMA members, including Associate members. Webinars include topics such as: hands-free crane operation, staying clear of debris zones, new employee orientation, hand and eye protection, why work safe, and mobile equipment training.

### Annual Safety Awards

Safety awards are presented each year at the MBMA spring meeting. In 2017, 45 manufacturing facilities submitted data for the OSHA Injury Statistics Safety Award program. The process was changed back in 2013 to make the program more stringent, with two levels of recognition: 1) Superior Safety Award for those companies with zero recordable injuries throughout the calendar year and 2) Safety Performance Award for



Curtis Archibald, Committee Chair

companies with an incident rate less than 50% of the industry average as reported by OSHA. Five MBMA member plants received a Superior Safety Award, and six MBMA member plants were recognized with a Safety Performance Award. Seven Associate members were also recognized for having achieved a zero-incident rate in 2016—this was a new award category created especially for Associate members to recognize their safety achievements.

### Another Great Annual Safety Workshop

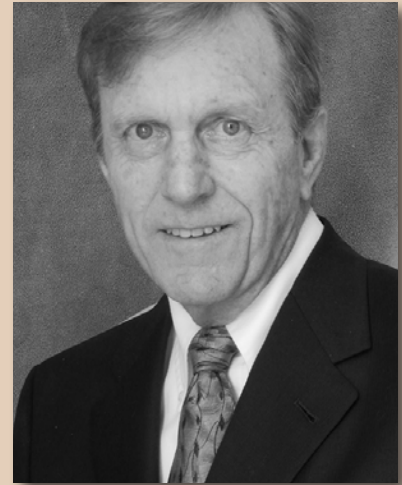
This year, the MBMA Annual Safety Workshop was held in Houston, Texas with 26 attendees. The workshop consisted of an interactive series of roundtable discussions where members shared best practices from their facility with the group. Their ideas for implementation included: assigning mentors to new hires; using photos as teaching tools to reduce unsafe situations; creating job knowledge books; and the value of installing netting to protect tow motors on loading docks. Dozens of other great new ideas were also shared. Attendees reviewed the top 10 OSHA citations for 2016 and how to prevent them, which helps companies to be prepared in their own plants and to prevent citations during an OSHA audit.

The Safety Committee will continue to hold an annual workshop, and we are busy planning a new series of webinars for 2018 to share best practices that continue to foster a culture of safety for the entire industry.



# Sustainability Committee

## Educating the Design Community on MBMA's Industry-Wide Sustainable Resources



John Underwood, Committee Chair

The MBMA Sustainability Committee works to ensure fair and equitable treatment for metal buildings by the many groups that publish standards relating to sustainability in the construction arena. Additionally, this committee prepares and maintains industry-wide resources to assist MBMA members in substantiating green building claims.

The following resources are now available on MBMA's website to assist the design community as they choose metal building systems for their sustainable building projects:

- Industry-Wide Life Cycle Inventory (LCI) data, available for practitioners to use in their Life Cycle Assessment (LCA) software programs
- Industry-wide LCA report
- Three Environmental Product Declarations (EPDs)
- Walter P. Moore case studies comparing metal building systems and other forms of construction
- Metal Building Systems solutions within the Athena Impact Estimator LCA software
- Promotional flyers highlighting the sustainable benefits of metal buildings versus wood in low-rise building construction
- USGBC LEED v4 summary of credits applicable to metal building systems

### Environmental Product Declarations

MBMA's industry-wide EPDs for primary framing, secondary framing and wall and roof panels are posted on UL Environment's website and featured on MBMA's website for use by the entire metal building systems industry.

MBMA's three EPDs disclose the environmental impacts of a product based on the results of an LCA, in addition to providing other useful information. The MBMA EPDs

are third-party validated, are ISO compliant, and can be used by the design community when specifying structural steel and metal panel products. They are available for download at MBMA.com.

### Sustainability Education and Webinars

Recordings of past webinars covering LCA, EPDs and sustainability have been posted on the MBMA YouTube channel in addition to a compelling video on the Sustainability Benefits of Metal Building Systems.

### Codes, Standards and Rating Systems Monitored

The Sustainability Committee monitors the development of the ICC International Green Construction Code (IgCC), ASHRAE 189.1 Standard for the Design of High-Performance Green Buildings, and the USGBC LEED Rating System.

We anticipate that upcoming trends in the sustainability related provisions will center on acoustics, resiliency, and chemical concerns. There will be increased stringency in developing EPDs and a goal to develop standards to allow EPDs to be readily comparable.

In 2017, MBMA also completed a series of acoustic tests on metal building systems. The tests provide STC and OITC data, often sought by architects when projects include noise management protocol within the design criteria.



**“MBMA has sponsored research over the years to develop a very sophisticated solution for low-rise, non-residential construction and it’s very highly engineered and very sophisticated design.”**

**-W. Lee Shoemaker, Ph.D., PE  
MBMA Director of Research & Engineering**



# Technical Committee

## Building the Future: Research and Guides to Improve Metal Building Systems



Mark Detwiler, PE, Committee Chair

MBMA's Technical Committee achieved significant progress on key initiatives in 2017. Below are the highlights.

### Research Projects Seismic Behavior

Great strides have been made in 2017 in determining the appropriate seismic design parameters for metal building frame systems. Dr. Vahid Meimand, at NBM Technologies, has made enormous progress in the development of tools and analytical processes required by FEMA P695. The MBMA Seismic Steering Committee has established the first three archetypes of metal buildings intended for processing through the analytical modeling methodology. The first archetype, a clear span metal building frame with heavy walls, has been processed and improvements in the design have been developed to refine the results of the initial study.

The next two archetypes to be processed are a lightweight wall version of the first archetype, and a taller, heavy wall version. Preliminary results look very promising and the MBMA Technical Committee is excited about the prospect of producing industry-beneficial results from this massive effort. Our goal is to expand the limits for which metal building frame systems are considered appropriate in higher seismic regions and to drive the methodology for designing metal building frames into its next generation.

### Wind

Research to determine appropriate wind pressures for metal building structures continues in several areas. First, a study by Gill Harris is evaluating the wind

load on continuous lapped purlin and girt systems. Designers calculate applied purlin wind loads based on an area average of a fluctuating pressure profile along a purlin span. The new approach would spread the high-pressure peaks over a larger area of continuous framing systems, thus reducing the design wind load. Mr. Harris' work is nearly complete and we look forward to introducing this into the next versions of standards.

In another project, Dr. Peter Vickery of Applied Research Associates is evaluating a refinement to a parameter (Wind Directionality Factor) used to calculate ASCE 7 design pressures. This parameter accounts for the probability that wind generated in a design-level storm may not approach a building at the exact angle necessary to create the highest pressure spike seen in wind tunnel testing. MBMA's intention would then be to introduce this topic at ASCE 7 Wind Subcommittee meetings for potential adoption into ASCE 7-22.

Now, MBMA is assisting in two additional research activities that are being carried out by insurance-funded groups. The first project is at Western University in London, Ontario, Canada, under the direction of Dr. Greg Kopp. This project is a phase 2 extension of the IBHS wind tunnel research that seeks to replicate the results of the 30' x 45' x 10' gabled IBHS metal building on a roof-only structure using a top-mounted airbag system capable of duplicating almost instantaneous wind suction profile changes along a roof. The intent is to drive the wind pressures to a higher level than could



be obtained in the wind tunnel and to examine standing seam roof behavior at near-capacity levels to refine strength predictions.

Preliminary discussions have been fruitful and it is possible that metal building roof systems have considerably more capacity than current test methods suggest. Our goal will be to tap into some of that over-capacity in the hope of offsetting some of the increases in required design wind pressures to be introduced in building codes based on the 2016 ASCE 7 specification.

### **Bolted End-Plate Connections**

The work on the second phase of this project has centered on developing and gaining approval for a significantly higher-strength connection for use in seismic applications. Connections must be prequalified and can only be employed for a limited range of beam depths, flange sizes, end-plate thicknesses and bolt diameters. The prequalification is carried out using cyclic loading to prove a connection can withstand a high level of deformation without ultimate failure.

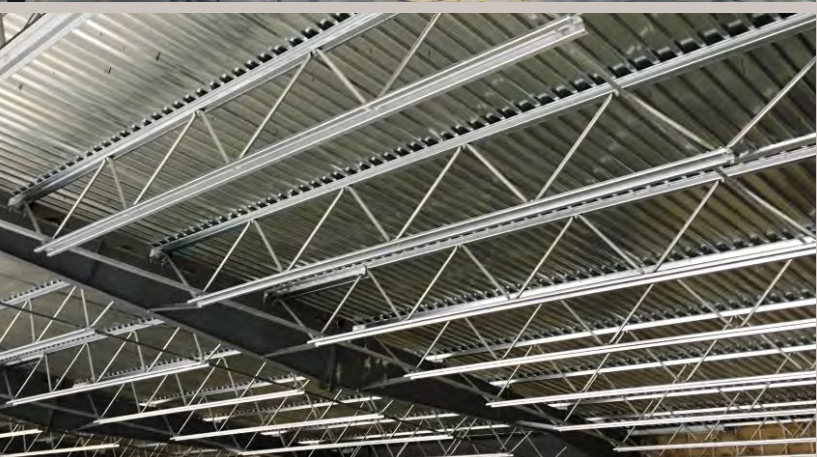


We are working with Dr. Matthew Eatherton of Virginia Tech to develop and test a stiffened 12-bolt extended end-plate connection that can use the larger built-up beam and column depths employed in metal buildings. Testing in 2017 showed the chosen connection performed well in most areas, but revealed an area at the stiffener/flange interface that needs further development to meet prequalification requirements for use in moment frames. Work is underway to refine the stiffener-to-flange transition area to provide the extra high strength required to bend without breaking, while still being fully producible within a metal building manufacturing facility.



### **Panel Zone**

The goal of the Panel Zone research, also being conducted by Dr. Eatherton, is to better understand the behavior in the panel zone of frames. This research should lead to improved and more economical design solutions. The intent is to develop a way to predict behavior more reliably and provide a design method to safely employ inelastic deformation in this region, particularly in design-level earthquake events. The results of this study will be incorporated into the *AISC/MBMA Moment End-Plate Design Guide*, which includes both the rectangular panel zones of conventional construction and sloped panel zone configurations used by the metal building industry. Multiple metal building frame designs have been provided using metal building software and should help to support the parametric finite element study to be undertaken as this project progresses.



### Effective Standoff of Purlin-to-Sheathing Connections

This project will help us better understand and quantify the horizontal force transfer between purlins and standing seam roof panels. This is a system effect that plays an important role in roof purlin stability. The work was performed under the direction of Dr. Michael Seek of Old Dominion University and was funded as an AISI Small Project Fellowship. MBMA members provided the panel and clip systems for the small-scale tests from which the results were derived, and provided input to the project team through a steering group. The results of this study have provided guidance for how to account for more of the system effects inherent in our structures. By better defining the additional strength metal building elements provide when attached to each other as a system, we can gain a greater competitive advantage over structures in other sectors of the construction industry.

### Rod-Brace-to-Web Connection Anchorage

Detailed knowledge of the rod x-bracing attachment to metal building member webs is critical to the successful performance of the majority of metal building structures. This testing and technical study is being performed by Dr. Cris Moen at Johns Hopkins University and is intended to update existing provisions characterizing the strength and stiffness of our x-bracing attachments. The goal of this project, in addition to gaining greater knowledge, is to develop accurate strength equations that capture the behavior of materials that are currently being used.

### Jamb Design for Overhead Vehicle Doors

MBMA's 2018 *Metal Building Systems Manual*, currently in development, will include guidance for designing cold-formed steel cee sections or HSS jambs for roll-up sheet doors with wind locks to reinforce the door-to-framing

attachment. The details of the design provisions were developed through testing and analysis performed in a recent MBMA research initiative. This year we partnered with the Door & Access Systems Manufacturers Association (DASMA) to develop similar guidance from the testing of roll-up slat doors.

### Manuals and Guides

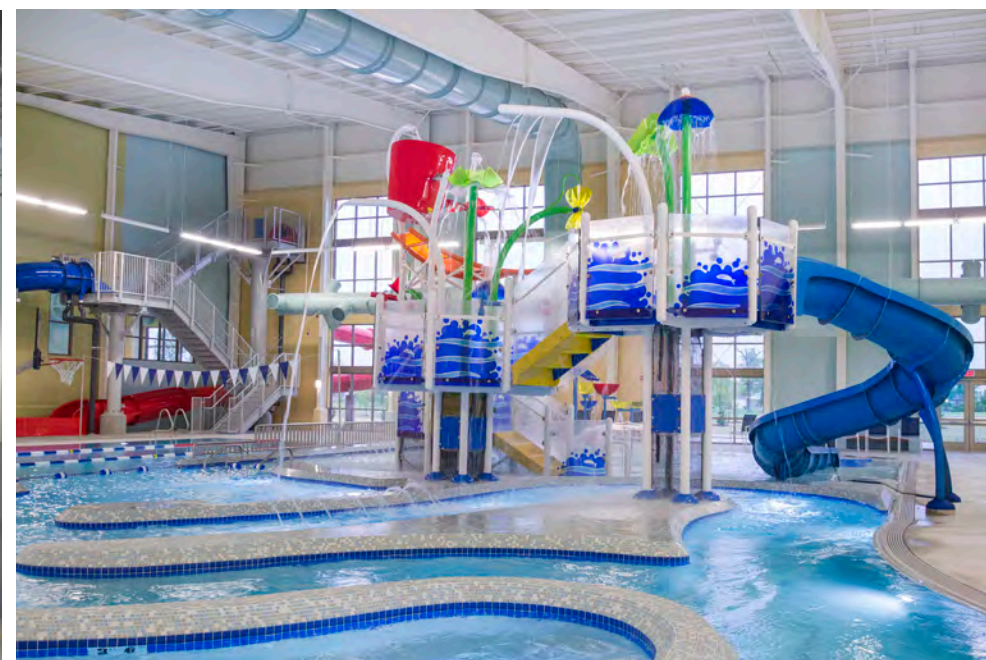
#### Updated Seismic Design Guide

MBMA's *Seismic Design Guide for Metal Building Systems* is being updated by Rafael Sabelli of Walter P. Moore and Associates, Inc. The document will include seismic design provisions pertinent to metal building framing systems based on the 2015 International Building Code and the 2010 ASCE 7 Minimum Design Loads for Buildings and Other Structures. It will include information gained from recent MBMA seismic research and provide guidance for metal building-specific seismic design issues. This publication will address concerns from some outside the metal building industry regarding the behavior of our structures under seismic loading, and help promote our structures as the safe and dependable seismic load support systems we in the industry know them to be.

#### AISI D111 Design Guide

This AISI design guide revision will update and consolidate two purlin design guides (AISI CF97-1 and AISI D111) into a single document representing the most current procedures for designing cold-formed steel roof purlin framing systems. Dr. Seek has been extremely generous with his time in working with the MBMA Technical Committee to address comments and concerns regarding the modernization of material from older guides for inclusion in this upcoming revision.

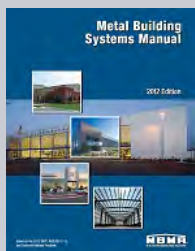




# Educational & Technical Resources

## MBMA Educational and Technical Resources Provide Valuable Information for the Industry

MBMA continues to lead the metal building systems industry and fulfill its mission by providing educational, research, and technical resources. These include an increasing number of design guides and manuals that are invaluable for anyone who works with metal buildings anywhere in the world. MBMA publications are sold as print-on-demand or downloadable PDF files at [techstreet.com/MBMA](http://techstreet.com/MBMA). Users who purchase manuals this way are automatically notified of updates and errata. MBMA also provides an array of free resources that can be found at [MBMA.com](http://MBMA.com)



### **2012 Metal Building Systems Manual**

- Nationally recognized reference manual for the metal building industry
- Used by building owners, manufacturers, general contractors, erectors, engineers, architects, specifiers, inspectors, and other building professionals
- Covers the 2012 International Building Code and the American Society of Civil Engineers ASCE 7-10



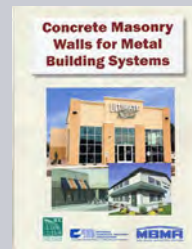
### **Seismic Design Guide for Metal Building Systems**

- It's out of print currently, but MBMA committees are working on a new version to be released in 2018
- Includes practical design examples to illustrate acceptable approaches for dealing with common seismic design issues, and provides insight into the impact of recent code developments



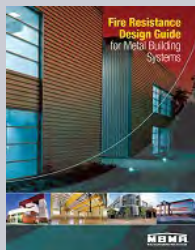
### **Metal Roofing Systems Design Manual - Second Edition**

- An important industry guide written about the most commonly adopted standards and codes
- Incorporates the results of research undertaken by MBMA, its members, and other industry groups
- Includes access to industry-wide roof details in AutoCAD format



### **Concrete Masonry Walls for Metal Building Systems**

- Published jointly with the National Concrete Masonry Association (NCMA)
- Highlights the advantages of metal buildings using concrete masonry hardwalls
- Includes recommendations on masonry design standards and industry practices, design aids, construction recommendations, and details for integrating masonry with metal buildings



### **Fire Resistance Design Guide for Metal Building Systems**

- Addresses fire protection solutions specific for metal building systems
- Includes prescriptive fire protection practices related to occupancy and construction options
- Offers extensive background information on fire-resistive provisions of the building codes relative to metal buildings



### **Guide for Inspecting Metal Building Systems**

- A resource for individuals responsible for contracting, performing, and reporting inspection tasks related to the construction of a metal building project
- Intended to help eliminate misunderstandings and lead to shorter punch lists, faster project delivery, and high-quality construction methods
- Focuses primarily on inspecting newly constructed metal building systems, including primary framing, secondary framing, and metal roof and wall cladding
- Provides an overview of standards on materials common to the building envelope, such as windows, doors, skylights, and insulation materials



### **Energy Design Guide for Metal Building Systems - Second Edition**

- A complete update of this essential guide
- Contains details on a variety of state energy codes, standards, and compliance tools
- Includes commentary on the latest editions of green building codes, standards and rating systems
- Provides information on cool roofs, a daylighting design guide, and useful information about photovoltaic panels on metal buildings
- Incorporates both the 2012 and 2015 International Energy Conservation Codes, as well as 2010 and 2013 editions of ASHRAE Standard 90.1 provisions pertaining to metal building systems

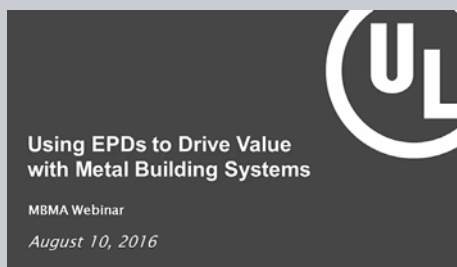
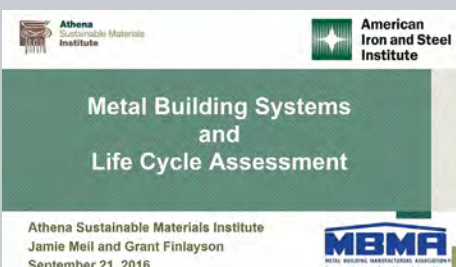
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## MBMA Informational Videos



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MBMA.com

## MBMA Case Studies, Articles, Reports & Fact Sheets



**RECREATION & FITNESS**  
MBMA

**EVANS FITNESS CLUB**

**MATERIAL CAPABILITIES**  
5 Things to Know About Metal Buildings & Fire Ratings

By Dan Wilbur, PE

“Take my guess: Pick this website. Its content is better than most.” This great content website is completely self-sufficient with content that is current and relevant. It is a great resource for anyone that desires the answers. How do you rate an internet resource? You can’t be a fully informed consumer if you don’t read the website. Full power each product’s strength.

There are few resources about the value of the metal building system and the metal building system.

“The metal building system is a great resource for anyone that desires the answers. How do you rate an internet resource? You can’t be a fully informed consumer if you don’t read the website. Full power each product’s strength.”

**PHASING IN GROWTH**  
A dealership successfully grows with a metal building expansion

By Dan Wilbur, PE



**Building Green**  
A Way of Life

By Jay D. Johnson, LEED AP



Over the past few years, there has been a lot of talk about green buildings. It is no longer a trend and is now a way of life. One thing is for sure: the green building industry is growing. It is no longer a trend and is now a way of life. One thing is for sure: the green building industry is growing. It is no longer a trend and is now a way of life. One thing is for sure: the green building industry is growing.

**The Evolution of Metal Buildings**  
By Dan Wilbur, PE

Backed by research and technical efforts, metal building systems of today are the first choice for many fabricators.

Metal building systems have been used to build churches, schools, government buildings, and many other types of buildings. The metal building system is a great resource for anyone that desires the answers. How do you rate an internet resource? You can’t be a fully informed consumer if you don’t read the website. Full power each product’s strength.

**2017 ANNUAL REPORT**  
Accelerating the Building Process



MBMA

**It's a Great Time to be in the Metal Building Industry**

“The metal building industry is a great resource for anyone that desires the answers. How do you rate an internet resource? You can’t be a fully informed consumer if you don’t read the website. Full power each product’s strength.”

**THE AIA/CES ACCREDITED PROGRAM BUILDING OFFICIALS**  
MBMA

“The metal building industry is a great resource for anyone that desires the answers. How do you rate an internet resource? You can’t be a fully informed consumer if you don’t read the website. Full power each product’s strength.”

**INSURANCE FACTS**

This brief discussion of insurance will help you improve your fire insurance knowledge.



MBMA

**FIRE INSURANCE COMPANY ORGANIZATIONS AND RATING PRACTICES**

“By understanding your clients’ insurance options, you can help them make wise design/build decisions.”

By Jay Johnson, LEED AP  
MBMA Director of Architectural Services

Five insurance options are available to help you make wise design/build decisions.

David Curran, Director  
Markus, Director  
Gregory, Director  
Tom Harty, Director  
John Landrum, Director (EM&I)

When you can generally expect that your customer will be using through-out the life of the metal building, you can help them make wise design/build decisions.

**INSURANCE ORGANIZATIONS**

**Stack Companies**

Stack companies and their use are important to the metal building industry. They are used to help you make wise design/build decisions.

**Material Considerations**

The metal building system is a great resource for anyone that desires the answers. How do you rate an internet resource? You can’t be a fully informed consumer if you don’t read the website. Full power each product’s strength.

**COOL METAL ROOFS**  
Cool Metal Roofs Are Energy-Efficient and Cost-Effective



“Cool metal roofs are energy-efficient and cost-effective. They are used to help you make wise design/build decisions.”

**Primary Structural Steel Frame Components**



“Primary structural steel frame components are used to help you make wise design/build decisions.”

# MBMA Member Manufacturing Facilities



## ALABAMA

Cullman  
Eufaula  
Florence  
Hueytown  
Muscle Shoals  
Rainsville

## ARKANSAS

Cabot  
North Little Rock  
Pine Bluff

## CALIFORNIA

Atwater  
Lathrop  
Lockeford  
Turlock  
Visalia

## FLORIDA

Fort Myers

## GEORGIA

Adel  
Cedartown  
Lithia Springs  
Thomasville

## ILLINOIS

El Paso

## INDIANA

Rensselaer  
Waterloo

## IOWA

Monticello  
Mount Pleasant

## LOUISIANA

Harahan

## MASSACHUSETTS

Sutton

## MISSISSIPPI

Batesville  
Columbus  
Starkville

## MISSOURI

Kansas City  
St. Joseph

## NEBRASKA

Columbus  
Grand Island

## NEVADA

Carson City

## NORTH CAROLINA

Greensboro  
Laurinburg  
Rocky Mount

## OHIO

Kenton

## OKLAHOMA

Claremore  
Oklahoma City

## PENNSYLVANIA

Ambridge  
Annville

## SOUTH CAROLINA

Swansea

## TENNESSEE

Caryville  
Elizabethton  
Jackson  
Lexington  
Memphis  
Portland

## TEXAS

Athens  
Hockley  
Houston

Irving

Terrell  
Tyler

## UTAH

Brigham City  
Ephraim

## VIRGINIA

La Crosse

## WASHINGTON

Airway Heights

## WISCONSIN

Evansville

## CANADA

Ancaster

## MEXICO

Monterrey



# MBMA Members



## BUILDING SYSTEMS MEMBERS

A&S Building Systems  
 ACI Building Systems, LLC  
 All American Systems  
 Alliance Steel, Inc.  
 American Buildings Company  
 Associated Steel Group, LLC  
 BC Steel Buildings, Inc.  
 Behlen Building Systems  
 Bigbee Steel Buildings, Inc.  
 BlueScope Buildings North America, Inc.  
 Butler Manufacturing  
 CBC Steel Buildings  
 Ceco Building Systems  
 Chief Buildings  
 CO Building Systems, Inc.  
 Dean Steel Buildings, Inc.  
 Garco Building Systems, Inc.  
 Golden Giant, Inc.  
 Heritage Building Systems  
 Inland Buildings  
 Kirby Building Systems, Inc.  
 Ludwig Buildings Enterprises, LLC  
 Mesco Building Solutions  
 Metallic Building Company  
 Mid-West Steel Buildings  
 NCI Building Systems, Inc.  
 Nucor Building Systems  
 Oakland Metal Buildings, Inc.  
 Package Steel Systems  
 Pinnacle Structures, Inc.  
 Red Dot Buildings  
 Robertson Building Systems  
 Schulte Building Systems, Inc.  
 Spirco Manufacturing  
 Star Building Systems  
 Sukup Manufacturing Company  
 Sukup Steel Structures, Inc.  
 Trident Building Systems, Inc.

Tyler Building Systems, L.P.  
 United Structures of America, Inc.  
 Varco Pruden Buildings  
 Vulcan Steel Structures, Inc.  
 Whirlwind Steel Buildings, Inc.

## ASSOCIATE MEMBERS

ABIS, Inc.  
 Akzo Nobel Coatings, Inc.  
 All Weather Insulated Panels  
 Applied Testing & Geosciences, LLC  
 Arcelor Mittal USA  
 Arcelor Mittal Dofasco, Inc.  
 Atlas Bolt & Screw Company  
 Bay Insulation Company  
 Beacon Business Solutions  
 Benchmark Consulting & Inspection, LLC  
 Birmingham Fastener, Inc.  
 Birmingham Rail & Locomotive  
 Building Products Development  
 Building Research Systems, Inc.  
 CADeploy, Inc.  
 Commercial Metals Company  
 Crane Composites, Inc.  
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 Global Building Products  
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Lincoln Electric Company  
 Metal Building Software, Inc.  
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 Preferred Solutions, Inc.  
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 Quality Roof Seamers  
 Redd Team by Sapa  
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 Royal Coatings, Inc.  
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 Sealed "N" Safe  
 SFS intec, Inc.  
 Sika Corporation  
 Silvercote Lamination, LLC  
 Solutions in Polycarbonate, LLC  
 Specialty Plus, LLC  
 Spectra Metal Sales, Inc.  
 Steel and Pipe Supply  
 Steel Dynamics, Inc.  
 Telling Industries  
 Tell Manufacturing  
 Therm-All  
 TopHat Framing Systems, LLC  
 Triangle Fastener Corporation  
 United States Steel Corporation  
 Valspar Corporation  
 VELUX Design and Development  
 Company USA, Inc.



# A Sampling of over 75 Corporations that Invest in Metal Buildings

Aaron's  
Ace Hardware Distribution Center and Warehouse  
Ace Hardware Regional Support Center  
ACME Tools  
Acura  
American Legion  
Amtrak Maintenance Facility  
Ashley Furniture Store  
Audi  
Avis  
BMW  
Bobcat  
Boys & Girls Club  
Budweiser  
Cadillac  
Carquest Auto Parts  
Chevrolet  
Chicken Express  
Chrysler  
Citizens Bank  
Coca-Cola Distribution  
Costco  
Dodge  
Dollar General  
Family Dollar  
Fast Track Car Wash  
FedEx  
FedEx Ground Distribution Center  
Firehouse Subs  
First Financial Bank  
Five Guys  
Ford  
Gold's Gym  
Goodwill  
Goodyear Tire Store  
Green Line Equipment  
Harley-Davidson  
Honda  
Hyundai  
Jaguar  
Jeep  
Jewish Community Center  
Kia  
Land Rover  
La-Z-Boy  
Lexus  
Mazda  
Mercedes-Benz  
MINI  
Mitsubishi  
Napa Auto Parts  
Nissan  
O'Reilly Automotive  
Pennzoil  
Penske  
Petco  
Porsche  
Qdoba  
Roto-Rooter  
Schlumberger  
Sherwin Williams  
Stanley Steemer  
Subaru  
Suzuki  
Top Golf  
Toyota  
Toys 'R' Us  
Toys 'R' Us Distribution  
Tractor Supply Company  
True Value Hardware  
United Rentals  
Volkswagen  
Volvo  
Walgreens Distribution Center  
Walmart Distribution Center  
Whole Foods  
World Gym  
YMCA



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