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A MESSAGE FROM MBI’S EXECUTIVE DIRECTOR

I hope all our members enjoyed a wonderful holiday season and a happy new year! I know the Modular Building Institute staff are ready to take charge of 2017 and grow as the Voice of Commercial Modular Construction.

The MBI has worked steadily to gain more traction in the construction market and while we currently hold a little less than 3% of the total market, we are determined to obtain at least 5% by 2020. We are using all avenues available to us to increase the market for the modular industry including raising awareness and changing the perception of modular construction. By increasing the awareness of all methods of offsite construction, the modular construction industry will gain more headway.

Offsite construction is a term that can encompass all forms of prefab construction ranging from bathroom pods to precast concrete. The parts and pieces under the offsite construction umbrella can all combine to create a volumetric module. A barrier for entering mainstream commercial construction is the hesitance to move all construction offsite. By creating a hybrid building method and introducing offsite construction methods incrementally, developers, owners, and contractors can see the benefits to their projects and embrace offsite construction more and more.

The first quarter issue of the Modular Advantage focuses on all forms of offsite construction including case studies from members that showcase how far modular construction has come.

This year’s World of Modular will be held in Tucson, Arizona at a spectacular resort from March 17-20, 2017. Presentations will cover a wide-range of topics and with interest in modular construction on the rise we are expecting a record-setting crowd. Don’t forget to register and attend to network and learn from modular professionals from around the world!

Sincerely,

Tom Hardiman

ABOUT THE MODULAR BUILDING INSTITUTE

Founded in 1983, the Modular Building Institute (MBI) is the only international non-profit trade association serving the commercial modular construction industry. Members are manufacturers, lease fleet owners, contractors, owners, and developers of commercial building projects, as well as associates supplying building components, services, and financing. MBI members are located in over a dozen countries around the globe and provide all types of building space, from temporary relocatable industrialized buildings to complex multi-story permanent construction projects.

MBI’s mission is to grow the industry and its capabilities by encouraging innovation, quality, and professionalism through communication, education, and recognition.

Each year, MBI hosts World of Modular, the largest gathering of professionals in the modular construction industry. With more than 700 modular professionals coming together from around the world, this event should not be missed. For more information about industry events, visit www.worldofmodular.org.

TOP FIVE MBI MEMBER BENEFITS

1. Leads and Referrals
2. Networking
3. VIP Discounts
4. Training and Education
5. Recognition

THANK YOU 2017 MBI CORPORATE SPONSORS!

PLATINUM

GOLD

SILVER
What’s a “traditional builder” doing in a modular building magazine? Leaning toward the future, of course!

Modular builders and general contractors approach construction from different points of view. The modular builder looks for replicable elements and works to achieve the client’s objectives by creating a building out of volumetric components. The general contractor endeavors to achieve the client’s objectives by bringing “bricks and sticks,” sub-assemblies and assemblies to the site, to achieve the owner’s and architect’s unique, project-specific vision.

But modular builders, general contractors, clients, architects, manufacturers - we have something in common. Most of us are on a Lean journey, whether we call it that or not. If, in your company today, you are engaged in addressing questions like the following:

- How can we deliver greater value to our clients?
- How can we grow our market share?
- How can we share knowledge better and faster within our company to elevate our game to the next level?
- How can we improve safety, quality, productivity and speed to market?
- What can we learn by looking beyond how we’ve always done it?
- How can we improve collaboration and integration across our whole value chain to be more efficient and effective?

Then you’re on a Lean journey.

And that question of how to improve collaboration and integration across the value chain turns out to be an essential element in any of our Lean journeys. I like to say that, if we’re going to move this industry forward, we need to do it with a “No Silos” approach. And that’s where the National Institute of Building Sciences’ Off-Site Construction Council comes in.

The National Institute of Building Sciences (NIBS) was founded in the 1970s to bring together the many constituencies involved in creating and maintaining the built environment - from owners to regulatory agencies to architects to researchers to contractors to manufacturers to facility managers and more. NIBS has established industry leadership with numerous councils in such focus areas as building envelope, resiliency, multi-hazard mitigation, advancement of technology - the list goes on.

In 2013, NIBS recognized that an interdisciplinary approach to off-site construction was needed to help the industry overcome barriers, share knowledge and advance better and faster. So they founded the Off-Site Construction Council (OSCC) to bring together all of the stakeholders in the value chain. We defined off-site construction as follows:

“Off-site construction is the planning, design, fabrication and assembly of building elements at a location other than the final installed location, to support the rapid and efficient construction of a permanent structure. Such building elements may be prefabricated at a different location and transported to the site or prefabricated on the construction site and transported to their final location. Off-site construction is characterized by an integrated planning and supply chain strategy.”

MBI and its members have been valued partners and engaged participants in the OSCC since its founding. In 2016, MBI members such as NRB, Inc., were co-presenters on several OSCC webinars, explaining the why-what-how of off-site. Together, we reached hundreds of people and companies.

OSCC initiatives for 2017 include: collaboration with building and code officials; development of guidance on how to specify off-site in specifications and requests for proposals; collaboration with other organizations to jointly produce webinars and conference presentations and development of metrics to assess progress in improving productivity, safety, quality, and speed to market.

The OSCC meets three times a year, in conjunction with NIBS annual conference, World of Modular and the Offsite Construction Expo. Membership in NIBS is all that’s required to participate (in OSCC and NIBS’ other councils and committees) visit www.nibs.org to join.
INSIGHTS INTO SHIPPING CONTAINERS

Written by Falcon Structures

The Modular Building Institute has seen the growth in the use of containers in new construction across the world. In 2016, containers became a hot topic in the United States and were being used not just in residential projects but also in the creation of commercial construction buildings. MBI’s Government Affairs Committee created a Containers Task Force, comprised of MBI members in the container market, to assist in overseeing how MBI may assist in clarifying and creating codes for containers.

Read on for an inside viewpoint from Falcon Structures CEO Stephen Shang on the modular building industry as a whole; the role of Conex shipping containers in that picture; what changes we can expect with shipping container codes; and how changes in our macroeconomic climate could affect the industry.

In a broad sense, what changes do you expect to see in the modular building industry in 2017?

Stephen Shang: Awareness regarding the benefits of modular building and modularization will continue to grow. We’re at a point now where we are still talking about the benefits of modular and all it can bring to the construction industry and for functional space. This concept has been catching on, and in 2017, we should see a groundswell of people really starting to get it.

How will shipping container structures fit into this equation in 2017?

SS: With ISO shipping containers, we will continue to see new applications – ideas we had never considered in the past – appear on the horizon. More engineers understand the structural properties of shipping containers, so they can put containers together in ingenious new ways, for example, how they stack and join containers.

Consequently, we will continue to see new methods used for plant upgrades and building equipment enclosures. I also expect to see more shipping container proliferation and acceptance of container structures by authorities having jurisdiction (AHJ) than ever before.

Can you share some insight on what we can expect with shipping container codes and compliance specifically?

SS: Yes, code reform is on everyone’s mind, as well as clarity with AHJs. Once clarified, there will be a watershed event where the container structures industry goes much more mainstream than it is at present.

In 2017, code agencies and government regulators will give more attention to ISO shipping containers, and due to the 2016 publication of AC462 (the International Code Council’s (ICC’s) acceptance criteria for structural building materials from shipping containers), AC462 provided guidance the container structure industry desperately needed.

I foresee a proposed revision to AC462 coming, now that the industry has had time to digest and understand the criteria. As with any code, AC462 should evolve in an iterative process, with container structure industry leaders providing feedback to the ICC, resulting in a new iteration.

While widespread adoption of Conex shipping container structures won’t happen in 2017, I do see that happening in the next five years. Once the code problem is resolved, shipping containers will become less experimental and all sorts of great ideas that have been pushed back by regulators will become reality. Realistically, that’s more likely to happen in 2018 or 2019.

In the meantime, we need to remain vigilant as an industry to ensure that the shipping container structures we build are safe for the general public.

How do you see the current and pending economic climate affecting the container structure industry?

SS: Recently, we’ve seen a business community that is willing to make decisions again, and we’re excited about that. Some promises made by the incoming administration touch on traditional industries – infrastructure, oil and gas, manufacturing, and others – that are a good fit for shipping container structures.

So it’s my observation that 2017 should be a great year for our industry, because the macroeconomic climate has changed. Of course change is always in the air when a shift in power occurs. Falcon has been in business since 2003, and we’ve seen a lot of changes in the political climate and the container structures industry.

As a business owner, it’s always been my very strong belief that businesses in general need to make adjustments, just as you would when you’re sailing. If the wind blows from the right or the left, you adjust your sails accordingly. So while many people say we’re going through a seismic shift with the new administration, at Falcon, we’ll just make our adjustments and keep on sailing.

Stephen Shang
CEO, Falcon Structures
Falcon Structures Headquarters in Austin, Texas
SAVING TIME WITH MODULAR BATHROOM PODS

Written by Modular Building Institute

The Modular Building Institute has brought together the knowledge of its members in a white paper that helps answer the question, “is a bathroom pod right for your project?”

This white paper includes the benefits of bathroom pods and even case study examples of successful bathroom pod implementations. Read on for a small preview of the white paper and then visit www.modular.org under the “Industry News” section of the homepage and download it now to learn more!

The white paper was compiled by MBI staff with information contributed by MBI members Intelligent Offsite, PIVOTek, Easy Building Solutions, PUDA Industrial Co., and non-member BLOX Modular. Their input provided insightful viewpoints into the modular bathroom pod industry.

WHO BENEFITS FROM BATHROOM PODS?

DEVELOPERS
With a compressed project timeline, developers will benefit from a quicker time to market. Bathroom pods eliminate the complexity of delegating to multiple trades and ensure a high quality product. The higher return on investment makes the addition of bathroom pods a sound investment.

CONTRACTORS
Bringing together all required trades in a controlled factory environment lessens the need for delays and reworking that would typically occur on-site. The factory setting allows for required construction building codes to be strictly followed.

INSPECTORS
Bathroom pods will be built to meet the local codes required and leave the factory compliant and ready to pass the final on-site inspection. Pods arrive on-site with open walls to allow for easy access for site electrical, mechanical, and plumbing component inspections.

OFFSITE CONSTRUCTION SAVINGS FOR JOBSITE COST AND SCHEDULE ADVANTAGES

Written by Casey Malmquist, SmartLam
-President & General Manager

Even as construction techniques evolve, jobsite pressures to keep on schedule are no less intense. Time is, literally, money. The good news is, those same evolving construction techniques hold great potential to deliver a more structurally sound component with greater precision both in terms of construction and installation, for a fraction of the time and staffing most project managers budget for today.

One such building technology, Cross Laminated Timber (CLT) has been used in Europe for a couple decades now. This engineered wood building system is made from several layers of solid lumber boards, stacked crosswise and bonded together, providing dimensional stability, strength, and rigidity.

Each CLT product is made to order, and turnaround time is comparably quick. For example, a multilevel building currently under construction in Whitefish, Montana chose a CLT elevator shaft instead of pouring a concrete shaft onsite. If the construction team was using concrete masonry units (CMU), the common and traditional method, they would have to budget for a process involving 8-12 people, several inspections, added equipment to stack and cure the shafts, and allow three weeks for the entire process. The CLT shaft, prefabricated in a SmartLam facility with zero impact from weather conditions, was assembled on site with just three people and a crane operator in just a matter of hours. The cost of a CLT modular structure is in the neighborhood of 70 to 75% of conventional methods and saves nearly 3 weeks’ time in the overall project schedule.

This is just a small example of the enormous potential of CLT and how it can positively make an impact on your project. Whether it be a single component like an elevator shaft, floor system, or stairwell system, or it may also be the major component of the entire building system such as was used in the 18 story

SAVING TIME WITH MODULAR BATHROOM PODS

Written by Modular Building Institute
Brock Commons building in Vancouver, BC. CLT is an emerging building system that is taking modular construction to new heights.

Speed and economy are clear, but what’s more impressive is the structural qualities that levels the playing field for CLT products with more traditional contenders like masonry or steel:

DURABILITY:
With proper design and maintenance, wood structures can provide long and useful service lives equivalent to other building materials. The key is careful planning and understanding of environmental loads and other external factors likely to impact a building over its lifetime.

STRENGTH AND STABILITY:
Cross lamination provides for superior dimensional stability and offers significant sheer strength performance at a very unique weight to strength ratio compared to other common structural materials. CLT panels outperform anything currently available in the USA.

SEISMIC RESILIENCE:
CLT panels can create an effective lateral load resisting system. Researchers have conducted extensive seismic testing on CLT and found they perform exceptionally well with no residual deformation, particularly in multi-story applications.

ACOUSTICS:
Because the mass of the wall contributes to acoustic performance, CLT building systems provide superior noise control for both airborne and impact sound transmission.

THERMAL PERFORMANCE:
CLT panels are better insulators, requiring little or no insulation. Since CLT panels can be manufactured using CNC equipment to precise tolerances, the tighter-fitting panel joints result in better energy efficiency for the structure. The solid panels also mean nearly zero air infiltration into the building envelope. Interior temperatures of a finished CLT structure can be maintained with just one-third the normally required heating or cooling energy.

FIRE RESISTANCE:
A thick cross-section provides valuable and superior fire resistance for a CLT panel. Their mass means they char slowly, slowing and eventually stopping combustion. With fewer concealed spaces, fire cannot spread undetected. Compared to concrete and steel structures in a catastrophic fire event, CLT structures suffer less degradation.

MOISTURE MANAGEMENT & VAPOR DIFFUSION:
Wood is naturally hygroscopic, serving as a moisture management system within a building envelope. Ideally manufactured at 12% moisture content, wood’s ability to absorb and emit moisture can naturally stabilize an indoor environment. CLT buildings ‘breathe’, minimizing the risk for mold growth and maximizing the comfort of its occupants.

ENVIRONMENTAL:
Wood is the only major building material that grows naturally and is renewable. Studies consistently show that wood outperforms steel and concrete in terms of embodied energy, air pollution and water pollution. CLT also has a lighter carbon footprint as wood products continue to store carbon absorbed by the trees while growing, and engineered wood manufacturing requires significantly less energy to produce than concrete and steel.

HEALTHY INDOOR ENVIRONMENT:
The only constituents of a CLT building system are wood and a non-toxic/non-VOC adhesive. CLT building materials do not introduce any toxins into the indoor environment providing clean indoor air quality. CLT wall systems are naturally breathable. Integrated with appropriate mechanical systems, this creates a healthy indoor environment that maximizes occupant comfort and health.

From one-person builders to large construction companies, CLT structural systems arrive on-site ready to assemble, saving time and money with a swift and accurate building process.

CLT panels are manufactured for specific end-use applications, resulting in little to no job site waste. Plus, manufacturers can reuse fabrication scraps for stairs and other architectural elements. The offsite advantages CLT brings to any project should not be overlooked.

ABOUT THE AUTHOR:
Casey Malmquist, President and General Manager of SmartLam, has served in this position since SmartLam’s inception in January of 2012, and has led the SmartLam team from the ground level to becoming a globally-recognized producer of Cross-Laminated Timber products. Mr. Malmquist has over 30 years’ experience owning and operating a successful construction and development company.
RELOCATABLE BUILDINGS

Written by Modular Building Institute

A Relocatable Building (RB) is a partially or completely assembled building that complies with applicable codes or state regulations and is constructed in a building manufacturing facility using a modular construction process. Relocatable modular buildings are designed to be reused or repurposed multiple times and transported to different building sites.

Relocatable modular buildings are utilized for schools, construction site offices, medical clinics, sales centers and in any application where a relocatable building can meet a temporary space need. These buildings offer fast delivery, ease of relocation, low-cost reconfiguration, accelerated depreciation schedules and enormous flexibility. Relocatable modular buildings are not permanently affixed to real estate but are installed in accordance with manufacturer’s installation guidelines and local code requirements. These buildings are essential in cases where speed, temporary space and the ability to relocate are necessary.

FMI Corporation reported in its fourth quarter 2010 Nonresidential Construction Index that modular construction is considered a growth opportunity for the industry. Of the panelists surveyed 49% expect growth to exceed 5%. Panelists expect this area to grow faster than the market in general due to the growing use of BIM, owners wanting projects faster and for lower cost, safety, quality and the shortage of skilled labor once markets return to more normal growth. These expectations are still true years later.

Permanent Modular Construction (PMC) is an innovative, sustainable construction delivery method utilizing prefabricate single or multi-story whole building solutions in deliverable module sections. PMC buildings are manufactured in a safe and controlled setting, and can be constructed of wood, steel, or concrete. The structures are 60 to 90 percent completed in a factory-controlled environment, and transported and assembled at the final building site.

PMC modules can be integrated into site built projects or stand alone as a turn-key solution and can be delivered with MEP, fixtures and interior finishes in less time with less waste, and higher quality control compared to projects utilizing only traditional site build construction. A lot of research has come out in the last few years supporting the fact that modular construction is an efficient construction process and poised to help the industry grow.

OUTLOOK FOR 2017:

With approximately $6 billion in building assets and 35-6 billion in annual revenue, the relocatable building industry showed signs of improvement in 2015 with overall utilization up slightly from 66.87% at year-end 2014 to 67.75% at year-end 2015. Revenue mix was generated from roughly the same market segments with construction site offices leading at the way at 30%.

With nearly one-third of industry owned assets “on the sideline,” construction of new fleet units is not anticipated in the near future. Additionally, more stringent code requirements will add to the cost of newly constructed units, without a corresponding increase in rental rates. This will encourage owners to spend more on renovations and repairs to extend the useful lives of existing assets, and to continue to challenge regulations that unduly limit revenue generation on their assets. These factors are materializing in the form of higher resale values of existing units, up to 121% of original cost in 2015 from 112% in 2014.

Customers in all these markets will continue to utilize relocatable buildings for their speed, flexibility, practicality, and cost.

OUTLOOK FOR 2017:

The overall market share for PMC activity in North America was approximately 2.72 percent of all new construction starts in MBI’s key markets: multifamily housing, educational, office, healthcare, retail, and institutional and assembly. This is down slightly from last year’s estimated 2.93 percent.

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“Manufacturing building components off-site provides for more controlled conditions and allows for improved quality and precision in the fabrication of the component.”

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Almost any process needed to complete a commercial building has an offsite alternative offered. Even when it comes to the mechanical, electrical, and plumbing (MEP) aspects of a project, much of that work can be completed offsite and in a controlled environment.

MEP work can be combined in a Central Utility Plant (CUP), centralizing the equipment that produces and distributes the heating/cooling for a building. These systems will include all or part of the following: chillers, cooling towers, boilers, pumps, heat exchangers, DH/W systems, steam boilers, pipe, valves, switchgear and transformers to serve these loads as well as sophisticated control systems to sequence heating and control performance. The CUP is a major operating cost center (electricity, natural gas) and the efficient design and operation is very important to the customer who will end up paying monthly bills.

CUP USAGE

CUPs typically serve larger buildings where centralizing the HVAC systems is ideal. Pumping water is one of the most energy efficient methods of transferring energy. Examples of buildings using CUPs includes hotels, casinos, office buildings, hospitals, pharmaceuticals, data centers, and industrial building such as automotive. All markets are potential uses, the size of the plant is what drives the requirement.

“Historically these systems are built on site, offsite construction options for this scope of work are now becoming more popular and gaining traction in most markets,” said Brad Hughes, Principal with Epsilon Industries, Inc.

BARRIERS TO USAGE

The CUP is an expensive line item in the construction process. The equipment is expensive and the labor costs are high due to the amount of equipment that must fit inside a very confined space. The design of a CUP is highly customized with each application demanding unique design requirements. Traditionally the consulting engineer designs the plant and the field contractors build at site.

The offsite construction strategy would have the consultant working with providers long before the sub-contractors have been selected. Providers work as an extension of the engineering design team by using their core competency (design/engineer and fabricate central plants) and providing a custom system to meet the unique site requirements.

Producing the CUP requires multiple disciplines including mechanical/electrical/structural/controls. These scopes of work must be completed by licensed skilled labor (both on-site and offsite). This complicated mix of trades and engineering ability elevate the barrier to entry for qualified vendors.

CUPs that are provided through offsite construction are typically physically located on the ground or on the roof of the main building. This allows for parallel completion of work where offsite construction can build the CUP at the same time the base building is under construction. The CUP can be delivered similar to JIT strategy.

The value statement is mitigation of risk. CUPs provide all the same advantages you see in other offsite construction markets. But the umbrella advantage is the mitigation of risk and this is the underlying motivation for all participants (contractors/engineers/architects) on any construction project.

THE SOLUTION

A solution that maximized the allowable area of the building, provided very high quality mechanical components and maximum efficiency was the incorporation of an Epsilon packaged mechanical plant.

This 2,000+ ton plant is enormous at over 5,000 ft² but it would have been twice as large if it had been field built. Working with Syska Hennessy Group in a design assist role, Epsilon used their advanced 3D computerized design to optimally arrange components. This plus their closely controlled factory fabrication results in minimum space required while insuring adequate access. The entire plant is classified as a piece of mechanical equipment (even though it shipped in 17 sections) because it is factory fabricated and bears the ETL label.

Depending upon fuel costs the plant can produce hot water via gas, oil, or electric heat pump. The Templifier heat pumps “amplify” 44° CHW to 140° H&W. Boilers are dual-fuel 97% efficient condensing type. Sufficient structural integrity is provided to enable mounting of the heavy cooling towers on the plant’s roof.

The electrical distribution system consists of high voltage input switchgear and transformer inside a 1 hour fire-rated enclosure. It serves chillers, towers, boilers, Templifiers, pumps, domestic hot water equipment, and fire pump. An Allen-Bradley PLC controls the entire facility and is tied-in to the main building BMS but also has a local touch screen interface.

Some of the benefits of the package plant are that, not only is it a higher quality installation than a field build system, it is also less expensive, takes much less construction time, reduces engineering time, and allows the owner and engineer to get exactly the brand and degree of quality that they want. The plant also qualified for a significant rebate from Pepco under the Empower Maryland Act.

Epsilon worked with Holy Cross, Whiting-Turner, Bell BCJ, and Syska Hennessy Group on costs, alternatives, brands, and layout to give Holy Cross exactly what they wanted and needed at the right cost.
INDUSTRY NEWS

STRUCTURAL INSULATED WALL PANELS
Written by Modular Building Institute
- Article source and photos provided by: Structured Insulated Panel Association

Structural insulated panels (SIPs) are a high performance building system ideal for residential and light commercial construction. The panels consist of an insulating foam core sandwiched between two structural facings, typically oriented strand board (OSB). SIPs are manufactured under factory controlled conditions and can be fabricated to fit nearly any building design. The result is a building system that is extremely strong, energy efficient and cost effective. Building with SIPs can save you time, money, and labor.

Building with SIPs generally costs about the same as building with wood frame construction when you factor in the labor savings resulting from shorter construction time and less jobsite waste. Other savings are realized because smaller heating and cooling systems are required with SIP construction.

THE FUTURE OF STRUCTURAL INSULATED WALL PANELS

Jack Armstrong, Executive Director for the Structured Insulated Panel Association (SIPA), expects growth in the use of SIPs due to the new 2012 International Energy Conservation Code and 2015 Building Codes being accepted by more and more states.

“These codes require more robust building envelopes and tighter buildings that lead to less air leakage,” Armstrong said.

The SIPA plans to launch a new engineering design guide for professional engineers in the commercial industry along with design software that will make it easier for them to design with SIPs. This software will be used for commercial building, multi-family housing, and multi-storied buildings.

DISCOVER OFFSITE
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THE 2017 OFFSITE CONSTRUCTION EXPO

September 29, 2017
October 18, 2017
Vancouver, Canada
Philadelphia, PA

Why Attend Offsite Construction Expo?

The 2017 Offsite Construction Expo offers a focused presentation of the abilities of offsite construction across all markets. Attendees and exhibitors alike will benefit from the variety of modular vendors and component suppliers all in one room. Previous show participants said:

“[THE BEST PART WAS] NETWORKING WITH INDUSTRY PEOPLE FROM ACROSS THE COUNTRY.”

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Contact us at info@hardimanwilliams.com or call 434-202-8180.

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Join hundreds of modular construction professionals for our 34th Annual World of Modular in Tucson, Arizona! For 30+ years, MBI has provided professionals in the modular building industry a place to network, exchange ideas, learn from experts, discuss issues, display new products and receive well-deserved recognition. Join us for high-profile speakers, top-notch educational sessions, exhibits, the latest trends in modular, entertainment, and more!

Exhibits are selling out quickly! With less than 10 booths left act now to save your space! Register now at www.worldofmodular.org.
**5 IN 5: UPDATE AND 2017 TRENDS**

Written by Modular Building Institute

With 2016 long over, we are now looking forward to an ambitious 2017. Coinciding with our goal of reaching 5% of the new construction industry. The construction industry will see trends in 2017 that will greatly impact the industry both negatively and positively.

Construction Dive lists offsite/modular construction as a construction trend to watch in 2017. Offsite construction, also called modular or prefab, isn’t new to the industry. However, experts predict the building method will grow in 2017 as quality, time and labor concerns make alternatives to traditional construction methods more attractive.

According to Cliff Cort, president of Triumph Modular, regarding permanent modular construction, modular building project opportunities seem to be getting much larger and more complex. Multi-story, multi-family residential projects are gaining market share from traditional stick-build methods. For fleet operators, market demand for office trailers and temporary modular buildings could be strengthened by infrastructure projects in the coming year.

“Regardless of what sectors your company operates, companies both large and small may use 2017 as a year to strengthen internal operations and invest in their people,” Cort said. “When fleet operators, factories, and construction companies continue to focus on what they do best, public perception of our industry and our bottom lines will continue to improve.”

Some predict that owners and developers will embrace offsite building methods more readily in 2017. This is due in part to some high-profile projects in the last few years. Owners are also coming around to the fact that modular construction can look just as good as onsite construction and be completed in a shorter amount of time and for less money, according to Kendall Jones with ConstructConnect.

Another trend greatly effecting the modular construction industry is labor shortage.

Labor shortages were a concern in 2016 and will continue to plague the construction industry through 2017. The Associated General Contractors of America (AGC) reported back in August 2016 that more than two-thirds of construction firms are having a difficult time filling hourly craft labor positions. Labor shortages can lead to longer project schedules and drive up project costs overall. Modular construction projects may help the industry entice laborers with working in a climate-controlled factory setting and safer working conditions.

**OFFSITE CONSTRUCTION**

Offsite construction has become the catch-all name for different forms of construction that take place away from the traditional project site. These construction methods range from complete volumetric modules to wall panels being integrated into the projects initial design. Owners and developers along with architects, engineers, and contractors are discovering how the implementation of offsite construction methods can lead to a higher return on investment.

According to the National Institute of Building Sciences (NIBS), the United States’ offsite design and construction industry has made significant advances in implementing processes and materials to build and deliver more sophisticated and complex facility types by virtue of system prefabrication, unitization, modularization, and panelization. This inclusion has taken place across all markets from healthcare to education. Construction industry professionals are constantly evaluating the potential benefits of offsite methods and discerning when and how they are appropriate for each project.
ARCHITECTURAL EXCELLENCE

The Sea Box Redeployable Air Traffic Control Tower is 50’ tall and comprised of 16 steel clad modules painted to the Federal Aviation Administration’s red and white checkerboard schema. Its 5 levels include: a rooftop crow’s nest to house communication antennas and lightning rods, a glass enclosed control room, and an exterior catwalk for window maintenance. The structure itself is utilitarian in nature but retains its industrial aesthetic through the utilization of specially manufactured IOS containers. An air traffic control tower is meant to serve as a beacon rather than a homogeneous fixture within its environment. This tower succeeds both technically and architecturally as an air traffic control tower should. In June of 2015, The American Institute of Architects (AIA) awarded Sea Box with a Special Citation in Institutional Architecture for its work on this project.

TECHNICAL INNOVATION & SUSTAINABILITY

Utilizing IOS (International Organization for Standardization) Shipping Containers as construction modules provides an inherent advantage for relocatable buildings. With relative ease, the building can be disassembled and transported worldwide via existing civilian and military transportation systems and handling equipment (including ocean liners, freight liners, trains, and aircraft). Also, shipping containers are designed to withstand the high loads often encountered on choppy seas. The swaying movements of fully loaded containers that are stacked nine units high behave similarly to a building under seismic loads. Therefore, the utilization of shipping containers as the main construction element for a tower of modest height is very practical. Additionally, designing a functional relocatable control tower that met IBC, NFPA, NEC and other requisite building codes required Sea Box to create innovative solutions for interconnectivity that were not previously on the market.

COST EFFECTIVENESS

Sea Box’s Deployable Air Traffic Control Tower advances the timetable for airport improvements, saves money and helps ensure continued operational revenue. It seamlessly allows controllers to continue their duties without disruption to the air traffic grid.
MBI MEMBER CASE STUDIES

THE CHRIST HOSPITAL JOINT AND SPINE CENTER

COMPANY: PIVOTek
LOCATION: CINCINNATI, OH
BUILDING USE: HEALTHCARE
GROSS PROJECT SIZE: 365,000 SQUARE FEET
DAYS TO COMPLETE: 543

ARCHITECTURAL EXCELLENCE

The Christ Hospital Joint and Spine Center is unique in that it was successfully completed despite the generally held expectation that finishes and tolerances present in this project are not normally achievable in traditional bathroom pod projects. The Christ Hospital Joint and Spine Center called for the highest quality in custom finishes, applied across three different configurations all of which needed to account for a zero-height transition from room to bathroom. This adaptability is, ultimately, what made this project a reality for the owner and construction management partner. All parties agreed that pods were the right solution, but it was PIVOTek’s innovation around the no-threshold slab issue that made this project a reality. So much so that The Christ Hospital Group added 30 additional pods to their original order, for a total of 90 pods for this particular project.

TECHNICAL INNOVATION & SUSTAINABILITY

Hospital grade bathroom pods are the most difficult prefabricated pods to design, produce and install, even more so for specialty hospital facilities such as The Christ Hospital Joint and Spine Center. For example, accommodations must be made for nurse call, medical gas, and fire protection, all of which must be coordinated into pod design to provide conduits, raceways and other needed spaces for the specialty systems. The most crucial of specialty needs is the need for a no-threshold barrier for wheelchairs and rolling IV trees. In this case, PIVOTek had to account for three inches that were removed from the slab sub-floor. To do this, PIVOTek had to find a solution that removed this floor height while maintaining density and performance. This came in the placement of a one-inch steel plate that was added to the bottom of the pod. This adaptability and design innovation are hallmarks of PIVOTek’s customized approach when taking on individual projects.

COST EFFECTIVENESS

Using pods presents inherent cost savings at every phase of the construction process. There is scalability in the planning process, there is certainty of delivery for the project timeline, there is streamlining of labor hours through seamless installation and, ultimately, there is substantial reduction in on-site waste. PIVOTek delivered on all of these cost savings, but what sets this project apart from even the usual cost effectiveness is the value delivered within each pod. Our pods allowed for bariatric lifts to be built into the bathroom configuration, as well as, incorporated waste vent stacks. We planned for patient-focused features such as a recessed area for flat screen TVs and, to assist in their actual care, fully equipped nursing station connections. These features and our partnership-first focus created an environment where the client increased their initial pod order by 50% after seeing the prototype pod that would be used in their facility.
MBI MEMBER CASE STUDIES

CENTER GROVE: MODULAR ELEVATORS

COMPANY: PHOENIX MODULAR ELEVATORS, INC.
LOCATION: GREENVILLE, IN
BUILDING USE: SPORTS AND RECREATION
CROSS PROJECT SIZE: 756 SQUARE FEET
DAYS TO COMPLETE: 78

ARCHITECTURAL EXCELLENCE

The project was a 3500 lb capacity, 3-stop inline elevator, hoistway and machine room with 47’-5” of travel from the ground floor to a 2-story press box at the top of the stadium grandstand. It was built to be ADA wheelchair and stretcher compliant. The finished structures of the hoistway and modular machine room were clad in an exterior to match the press box and trimmed in the school colors. The interior of the elevator car features white enamel doors, durable, brushed stainless steel fixtures and laminate covered wood core walls for stability, durability and sound control, as it is in service at a school. The three modules that comprise the project include one machine room and two modules that were stacked to make the hoistway. The architectural challenge was to build an impressive and matching elevator hoistway that would be completed on a tight time schedule, prior to the dedication of the new sports complex and opening home football game.

TECHNICAL INNOVATION & SUSTAINABILITY

The technical innovation is demonstrated by the manufacturing process itself. Unlike its stick-built counterpart, a Phoenix Modular elevator is built horizontally and will remain that way until installed. This project started with two openings 4” X 4” tube steel frames with proper door and supports. It was then clad in Densglass sheathing for one hour fire protection and door frames were added. On the inside of the hoistway, drywall was applied and elevator rails were welded to the structure, aligned and plumbed. Simultaneously, the elevator cab was constructed and then inserted onto the rails in the hoistway. Another unique aspect of multiple module, modular elevators is rail installation. To ensure perfect alignment of the rails, the two modules of the hoistway are joined together and then the rails are added in as one unit. They are then taken apart for transport and united again on site. This ensures a perfectly aligned elevator rail system and a smooth riding elevator.

COST EFFECTIVENESS

Cost effectiveness is accomplished in several ways. First, the modular built elevator is not subject to cost over runs due to weather. The elevator hoistway is built in a factory and the work is never slowed by outside weather conditions. Second, the elevator cab is built at the same time as the shaft. This saves significant time and like the hoistway, the cab fabrication is not subject to excessive cold or heat. Third, material waste is significantly reduced in production. We know the exact total amount of materials for each elevator and consider layout of the materials to keep costs lower. Finally, other site work does not have to accommodate the elevator construction. Oftentimes, the elevator is the most time consuming element of a major building project and creates delays. The Center Grove project clearly demonstrated that other construction can be completed uninterrupted, as the elevator was built off site in just four weeks. It was then shipped, set in place in a day, and ready for inspection three days later.
MODUS_NG: MULTIFAMILY UNIT

COMPANY: R.I.S.p.A
LOCATION: TREPUZZI, LECCE, ITALY
BUILDING USE: MULTIFAMILY UNITS
GROSS PROJECT SIZE: 756 SQUARE FEET
DAYS TO COMPLETE: 78

ARCHITECTURAL EXCELLENCE

Modus NG is a new generation of mobile eco sustainable unit, designed to maximize the potential of living spaces, that can literally be built anywhere. It is created with components that are shipped in flat-packed boxes, to enable easier transportation and assembly. The environmental footprint of this 35 square meters modular house is very low, making it an enticing prospect for green minded tenants, owners or landlords. The interior includes a bathroom, kitchen and living area, with a separated bedroom. The innovative unit can be stacked up to six stories in height and in infinitely expandable horizontal length by simply connecting additional units. This model is highly customizable thus allowing its residents to decide on the floor plan’s design, and the facade and floor elements they want to include in their apartment.

TECHNICAL INNOVATION & SUSTAINABILITY

Modus NG’s design and construction minimize energy consumption by utilizing “Energy Efficient Systems” using recyclable building materials.

Offsite prefabrication helps minimize construction waste and ensure an airtight energy performance and thermal efficiency. A high-efficiency HVAC system, advanced thermal solutions and solar shading reduce cooling costs, while large glazed openings let in natural light to minimize reliance on artificial lighting.

The unit is built to withstand Typhoons and Earthquakes – using “Resilient Design” strategies: steel frame structure has resistance up to 150 km/h according to Eurocodes of wind action and to cataclysmic seismic events. The sleek and beautiful design incorporates a smart home technology system already installed to control the appliances and the lights; e.g., from the smart phone.

COST EFFECTIVENESS

Modus NG is a custom, cost-effective, green modular unit, which provides high-quality sustainable residential development at an affordable price point. RI’s “industrialized building” system allows Modus NG to produce in series, up to 50 modular units per month, keeping the price very competitive on the market.

Modus NG’s modular structure is covered with a roof that integrates a new type of solar panel that can both produce electrical energy and thermal energy to power, heat and cool the house. The purpose of the new design is to not only to create a comfortable and sustainable house, but to reduce long-term running costs for the owner.
An excerpt from the draft code shown here:

A2 Element design

A2.1 Material Reduction Factors

A2.1.0 Material Reduction Factors are based on reliability methodology. The following overall constraint must also be satisfied:

\[ N^* = \min\{N^*, \frac{M^*}{s} \} \]

A2.1.0.1 The use of capacity reduction factors in accordance with AS 1550 Cold-Formed Steel Structures ([5.17]) is presented in Table A14. The capacity reduction factors for cold-formed steel structures are repeated in Sections 5–8 or the appropriate Standard for the Designer’s jurisdiction. Typical capacity reduction factors for Australian steel structures are given in Table A15. See Table A18 for additional guidance for cold-formed steel structures.

A2.1.0.2 The capacity reduction factors in accordance with AS 4600 Concrete Structures ([5.16]) is presented here. For cold-formed steel members, additional specific design guidance to AS 4600 ([5.18]) is presented here. The Designer should refer to the appropriate design standard for the Designer’s jurisdiction.

Additional information about the Codes Board is available at www.prefabaus.org.au/mccb/

The coming year will be another exciting one where we can look forward to:

- The national roll-out of the Modular Construction Code exposure draft
- Our first PrefabAUS Sweden Panelised Building Study tour (the first PrefabAUS study tour)
- The Fourth Annual PrefabAUS Conference to be held 11–13 September in Melbourne
- Developing further our valued relationships with alliance partners such as the Modular Building Institute

Best wishes for a successful 2017!
The Modular and Portable Building Association (MPBA) is urging hospitals to consider an alternative to traditional construction to ensure that they can provide the best possible facilities to ease the pressure on health services. Jackie Maginnis, chief executive of the MPBA, explains why:

With the ever increasing demand for emergency care units it is the right time to be talking to the industry about its requirements. A completely new building or extensions to an existing one, whatever the need, modular manufacturers have the skills to ease the burden of designing an appropriate solution whilst also minimizing disruption to the existing facilities.

Given the critical nature of the healthcare industry in the UK, modular construction companies can work on severely restricted sites, save up to 50% in completion time against traditional construction and still comply with the stringent NHS quality and budget restraints that estate managers work within. It should come as little surprise then that modular is rapidly becoming a popular solution.

We want the health sector to be aware that modular buildings have the potential to be a more cost-effective solution than conventionally built projects. Modular manufacturers specialize in providing a ‘complete service’ from undertaking the initial design and carrying out all necessary groundwork to construction of standalone structures, single-story ‘cluster’ departments, two-story schemes or whole-hospital configurations. Final fit out of wards, operating theaters, laboratories, kitchens dining areas and meeting rooms.

It's my impression that hospitals are now starting to realize that you don’t have to employ one of the really big contractors and undertake a conventional build to get the premises they require. But sometimes, healthcare managers aren’t aware that these structures are available as a permanent or temporary option at a cost to suit their needs. There is also a strong refurbished market along with a large hire industry within their reach. Other major benefits of modular buildings include energy compliance, meeting the latest regulations and the ability to create buildings that are designed to meet the precise specifications of that hospital’s requirements.

There is a misconception in some quarters that once a modular building has been installed, it can’t subsequently be moved and used elsewhere. The beauty of some temporary buildings is that they can be removed and reused in other parts of the hospital complex or indeed elsewhere. Modular buildings can be constructed to the latest healthcare standards fully compliant to all building regulations and encompass ‘Part L’ energy efficiency – which means some modular buildings also have lower carbon emissions than the traditional option.

Members of the MPBA produce the required Energy Performance Certificates, so a customer can be certain of the energy rating for a building.

It’s the ‘flexibility’ of a modular approach that gives healthcare managers the greatest benefits and this is particularly relevant when it comes to urgent and difficult projects. The length of time it takes to install modular buildings will vary according to a hospital’s specific requirements and the ease of access to the site amongst other things but it will always be quicker than the conventionally built alternative and the benefits of a quick installation combined with minimal on-site disruption are not to be overlooked.
ROYAL LIVERPOOL HOSPITAL – The new building work at Royal Liverpool Hospital is no small undertaking. Main contractors Carillion are not only creating a new development for Merseyside’s busiest hospital, but are adding a cutting edge Bio-campus to the site of the old hospital building. The site is active 24 hours a day, seven days a week with more than 1,000 operatives on site at any time.

NORTH MIDDLESEX UNIVERSITY HOSPITAL – The construction of a new 8,000m² Women and Children’s Centre is the UK’s largest and most complex modular building project to be built in the health sector.

The £17.9m ($21.7m) contract awarded to Portakabin involved the offsite manufacture of 152 steel-framed modules up to 18m long and weighing up to 18.5 tonnes. These were craned into position in just 28 days.

The center opened on time, despite a challenging program to accommodate a significant increase in maternity patients. The offsite approach radically reduced disruption to patient care and cut the build time by around seven months to ensure the reduced disruption to patient care and cut the build time by around seven months to ensure the

The speed with which the building was needed was not the only problem. To provide an optimum service, the location of the unit was vital. By far the most effective placement for it was in the existing ambulance bay adjacent to the Accident and Emergency ward, which from a construction point of view offered its own challenges. Hemmed in on 3 of its sides, and sitting partly above the entrance to the underground car park, any solution would need to overcome problems of severely limited space and weight distribution.

For more details of the case studies mentioned, visit the www.mpba.biz where these, plus other case studies, are available. Access to all member companies’ websites is also available where much more information can be obtained.

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For more details of the case studies mentioned, visit the www.mpba.biz where these, plus other case studies, are available. Access to all member companies’ websites is also available where much more information can be obtained.
Offsite or off-site construction refers to structures built at a different location than the location of use. Offsite construction occurs in a manufacturing plant specifically designed for this type of process. Individual components, assemblies, or modules of the building are constructed in the factory then transported to the site on specially designed trailers. Concrete foundations are dug into the earth allowing the building to be set at grade level. Once on site, the building will be installed onto a permanent foundation by fastening it to the ground and to the offsite components and covering and sealing the seams. These buildings meet all applicable building codes and are indistinguishable from traditional site-built construction.

**Under the Offsite Umbrella**

- **Prefab**: Prefabrication is the practice of assembling components, sub-assemblies, or modules of the building in the factory then transported to the site where the structure is to be located.
- **Modular**: Modular buildings and modular homes are sectional sub-assemblies that are constructed in the factory then transported to the site where the structure is to be located.
- **Precast/Prestressed**: Precast/concrete is a construction product produced by casting concrete in a reusable mold or “form” which is then cured in a controlled environment, transported to the construction site, and then into place. Prestressed concrete is a method of using prestressing tendons to build structures that have higher tensile strength.
- **Panelized**: Panelized building method incorporates construction techniques that use advanced technology, quality materials, and a controlled work environment to build unique high-performance buildings.
- **Component**: Offsite manufactured components are composed of aggregates and cement-making materials, formed in a purpose-built factory for delivery when needed.
- **Volumetric**: Volumetric construction (often referred to as modular construction) involves the production of three-dimensional sub-structures fabricated in controlled factory conditions, prior to transportation to the site.

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Dr. Al-Hussein was also recently appointed as the first director of the recently established Nasseri School of Building Science and Engineering. The Nasseri School was established in 2014 with the support of a $10 million endowment from Reza Nasseri of the Landmark Group, a founding industry partner and key supporter of the chairholder’s IRC.

RESEARCH SUPPORT:

The IRC has a total of $3,500,000 in cash support from NSERC together with a consortium of industry partners. The total project value for the 5-year term, including the cash-equivalent value of in-kind contributions, is $4,909,890. Dr. Al-Hussein is supported by 14 industry partners, including the Modular Building Institute, with combined annual cash support of $350,000.

The IRC forms the hub of a broader research program that includes 12 CRD grants (9 active and 3 pending), as well as Discovery and Engage Grants held or co-held by the chairholder. The total cash value of grants currently held by the chairholder, not including the IRC, is $2,595,000.

TRAINING:

The IRC is committed to the training of highly qualified personnel (HQP) who will become ambassadors to industry in the area of modular and offsite construction. In addition to 40 undergraduate students, the chairholder has supervised more than 75 HQP since the beginning of the first IRC term in July, 2011.

DISSEMINATION:

The IRC’s research findings in support of modular construction have also been disseminated in international conference proceedings and peer-reviewed journals. Since July 2011, in addition to 78 conference papers, 2 book chapters, and 4 technical reports, 37 papers have been published in leading peer-reviewed international journals, including Advanced Engineering Informatics, Automation in Construction, Building and Environment, Building Simulation, Canadian Journal of Civil Engineering, Energy and Buildings, European Geriatric Medicine, Gerontechnology, Journal of Computing in Civil Engineering, Journal of Construction Engineering and Management, Journal of Housing for the Elderly, Journal of Infrastructure Systems, Journal of Management in Engineering, KSCE Journal of Civil Engineering, Sustainable Cities and Society, and Urban Water Journal.

INTERNATIONAL COLLABORATION:

The IRC has established channels for international collaboration in support of modular and offsite construction research, including in Australia, Brazil, China, Finland, France, Germany, Kazakhstan, Korea, New Zealand, Norway, Sweden, Taiwan, and the United Kingdom.
“INTRODUCTION TO COMMERCIAL MODULAR CONSTRUCTION” BECOMING AN ACCREDITED COURSE WITH CLEMSON UNIVERSITY

The Modular Building Institute (MBI), along with Clemson University, developed “Introduction to Commercial Modular Construction” over two years with the goal of introducing the reader to an innovative and exciting construction method. This book discusses the modular building process compared to traditional site-built construction and is designed to help the reader understand terminology and concepts of modular building including client needs, design, fabrication, transportation, and installation.

The book was such a success that Clemson University has developed a course for credit that focuses on all the information available in the book. The course will be available in 2017.

“Introduction to Commercial Modular Construction” is a book that every modular industry professional should own!

SAVE 50% ON THE “INTRODUCTION TO COMMERCIAL MODULAR CONSTRUCTION!” PAY ONLY $49 UNTIL MARCH 20, 2017.

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WE WANT TO HEAR FROM OUR MEMBERS!

Does your company have a new product, innovative project, recent hire, a change in your office location, or a revamped website? Please share it with us so we can let others in the industry know your latest news.

Please send your stories and high resolution photos to the MBI’s communications department via email: communications@modular.org. Don’t miss the opportunity to let others in the industry hear about the exciting developments in your company!

UPCOMING EVENTS

2017 Offsite Construction Expo (OSCE)
September 29, 2017 - Philadelphia
October 18, 2017 - Vancouver
offsiteconstructionexpo.com

2017 World of Modular
March 17 - 20, 2017
JW Marriott Tucson Starr Pass Resort & Spa
Tucson, Arizona
worldofmodular.com

The Modular Building Institute will participate in multiple tradeshows this year that will coincide with our 5-in-5 efforts. Visit bit.ly/MBI_Events for the most updated information.

REMINDERS:

WANT TO ADVERTISE IN THE NEXT ISSUE OF MODULAR ADVANTAGE?

With an ad in the Modular Advantage you will reach all MBI members across the globe, plus the 40,000+ subscribers of Building Design & Construction Magazine, in the digital version of the Modular Advantage.

Upcoming Deadlines: 2nd Quarter (2017) | Magazine focus: Member Directory
All artwork & article content due March 10, 2017

CONTACT INFORMATION:
All MBI sponsorship and advertising: Dave Sikora: dave@modular.org
Article content: communications@modular.org
Ad content: dave@modular.org

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2nd Quarter Focus: MBI member Directory

Ad artwork and article content due: March 10, 2017.

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