Innovative Structural Steel Systems
Think, design and build with structural steel—outside the box. There are several innovative structural steel systems and products that go beyond conventional steel framing and that have, in many cases, changed the way designers approach projects. This list provides a look at several of them. Selection was based on manufacturers’ descriptions and claims; no product testing or evaluation was performed. Inclusion in this list does not constitute a product endorsement by AISC.

From the cover: Learn more about the innovative SpeedCore system on page 7.
CAST CONNEX simplifies the design and enhances the performance of structures by enabling architects and engineers to integrate steel castings into their designs. CAST CONNEX® standardized products include Universal Pin Connectors™, Architectural Tapers™, Diablo Bolted Splices™, Timber End Connectors, High Strength Connectors™, Cast Bolted Brackets, Scorpion Yielding Connectors™, and High Integrity Blocks®. The company also offers design-build services for custom cast steel nodes and components. CAST CONNEX takes pride in collaborating in the creation of safer, innovative and more beautiful built environments.

www.castconnex.com

ConX® is an innovative Chassis Based Modular™ structural steel building system. ConX enables rapid design, fabrication and assembly of robust, cost-efficient and sustainable structures for the industrial, high-density residential, healthcare, data center and commercial markets. ConX steel connections simply “lower and lock™” together in the field, allowing two- to four-times-faster assembly vs. conventional steel or concrete structures. The ConX System typically results in cutting total tonnage, eliminating waste in the factory and field and reducing risk with a stronger, safer structure. ConXL™ is OSHPD approved, codified by AISC and published in AISC 358-10. ConX is LADBS approved and Cradle to Cradle Certified CM at the silver level.

www.ConXtech.com

SidePlate is the most experienced structural steel expert in the industry—we only work on steel building design. Our team takes a steel lateral design, optimizes it with our patented connections and the result is a steel tonnage reduction, erection time savings and a performance-based design that saves money. For the general contractor, SidePlate becomes their extension in the design team, for the engineer, SidePlate becomes the go to source for steel structure optimization.

Working closely with the fabricator, SidePlate supplies detailing tools and hands-on assistance, assuring the new, lighter, easier to erect steel package is the best job to run through the shop. In the field, erectors like our bolted connection designs that allow faster erection, mitigate weather delays that welded connections struggle with and, of course, adds strength to the building, resulting in high levels of resiliency. Finally, SidePlate brings a huge bonus to owners by delivering a lighter steel package, faster erection and multiple areas of savings. For all your steel buildings, SidePlate Systems just makes sense.

www.sideplate.com
C-Beams (a division of SteelFab, Incorporated) is proud and excited to market and manufacture Castellated and Cellular beams for your next project. The C-Beam offers versatility, reliability and economy for all types of floor and roof structures while being aesthetically pleasing, lightweight and structurally sound. Benefits include:

- Long span C-Beams erect faster due to fewer pieces
- Ability to pass ductwork and utilities through web openings creating lower floor-to-floor heights
- Asymmetric sections produce the most economic composite design while reducing material consumption and decreasing environmental impact
- Asymmetric composite design increases stiffness, therefore improving vibration characteristics
- Eliminate columns and creates open floor space due to long span capabilities
- Less bridging compared to joist floor systems

www.c-beams.com

The GIRDER-SLAB® system is a structural steel and precast hybrid, the first to use pre-cast hollow core planks with an integral steel girder to form a monolithic slab assembly. This proven technology achieves low floor-to-floor heights, is low cost, lightweight and offers rapid assembly and construction. The nonproprietary GIRDER-SLAB® system is designed by the owner’s architect and structural engineer in combination with a conventional structural steel frame. The components of the system, structural steel (including the unique D-BEAM® girder) and precast prestressed hollow core slabs, are manufactured and supplied by the builder’s customary subcontractors, ensuring the owner competitive procurement of the building’s superstructure.

www.girder-slab.com

Deltabeam is a tested, proven and superior composite beam used for slim-floor designs. It is the first composite steel beam that has successfully passed the UL test requirements for a UL unrestrained fire rating of up to four hours without any added fire protection materials. Deltabeam’s shallow depths, flush finish and clear spans of over 40 ft provide added design flexibility. It can support all types of slim-floor construction including metal form deck, hollow-core plank or reinforced concrete slabs. Thanks to its simple, economical and time-saving erection, Deltabeam has been used in over 12,000 projects worldwide.

www.peikkousa.com/product-category-deltabeam-us
Versa-Floor™ featuring Deep-Dek® Composite (DDC) is a floor system capable of spans up to 40 ft. It integrates deep-ribbed steel profiles with a structural concrete topping. The deck serves as formwork during construction and strengthens the slab to support service stage loading. Versa-Floor can be placed on beam or wall bearing frame system. Deck ends, for example, can be placed on ledger angles attached to upturned steel beams to help reduce the depth of the beam soffit below the ceiling plane. DDC’s 12-in.-wide deck sheets, available in three depths, can be spread individually on the frame or preassembled into panels on- or off-site. DDC has factory-closed ends so end-closure angles are eliminated. A pneumatic-drive tool forms the deck side-lap connections, which are critical to achieving composite strength.

Prior to placing concrete, longer deck lengths are line-shored at mid-span, and unshored designs are obtainable over mid-span lengths. DDC is ICC-ES evaluated for structural conformance with the International Building Code. The system is noncombustible and UL fire rated and responds predictably to floor vibration. The authors of AISC’s vibration design guide customized our vibration analysis software based on the results of extensive field and laboratory testing.

www.versafloor.com
Wall Systems

The Integrity Wall™ Panel by South Shore Iron Works is the hybrid wall panel solution for mid-rise projects and overbuilds up to 25 floors. The panels are shipped and erected efficiently in less time and with better results than conventional stick framing or CFS panel systems. Using the panels with a composite floor system allows designs to achieve longer free-spanning decks without load-bearing partitions. Being an AISC-certified fabricator means that Integrity Wall is manufactured in an experienced, high-efficiency plant under rigorous quality-control processes to rapidly furnish consistent and precision-crafted panels. The panels are shipped vertically to the job site on our fleet of custom-built trailers for efficiency and minimization of potential transport or weather damage. Our panels are delivered and erected without problems or the weather delays that plague other panels systems. The panels are efficient and cost-effective for hospitality, dormitory, multifamily, senior living, office and retail projects, and are engineered to meet nearly any design requirement. Panels of varying sizes in lengths up to 32 ft make it possible to start and finish jobs in significantly less time than typical job-built systems. The panels are available up to 12 ft, 5 in. tall and can be stacked to achieve greater heights. In addition, they are energy-efficient and create a low amount of waste and contribute to LEED credits by using a high percentage of recycled steel.

www.integritywallpanel.com

Pueblo Building System is an innovative yet simple structural steel framing system for mid-rise and multistory residential projects such as apartments, condominiums, hotels and student housing. It is a conventional system, not requiring special code approvals or fabrication techniques. Prefabrication of steel framing results in significantly reduced labor at the site. Advantages over concrete construction include:

- Significant saving in construction cost and time
- About 40% lighter than a concrete structure, resulting in reduced foundation costs
- Fits within the walls of residential units
- Floor cavities and steel joist web openings allow for horizontal air exhaust for the units, thus eliminating need for costly fire-rated vertical shafts and scavenger fans on the roof Advantages over wood construction include:

- A higher-quality and more robust system at a very competitive cost
- All noncombustible materials, resulting in lower insurance costs
- No hidden problems due to dry rot
- No shrinkage or warping
- Can go taller than four or five stories, thus adding more units and reducing cost per unit

www.pueblobt.com
The Re-Fuse Braced Frame (RFBF) is a high-performance lateral load resisting system with enhanced reparability characteristics resulting in a highly resilient structure. The system consists of traditional, rolled section brace members that are connected to gusset plates via specially engineered, proprietary steel fuse elements. The fuse elements have unique geometry designed to accommodate large inelastic deformations under extreme seismic or other hazardous events while the remaining structure is intended to remain essentially elastic, thus undamaged. The fuse elements are intended to be replaced if damaged in a significant hazardous event. The fuse elements vary from 26 in. to 62 in. in length and 37 to 91 lbs in weight. The relatively compact size of the fuse elements allows for ease of handling by one or two people without need for a crane. In addition to the obvious application of the primary lateral system for new construction, the fuses can be transported through nearly any elevator, stairway, or ladder access making the product highly suitable for renovation and retrofit applications.

novelstructures.com

SpeedCore

SpeedCore is a non-proprietary revolutionary system of composite structural-steel framing, aiming to replace common reinforced concrete core construction. The steel plate composite wall system leverages the stiffness of concrete and the speed and accuracy of steel. The system removes the need for reinforcement placed on site and the additional time for concrete curing which typically sets the pace for building construction. Embeds are no longer a field-measured installation, reducing on-site coordination. Construction schedule savings and cost savings are dramatically demonstrated in the Rainier Square Tower (Seattle, WA) project, designed by Magnusson Klemencic, & Associates. Any fabricator can produce this innovative composite system.

www.aisc.org/speedcore
In 2012, Atlas Tube, a division of Zekelman Industries, partnered with Nippon and Sumikin Metal Products Co., Ltd. (NSMP), and Mitsui Co., Ltd., to supply “jumbo” hollow structural sections (HSS) to the North American market. Typical sizes available are 10 in. to 16 in. for 0.750-in. walls and 18 in. to 22 in. for wall thicknesses of 0.375 in. to 0.875 in. Rectangular sections are also available. Atlas Tube continues to see an increase in demand for these products. Recently, jumbo HSS have been used in column applications in a large distribution center, a new headquarters for a Fortune 100 company, various stadiums and sports arenas and a large industrial project. Because of its high load carrying capability, jumbo HSS are selected as a more efficient alternative to open sections and built-up, welded box sections. The jumbo HSS are provided via Atlas’ Chicago facility, and Atlas has also partnered with the following service centers, who will carry inventory of the shapes:

- Totten Tubes, Los Angeles
- Tubular Steel, St. Louis

www.atlastube.com/jumbo-hss

A new material specification for hollow structural sections (HSS) was published in the U.S. in 2013. The AISC Specification 360-16 now includes the specification, as well. This material provides enhanced performance and reliability for seismic and dynamic controlled structures. The AISC Committee on Specifications allows designers to take advantage of the full nominal wall thickness when designing with A1085—which ultimately provides more economic designs. Highlights of the new specification include:

- Uniform minimum yield stress of 50 ksi for all shapes
- Maximum yield stress of 70 ksi for all shapes—the first material specification in Europe or North American to provide this
- Standard Charpy notch toughness (CVN) values provided for all material, with an option for project specific CVN if desired
- Tighter wall thickness tolerances and the addition of an overall mass tolerance allow designers to use full nominal wall thicknesses and section properties in design

This material will be treated as a complementary specification to ASTM A500. Check with domestic fabricators/producers for availability.

www.aisc.org/A1085

In 2012, Atlas Tube, a division of Zekelman Industries, partnered with Nippon and Sumikin Metal Products Co., Ltd. (NSMP), and Mitsui Co., Ltd., to supply “jumbo” hollow structural sections (HSS) to the North American market. Typical sizes available are 10 in. to 16 in. for 0.750-in. walls and 18 in. to 22 in. for wall thicknesses of 0.375 in. to 0.875 in. Rectangular sections are also available. Atlas Tube continues to see an increase in demand for these products. Recently, jumbo HSS have been used in column applications in a large distribution center, a new headquarters for a Fortune 100 company, various stadiums and sports arenas and a large industrial project. Because of its high load carrying capability, jumbo HSS are selected as a more efficient alternative to open sections and built-up, welded box sections. The jumbo HSS are provided via Atlas’ Chicago facility, and Atlas has also partnered with the following service centers, who will carry inventory of the shapes:

- Totten Tubes, Los Angeles
- Tubular Steel, St. Louis

www.atlastube.com/jumbo-hss

ASTM A1085 Material

Black Rock Fireproof Column manufactures durable, aesthetically designed prefabricated fireproof columns. Black Rock Fireproof Columns are UL and AISC certified and offer several types of cost savings to building owners. Black Rock's round, square, and rectangular shapes (along with customized shapes and sizes) are designed for exposed exterior and interior load bearing columns. They are utilized in hospitals, schools, dormitories, cafeterias, shopping centers, and countless other structures.

www.blackrockfireproof.com

www.aisc.org/A1085

www.atlastube.com/jumbo-hss
Modular Solutions

**Z-Modular**

Z-Modular, a division of Zekelman Industries, has pioneered a better and more innovative way to build with steel. Using the revolutionary VectorBloc connector and steel Hollow Structural Sections (HSS), Z-Modular can deliver modular construction which is stronger, taller, faster, smarter and greener than other current alternatives. Utilizing precise fabrication techniques, the steel modules are built in a factory setting allowing very tight control of fabrication and construction tolerances. Modules are erected quickly on site without any "tolerance creep." Z-Modular can provide services that start with the design and engineering of the modules, continues with the fabrication and full fit out, and ends with the erection and installation of a completed modular structure. Whether you are looking to build multi-family housing, hotels, dormitories, small office buildings, or datacenters, Z Modular can deliver and take your modular project to new heights.

[www.z-modular.com](http://www.z-modular.com)

---

**RediCor™**

RediCor™ (by Nucor®, Vulcraft/Verco Group) is a pre-fabricated, ready-to-set, stay-in-place, modular steel form system engineered to simplify and accelerate the design and construction of reinforced concrete stair and elevator cores. This exciting new product is custom made for each structure and delivers to the site in modules that simply stack like building blocks. When RediCor arrives onsite, it is ready to go. The horizontal rebar is already placed inside the form and the vertical rebar, which is supplied with the cores, is simple to install. Stack the modules, drop in the vertical rebar and place the concrete. It really is that straightforward.

No more waiting for the cores to be finished or forms stripped. No more bulging or twisting cores. No more misaligned embeds to repair or relocate. The surrounding structure can be erected simultaneously with the steel forms prior to concrete placement, potentially removing the concrete core from your project’s critical path! And since the stairs are pre-installed inside the cores at the factory, other trades gain immediate access to upper levels of the structure, helping to keep the project moving forward safely, without the hassle of temporary scaffolding, ladders or other means of temporary vertical conveyance.

[www.redicor.com](http://www.redicor.com)
Thermal Breaks

Armatherm™ provides a combination of low thermal conductivity and high compressive strength and has been used in hundreds of structural steel framing connections transferring load in moment and shear conditions. The material is made of a reinforced, thermoset resin which is fire resistant, does not readily burn and has very limited creep under load, making it the ideal material for use in structural and facade thermal break connections.

It can be used anywhere a penetration or transition exists in the building envelope creating a thermal bridge. Situations using Armatherm™ to minimize heat loss include balcony, canopy parapet, masonry shelf angle, cladding/Z-girt and curtain wall mullion connections. Improvements in the effective U value of wall assemblies can be realized by as much as 60–70%.

www.armatherm.com

Fabreeka-TIM® is a load bearing thermal break used between flanged steel connections. The primary benefit is that it maintains structural integrity while reducing energy loss. Made in the U.S. from a fiberglass reinforced laminate composite, Fabreeka-TIM® is stocked in several thicknesses, including ¼-in, ½-in and 1-in. Fabreeka utilizes a water jet machine for precise cutting to any configuration. It can be supplied with Fabreeka-TIM® washers, and Fabreeka® bushings, which when used together in a structural connection, greatly reduce the energy loss rate through conduction.

www.fabreeka.com

The Farrat Structural Thermal Break (FTB) is a high-performance thermal insulator used between horizontal and vertical connections of internal and external elements to prevent thermal or cold bridging. The plate provides a simple, economical and extremely effective solution to meeting Part L of the Building Regulations by way of reducing heat loss and the risk of internal condensation. FTBs are available in two grades of low-thermal conductivity, high-compressive strength material: Farrat TBK and Farrat TBL, both of which come in a variety of thicknesses and are precision water-jet cut for custom configurations. Both material grades are accredited by the Steel Construction Institute (SCI) under the Assessed Product Quality Mark Scheme and are manufactured under the ISO 9001:2008 Quality Assurance system. They meet the NHBC’s technical requirements and are the only thermal break plates on the market holding this level of accreditation. Unlike proprietary mechanical thermal break systems, FTBs are simple to incorporate into most details. This flexibility means that they can be used for a wider variety of steel-to-steel, steel-to-concrete, steel-to-timber and concrete-to-concrete applications, including balcony, canopy, parapet, masonry shelf angle, cladding and external staircase connections.

www.farrat.com
Tnemec has combined its high-performance coatings technology with the insulating solid, aerogel, to produce Aerolon—a spray-applied thermal insulating coating. Aerolon is the first fluid-applied coating to act as an effective non-structural thermal break, helping to regulate heat transfer and control condensation within and in-board of the building envelope.

With a low thermal conductivity of 35 mW/mK, Aerolon helps keep surface temperatures above the dew point, reducing condensation and inhibiting moisture inside walls. When applied to common thermal bridging areas—such as pass-through I-beams, fins, canopies, roof davits or window frames—the insulating coating reduces the thermal conductivity of the substrate, limiting the transfer of exterior temperatures through building penetrations.

Aerolon is a low VOC, water-based coating that can be spray-applied onsite or offsite and, if needed, can be touched-up in the field during new construction or retrofit projects. Its application is more versatile than structural thermal breaks and can limit overall labor and material expenses for projects focused on green building and holistic design.

www.tnemec.com/thermalbreak
Your project just got easier.

With almost 125,000 project teams assisted to date, AISC’s Steel Solutions Center is a free resource made just for you.

AISC steel experts assisted the project team with the original structural concept. For the full story, visit www.aisc.org/godfrey.