

# Innovative Structural Steel Systems



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**Smarter.  
Stronger.  
Steel.**



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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 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 the back cover.





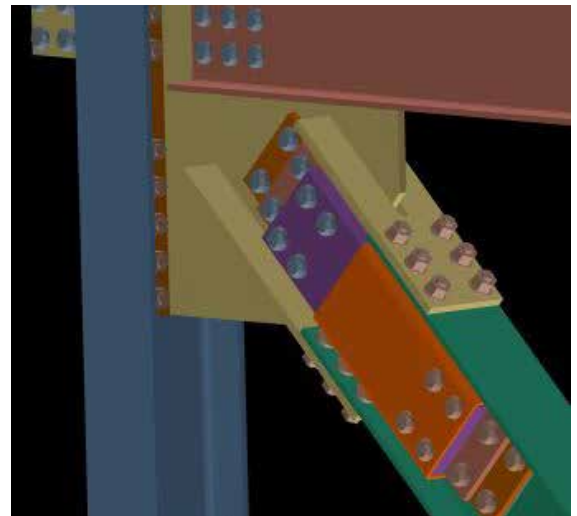
**CoreBrace** has been designing and manufacturing buckling restrained braces (BRBs) for nearly 20 years. BRB frames are a codified building lateral force-resisting system that offers improved seismic behavior, resulting in lower project costs. The ductile BRB response provides reduced frame member sizes, less structural steel weight, and smaller foundations. Independent test results from over 90 full-scale specimens have consistently shown that CoreBrace BRBs significantly exceed the performance requirements of the *Seismic Provisions for Structural Steel Buildings* (AISC 341). Additionally, CoreBrace BRB frames are among the first systems that can be monitored in real-time. Our new reCOREder, a self-contained displacement transducer (SCDT), makes it possible to assess remaining capacity for post-event evaluation. CoreBrace BRBs mean cost savings and superior seismic performance for every project.

[www.corebrace.com](http://www.corebrace.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 that have unique geometry designed to accommodate large inelastic deformations under extreme seismic or other hazardous events while the remaining structure remains essentially elastic and therefore undamaged. The fuse elements can be replaced if damaged in a significant hazardous event. The relatively compact size of the fuse elements allows them to be transported through nearly any elevator, stairway, or ladder access, making the product highly suitable for renovation and retrofit applications as well as new construction.

[www.novelstructures.com](http://www.novelstructures.com)



Steel Special Moment Frames (SMFs) with supplementary **Viscous Damping Devices (VDDs)** by **Taylor Devices, Inc.** provide the best value for building owners looking to improve seismic resilience and reduce construction costs. The VDD dampens the motion of the SMF during an earthquake like the shocks on a car traveling down a bumpy road. The reduction in the response of the SMF yields a significant reduction in both the steel tonnage of the SMF and the foundation materials. Installation is simple, and no third-party special inspections are required. Unlike other seismic products, fluid viscous dampers do not need to be replaced after a major seismic event. Taylor Devices' VDDs are uniquely capable of protecting a building structure during an earthquake without being damaged. Taylor Devices' VDDs have been installed in over 700 buildings, bridges, and other crucial structures around the world and have an established track record for reliability and state-of-the-art performance.

[www.taylordevices.com](http://www.taylordevices.com)





## Connection Solutions

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### CASTCONNEX<sup>®</sup>

**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<sup>®</sup> standardized products include Universal Pin Connectors<sup>™</sup>, Architectural Tapers<sup>™</sup>, Diablo Bolted Splices<sup>™</sup>, Timber End Connectors, High Strength Connectors<sup>™</sup>, Cast Bolted Brackets, Scorpion Yielding Connectors<sup>™</sup>, and High Integrity Blocks<sup>®</sup>. The company also offers design-build services for custom cast steel nodes and components. CAST CONNEX takes pride in collaborating to create safer, innovative, and more beautiful built environments.

[www.castconnex.com](http://www.castconnex.com)

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### CONXTECH<sup>®</sup>

**ConX<sup>®</sup>** is an innovative Chassis Based Modular<sup>™</sup> 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”<sup>™</sup> 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<sup>™</sup> is OSHPD-approved and published in the *Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications* (AISC 358-16). ConX is LADBS-approved and Cradle to Cradle Certified CM at the silver level.

[www.ConXtech.com](http://www.ConXtech.com)

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### SIDEPLATE<sup>®</sup>

Structural Design Optimization

**SidePlate Systems** is the most experienced structural steel expert in the industry—we only work on steel building design. Our team takes a steel lateral design and optimizes it with our patented connection designs that feature no procured parts. The results of our optimization are steel tonnage reduction, erection time savings, and a performance-based design that saves money. For the general contractor, SidePlate Systems becomes their extension in the design team. For the engineer, SidePlate Systems becomes the go-to source for steel structure optimization. Working closely with the fabricator, SidePlate Systems supplies detailing tools and hands-on assistance, ensuring 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, add strength to the building, resulting in high levels of resilience. SidePlate Systems 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](http://www.sideplate.com)

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### **lindapter**<sup>®</sup>

The **Lindapter Girder Clamp** is the world's first and only structural steel clamping system approved by the International Code Council (ICC) and compliant with the *International Building Code*. A faster, cost-effective alternative to welding or drilling in the field, it is designed to reduce installation time and labor costs. A high-strength, permanent connection is quickly achieved by clamping two steel sections together. There's the added convenience of adjustability for easier alignment in the field, too. ICC-ES Report ESR-3976 verifies that Types AF and AAF Girder Clamps are an alternative to high-strength bolt assemblies prescribed in the *AISC Specification for Structural Steel Buildings* (AISC 360) and are used in structural steel connections. The report also confirms that Girder Clamps may be used to resist axial tension and slip due to load combinations that include wind load or seismic load for steel structures.



The **Hollo-Bolt** is the original expansion bolt for structural steel that is quickly and conveniently installed by simply inserting the fastener into a pre-drilled hole and tightening with a torque wrench, which reduces construction time and labor costs. The Hollo-Bolt is a faster alternative to welding or through-bolting hollow structural sections (HSS) or other steel members where access is restricted to one side. It is also ideal for joining HSS in spliced connections, as demonstrated on Los Angeles' tallest skyscraper, the Wilshire Grand Center. The Hollo-Bolt is approved by the International Code Council (ICC) and compliant with the *International Building Code*. ICC-ES Report ESR-3330 verifies that the Hollo-Bolt is approved for use in all Seismic Design Categories (A through F) for resisting wind loads and seismic loads. In addition, the Hollo-Bolt provides the highest resistance to tensile loading in accordance with AC437 while ensuring compliance with the *International Building Code*.

[www.lindapterusa.com](http://www.lindapterusa.com) | 866.566.2658



### **SIMPSON**

### **Strong-Tie**

The **Simpson Strong-Tie Yield-Link**<sup>®</sup> connection is made to meet the tough demands and strength requirements necessary for structural steel construction and is the first prequalified SMF connection specifically designed to protect beams and columns from damage during earthquakes. From building owners and engineers to contractors and fabricators, the Yield-Link's state-of-the-art design saves everyone time and money—while providing a connection that keeps structural steel buildings strong and safe. The Yield-Link connection is included in *Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications* (AISC 358-16), Chapter 12, and new larger links (up to 1 in. thick) have been developed to support larger beams and columns (up to W36).

Our software and design support services provide the speed and technical expertise needed to tackle the complex challenges of structural steel connections. To assist designers in streamlining structural analysis and connection design using the Yield-Link connections, we created plugins for SAP2000<sup>®</sup>/ETABS<sup>®</sup> and Revit. Simpson Strong-Tie also has a Tekla custom component to assist detailers in locating the beam and column holes at the special moment connection region. Our tools can help you quickly plan, model, and document complete designs according to your project's unique specifications—all while staying on time and within budget.

[strongtie.com/yieldlink](http://strongtie.com/yieldlink)



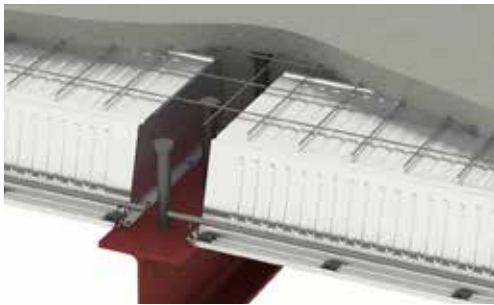
# Floor Systems



**C-Beams** (a division of SteelFab, Inc.) 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
- Eliminates columns and creates open floor space due to long span capabilities
- Less bridging compared to joist floor systems

[www.c-beams.com](http://www.c-beams.com)



## COMSLAB®

**ComSlab®** is a long-span and shallow composite floor system that helps structural steel compete with low floor-to-floor concrete designs. With depths as low as 10½ in., it can be combined with various proprietary flush beams or conventional AISC sections hidden in the floor section. ComSlab® is a lightweight assembly that has UL-listed unrestrained ratings of one, two, and three for spans of more than 30 ft. It is ideal for all elevated concrete slab construction such as hotels, schools, parking, office, multi-residential, and medical buildings.

[www.comslab-usa.com](http://www.comslab-usa.com)



COMPOSITE FLOOR SYSTEM

The **Ecospan® Composite Floor System** is an efficient and environmentally friendly steel floor system using open-web steel joists and steel deck with a concrete topping slab. The integral component of this system is the Shearflex® HD screw, which bonds the concrete slab to the top chord of the steel joist. The Shearflex HD screw is a self-drilling, self-tapping fastener that is attached with a Shearset® tool (provided) in a matter of seconds. Since it also serves as the deck attachment, no additional welding is required.

The system is custom-designed to the requirements of each project. A typical floor with exceptional strength and serviceability will include spans up to 60 ft, with joists spaced at 4 ft to 6 ft on center. Being a composite floor system, the maximum span-to-depth ratio of the bare joist is L/30, allowing a shallower floor-to-floor height than traditional floor systems.

Ecospan has both STC and IIC ratings that meet or exceed the requirements of the *International Building Code*. The system has also undergone UL testing and has fire ratings up to three hours with multiple assemblies.

[www.ecospan-usa.com](http://www.ecospan-usa.com)





The **GIRDER-SLAB**® system is a structural steel and precast hybrid, the first to use precast hollow-core planks with an integral steel girder to form a monolithic slab assembly. This proven technology achieves low floor-to-floor heights and 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](http://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.

[peikkousa.com/product-category-deltabeam-us](http://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 either 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 non-combustible 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](http://www.versafloor.com)



## Columns



In 2012, **Atlas Tube**, a division of Zekelman Industries, partnered with Nippon Steel Engineering 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 their high load-carrying capability, jumbo HSS are selected as a more efficient alternative to open sections and built-up, welded box sections.

[atlastube.com/jumbo-hss](http://atlastube.com/jumbo-hss)



**BLACK ROCK**  
**FIREPROOF COLUMN**  
A DIVISION OF UNITED STEEL

AISC-certified **Black Rock Fireproof Column** manufactures durable, aesthetically designed, prefabricated fireproof columns. Black Rock Fireproof Columns are UL-listed 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 used in hospitals, schools, dormitories, cafeterias, shopping centers, and countless other structures.

[www.blackrockfireproof.com](http://www.blackrockfireproof.com)

## Material



### ASTM A1085 Material

A new material specification for hollow structural sections (HSS) was published in the U.S. in 2013. The AISC *Specification for Structural Steel Buildings* (AISC 360) now includes the new 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.

[aisc.org/A1085](http://aisc.org/A1085)





The most progressive specification for structural shapes in the market, **ASTM A913** steel, produced by quenching and self-tempering, simultaneously combines high-strength with superior weldability, toughness, and ductility characteristics. Available in yield strengths of 50 ksi (345 MPa), 65 ksi (450 MPa), and 70 ksi (485 MPa), ASTM A913 steel is compliant with structural design and fabrication codes throughout the world, including the *International Building Code*, AISC's *Specification for Structural Steel Buildings* (AISC 360) and *Seismic Provisions for Structural Steel Buildings* (AISC 341), CISC's *Handbook of Steel Construction*, ASTM A709 *Standard Specification for Structural Steel for Bridges*, and AWS's *Structural Welding Codes*, among others.

[www.nucor.com](http://www.nucor.com)



## Modular Solutions



**RediCor** (by Nucor, Vulcraft/Verco Group) is a pre-fabricated, stay-in-place, modular steel form system that will 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 delivered to the site in modules that simply stack like building blocks. When RediCor arrives onsite, 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)



**ZModular**, 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), ZModular can deliver modular construction that is stronger, taller, faster, smarter, and greener than other current alternatives. Using 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 onsite without any "tolerance creep." ZModular can provide services that start with the design and engineering of the modules, continue with the fabrication and full fit-out, and end 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, ZModular can deliver and take your modular project to new heights.

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



## Thermal Breaks

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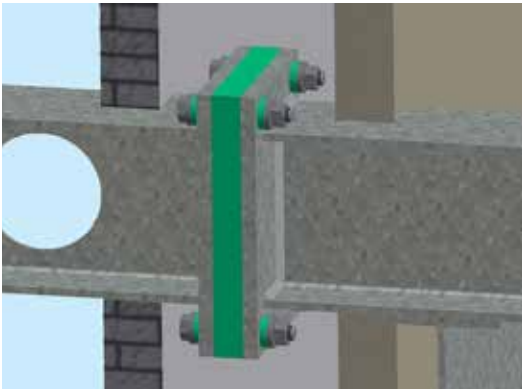


**Armatherm™** provides a combination of low thermal conductivity and high compressive strength and has been used in hundreds of structural steel framing connections transferring load in moment and shear conditions. The material is made of a reinforced, thermoset resin which is fire-resistant, does not readily burn, and has very limited creep under load, making it the ideal material for use in structural and façade 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](http://www.armatherm.com)

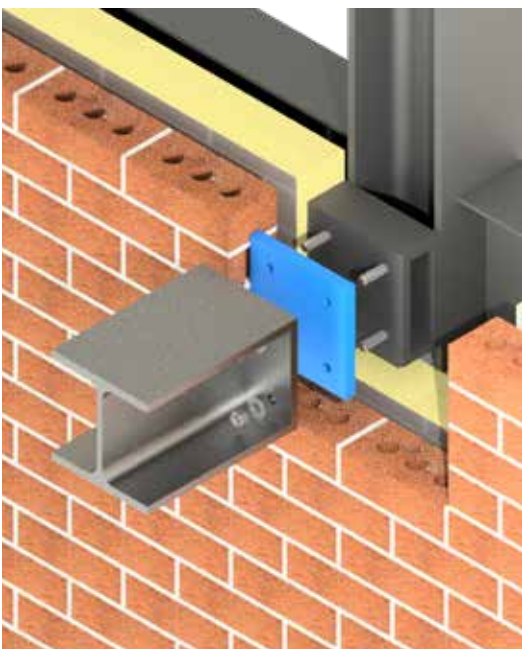
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**Fabreeka-TIM®** is a load-bearing thermal break used between flanged steel connections. The primary benefit is that it maintains structural integrity while reducing energy loss. Made in the U.S. from a fiberglass-reinforced laminate composite, Fabreeka-TIM® is stocked in several thicknesses, including ¼-in, ½-in, and 1-in. Fabreeka uses 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](http://www.fabreeka.com)

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**Farrat Structural Thermal Break plates (FTB)** are high-performance thermal insulators used between horizontal and vertical connections of internal and external structural elements to prevent thermal bridging. The plates provide simple, economical, and extremely effective thermally and structurally efficient connections to achieve the highest LEED certification levels by reducing heat loss and the risk of internal condensation. FTBs are available in three grades of low-thermal conductivity, high-compressive strength material: world-renowned Farrat TBK, new fire-rated Farrat TBF, and best-seller Farrat TBL, all of which come in a variety of thicknesses and are precision water-jet-cut for custom configurations. All FTB materials 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. FTB plates also meet the highest independently tested technical standards, as the only solid-state thermal break plates on the global market holding British Board of Agrément (BBA) accreditation. Unlike proprietary mechanical thermal break systems, FTBs are simple to incorporate into most details. This flexibility means that they can be used for an infinite 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](http://www.farrat.com)

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**Schöck Isokorb®** is a manufactured structural thermal break (MSTB) solution to thermal bridging. The Schöck Isokorb insulating element thermally separates and transfers the load of the exterior structure in cantilevered steel conditions such as canopies, steel balconies, roof extensions, and steel columns. Isokorb modules consist of stainless steel inner components and a polystyrene hard foam (Neopor®) exterior. The modules are fully engineered and ready to install onsite. Isokorb S22 modules can be arranged above one another to transfer bending moments, as well as beside each other to fit the steel member dimension and load requirements. Benefits include:

- Minimization of thermal bridges, thus eliminating condensation and dew-point problems
- Increasing energy efficiency, sustainable design, and possible LEED certification
- Ease of installation with a modular stacking system
- Accommodation of a range of profile sizes and structural loads
- Independently verified thermal and structural performance

[www.schock-us.com](http://www.schock-us.com)



**Tnemec** has combined its high-performance coatings technology with an 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.

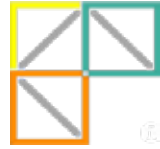
With a low thermal conductivity of 35 mW/mK, Aerolon helps keep surface temperatures above the dew point, reducing condensation and inhibiting moisture inside walls. When applied to common thermal bridging areas—such as pass-through I-beams, fins, canopies, roof davits, or window frames—the insulating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

[tnemec.com/thermalbreak](http://tnemec.com/thermalbreak)



# Wall Systems



**Pueblo Building System** is an innovative yet simple shop-fabricated structural steel framing system for mid-rise and multi-story residential projects such as apartments, condominiums, hotels, and student housing. It is a conventional system and does not require special code approvals or fabrication techniques. Prefabrication of steel framing results in significantly reduced labor at the site.

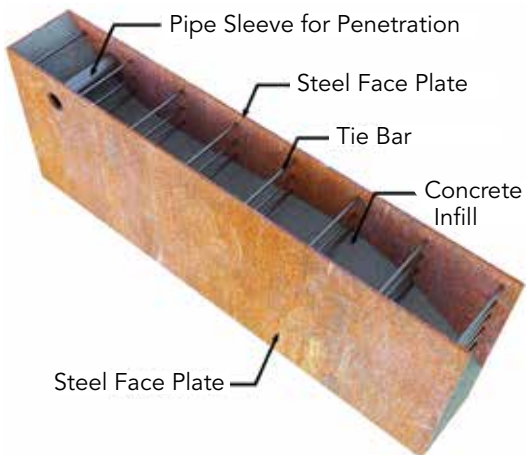
Advantages over concrete construction:

- Significant saving in construction cost
- Faster to build—about one week per floor
- Early to market, lower general conditions
- 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 the need for costly fire-rated vertical shafts and scavenger fans on the roof

Advantages over wood construction:

- 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](http://www.pueblobt.com)



## SpeedCore

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

[aisc.org/speedcore](http://aisc.org/speedcore)

For the latest and greatest innovations, visit [aisc.org/innovations](http://aisc.org/innovations). And to add one to our list or learn more about how to use any of these options on your next project, visit [aisc.org/solutions](http://aisc.org/solutions) or contact us at [solutions@aisc.org](mailto:solutions@aisc.org).



**STEEL SOLUTIONS CENTER**

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