

Specialty Joists

NATIONWIDE DESIGN, MANUFACTURE AND DELIVERY



NEW MILLENNIUM

BUILDING SYSTEMS

Building a better steel experience.



Overview

New Millennium engineers and manufactures a full range of specialty steel joists designed to meet specific needs. Architecturally enhanced roofing systems can be readily achieved with our wide range of special profile joists. And to optimize building safety, Flex-Joist™ tension-controlled open web steel joists are engineered to exceed standard steel joist design for strength, reliability and ductility.

Certifications

New Millennium is a Steel Joist Institute (SJI) member company, fully certified to manufacture K, LH and DLH-Series steel joists, and Joist Girders. New Millennium is also a Steel Deck Institute (SDI) member company, fully certified to manufacture roof deck, form deck and composite floor deck.

- New Millennium products meet FM, UL and ULC requirements
- The Indiana, Virginia, Florida, Tennessee, Arkansas and Arizona facilities are ICC certified
- F, B and N deck are Factory Mutual approved for use as a component in Class 1-60, 1-75 and 1-90 wind uplift metal roof decking construction
- Steel deck products are approved by Underwriters Laboratory and listed in the UL Fire Resistance Directory
- All acoustical deck has been tested in accordance with ANSI ASTM C423 and E795 to determine the noise reduction coefficient (NRC) rating
- Welders are certified in accordance with AWS D1.1 and D1.3
- The Indiana, Virginia and Nevada facilities meet CSA Standard W47.1 in Division 2 for open web joist
- The Indiana facility is certified in accordance with the requirements of the current IBC/Michigan Building Code, Chapter 17, Section 1705, Paragraph 2.2
- The Florida facility is certified in accordance with the requirements of the Miami-Dade County, Florida Building Code, Article IV, Chapter 8
- The Arkansas and Florida facilities are certified in accordance with the Houston, Texas Building Code, section 1704.2.2
- The Nevada and Mexico facilities are certified in accordance with the requirements of LA City
- The Nevada facility is certified in accordance with the requirements of Clark County

ICC Reports

ICC-ES, a nonprofit organization, evaluates building products and publishes reports that verify they comply with building codes. For complete reports of New Millennium deck verified by ICC-ES, please visit www.newmill.com/certifications/certifications.html



Special Profile Joists.....pages 4-7

Uplift your design ideas with more than 40,000 specialty joist designs to change the shape of architecture. There's a growing demand for new structural design ideas and innovative rooflines that are only possible using special profile steel joists. To meet the aspirations of both architects and engineers, New Millennium Building Systems has vastly expanded the range of published weight table specifications for the four basic special joist profiles: gable, bowstring, scissor and arch. Most SP-Series joists are either one of these four types, a variation of one type, or a combination of one or more types.



Flex-Joist™pages 8-9

To optimize building design and safety, Flex-Joist™ tension-controlled open web steel joists are engineered to exceed standard steel joist design for strength, reliability and ductility. This alternative design approach gives building owners and specifiers the option of consistently higher steel joist performance at an affordable cost. Increased strength, higher reliability index and improved ductility provide an enhanced timeframe for emergency management in the case of an overload situation. The Flex-Joist™ system can be coupled with a third party overload sensing system to further enhance building safety.

SPECIAL PROFILE JOISTS

When integrated with our roofing, ceiling and cladding deck solutions, you can achieve your architectural vision with a system optimized for unmatched cost and performance.





Special Profile Joists

Architecturally unique roofline designs are practical and economical using special profile steel joists. Our leading development of engineering specifications enables over 40,000 special profile steel joist design possibilities. New Millennium provides comprehensive support from early design to on-site delivery. We manufacture a complete range of special profile steel joists, including gable, bowstring, arched, scissor and double-pitched joists. Our special profile steel joists are designed and manufactured at our six plant locations in accordance with the specifications of the Steel Joist Institute.

Design Considerations

Scissors and arch (barrel) steel joists present a horizontal thrust to the supporting structure. The specifying professional is advised to consider this thrust and the resulting lateral displacement in the design of the supporting structure. Load and deflection requirements for these products need to be clearly specified on the structural drawings.

- Our engineers are readily available for consultation
- All special profile steel joists are furnished with no camber unless otherwise specified
- Design calculations are available, prepared by a professional engineer registered in the state of manufacture

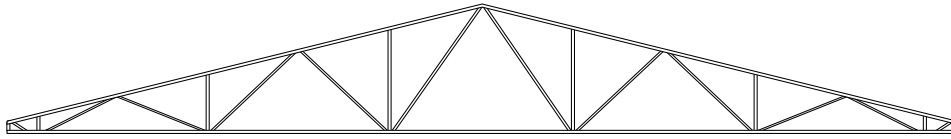
Handling and Erection Considerations

Refer to the SJI Specification for minimum rules guiding the erection of special profile steel joists. For these joists, the type and amount of bridging and bridging anchorage need to be conservatively calculated. This is due to the generally higher degree of instability in these high center of gravity joists, even with no load other than self-weight. At a minimum, the specifying professional and erector should be certain that before any load is allowed on the special profile steel joists:

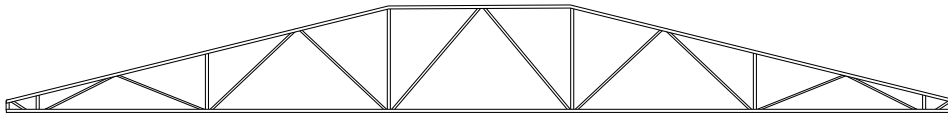
- All rows of bridging are bolted diagonal bridging
- Hoisting cables are not released until all rows of bridging are installed and anchored and both ends of the joist are attached to its support



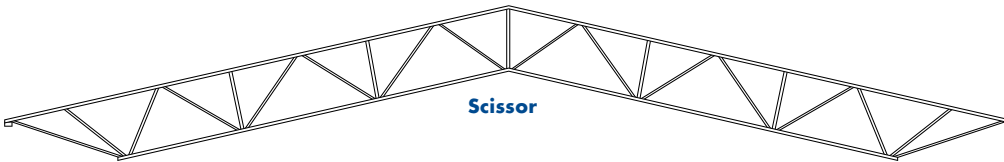
Complete Range of Special Profile Joists



Gable



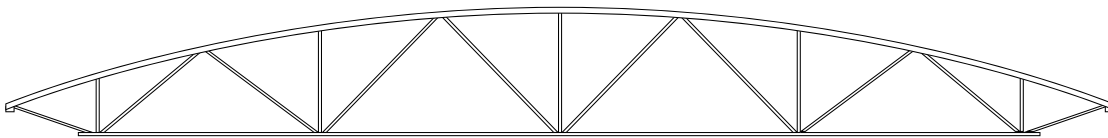
Flat Top Gable



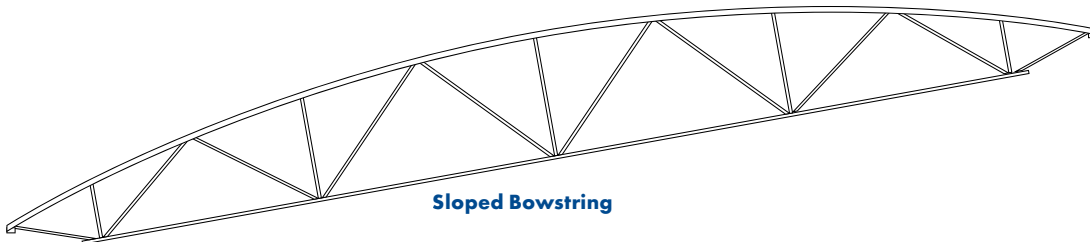
Scissor



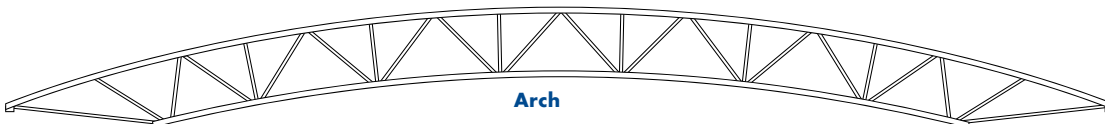
Compound Scissor



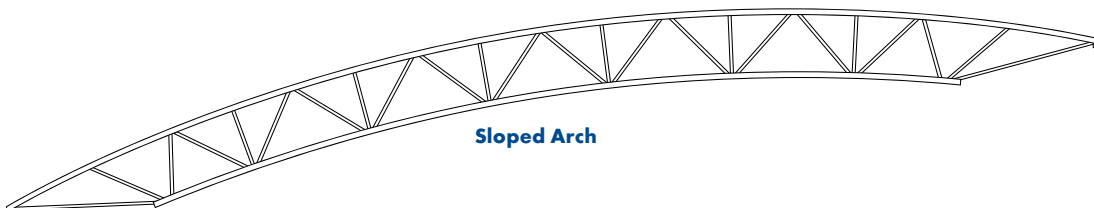
Bowstring



Sloped Bowstring



Arch



Sloped Arch

Flex-Joist™ Tension-Controlled Joist Design

The open web steel joist industry produces millions of joists each year that safely support roofs and floors in hundreds of thousands of buildings. Due to a range of potential overload conditions, including unusual snow and rain levels, it is inevitable that some percentage of roofs and floors will be overloaded beyond anticipated worst-case load conditions during the lives of these structures.



Flex-Joist™ tension-controlled open web steel joists offer a safety feature to building owners and managers seeking additional protection against potential overload conditions and the related risks of damage, injury and exposure to liability. Under most overload conditions, Flex-Joist™ introduces important advantages including:

- **Engineered overload safety for floors and roofs**
- **Steel joist structure is designed to flex under extreme static gravity overloading**
- **Time delay for possible evacuation and shoring, removal and collapse prevention**

Flex-Joists are designed for superior performance under unanticipated gravity loads in excess of engineered capacity. While not intended to outperform traditional joist systems under lateral or uplift load events such as a tornado, hurricane or seismic event, Flex-Joist™ design provides better protection in the more common overload scenarios such as rain, snow and floor live loads.

Optimized Safety Sensoring

Flex-Joist™ projects are ideally suited for optional, post-erection installation of electronic sensors by a third party provider. In the event of an overload, the bottom chord and end webs of a Flex-Joist™ will be highly stressed prior to collapse. Sensors and alarms installed along these components by the third party provider can establish an early warning system for possible overload removal, roof shoring and evacuation of personnel.

31% Higher Reliability Index

Standard SJI joists are designed based on procedures derived from the American Institute of Steel Construction (AISC) design specifications. AISC states that their design specifications result in an average member reliability index of $\beta = 2.6$, where β is the ratio of the standard deviation to the mean. Flex-Joist™ has been demonstrated to have a system reliability index of $\beta = 3.4$, or 31% higher than the industry standard.

29% Stronger

By selectively increasing the size of the weakest components without decreasing the size of the strongest components, the strength of a Flex-Joist™ is substantially increased at an affordable cost.

129% Higher Ductility

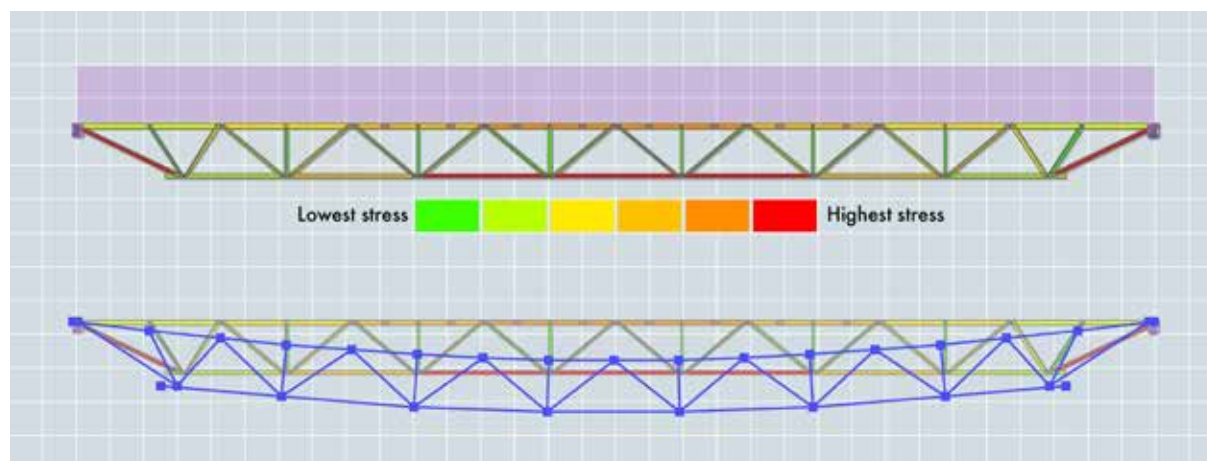
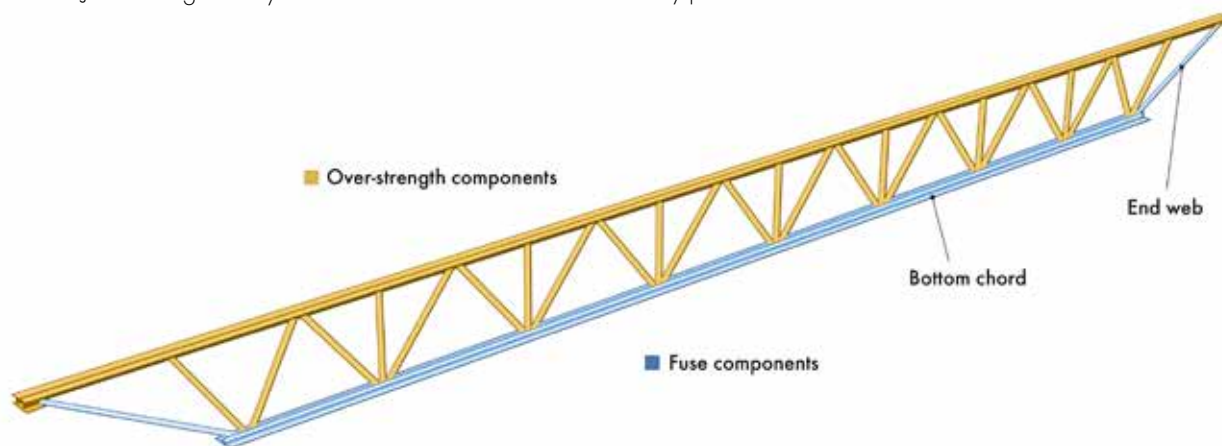
The Flex-Joist™ design is based on limit states control, so it has a much higher probability of achieving a ductile tensile yielding limit state that is characterized by slow collapse, with large inelastic deformations and inelastic reserve capacity. This very ductile behavior gives sensory warning of impending collapse, allowing more time for evacuation and response.

Disclaimer: No joist will withstand sudden and catastrophic impact forces that exceed system capability. Flex-Joist™ design offers probability of high ductility and time delay under static gravity overload conditions.

Component Relative Strength Ratios

Flex-Joist™ system design accounts for the relative strength ratios between the various joist components and the joist primary tension members (bottom chord and end webs). This establishes a primary ductile tensile yielding limit state. Depending upon the nature of the overload event, a Flex-Joist™ can gradually deform and achieve extreme

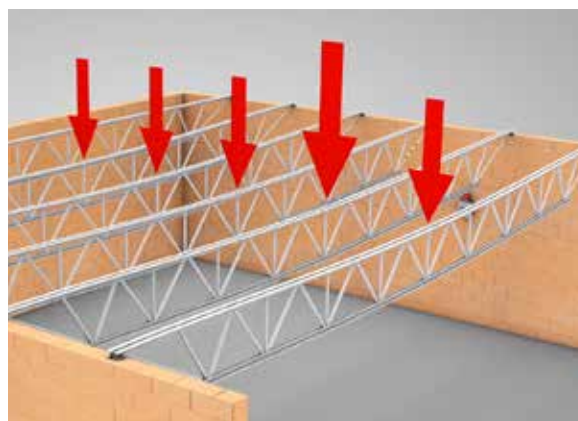
deflections, establishing a built-in element of time delay to provide warning prior to collapse. Although traditional joist systems are designed to exceed strength requirements for each component of a joist, there is no consideration of relative strengths between different joist components or any preferred limit state behavior.



Each joist component is designed with relative strength ratios, such that in the event of extreme overload, the joists can experience ductile tensile yielding in the bottom chord or end webs. As a result, each overloaded joist provides systematically prolonged plastic overload deflection.

Adjacent Joist Load Sharing

Load sharing between adjacent joists is an inherent function of the Flex-Joist™ system. This is made possible by the ductile behavior of each joist in the system during an overload. Unlike most traditional joist systems, a Flex-Joist™ loaded in excess of the elastic limit will continue to sustain loads at the joist's plastic load capacity. Any loads added in excess of the plastic load capacity of the individual joist will be transferred to adjacent joists, while the individual joist continues to sustain its own plastic load capacity.



Shipping



New Millennium Building Systems ships special profile steel joists to all regions of the country and is always mindful of related considerations, such as trailering length and erection site constraints. We will collaborate on these important considerations to further assure the cost-minimized success of the project.

- Coordination on material delivery schedules prior to shipping to ensure the erection crew has the proper equipment and is ready to unload when the truck arrives. Engineering can provide joist weights and bundle weights to assist in this planning.
- Coordination on erection site access and joist routing on site are often based on joist size and length, including whether profile dimensions must be modified in advance to minimize delivery costs. Related considerations include whether the joists can be shipped and erected in one piece or shipped in shorter sections for field splicing.
- Coordination extends to roadway considerations and meeting any state requirements regarding over-length or over-width material, types of escorts and route surveys.
- Sufficient time should be allowed for safe unloading. Special profile joists can take more time to unload than standard steel joists, due to their often-unusual shapes and dimensions.
- The safe erection of steel joists is guided by the OSHA Steel Erection Standard Part §1926. This information is published in our Steel Joists and Joist Girders catalog.

Dynamic Joist® BIM Steel Joist and Deck Design

BIM-based steel joist and deck from a proactive supplier can improve the design of your building, reduce overall project costs and support a faster-to-market timeline. Our Dynamic Joist® BIM component was introduced in early 2010. Many software generations since, it's still the leading BIM steel joist component — and still a free download.

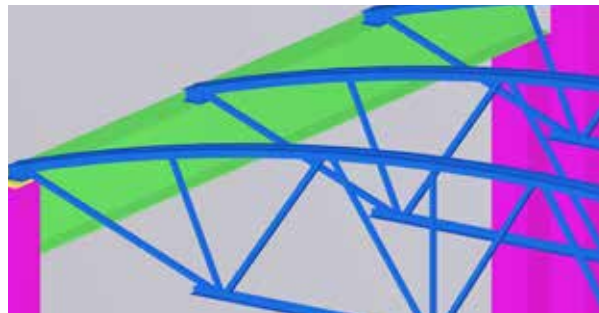
- Cut costs and timeline
- Address a range of cost/value decisions
- Design collaboration supports architectural goals
- Provides a lifelong facility management tool
- Includes joist configurations, specs, design guidelines
- Endorsed by the AISC strategy for interoperability

Managed Costs and Scheduling

Our Dynamic Joist® model integrates smoothly into the structural model, which in turn integrates into the building's "master" model, where they are joined by models from other participating trades.

In addition, our joist BIM development process pays off in ways beyond just the delivery of the steel joist model. The process fully leverages our value-added engineering capabilities, as we address a wide range of cost/value decision points, such as bridging placement and erection, evaluating and improving unusual connections, seeing where and how special load conditions can be better supported, or where an aesthetic architectural objective can be achieved using less metal and labor. The process also encompasses such cost-performance decisions as erection-synchronized joist delivery.

Our commitment to the BIM process has fostered an operational evolution within New Millennium across all disciplines, from design and engineering, through manufacturing and delivery. Within the steel joist model, we can call up such information as the type of joist to be



designed and the color of the paint. And once the model is approved, all of this information can seamlessly flow into our dynamic, timeline-sensitive, manufacturing systems.

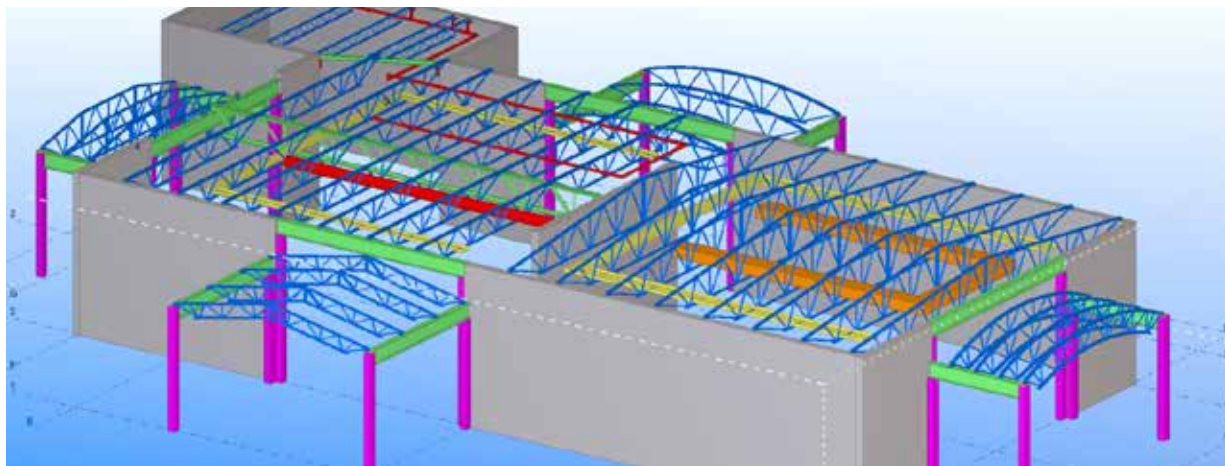
Our digital steel joist design component, together with our proven process for joist BIM development, serves the building owner's point of view — from start to finish, and beyond:

- Increases information sharing and problem ownership
- Improves structural design and smoother project flow
- Shortens project timelines for earlier building occupancy
- Eliminates errors resulting in a wide range of cost reductions
- Delivers to the owner a tool for lifelong facility management

BIM Object Files For Autodesk Revit Software



BIM Components For Tekla Structures Software





**Your nationwide resource for the broadest range of cost-optimized,
high-performance structural steel joist and deck solutions**

- Structural steel joists, Joist Girders and deck
- Architectural decking solutions
- Multi-story long-span composite systems
- Custom engineering and design assistance
- BIM-based steel joist and deck design
- Nationwide manufacturing and availability
- Design-Build and Integrated Project Delivery (IPD)
- AIA and PDH courses for project optimization

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