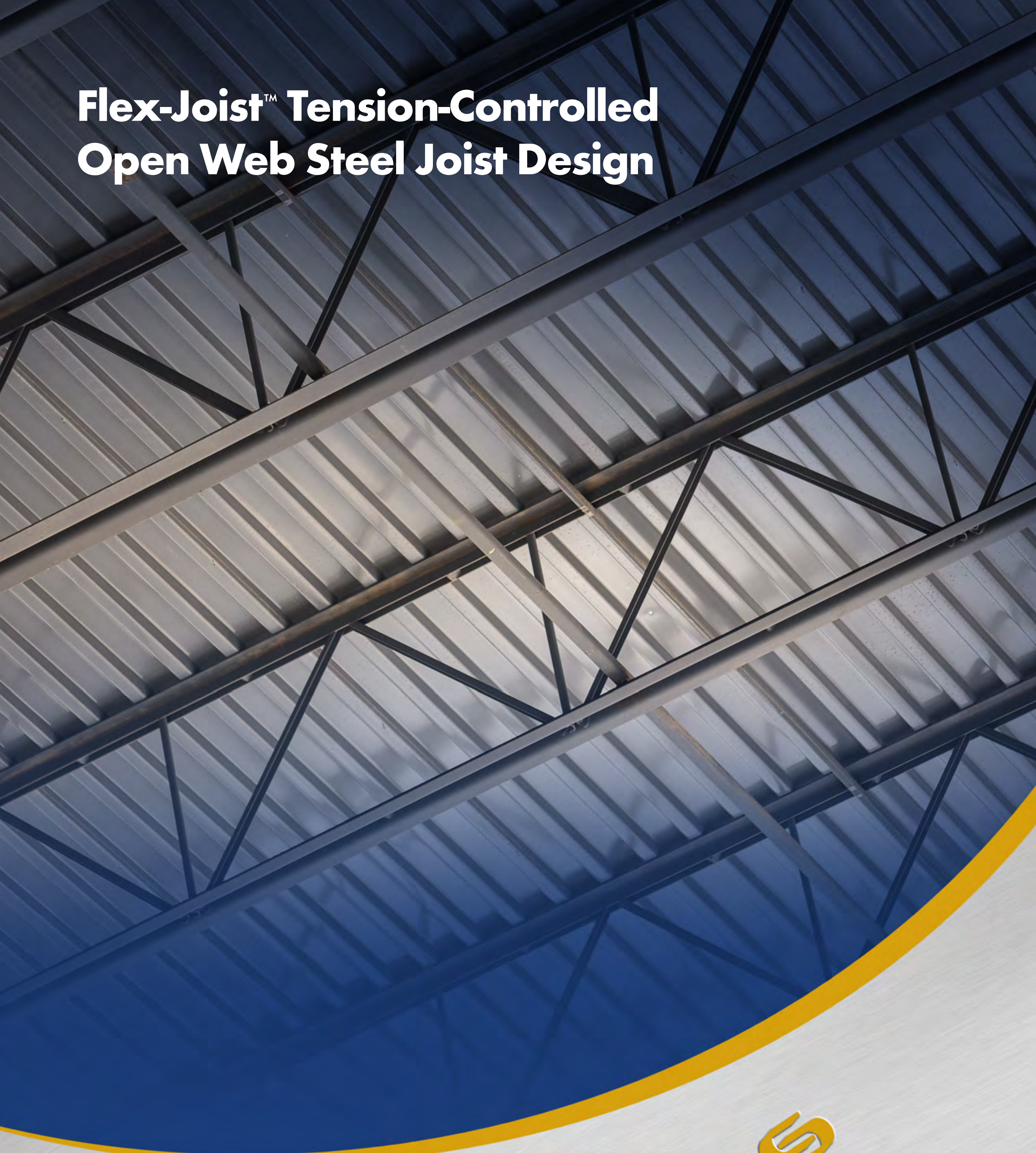
Flex-Joist™ Tension-Controlled Open Web Steel Joist Design



- *Increased strength and higher reliability index*
- *Improved ductility and safety management*
- *Optimal overload sensoring*

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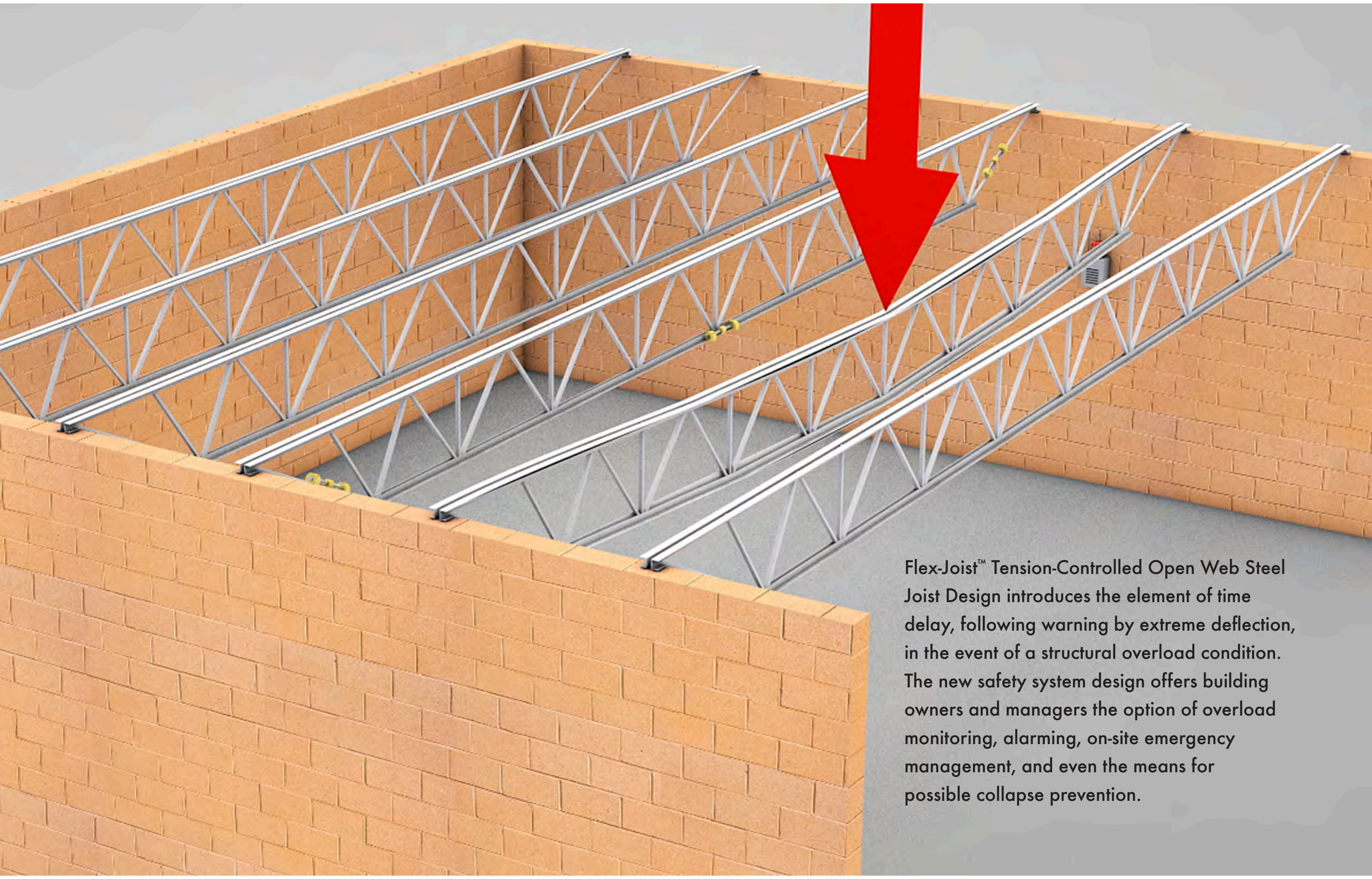
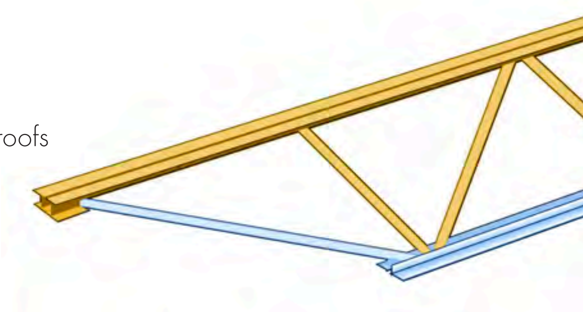


Flex-Joist™ Tension-Controlled Open Web Steel Joist Design introduces the element of time delay, following warning by extreme deflection, in the event of a structural overload condition. The new safety system design offers building owners and managers the option of overload monitoring, alarming, on-site emergency management, and even the means for possible collapse prevention.

Verified higher strength, reliability, and ductility



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 offers 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 injury prevention*
- *Provides for possible shoring, removal and collapse prevention*

For more information about Flex-Joist Tension-Controlled Open Web Steel Joists, visit: www.newmill.com/flex

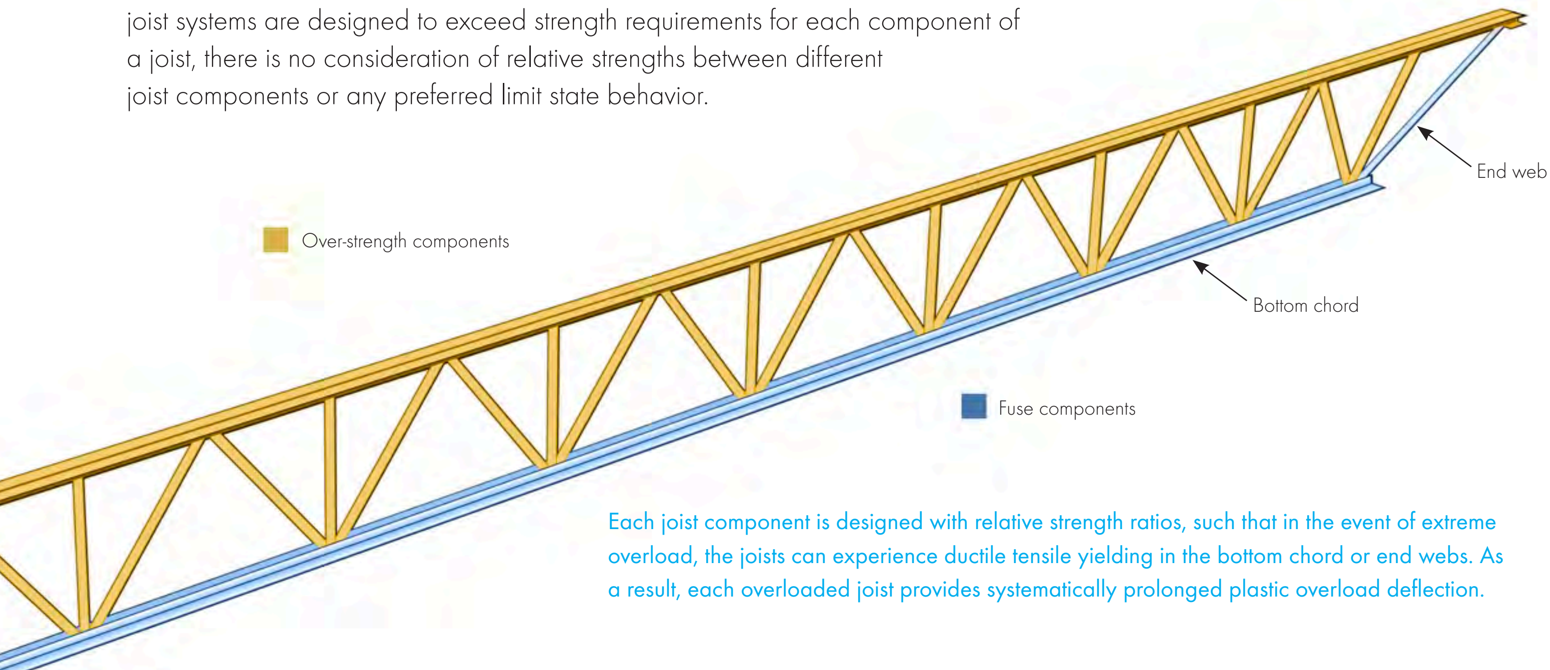
Flex-Joist™ is different by design

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. Flex-Joists differ in two fundamental ways:

Component relative strength ratios

Flex-Joist™ design addresses component relative strength ratios. Traditional joist design (including cold-formed channels, Z-purlins, and wood joists, as well as open-web steel joists) does not.

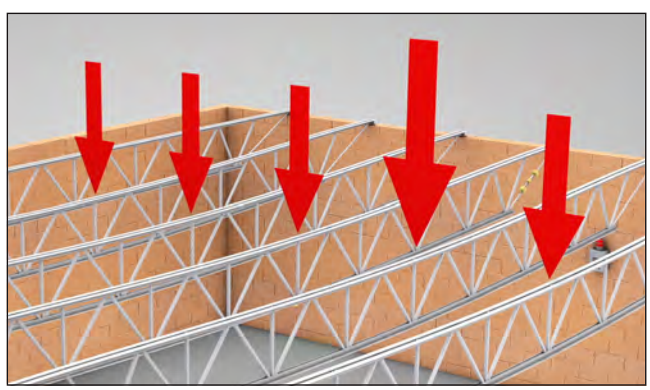
Flex-Joist system design accounts for the relative strength ratios between the various joist components and the joist primary tension members (bottom chord and end webs). This establishes a primary ductile tensile yielding limit state. Depending upon the nature of the overload event, a Flex-Joist can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



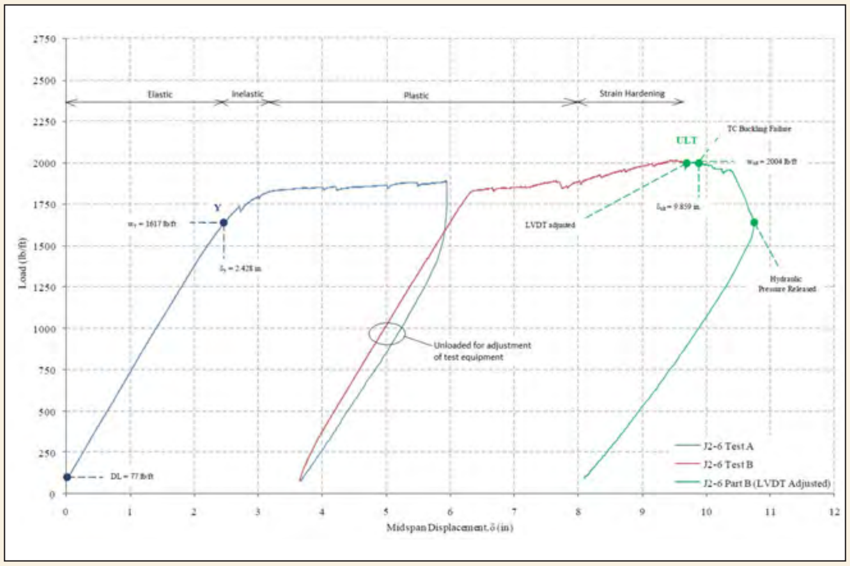
In a Flex-Joist system, overload conditions are met by initial joist deflection, followed by load sharing among adjacent joists. Load sharing further extends the timeframe for emergency management, prior to a collective collapse.

Flex-Joist ...the proven system solution

The Flex-Joist™ system achieves its controlled collapse capability through engineered relative strength ratios for all components of the individual joists. The Flex-Joist design criteria have been developed over several years, through extensive research and testing.

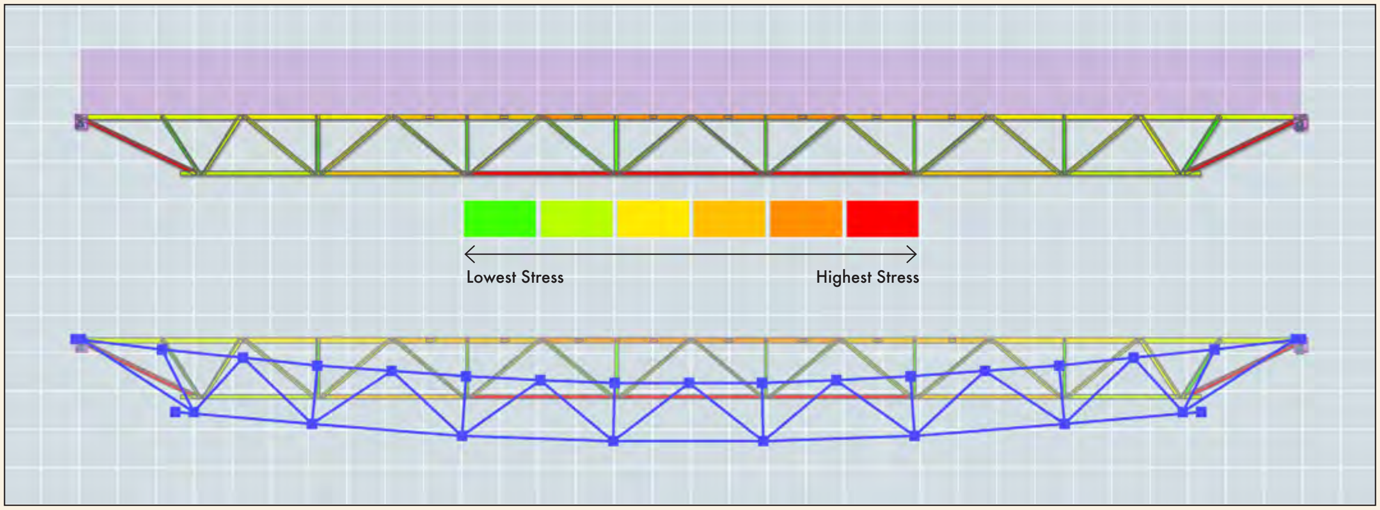
Engineered limit states

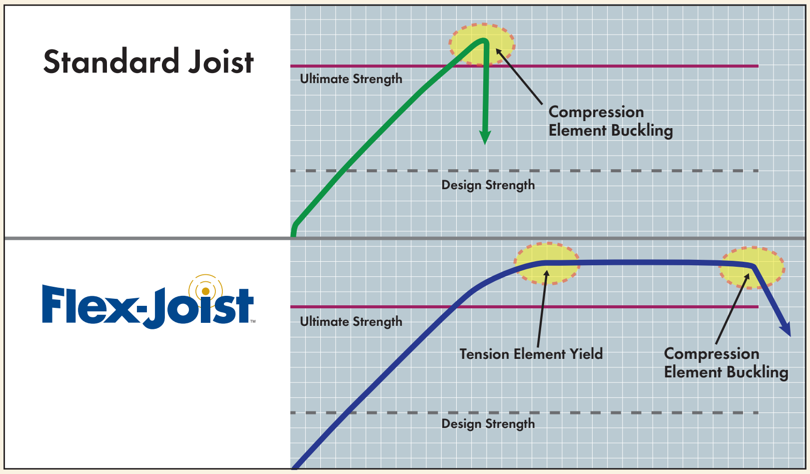
During an overload, the primary limit state established by the Flex-Joist system is characterized by prolonged phases of deflection, moving from the initial elastic phase through to strain hardening, followed by a loss of load-bearing strength, buckling and collapse.



Early ductile yielding

Under load test, a Flex-Joist bottom chord and/or end web yield substantially during the primary limit state. All other components of a joist are designed to be stronger than the bottom chord and end web in order to promote ductile tensile yielding.





Advanced ductile yielding

Under load test, the Flex-Joist continues to support loads in excess of the elastic limit during the primary limit state, while undergoing extreme deformations.

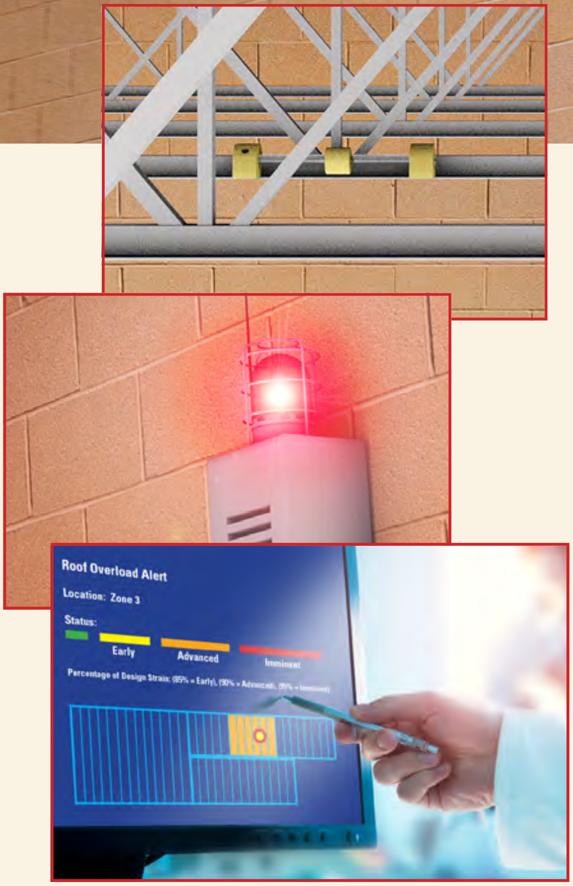
Ahead of the curve

Compared to traditional joist systems, the Flex-Joist is engineered to collapse after a significantly longer yield time in the event of static gravity overload. This is because Flex-Joist design promotes tensile yielding.

For more information about Flex-Joist Tension-Controlled Open Web Steel Joists, visit: www.newmill.com/flex

Optimized safety sensoring

A Flex-Joist™ project is ideally suited for the optional, post-erection installation of electronic sensoring 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.



1. Early detection

With Flex-Joist Tension-Controlled Open Web Steel Joist Design, each joist is engineered to flex in the event of an overload to establish the new element of time-delay before the collapse of a steel joist roof or floor structure. Strain gauges installed post-erection by a third party throughout the system measure ductile tensile yielding within the structure, detecting a problem early, well in advance of a collapse.

2. Notification

An overload condition can alarm locally and remotely. This simple safety solution can function as a stand-alone management package or be integrated into an existing building alarm system.

3. Overload location and status

Informed of the location of an overload, management can also "see" the estimated status of the overload. The system provides a measure of available response time, allowing for decisions as to evacuation, roof shoring and load removal.

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.

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