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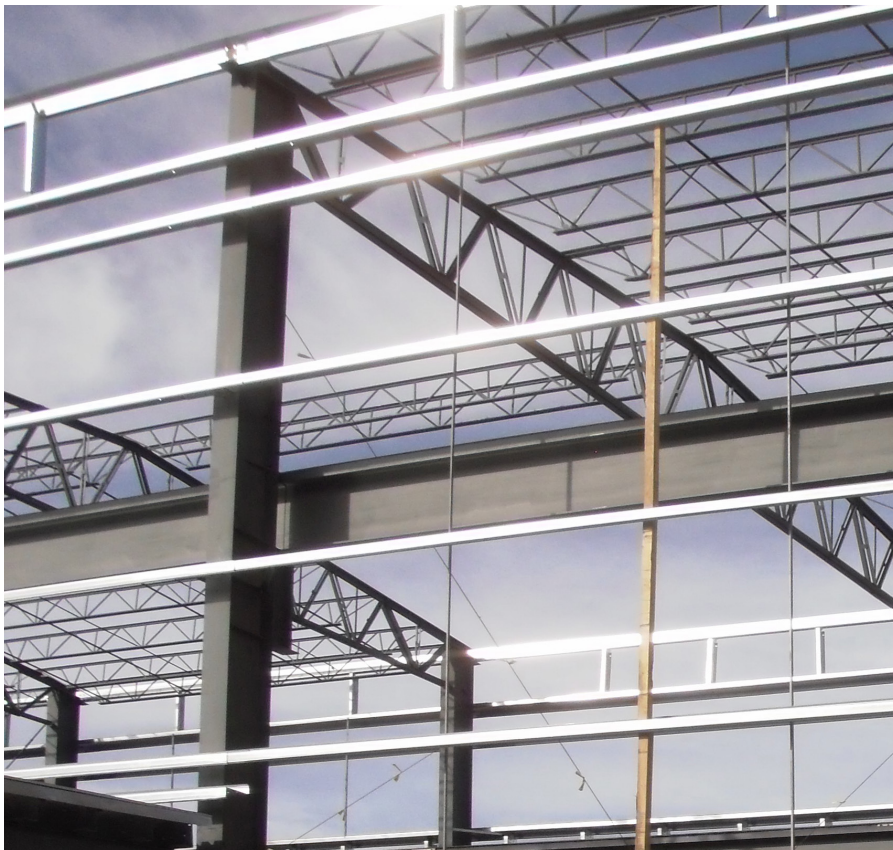


Three Ways to Uplift Metal Building Design

By Gerald Venable, PE, New Millennium

Here are proven advantages of steel joists and decking

When a metal building project requires the integration of steel joist or deck, it is often an opportunity to capitalize on the cost-performance advantages of these alternative structural elements. Here are three ways to do that.



Simplify and accelerate erection

The right steel joist and deck solution acts as a packaged, pre-engineered system that goes together seamlessly on-site with the lighter gauge metal framing. Joists and decking are delivered to the job as they are needed, ready to erect, with no labor-intensive parts assembly. The joists can also quickly integrate HVAC, electrical and fire suppression runs. All of this contributes to a more cost-efficient and accelerated erection schedule.

In addition, metal building layouts and designs often create large quantities of like-joist marks, making it more efficient for the erector by minimizing the amount of “shake-out” required for locating the correct joist marks. Similarly, the layouts are commonly repetitive for bays with consistent widths, allowing for panelized erection methods that can eliminate the need for x-bolted erection bridging.

Cut costs while improving performance

Longer spans are made possible with the use of steel joists, which can minimize column counts, introduce more open floor spaces, and lower the costs of both material and erection labor. “Strut” joists are commonly used in the bracing of the structure and can be a cost-effective alternative to heavier solid web members.

Steel joists offer the added flexibility of engineering to unique load management requirements, including hanging loads such as for internally integrated HVAC units. Such proposals may have a strong appeal to the owner, as the relocation of large units from the outside to the inside can free up precious real estate that could be used for a larger facility or for increased parking.

space. Most metal buildings do not utilize the deck to offer diaphragm strength to the structure. However, there is the option of an underlayment of diaphragm deck on top of the joists and under the SSR to provide this diaphragm strength when it is found to be more efficient than the typical rod cross bracing.

Think even further out of the box

Metal buildings can benefit from innovative trends in steel joist and deck design, such as the use of castellated and cellular beams for mezzanines, or the use of special profile steel joists for unusual roof-lines or architectural accents; and most recently, the use of tension-controlled open web steel joist systems that are engineered to “flex” and alarm in the event of roof or floor overloads.



A tension-controlled open web steel joist system uses a “bend before it breaks” design approach. Each joist component is designed with relative strength ratios, such that the joists can, in the event of an extreme overload, undergo ductile tensile yielding in the bottom chord or end webs. As a result, each overloaded joist provides systematically prolonged deflection. Optionally, with sensors in place to detect this deflection, the joists form a gravity overload safety system that can provide an early audible and visual warning in the event of an overload condition, affording facility management valuable time for emergency evacuation, shoring of the roof and removal of the overload source.

Summary

By leveraging the many advantages of steel joist and deck design, you can offer the most attractive, bid-winning combination of building cost and performance for your more unique metal building projects. And by staying informed about what’s possible, you may even find that steel joist and deck can afford you a competitive advantage on other, more traditional metal building project opportunities.

Gerald Venable, PE, is Engineering Manager at New Millennium Building Systems in Rogers, Arkansas. To learn more, go to www.newmill.com.

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