

BIM keeps on trucking:

Helps metal building project save time and money.

As featured in a lead article in the July 2012 edition of Metal Construction News, this metal building project is among the first to deploy BIM-based design. The use of 3-D dimensional frame models eliminated potential construction problems, demonstrating that BIM offers significant benefits to metal building manufacturers and partners on a typical project.



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The 12,600-square-foot truck maintenance facility was built at a MolyCorp, Inc. rare earth oxide mine as part of an \$895 million expansion and modernization project. Airway Heights, Washington based Garco Building Systems supplied the framing to steel erector Sure Steel. The building, scheduled to be put in service this year, is 43 feet tall to

Three-dimensional model sharing prevented problems during the metal framing design and fabrication of a 12,600-square-foot MolyCorp, Inc. truck maintenance facility in Mountain Pass, California.

accommodate large mine haul trucks, front-end loaders and truck-mounted cranes. The facility is fairly typical of ones in the mining industry for which Garco supplies framing. In 2010 New Millennium became the first joist company to offer BIM-based project development by introducing Dynamic Joist® design software, the first digital joist design component. Its work with Garco was its first use of 3D file sharing in metal building manufacturing—and this approach boosted the efficiency of the collaboration significantly.

New Millennium used a Tekla Structures model provided by Garco as its initial joist model. Using proprietary automation tools, New Millennium inserted the joists in the model. The tools scanned the model for joist reference points, established by Garco, and inserted Dynamic Joist® components at those locations. The components were then used throughout the joist detailing and design process. New Millennium exported the joist system to an Industry Foundation Classes (IFC) file for delivery to Garco. IFC is a data model exchange format from buildingSMART International.

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Major time savings

According to Ricky Gillenwater, information technology director at New Millennium, although this was not a “full” BIM project in which all contracting firms shared 3D files, even on a smaller scale the practice can save a lot of time and money in metal building construction.

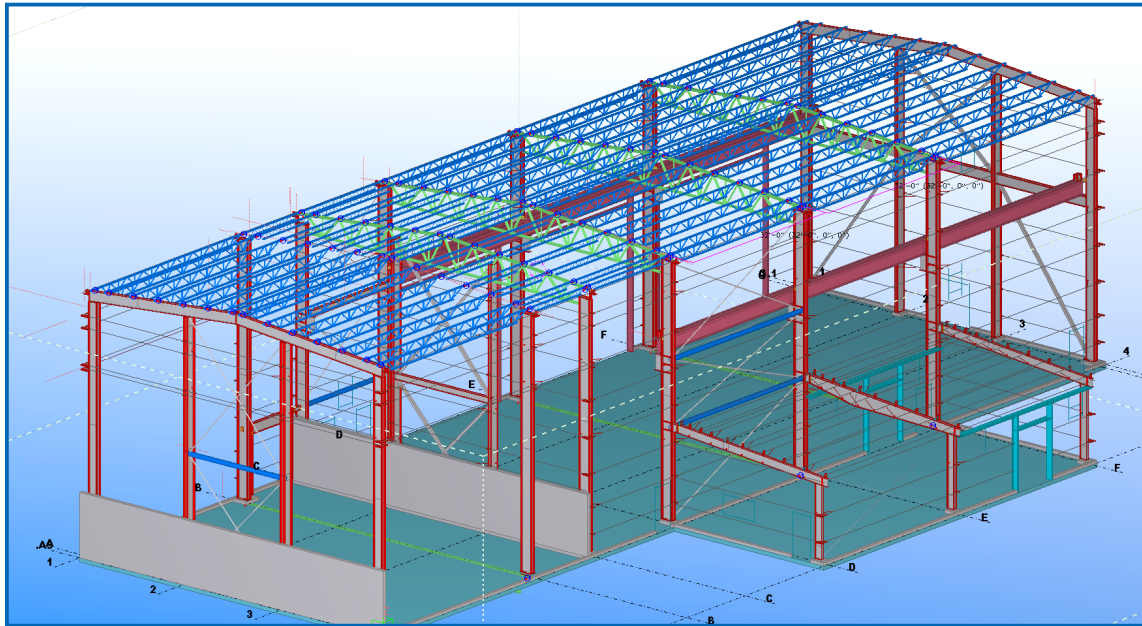
“We don’t see BIM as just modeling—we really see it as a strong coordination and collaboration process or concept,” Gillenwater said. “We see it as a way to give more value to the owner in the end and to reduce all of the Requests for Information that come through, which makes the project go a lot more smoothly. Since we’re supplying this information in the BIM model, we’re talking to other trades and having coordination meetings with the mechanical contractors and with contractors we haven’t talked to in the past.” For its part, Garco had been involved in BIM projects in which all of the contractors shared design files. This was the first project in which it coordinated girder and joist modeling, however. Kyle Beebe, district sales manager for New Millennium, touted the company’s BIM processes to Garco’s managers, who viewed the potential favorably.

A kickoff BIM meeting made the entire process go smoothly, according to Gillenwater. “We talked about what we look for in the model when we’re doing the coordination, what we expect to get into the model when referencing the joists, and what they should expect from us once we get our as-built joist ready and sent back to them,” he said. “The thing that helped out was the coordination with the girders—that was about the most complicated part of the project.”

This project was not unusual from New Millennium’s standpoint, other than in one aspect, according to Tom Evans, engineering manager at the company’s Juarez, Mexico manufacturing facility. The roof had a 1:12 slope from the ridge, necessitating the use of double-pitched girders and canted joists with the same slope.

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On a typical commercial facility like this, Evans added, the building owner benefits from the use of the BIM process that New Millennium utilizes by seeing what the shell of the building will look like. The steelwork contractor—in this case, Garco, the metal framing contractor—benefits by determining how much space is available between joist members for the installation of mechanical, electrical and plumbing utilities.



Joist girder helped save weight

This project was anything but typical from Garco's standpoint, noted David Zabinski, the sales engineer, estimator and the design engineer on the project for Garco.

Another unique feature of the facility was the use of double-pitched girders and canted joists that matched the joist girders' slope.

"Typically, we use moment frames to resist loading in the lateral and vertical directions in our buildings," he said. "Usually, deflection limits require large columns to be used, but in this case we were able to economize by using a brace frame system and incorporating New Millennium's joist girder. "Normally we don't use a girder with our framing, although we use joists quite often," Zabinski continued. "We actually incorporated their girder into our building design, which was unique. Using the BIM process gave us the confidence that the detailers would be able to properly incorporate details from another manufacturer—in this case, New Millennium—to avoid any problems with fabrication or erection. That's one main advantage from a design standpoint. Plus, we were able to verify our crane clearances with the BIM process."

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Garco also used the 3D building model to ensure that the joists that New Millennium provided would bolt up accurately, according to Steve McChesney, senior product manager/estimator for Garco. New Millennium designed its joists by using Garco's Tekla Structures model. "Typically, we would detail that material ourselves, but since they were able to utilize our model and import the joist into their model, they could actually detail it for us and then fabricate it," McChesney said.

On a few occasions, Garco modified its Tekla Structures file to reflect few changes in the building design and New Millennium made corresponding changes to the joists in the same model, recalled David Fletcher, senior detailer/modeler for Garco. After viewing a 3D model of New Millennium's joists, Garco determined that ensuring the accurate alignment of the girder to 10-inch eave purlins was critical in ensuring the structural integrity of the building. "Up at the building eave, the overhang, there were a few crashing problems with bracing and with the girder bolting to the top of our column," Fletcher said. "That was nice because, otherwise, we would have had to work out old-school sketches and have the project manager fax them or send them by email to New Millennium to have them make changes that way." Moreover, Sure Steel would have had to modify the joists and girders in the field if the designs were slightly off and did not bolt up accurately, McChesney pointed out.

As on any construction project, time was money here. "If we would have done this using the typical mailing back and forth of paper drawings, we probably would have increased our time by 30 percent," Zabinski said. "By using the BIM process, we definitely had the confidence that the details were correct, especially because we were transferring connections details from one manufacturer to another." McChesney added that, without BIM, the framing would have been delivered much later than late December 2011. "[BIM] probably saved, at the very minimum, a month for delivery of the building just because we were able to catch problems early on instead of proceeding down the wrong road, not realizing it until the end, and having to go back and redo the work. [Design coordination problems] hurt everybody—they delay our schedule, our customer's schedule and the end user's schedule."

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New Millennium's use of its Dynamic Joist® software and the IFC exchange platform allowed the company to generate a client-compatible 3D model—in this case, Tekla Structures—overcoming a potential barrier to the use of BIM. "Some suppliers such as New Millennium offer a joist component where you can detail with exact profiles," said Jeremy Gross, Tekla Group drafting supervisor for Garco. "You save the time because you don't have to ask what size their joists are or typical information that requires a lot of paperwork or email back and forth. It just so happened that New Millennium used Tekla Structures, so there was direct collaboration between programs."

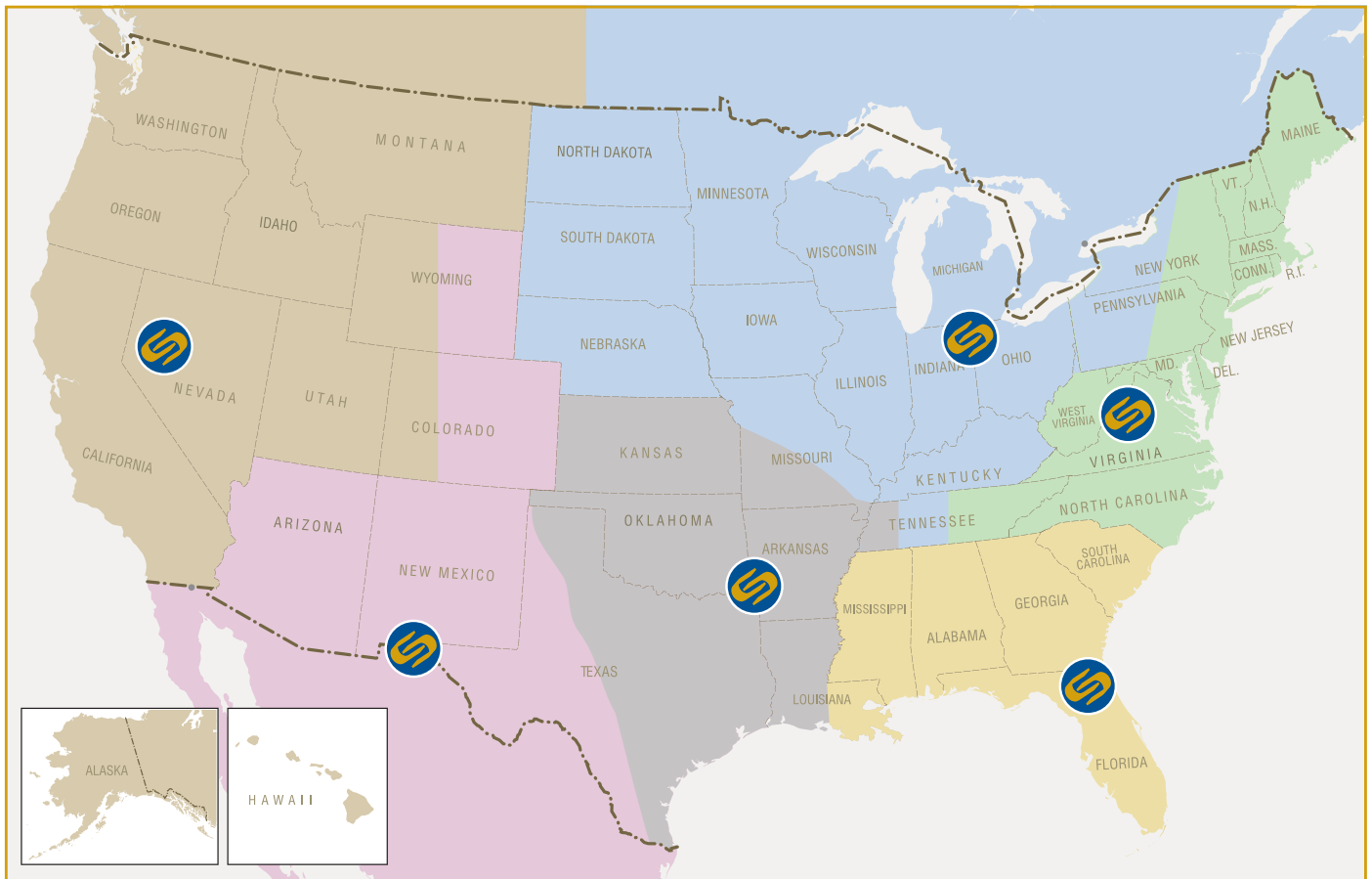
Read the article in *Metal Construction News*:
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Corporate Office

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