



# Dynamic Exchange

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Data transfer, teamwork and the use of structural steel were swift solutions for the Nebraska Furniture Mart In Kansas City, KS.

In the fall of 2003, Nebraska Furniture Mart will open the largest volume, single-location home furnishings store in the world. The \$100-million project is located on the west side of Kansas City, KS.

## BUILDING HIGHLIGHTS

The new building features 500,000 sq. ft of retail space on two levels that showcases furniture, appliances, flooring and electronics. The building also includes a 225,000-sq.-ft cross-dock, and high-bay racking area for warehouse space. Almost half of that space requires state-of-the-art super-flat floors. An additional 70,000 sq. ft of storage and office space is located above the cross-dock and general warehouse section, with provisions for adding 34,000 sq. ft of floor space.

Nebraska Furniture Mart is designed so that its showroom will be user friendly. Two escalators, five elevators and 14 stairwells help customers and employees maneuver through the store. To provide more pleasant natural light, three 50'-square skylights and two 25'-square skylights, constructed

of HSS members, were added in the retail area. Curved glass with HSS supports was used to create extra appeal at the primary and secondary customer entrances.

## FACING THE CHALLENGES

Nebraska Furniture Mart presented significant challenges to the building team. It required an open floor layout and unique building components—all on an accelerated schedule.

The facility required larger-than-normal floor-column spacing in order to minimize obstructions to merchandising and warehouse operations on the first floor, and to facilitate movement around the store. A structural steel system was chosen because Nebraska Furniture Mart's high-bay racking system dictated atypical column spacing. Using steel accommodated these requirements and enabled the finished building shell to be completed in only four and a half months.

The building owners specified a concrete hard-wall exterior for added durability and increased security, because the facility houses expensive fur-



*Above:* By pre-assembling joists in bays, the structural steel erection process progressed more efficiently and reduced chances of worker injuries during construction. The erected steel shell for the facility was in place in only 4½ months.

*Opposite:* When complete, the new \$100-million Nebraska Furniture Mart retail showroom will be the largest volume, single-location home furnishings store in the world. The 800,000-sq.-ft facility is expected to attract visitors from up to 350 miles away.

*Below:* These HSS supports will hold curved glass to create extra architectural appeal at the primary and secondary customer entrances.



niture and electronics. The lateral system for the structure combines precast concrete shear walls and braced frames. Precast concrete shear walls were used where possible, but due to the building's unique layout, braced frames were required to stabilize some portions of the structure. Beam-to-column connections were established using shear tabs. Braced frames consisted of HSS braces with gusset plates, connected to wide-flange beams and HSS columns.

Other innovative solutions include a 105'-long, 27'-deep structural steel truss that supports the second floor, the roof and precast cladding over a recessed customer loading dock. In addition, floor and roof joists spanning 110' form a "bridge" over a separate customer pick-up area. Employing a structural steel system provided flexibility to adapt to special requirements.

Special design provisions were also required in the storage portion of the building. In order to support the load of merchandise, the owner specified 150 psf storage load requirements,

which is 20 percent greater than typical light storage requirements.

#### PUSHING THE SCHEDULE

In the retail industry, owners are increasingly schedule sensitive. The sooner a building is completed and open for business, the sooner products can penetrate the marketplace. Fulfilling the schedule requirements took a coordinated effort from the entire building team.

The project's steel fabricator/erector, The Bratton Corporation, of Kansas City, MO, recognized that by pre-assembling joists in bays, the erection process would progress more efficiently and reduce chances of worker injuries during construction. Structural steel frames for the skylights also were assembled on the ground and lifted as single units.

The project architect, Design Forum, of Dayton, OH, included a structural team at LJB Inc. of Dayton, OH as a design consultant and engineer of record because of the firm's experience and expertise with design-build construction. LJB offered increased efficiency to

the project with the effective application of steel detailing software. Before the detailing portion of the project began, LJB's chief detailer visited Bratton to assess the company's preferences, abilities and operations. Simply installing software does not mean a detailer can deliver quality drawings with no errors. By recognizing the preferences of the fabricator, and understanding steel detailing and multiple software programs, the team was able to take advantage of timesaving software applications. The process shaved an estimated two months off the steel construction schedule.

#### EXPERIENCE MAXIMIZES TECHNOLOGY

The integration of electronic data interchange (EDI) was vital to the success of the Nebraska Furniture Mart project. LJB's ability to implement the steel detailing process concurrent with the development of structural design drawings was key to the compressed delivery time. Designers did this by translating the RAM Structural System 3-D design model into the SDS/2 steel



Three 50'-square skylights and two 25'-square skylights were used to provide natural light to the Nebraska Furniture Mart's retail showroom. The skylights were constructed of HSS members, assembled on the ground and lifted as single units.

detailing software, using the CIS/2 standard.

SDS/2 then assisted in the production of a set of fabrication drawings showing individual structural steel pieces. The program draws all members piece by piece, then shows how to put them together, like an erector set. SDS/2 also automatically produces a bill of materials. For the Nebraska Furniture Mart project, an advanced bill of materials was produced prior to delivery of the construction documents, which allowed the fabricator to purchase materials from the steel mill, rather than from a warehouse. Providing this information earlier in the process significantly reduced cost and saved time.

Translating engineering models directly into steel detailing models shortens the steel detailing process and minimizes errors by eliminating the need to input the data a second time. Zero detailing errors were recorded for the Nebraska Furniture Mart project.

#### SUCCESSFUL COORDINATION

The first set of approved shop drawings was released to the fabricator two weeks after design drawings were issued for construction. One company completed both construction drawings and shop drawings, enhancing the ac-

curacy and coordination between the drawings. Since they were already approved when released, there was no time-consuming review process. Fabrication then coincided with erection, and the project completion date was accelerated.

By capitalizing on the advantages of advanced technology and the flexibility of steel, the building team for the Nebraska Furniture Mart was able to deliver the project successfully with few errors in a compressed time frame. The benefits realized by condensing the steel detailing process not only saved the owner time and money, but it also saved the entire building team stress brought on by errors. On a project of this magnitude, any savings in cost, schedule and tension are a welcome addition.★

*Mark H. Stemmer, P.E., is the director of the Industrial Facilities Business Team at LJB Inc., located in Dayton, OH.*

#### OWNER/DEVELOPER

Nebraska Furniture Mart, Omaha, NE

#### STRUCTURAL ENGINEER

LJB Inc., Dayton, OH

#### ARCHITECT

Design Forum, Dayton, OH

#### CONTRACTOR

Turner Construction Co., Dallas, TX

#### STEEL DETAILER

LJB Inc., Dayton, OH (AISC member)

#### STEEL FABRICATOR/ERECTOR

The Bratton Corporation,  
Kansas City, MO (AISC member)

#### ENGINEERING SOFTWARE

RAM Structural System, RAM  
Advance, MicroStation, Enecalc

#### STEEL DETAILING SOFTWARE

SDS/2

Read more about panelized construction in the story "Panel Power" that follows on p. 32 of this issue.

The building shell for the Nebraska Furniture Mart project contains 1,300 tons of structural steel, not including joists, joist girders and deck. Using a structural steel system provided more flexibility to accommodate the building's special requirements, and increased erection speed and cost-efficiency.

