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Project

Three steel structures for The Artist Journey Show, a ride-based music attraction housed in one of the buildings of the Experience Music Project in Seattle: projection booth and rigging for an IMAX screen and a full-motion stage.

Challenges

- Highly irregular shape of the Frank O. Gehry-designed building
- Vibrations loads needed to be isolated in the various show segments
- Structures required individual FEA analysis and many unique steel framing details

Solutions

Brad Read did not know whether it was possible to model and design the complex structures outlined by the architects of the Experience Music Project. If it was possible, Read knew the software he would use: RISA-3D.

As a leading provider of structural engineering services for the themed entertainment industry, Entertainment Engineering, Inc. (Burbank, Calif.) specializes in helping clients turn their most ambitious visions into reality. Still,

Read admitted he was not sure The Artist Journey Show could be built as it was conceived.

The Artist Journey Show is one of several unique attractions of the Experience Music Project, a music museum designed by renowned architect Frank O. Gehry. The EMP consists of a series of unique and fluid shaped enclosures linked by a monorail system. The 140,000-sq.-ft, \$250 million facility was built in 2000.

QUICK FACTS

Location

Seattle

Structural Engineer

Entertainment Engineering, Inc.,
Burbank, Calif.

Design Team

Kent Bingham
Brad Read, PE

Architect

Frank O. Gehry

Built

2000

Size

7,500 sq. ft.

Software

RISA-3D

“On projects like this where I’m looking for overall stresses, I don’t have to go anywhere else (than RISA-3D.)”

Brad Read, P.E., Entertainment Engineers, Inc.

Entertainment Engineering, Inc. was contracted to design steel structures for several acts for The Artist Journey Show.

In all, the separate steel structures incorporated 30 tons of moving and flying sets and partitions, an oculus opening with show elements entering and exiting via winches, a motion-simulation IMAX Theater with digital animations and light and sound shows.

In addition, a monorail track ran in the middle of the show and Read needed to make certain the vibrations caused by the train did not affect the steel structures.

“My first thought was that it was impossible to stabilize the show and isolate the projection booth from the moving show loads,” Read says. “With

the RISA-3D analysis, I was able to approximate the moving loads and vibration of the monorail and design a structure that accomplished the goals of keeping the screen still while the show elements and monorail moved.”

Due to irregular design of the building and the need to isolate vibrations caused by moving loads in the various show segments, Read chose to design all the steel structures as free-standing entities.

Starting with the structural shells designed by Gehry in CAITA, Read sliced up the model in AutoCAD to determine the best approach for isolating the steel frame from the outer shell.

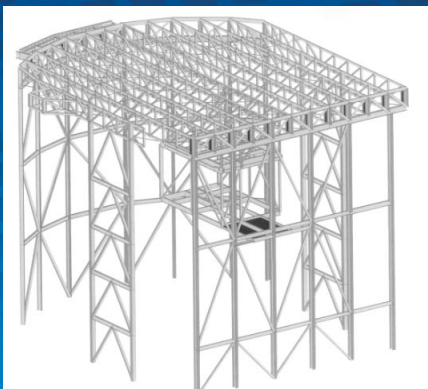
The complex arch design of the shell resulted in severe geometric

constraints to where Read could and could not place steel.

The rapid interface between RISA-3D and AutoCAD made it easy for Read to explore many design options. He was able to quickly substitute members in the model and go through the numerous iterations needed to come up with a final design.

The computer analysis of the Act II show structure was one of the most difficult and complex ever performed by Entertainment Engineers, Inc. But after years of using RISA-3D on every structural project, from buildings to bridges to theme park attractions, Read knew RISA-3D was up to the task.

“On projects like this where I’m looking for overall stresses, I don’t have to go anywhere else,” Read says.



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