

## Hunt/Moss

Customer Success Story

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BIM and collaboration and data management are improving the quality of our work, minimizing impacts to the project schedule, and reducing costs. With results like that, there's no question that using BIM to execute and deliver this ballpark was the right decision.

—Russ Dalton  
Virtual Design and Construction  
Manager  
Hunt Construction Group

# Hit a Home Run with BIM.

## Hunt/Moss uses Autodesk BIM solutions to build a new baseball park, virtually.



Aerial photograph of the ballpark under construction. Image courtesy of Hunt/Moss. Photo by Aerial Photography, Inc.

### Project Summary

When the North American 2012 Major League Baseball season begins, the Marlins baseball team will be playing in a new ballpark. The \$515-million facility is being built on a 17-acre site in Miami, Florida. The 37,000-spectator ballpark will have a 8,300-ton retractable roof and a natural grass playing field. Other features include a half-acre retractable window wall providing views of downtown Miami, 50 luxury suites, and even a party suite with a swimming pool perched over the left field wall. It is expected that the ballpark will be the first retractable roof facility to be LEED Silver™ certified. Construction of the ballpark began in July 2009 and its opening day is set for April 2012.

The project is a partnership between Miami Dade County, the City of Miami, and the Marlins. The construction manager is Hunt/Moss, a joint venture consisting of Hunt Construction Group and Moss & Associates. Hunt is the nation's leading sports builder and is ranked number one in sports construction by Engineering News Record. Moss & Associates is one of the largest construction companies in Florida, with extensive experience in the Miami/Dade County area.

### The Challenge

The inspiration for the ballpark's architectural design is the concept of water merging with land, symbolizing Miami's coastal location. The sweeping roof panels and glass outfield wall retract away to transform the architecture into a completely new composition open to the sky. The curvilinear exterior includes faceted metal and glass panel systems floating above a sculpted white plaster podium. "One of our biggest challenges on this project is the sheer complexity of the design," remarks Russ Dalton, a virtual design and construction manager at Hunt Construction Group. "The geometry of the building is very complicated, chockfull of curved walls, bands of windows, and open intersecting levels and concourses."

There are more than 3000 drawing sheets that detail the ballpark. And as an indoor/outdoor facility, the mechanical systems are equally complex and also enormous, with some ductwork over six feet wide. "On paper, the design was very difficult to visualize, much less coordinate," explains Edwin Perkins, virtual construction coordinator for Hunt/Moss. "To really understand how all the design elements and disciplines come together, the team needed a 3D virtual model."

# Combine design data, fabrication models, and project schedules for construction planning and simulation.

## The Solution

For many years, both Hunt Construction Group and Moss & Associates have been using Building Information Modeling (BIM) for the construction of their projects. “Although our client did not require the use of BIM on this ballpark, we knew that BIM was essential for the success of the project,” says Patrick Delano, Hunt/Moss construction manager. But only the structural engineer used Autodesk® Revit® software for its design—Autodesk® Revit® Structure. The architect and MEP engineer developed their designs using AutoCAD® software.

“So we decided to create a model of the project, representing all disciplines, ourselves,” says Perkins. The Hunt/Moss team used Autodesk® Revit® Architecture and Autodesk® Revit® MEP software to create discipline-specific models of the ballpark from the original 2D architectural drawings and the 3D MEP design data. To help with cross-discipline design coordination, they combined those models, along with the Revit Structure model, into a single integrated project model using Autodesk® Navisworks® Manage software, a key component of the Autodesk solution for collaboration and data management. Hunt/Moss also requires BIM submittals from its major subcontractors on this project and uses Navisworks software to aggregate the design and fabrication models, creating an as-fabricated model of the entire project. “The whole project team relies on the consolidated Navisworks model to facilitate communication, collaboration, clash detection, and construction planning,” says Perkins.

The other key component was the Autodesk collaboration and data management solution such as Autodesk® Buzzsaw® software as a service (SaaS) to help with project collaboration and centralized project information management, and Autodesk® Design Review software to support digital design reviews and sign-offs. AutoCAD® Civil 3D® software was used for site layout, site drainage and earthwork calculations.

## Build the Project Virtually

“We’re actually building the project twice,” remarks Perkins. “Virtually, then physically.” To help keep the BIM project up-to-date, Hunt/Moss manually updates the Revit Architecture model with design changes and drawing revisions from the architect, and then refreshes the Navisworks consolidated model. The team even tags updated elements to capture the source of the change, adding the request for information (RFI) number or drawing revision number for example. When Hunt/Moss transfers the updates to the consolidated Navisworks model, this information goes with it. “We can quickly identify not only how a change will affect a current field operation but exactly where the change came from,” says Delano.

Hunt/Moss regularly uses the consolidated Navisworks model to help identify potential design conflicts and resolve issues prior to construction. “In fact, we often include Revit or Navisworks 3D screen shots in RFIs,” says Dalton. “BIM and collaboration and data management enable the extended design team to visually see the design conflicts and quickly work towards a resolution.”

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Construction Manager  
Hunt/Moss

## Integrate the Project Team

At the start of the project, Hunt/Moss provided training for all the project’s subcontractors, from project managers to superintendents to foremen. “We held training sessions several times a month, helping the subcontractors understand the value of BIM and collaboration and data management for the overall project as well as their own businesses,” says Dalton.

The training included general BIM and collaboration and data management concepts and project-specific processes for posting, searching, and downloading information to and from the Buzzsaw site. “By the end of the training, the subcontractors knew how to download and use the other trade models for their own coordination efforts, and how to upload their fabrication models for integration into the Navisworks consolidated model and formal clash detection,” says Dalton. In addition, the subcontractors learned how to use Autodesk® Navisworks® Freedom software to navigate and explore the consolidated model for overall project collaboration.



Conflict identification. Image courtesy of Hunt/Moss.

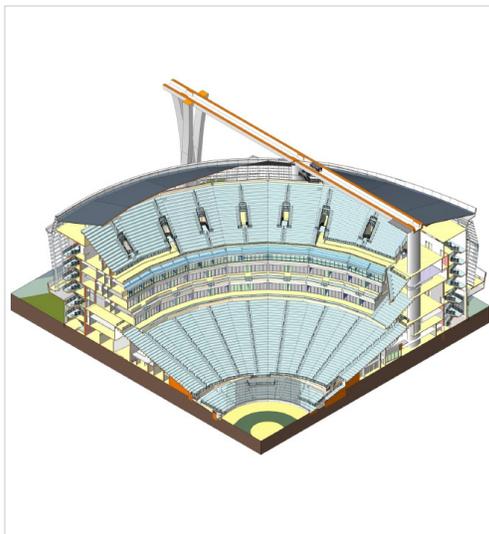
### Keep it Coordinated

"We have over 16 different trade models, including mechanical ducts, mechanical piping, plumbing, sprinkler systems, communication cable trays, food service equipment, and beverage systems—not to mention two separate models for the fixed canopy and retractable roof systems," says Dalton. "All these trades are using individual software solutions that suit their fabrication workflows. But we make their models accessible to the whole project team using Buzzsaw and then combine them all in the Navisworks model for cross-discipline coordination and to develop an efficient construction strategy."

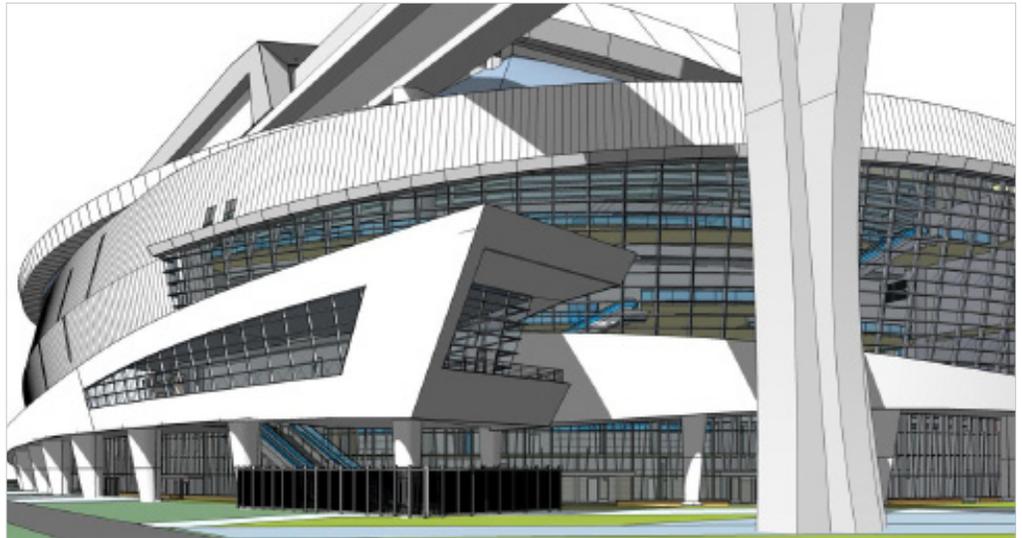
### Make Sure it Fits

The ability to create a virtual as-fabricated model has been vital for preconstruction coordination on this project. For example, the steel fabricators for the two roof systems delivered their respective fabrication models to Hunt/Moss. "These roof systems are completely irregular with lots of curvilinear forms that have to attach to huge structural trusses, making manual coordination extremely difficult," explains Perkins. "Their fabrication models contained everything down to the angles, plates, and bolts—enabling us to digitally detect and correct conflicts with these massive systems before they become costly field changes."

Virtual fabrication models were also essential for the coordination of the complex MEP systems and the huge ducting that runs throughout the ballpark. "When you're installing a six-foot wide duct, you better make sure that it will fit," says Delano. The



Cutaway view of the home plate seating. Image courtesy of Hunt/Moss.



Shaded exterior view. Image courtesy of Hunt/Moss.

mechanical subcontractor modeled their ductwork, piping, and equipment, as well as the clearance spaces around the equipment needed for access and maintenance. "Using 2D coordination, clearance requirements are always difficult to identify," remarks Delano. "But with Navisworks software, it's just another clash detection."

### Plan Carefully

In addition to project coordination, the team uses Navisworks for construction planning. "Our project plan is about 160-pages long with over 11,000 activities, so we linked our consolidated Navisworks model to our Primavera project schedule to simulate the construction schedule," says Dalton. "Navisworks is helping us create an aggressive yet realistic schedule."

Once the schedule was linked to the project model, the team began using the 4D construction sequencing features of Navisworks software to help visually identify conflicts in the schedule. "For example, using Navisworks we recently discovered that several roof trusses were being lifted into place at the same time sections of the precast seating bowl were being installed right below them," says Delano. "Scheduling conflicts like this are almost impossible to detect using 2D drawings or even 3D models."

### Photograph the Construction

Hunt/Moss is also using photographs to document the construction progress, particularly the MEP systems in walls and ceiling. The resulting digital images are then hyperlinked to spaces in the consolidated

Navisworks model. "We just navigate to a room, click on the camera icon, and up pops the as-built photograph," says Perkins. "This approach helps us resolve field issues when we need to compare what was coordinated versus what was installed. We can instantly access digital photographs of the construction to make better decisions, faster."

The ability to navigate and virtually "walk through" the consolidated Navisworks model and view this photographic documentation is also a powerful communication tool, particularly for non-technical project stakeholders such as the owner or building inspectors.

### Go Onsite Virtually

With construction in full swing, Hunt/Moss is now using Navisworks software onsite. "To resolve construction issues and plan ahead, we have regular coordination meetings with various construction trades, referencing the Navisworks model from computers in construction trailers at the jobsite," says Dalton. "The next step is using tablet PCs to access the Navisworks model from the field."

In addition, corporate personnel at both Hunt Construction Group and Moss & Associates use Navisworks and Buzzsaw software to monitor the job from their corporate offices and assist the onsite team in resolving design, budget, or scheduling issues. "By making a trip to the job site unnecessary, we're solving problems at a fraction of the normal time and cost," says Dalton.

# Use BIM for collaboration, clash detection, construction sequencing, and close-out.

## Go Green

The project team is implementing several green initiatives in order to achieve LEED Silver Certification for the new ballpark, including an aggressive waste management recycling program, the use of recycled content and locally manufactured building materials, and the use of low VOC (Volatile Organic Compounds) paints, adhesives, carpets and flooring to improve indoor air quality.

"We rely on our Revit models to extract and calculate quantities of materials that are needed for our LEED submittals," explains Perkins. "For example, the concrete used on this job qualifies as a local material and recycled content. We used the Revit software to extract concrete quantities and calculate materials required to attain LEED credits."

## Plan Ahead

Although the ballpark won't be operational until 2012, Hunt/Moss is already working with the Marlins organization to extend BIM to their building operations. "We're currently investigating how to merge our BIM processes and models with their operations, maintenance, and building automation systems," says Dalton. "When we created the Revit models for the project, we also added facility-specific information so that, ultimately, we can deliver a data-rich, as-built model that the Marlins can use for facilities management."

## The Results

Through the use of BIM and collaboration and data management, Hunt/Moss is able to combine design data, fabrication models, and the project schedule for whole-project visualization and 4D simulation. "Realistic visualizations, walkthroughs, and construction animations continue to strengthen the team's understanding of this complex ballpark," says Perkins. "BIM improves our ability to communicate the design both internally for project collaboration and externally for public outreach."

"BIM and collaboration and data management are improving the quality of our work, minimizing impacts to the project schedule, and reducing costs" says Dalton. "With results like that, there's no question that using BIM to execute and deliver this ballpark was the right decision. We are minimizing re-work and saving all of us—Hunt/Moss, the design teams, the subcontractors, and the client—both time and money."

For more information about Autodesk BIM solutions, visit [www.autodesk.com/BIM](http://www.autodesk.com/BIM).



Floor plan sectional view. Image courtesy of Hunt/Moss.



Rendered cutaway view. Image courtesy of Hunt/Moss.

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Virtual Construction Coordinator  
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