

ARCHITECTURE, ENGINEERING &
CONSTRUCTION CASE STUDY
**SHoP ARCHITECTS +
SHoP CONSTRUCTION**



Challenge:

SHoP Architects and SHoP Construction (SC), collectively “SHoP,” needed to quickly design and deliver an innovative, modular residential home for an area hard hit by Hurricane Sandy.

Solution:

SHoP chose the cloud-based **3DEXPERIENCE®** platform, including the IFWE Compass for intuitive navigation and dashboarding; CATIA, the 3D modeling app; and ENOVIA, the social and collaborative app.

Benefits:

Using the new **3DEXPERIENCE** platform enabled online collaboration among all the project’s stakeholders – from the owners to designers, engineers, and the fabrication and on-site construction teams – to accelerate the project schedule and maximize savings.

LEVERAGING CLOUD-BASED COLLABORATION WITH THE 3DEXPERIENCE PLATFORM

SHoP Architects and SHoP Construction (SC), collectively known as “SHoP,” based in Manhattan, NY, has always embraced the idea of a new challenge. So when approached to design and fabricate a four-story modular residence for Red Hook, an area in Brooklyn hard-hit by Hurricane Sandy, the firm was quick to rise to the occasion.

“We take on challenges that most firms would not, and look at each one as a unique opportunity to express an architectural design and deliver it for the community,” said Jonathan Mallie, a principal of SHoP Architects and managing director of its affiliated company, SC.

The project also gave SHoP a perfect opportunity to test out its new implementation of Dassault Systèmes’ (3DS) **3DEXPERIENCE®** platform on the Cloud.

A long-time customer of 3DS, SHoP used CATIA to develop high-profile projects such as the iconic Barclays Center in Brooklyn, home to the Brooklyn Nets. With CATIA, SHoP designed and engineered the Center’s façade, then developed data for off-site fabrication and on-site construction coordination of the façade’s 12,000 uniquely sized steel panels.

USING 3DEXPERIENCE FROM START TO FINISH

In October 2012, Hurricane Sandy hit the United States’ Northeast coast flooding streets, tunnels, and subway lines and cutting off power to 8.5 million people. After the hurricane, the long rebuilding process began. As a local business, SHoP took on the challenge to create, develop, and build a unique, prototypical housing solution in Brooklyn’s Red Hook area.

The Red Hook project could hardly be more different from Barclays Center. It is tiny by comparison: a 3100 square-foot, two-family residence. The modular design includes a three-

bedroom primary unit on three upper floors, and a smaller one-bedroom unit on the first floor. The design calls for four modules to be fabricated off-site, then stacked and mated on site in just 48 hours. The modules sit on a foundation of concrete micro piles, raising all living spaces, mechanical and electrical equipment above flood elevation.

Mallie chose to develop the Red Hook project using the **3DEXPERIENCE** platform and its cloud-based collaborative environment.

“With the Barclays project, we were utilizing CATIA V5 in order to manage the geometry and work with the factory floor,” Mallie explained. “We didn’t have a fully online collaborative Cloud environment to post the models. We developed our own.

“However, on the **3DEXPERIENCE** platform, the modeling is on the Cloud and available to the factory floor immediately,” Mallie continued. “The benefit of cloud-based collaboration is speed and efficiency. You’re increasing productivity. You’re getting to the end of the project quicker.”

He said the aspirations of the cloud-based **3DEXPERIENCE** platform align with SHoP’s goals to focus on sustainable planning and architectural design, integrated with efficient fabrication and delivery. “A widespread challenge in the industry is for architects to come up with a design that the client will love and the builder can deliver on budget. We use the **3DEXPERIENCE** virtual environment to maximize every dollar for design,” Mallie said.

IFWE COMPASS NAVIGATION AND DASHBOARDING

John Cerone, director of virtual design and construction for SHoP, said the transition to V6 was an easy one. First, he notes, the feel and functionality of familiar 3DS applications, such as CATIA for 3D modeling, remain. Even all-new features of the V6 collaborative environment, like the new unified navigational interface embodied in the IFWE Compass, were easy to pick up.

“We didn’t require training for the Compass navigation,” Cerone said. “We were shown its capabilities and its basic layout, and from there we explored on our own. It’s very intuitive and logically structured.”



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The IFWE Compass enables users to navigate quickly not just to applications, but also to live dashboarding capabilities, online chat including 3D imaging, cloud storage, unified search across all applications and data, and more.

When Cerone first learned about the Red Hook project, he said his first instinct was to go north on the Compass to begin forming a collaborative team and to set up an initial schedule. Then he went west to work on geometry – to start the design process based on his initial ideas, and to share them as quickly as possible. “It’s all there in the Compass,” he said. “It enables you to create, collaborate, manage and share.”

CATIA ON THE CLOUD

Cerone said another highlight of the new 3DEXPERIENCE platform is CATIA’s Showreel Experience, used to create imagery of a project model. What distinguishes it most from previous presentation applications, he said, is the fact that the Showreel Experience is integrated with the model.

“There’s no need to leave the platform and create a new process to represent the model,” he said. “It happens seamlessly in the same environment that you’re navigating. There’s no extra step.” That efficiency is important in the highly competitive Architecture, Engineering & Construction (AEC) industry where client-facing presentations are used repeatedly to gain approvals and client buy-in.

He said the Showreel Experience allows anyone to deliver high-quality imagery. “The settings mimic the natural process of taking a photograph. It’s a very simple interface,” Cerone said.

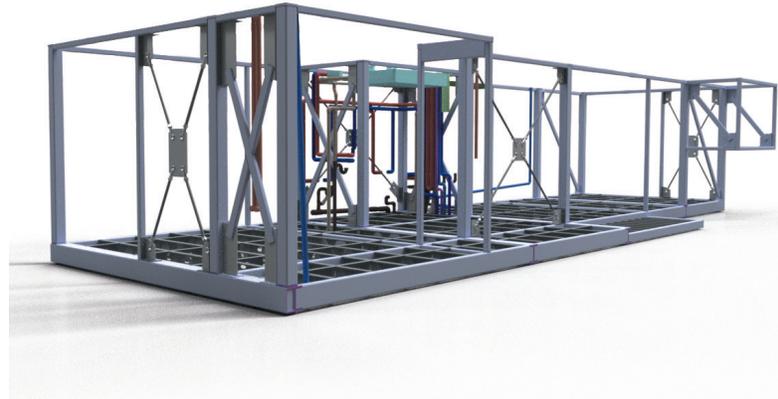
ENOVIA ON THE CLOUD

Accelerating the project schedule is important given the short time cycles typical of the AEC industry. ENOVIA manages CATIA 3D models on the Cloud with its data-based management technology eliminating the need to store local CAD files on desktops. This ensures SHoP’s architects, engineers and contractors can confidently connect to the virtual prototype to validate and send to fabrication for manufacturing, without any need for physical prototyping.

To help manage projects based on associated product development deliverables, SHoP uses ENOVIA’s deliverables-based Program Management.

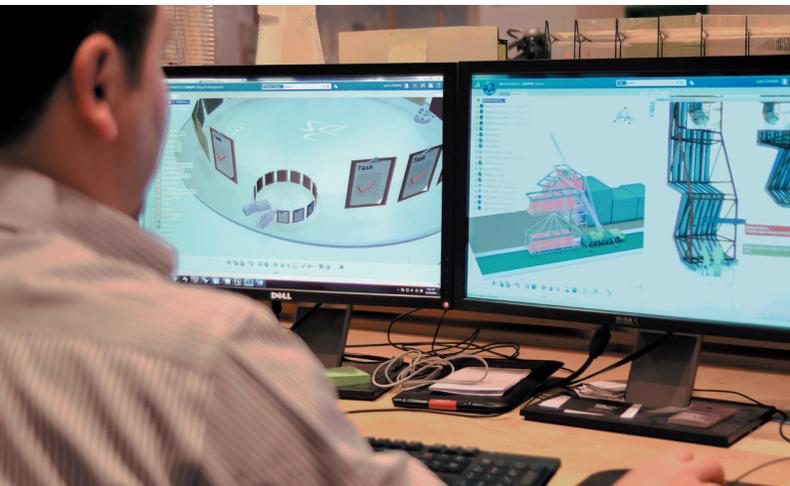
“We are using ENOVIA to manage project durations and milestones, as well as assign tasks and CATIA-based deliverables to team members across both the design and fabrication disciplines,” Cerone said. “Soon we’ll be utilizing the folder system to release fabrication information to the factory. These deliverables begin with the design, modeling, and fabrication information of primary structural steel framing systems, as well as the design of the rigging-system for logistics coordination.”

Designers access the project tasks from the familiar CATIA modeling environment and associate design deliverables saving them valuable time.



(Top) A high-quality visual representation of the module’s structural chassis in CATIA’s Showreel Experience

(Bottom) A close-up rendering of the module’s structural bracing system



“The AEC industry typically relies on disjointed platforms to accomplish discrete scopes, for instance, Microsoft Project or Primavera to schedule, 3D modeling software to create geometry, FTP servers to transmit files, and Microsoft Outlook to communicate among the team,” Cerone said. “The **3DEXPERIENCE** platform is the first convincing effort towards a holistic project environment. The ability to conduct projects in a single platform, creating interrelationships between scheduled tasks and geometry, has limitless potential for efficiency in productivity and, of course, business success.”

Another way the platform fosters online collaboration is in the review and validation application embedded in ENOVIA. It enables a user to review geometry and leave notes connected directly to a model that will be accessed by others.

“You’re not editing a PDF. You’re not marking up a flat representation of a 3D model and emailing that to someone,” Cerone explained. “You’re leaving your feedback in an active production model and alerting someone to review it.”

The benefit of such collaborative review of actual models, he said: real-time feedback that facilitates seamless coordination between multiple parties.

COLLABORATING WITH PARTNERS

The real-world test of that function came when SHoP began working with Island Exterior Fabricators, based in Calverton, NY, to translate its design into the first actual construction modules. The detailed 3D CATIA model of each module was used to create the data to drive CNC (computer numerically controlled) machining – a major departure from traditional construction methods.

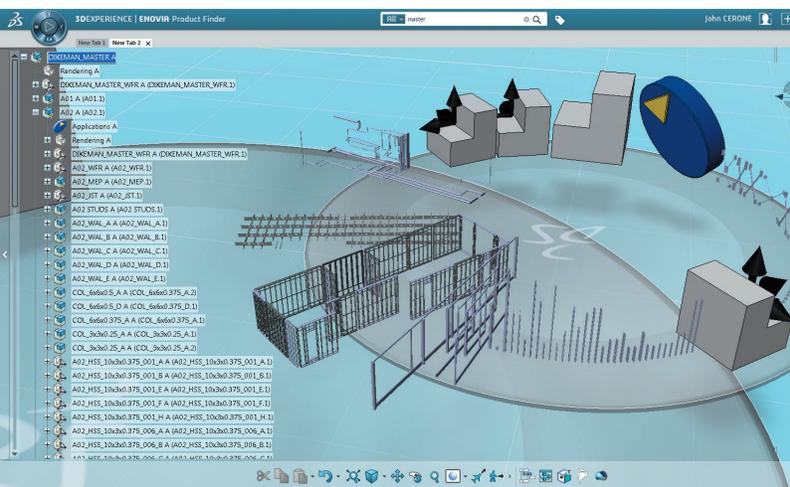
“Without the 3D model created in the **3DEXPERIENCE** platform, the design would have been delivered through drawing sets – detail views, assembly drawings, annotations – hundreds and hundreds of pages of documentation,” Cerone explained. “It would be an incredibly intense exercise in documentation, and it would require a much larger team than was actually employed for this project.”

Avoiding the creation of drawings, which opens up the design to interpretation rather than strict adherence to the 3D model, is one of SHoP’s continuing goals. “We’d love to never make another drawing again,” Cerone said with a grin.

FUTURE OF THE AEC INDUSTRY

Instead of drawings, the 3D model becomes the one source of truth with regard to a design. That is how SHoP operates today – and perhaps where the entire AEC industry is ultimately headed.

“One of the keys to improvement in the AEC industry is collaboration. That means not working in an isolated environment in our office, but creating a single source of truth, which is the project model, and having all the stakeholders – the owners, the engineers, the architects and the contractors – all work from the model,” Mallie said.



(Top) The cloud-based **3DEXPERIENCE** platform enables a 3D model to be a single source of design truth, readily accessible for all stakeholders.

(Bottom) ENOVIA’s Product Finder navigates the Red Hook project in a graphical 3D environment - ensuring all information, both data and geometry, is accessible.

Focus on SHoP Architects + SHoP Construction

SHoP Architects is a world-renowned design firm. SHoP Construction reconnects owners and architects to the construction process.

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The cloud-based **3DEXPERIENCE** platform supports that concept. It makes the model not only a single source of design truth, but also a readily accessible source for all stakeholders. It guarantees that everyone will work from the same model, and that whenever or wherever they access it, that model will be up to date.

"It is the platform that we will model in, review in and schedule in. It is the platform that will determine the material we need to procure," Cerone concluded. "The idea of a cloud-based solution is not the industry standard right now, but I think it's inevitable."

Our 3DEXPERIENCE® platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the 3DEXPERIENCE® Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 170,000 customers of all sizes in all industries in more than 140 countries. For more information, visit www.3ds.com.



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