

## E-TOOLS

## Standardized Collaboration

## Laser Scanning, Orthophotos and BIM Converge to Facilitate Restoration

by Vicki Speed  
contributing writer

In the BIM environment, laser scanning is one of the few speedy, accurate ways to gather as-built conditions on existing structures. In some cases, such as the historic Saenger Theater in New Orleans, it was the only option.

First opened in 1927 and listed in the National Register of Historic Places, the theater has provided Big Easy residents and visitors entertainment ranging from silent movies to stage plays. Around 2004, Saenger Theater Partnership Ltd. sought to restore the property to its original state. Then Hurricane Katrina struck and the three-story, 70,000-sq.-ft. structure suffered severe damage as flood waters rose above stage level.

Because of additional damage from Katrina and the limited availability of original architectural drawings, the theater owners contracted 3D Laser Imaging to prepare an as-is digital model that could be used to plan and facilitate renovations. This seemingly straightforward request soon morphed into the need for an Autodesk Revit-friendly 3-D model with interior and exterior decorative detail—all on a limited budget. A combination of laser scanning and orthographic images created from the laser-meshed data provided the perfect solution.

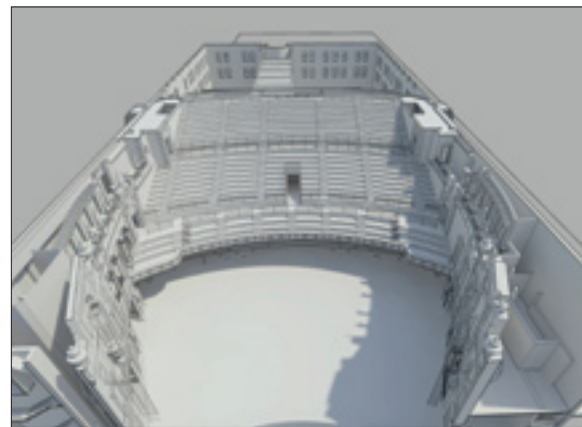
## DEVELOPING A DELIVERABLE

The theater's owners requested an accurate 3-D model as well as scanned images for use in the free Leica TruView software. Over the course of three days, 3D Laser Imaging's two-person crew set up in 240 different scan positions inside and outside the theater.

## 3D Laser Imaging

A traditional auditorium cutaway. But by using orthographic images created from scanned mesh data, 3D Laser Imaging was able to add detail to the Revit-based 3-D model.

## SAENGER THEATER, New Orleans



The level of detail required is tied to the purpose of the data. Identify the level of the data, so that the scan team can gather the proper detail in the appropriate format.

"It is a learning process on both sides to provide the necessary detail within the budget," explains Evans. "The difference between a 2-D footprint vs. an intelligent 3-D model can be the difference between a couple hours or days and a few months."

## LASER ADVANCES

For the Saenger Theater, 3D Laser Imaging used the Leica HDS 6000 from Leica Geosystems. The firm has since upgraded to Leica ScanStation C10 from Leica Geosystems for its range and functionality.

"Laser scanning tools continue to get more affordable, flexible and powerful," says Evans. "I would have cut my workload by 35% on the Saenger Theater if I had the C10 range and functionality by cutting setups from 250 to about 150—50 scans vs. 250 scans makes a big difference in managing data."

The firm used Leica Cyclone 3-D point cloud processing software to manage most of the point cloud data and Leica CloudWorx to translate data into Autodesk Revit.

Evans concludes, "With the increased demand for renovations and reuse, laser scanning provides owners and project teams with accurate, comprehensive as-is conditions. I believe we're in the midst of a huge paradigm shift in the way we use laser scanning. It's valid currency in the data exchange market." □

TruView images created from raw scanned data look much like photographs, except that they are accurate and measurable.



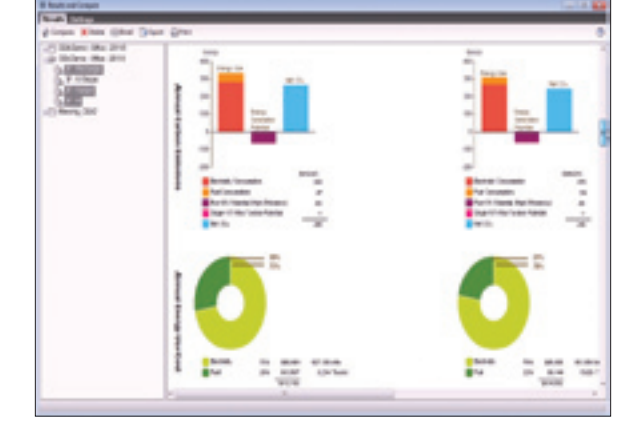
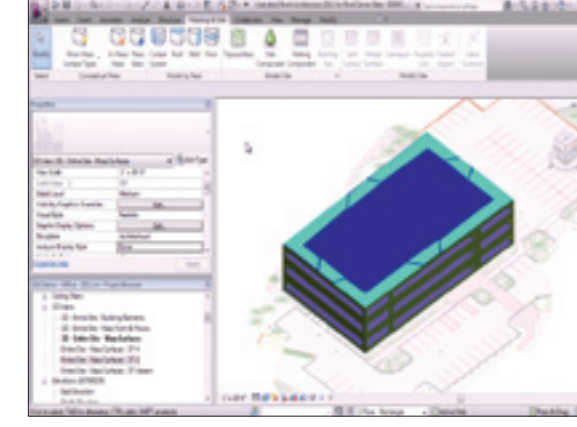
Dietrich Evans, CEO and founder of 3D Laser Imaging, noted with that much data, the real challenge was to extract the correct amount of detail from the point cloud without blowing the budget. "Initially, we were just supposed to shoot the inside/outside shell of the structure, but then the owner asked if we could also detail the decorative décor and detail on the interior wall faces."

In response, Evans used the point cloud data to create a shell model of the interior and exterior. He also used the scanned data to create orthographic tif files. "It's not always apparent what the owner, architect or project team will need. In some cases, architects only needed to illustrate the structural details, not necessarily reconstruct. That's where the orthographic images proved invaluable," says the product developer.

Orthographic images are a common deliverable in the architectural community, used by architects within the CAD environment to trace or redesign. The scaled tif orthophotos can be used in the same way as a backdrop for laser-scanned point clouds or to help define decorative detail within the 3-D model.

## LESSONS IN LASERS

As the model data began to emerge, the owner and architect asked for greater detail than they had originally asked for. "This is a common trend. It's imperative that architects and owners clearly define what level of detail they want from a laser scan," says Evans. "Create a digital checklist of items that you or the client expects in the 3-D model."



## EASY DATA EXCHANGE

The U.S. Green Building Council introduced LEED Automation, an electronic interface that facilitates the exchange of data with energy modeling software, BIM tools and other technologies required for LEED certification. The interface enables LEED Online—the tool teams use to submit documentation—to interact with third-party technology solutions, such as LoraxPRO LEED collaboration software. Visit [www.loraxpro.com](http://www.loraxpro.com) or Circle 394

## BIM/ENERGY CONNECT

Autodesk recently launched Revit Conceptual Energy Analysis for BIM as a feature set available via Autodesk Subscription to Autodesk Revit Architecture and Autodesk Revit MEP software customers. An early stage analysis tool, Conceptual Energy Analysis is developed to facilitate energy analysis from within the BIM workflow to help enable more sustainable design. With functionality to support carbon energy analysis, the tool is designed to provide users with early decision sustainable design support delivered via cloud computing so that the user's workflow is never disrupted. Conceptual Energy Analysis is available free to all Revit Architecture and Revit MEP Autodesk subscription members during the term of their subscription. Visit [www.autodesk.com](http://www.autodesk.com) or Circle 393

*It's imperative that architects and owners clearly define what level of detail they want from a laser scan, as the team will commonly ask for more details as the model begins to emerge.*

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