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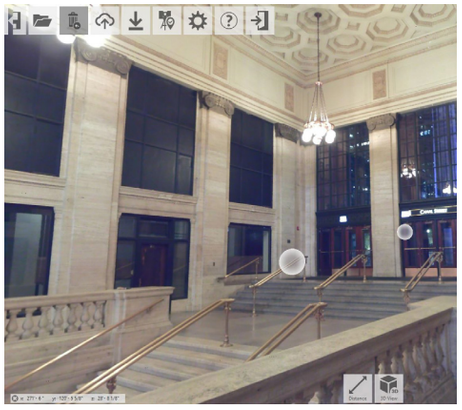
Catching all the Iconic Details with HD Laser Scanning

Step 1 in **Chicago Union Station**'s $1 Billion Renovation: Document As-Built Conditions



From scan to a 3D model: Deep Design Studio used Autodesk® ReCap™ and Revit® to deliver a detailed model in less than 15 days.

Challenge

The numbers are staggering, even by Chicago's outsized build standards: 2 million square feet of office space, 780 luxury apartments, 350 hotel rooms and five high-rises all within a 6-year period. Price tag? An estimated $1 billion.

The long-planned renovation of the iconic 92-year-old **Chicago Union Station** is a signature project for the Windy City. The station, largely underground, covers about 9 ½ city blocks. The outside public face of the sprawling facility is the one-square-block headhouse on South Canal Street, a combination of Bedford limestone Beaux-Arts facades, massive Corinthian columns, sparkling marble floors and the legendary Great Hall.

Historic building restoration specialist Berglund Construction and Chicago-based architects Goettsch Partners were engaged to begin Great Hall restoration work. The imposing Great Hall lives up to its name with a 110-foot-high atrium topped by a large barrel-vaulted skylight and surrounded by arches, sweeps, alcoves, balconies, windows and other intricate architectural features. Berglund and Goettsch were in critical need of precise, BIM-friendly as-built documentation to guide their renovation planning. Without a firm digital footing, an already-compressed timeline could be jeopardized.

Solution

The call went out to **Deep Design Studio (DDS)**, a laser-scanning contractor, to provide a 3D as-built model of the Great Hall in Autodesk® Revit®, a widely used architectural design and documentation software application. Deep Design Studio is headed by a pair of architecturally trained and experienced entrepreneurs, Chicago-based Daniel Poloz and Colorado-based Joseph Juliano.

"When you need to create an as-built model of a space as large and as ornate as Union Station's Great Hall, there's really no other way to approach it than to first have 3D scans to develop a detailed point cloud," explains Poloz. Armed with a FARO® Focus Laser Scanner, Poloz took approximately 60 scans of the Great Hall over a two-day period. To minimize interference from 120,000 daily commuters, Poloz scanned only at night.

Because of the Great Hall's intricate detail, scanning resolution was set at a higher resolution. Each scan took between seven to eight minutes to render. "Also, it was important to document it in color so our clients would have a much clearer understanding of the space and its materiality," Poloz says.

"The model was drawn at a 300-level," adds Juliano. Juliano says 300-level documentation is a mid-level resolution, compared to the construction document quality of a 500-level scan. "Modeling the coffered ceilings accurately posed a unique challenge and would have been impossible without using scan data and the point cloud to guide the process. To achieve a high level of accuracy and precision in our model we registered the scans and created an RCP file (point cloud) and incorporated it into Revit® using Autodesk® ReCap™. From that one point cloud, we created the entire 3D model."

The Deep Design Studio team had less than 15 days to deliver the Revit® file to their clients, a very short time-frame for modeling a building this complex in detail and large in size.

Results

"The model was delivered on-time and was well received," reports Poloz. "We got all the information we needed with the FARO laser scanner, and the DDS team did the rest to accommodate the scope of work and schedule."

Juliano is especially impressed by the process. "I'm able to 'walk through' this building from my desk in Colorado and observe the most fine, intricate details. I can model more accurately and efficiently than ever before. The software provides a reference to any element exposed to a scan, which is a great communication tool."

With backgrounds in architecture, the DDS duo is especially sensitive to the way scan data transforms the design process in renovation work. For Poloz, it's a huge difference-maker. "Design decisions happen a lot quicker. All of a sudden, the process advances more rapidly because you have so much more information. And stakeholders start to have more certainty and confidence in their decision-making.

"There's no more, '*Did I miss something?*' Laser scanning saves the AEC industry and anyone involved time, energy and money."

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