



Laser Scanning for Contractors: Is This Real Life?

David Epps – Holder Construction Company

Class ID: CR5588

Class Description

We will discuss ways in which Holder Construction has harnessed the power of laser scanning and related reality capture technology to supplement existing Building Information Modeling (BIM) workflows. Laser scanning has the potential to fundamentally change the way in which we plan and coordinate construction work and interact with our built environment. While the technology may be relatively new to our industry, there are many high-value opportunities to use laser scanning to enhance our workflows and provide better-quality products to our owners at the completion of our projects. Software discussion will include integrating laser scan data into AutoCAD software, ReCap software, Revit software, and Navisworks project review software.

Key Learning

- Discover how Holder uses laser scanning before, during, and after construction to improve the quality of project delivery.
- Learn how to take back the value proposition of laser scanning and discover how it can impact your business's efficiency and construction quality.
- Discover ways to use laser scan data across various Autodesk products including AutoCAD software, ReCap software, Revit software, and Navisworks software.
- Learn how to integrate laser scanning into your workflow, either through rental of the service or purchase of your own equipment.

About the Speaker

David Epps – Manager, Building Information Modeling

depps@holder.com

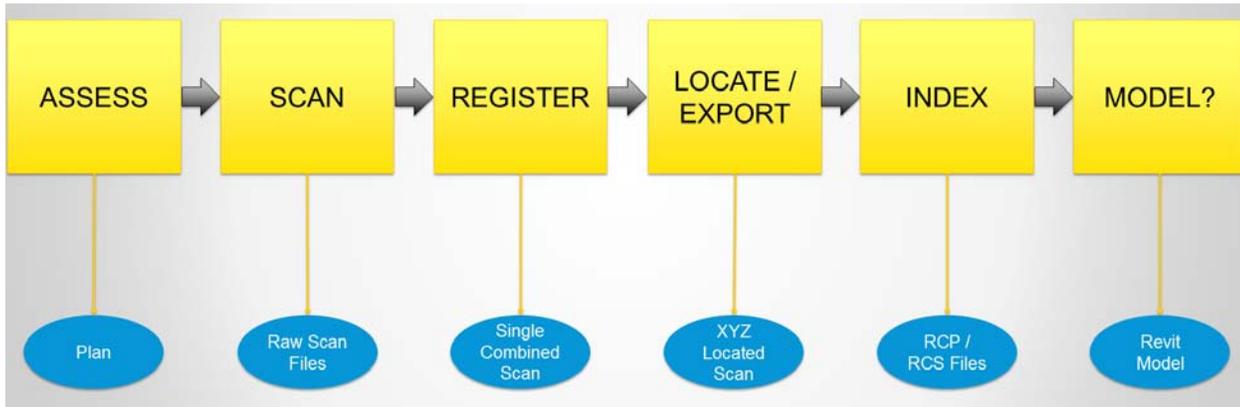
David has been in the construction industry for 14 years and has worked with BIM/VDC technology for 11 years. As a BIM Manager, David develops, integrates, coordinates, and manages digital Building Information Models for design, construction, and field use during design, preconstruction, construction and post-construction. This incorporates: 3D visualization, options analysis, constructability analysis; Layout, laser scanning, as-built validation; 3D collision detection, coordination and QA/QC; 4D phasing, sequencing, and scheduling analysis; 5D quantity, cost, and attribute data extraction; and the next levels of Facilities Management in '6D' and 'XD'. Services also include regular participation in project pursuit efforts and presentations, and collaboration with owners, executives, design partners, vendors, preconstruction, project managers, superintendents, field BIM coordinators, and trade contractors.

He has facilitated the construction process on more than 100 projects on and off the jobsite via Building Information Modeling. He plays an integral role in departmental and company training, department recruiting efforts, R&D, and the continual development and refinement of BIM standards and processes.

He is an active member of the BIMForum Leadership, a contributing author of the AGC 'BIM 101' & 'Contractor's Guide To BIM' and a frequent presenter at Autodesk University and other national industry conferences.



Laser Scanning Workflow



❖ Assess

- Internal & External Assessment
- Education – “Point Cloud Model”
- Define Goals
- Establish Timeline & Deliverables
- File Transfer
- Who Scans? Internal vs External?

❖ Scan

- Set Up Targets / Control
- Define path of scan progression
- Establish resolution necessary
- B&W or Color?

- ❖ Register
 - Auto-Align
 - Find Targets
 - Manual
 - Map / Key

- ❖ Locate / Export
 - HES Shoots Targets
 - Import & Adjust Coordinates
 - Export Point Cloud
 - Need one mass of points?
 - Need separate scans?

- ❖ Index
 - Index in RECAP
 - Index in Revit → RCP/RCS

- ❖ Model
 - Convert Scan to Model
 - Manual vs 'Automatic' Conversion
 - Internal vs. Outsource?

Notes:

Laser Scanning Uses



Laser scanning is a technology that leverages the accuracy and precision laser measurement of a 'Robotic Total Station', but can do so to the tune of up to 1,000,000 times per second. The hardware is similar to a 'Robotic Total Station' and captures any information it can 'see' from its location. Scanning from multiple locations and registering the data together results in a full 'Point Cloud' representation of the built environment. Depending on the type of scanner, data can be captured as far as 1,500' away at an accuracy of 2mm. In the past, this process was extremely expensive and time intensive to scan/register/model for the data to be useful. While laser scanning hardware is still a premium, the software to process the information has become much more efficient and less labor intensive.

It affords new ways to analyze, measure, assess, and monitor that which must be evaluated in terms of the value provided to the client.

Notes:

Preconstruction / Existing Conditions



Pre-Construction or Existing Condition scanning is used to provide a true as-built representation of a project's starting point...existing structure, topography quantification, building tie-in, and remodel/interior projects are all examples of scanning at this stage.

- Existing Conditions in high resolution
- Identify errors with 2D 'as-built' docs
- Reduce client risk for reno/rehab projects
- Reduce need for physical site visits and inspection

Notes:

Mid-Construction



Mid-Construction scanning involves leveraging the technology to validate 'planned vs installed work'. This can be helpful to quickly ensure the scope in a Building Information Model has been installed as coordinated, check for stub-up/rebar/PT prior to a slab pour, ensure walls are plumb and verify floor flatness, and track structural settlement/deflection over time. Our Mid-Construction scanning process has come to be known as 'Construction Verification.'

- Excavation Volumes
- Facade and Structural Deformation
- Monitor and record construction progress
- Validate installed work

Notes:

As-Built



When scanning is performed consistently during a project, a digital As-Built representation of the built environment is a byproduct. The scan or point cloud depicts the As-Built conditions and can then be overlaid with the Building Information Model. Then any final adjustments can be made to the final model ensuring an accurate as As-Built.

- Provide 'true' As-Built documentation
- Measurable record of everything scanned
- Reduce risk, increase knowledge of 'covered' conditions

Notes: