



Getting to the Point with Reality Capture and Factory Design Suite

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Code PF6425

Learning Objectives

At the end of this class, you will be able to:

- Ways to share
- Use in 2D and 3D Workflows
- Cloud as CAD
- Adoption Strategies

About the Speaker

Steve Schuchard has spent 15 years in research, development, support, and deployment of CAD and related software. He is dedicated to creating efficient work processes combining problem solving, technology, and common sense. His experiences and service in General Motors Company, and now with 3D Laser Advantage, has exposed his workflows and ideas to broader audiences.

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Sharing Laser Scan Data – The basics

Laser Scan data is nothing more than a cloud of points. However, what you do with data, structure data, and present the data is when the value is presented.

Laser Scan Data usage scenarios

- Web Based - Panoramic Pictures with measurement capability. Easy to use and no software to install.
- Point Cloud – Use the Point Cloud with Autodesk ReCap to view the data and measure the data.
- Conversion – This is the most traditional work flow. Convert the point cloud to CAD data.
- Visualization – Place your new CAD in context with the Points to compare data.

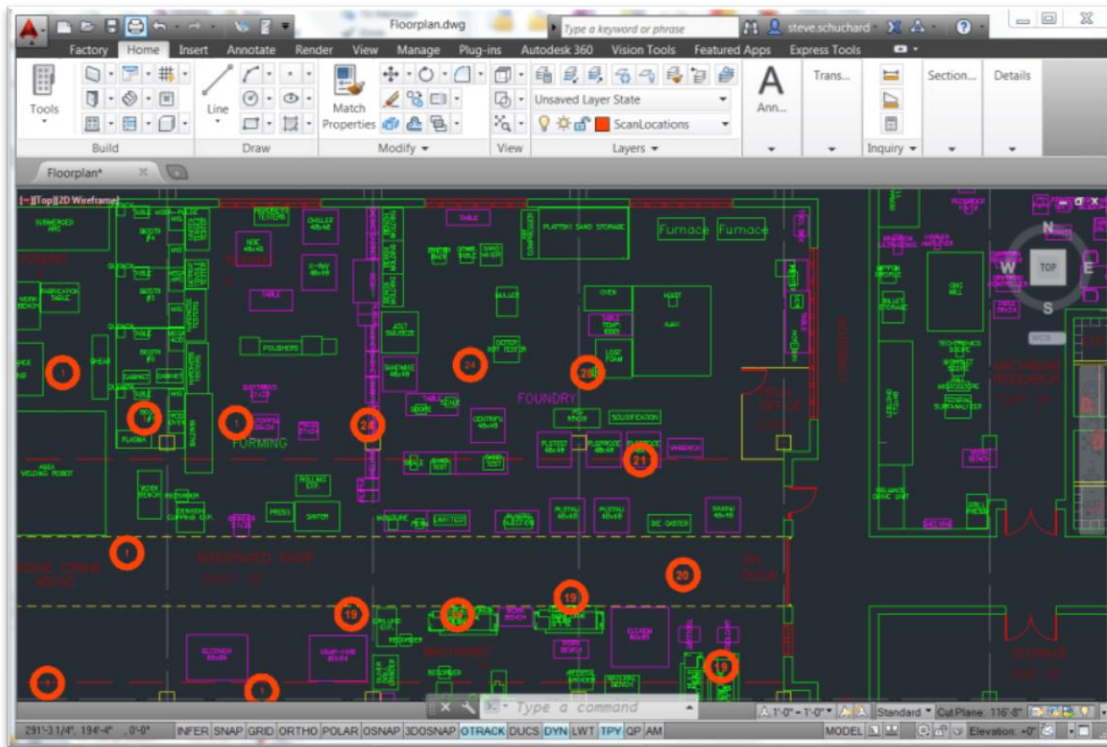
Get what you ask for..

How will the data be used?

- What is the desired coordinate system? - Do you want the data set to match your model coordinates? You can request the data to be aligned so that when it is inserted you enter 0,0,0. If you don't do this step, it makes many workflows difficult, and more painful.
- Naming Conventions – Consider requesting scans to be named in a specific format that makes sense for the area you are scanning. These names stay with the data as you use and can help you locate the information you need. Consider asking for scans to be named per Department / Area. Don't ask for each scan to have a specific name with being prepared for increased cost.
- Level of Detail – BIM Standards – When modeling, the use of the BIM standards can help you understand what to ask for and gives you some common ground so that there are no misunderstandings and disappointment when the data is delivered.
- Project Breakdown and Post Scan delivery – You can ask for the data to be exported into logical sections that make sense for the way you group your CAD Data. You can also do this yourself to save some money and have the time to do it. This can be done with Autodesk ReCap.

Simplicity

There is much value in keeping access to the Scan data simple. Most applications has a web based viewer. Consider creating a map of the scan locations (Red Circles) then creating a hyperlink to the data. When created in a separate file, any user can X-reference the file select the hyperlink and be standing in the view in the spot. Simple and effective.



Processing the Point Cloud

Autodesk ReCap is a great tool for cleaning and preparing data.

Why:

- Common format in CAD Tools – ReCap data is a common file type to Autodesk products such as AutoCAD, Inventor, Revit, Navisworks. You can use common data insertion commands in these tools to attach this data into your model.
- Works with multiple scanner types.
- Work with Point Cloud data the way you want. Segment, break up and export portions of the point cloud that match your CAD Data.

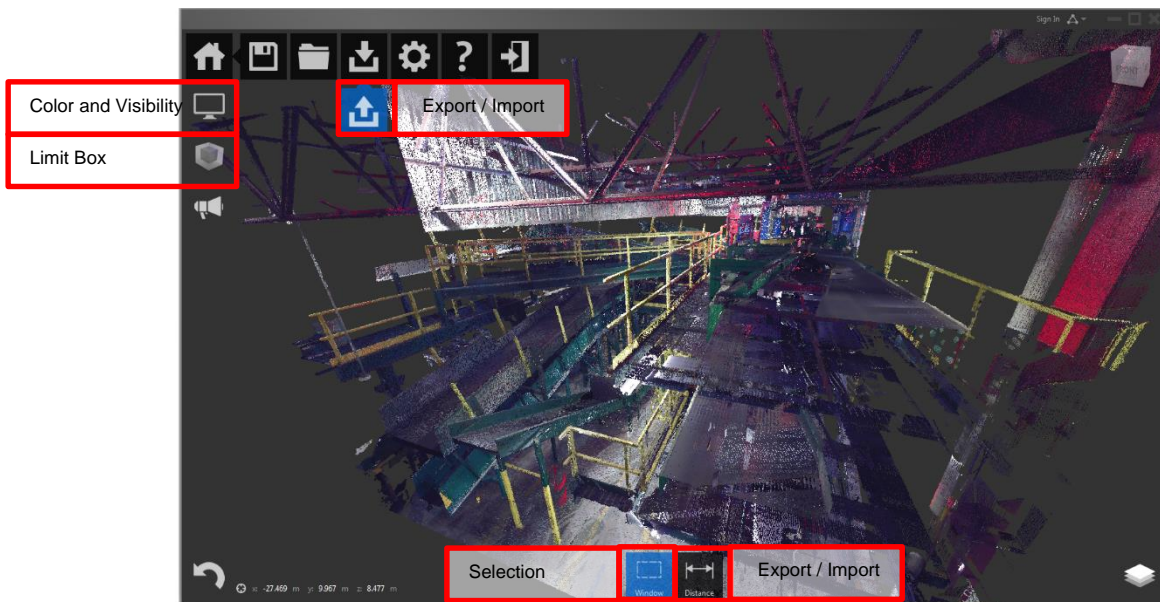
General ReCap Process Notes

A very important portion of the workflow is to take the point cloud and separate it into smaller sections that are logical for your drawings. This makes the file smaller for faster response and the display becomes easier to visualize as a result of less surfaces. This is done in Autodesk ReCap, then saved as a RCS file (2015 products) or PCG (2013 Products).

Point Cloud Consumption Tips – ReCap 2014/2015

Autodesk ReCap is free downloadable software that allows you to edit point cloud content. It can be located at this web address – <http://www.autodesk.com/recap>.

1. ReCap opens .rcs and .rcp files.
 - a. RCP = ReCap Project File – This file is the master file that uses and looks for RCS files.
 - b. RCS = ReCap Scan – These files contain point cloud data. They can be each scan location, or a exported set of data from another point cloud.
2. To open a file, start a new project, and select the provided .rcs file. Select Next, and the file will open.
3. Use Right Click to Rotate the Model. Use the middle wheel to zoom and roll the wheel to zoom.
4. Use the Limit Box to control the model limits.



5. Use the window selection to select points. Once the points are selected, you can temporarily clip them or place them on regions (like AutoCAD Layers).

6. When exporting data, anything visible will be exported to the selected file. For Autodesk 2015 - 2014 products, use RCS. For AutoCAD and Inventor 2013, use PCG.

My Favorite Work flow

1. Use the limit box to trim the point cloud, then export the data to RCS.
2. Select the floor using the plane option (pick at least 3 points) then categorize them as a region. Turn the region off then use the limit box to export data without the floor included.
3. After segmenting the point cloud into logical groups / files. Start a new RCP and attached the export groups. This will rebuild the point cloud into a “CAD – like“ RCP..

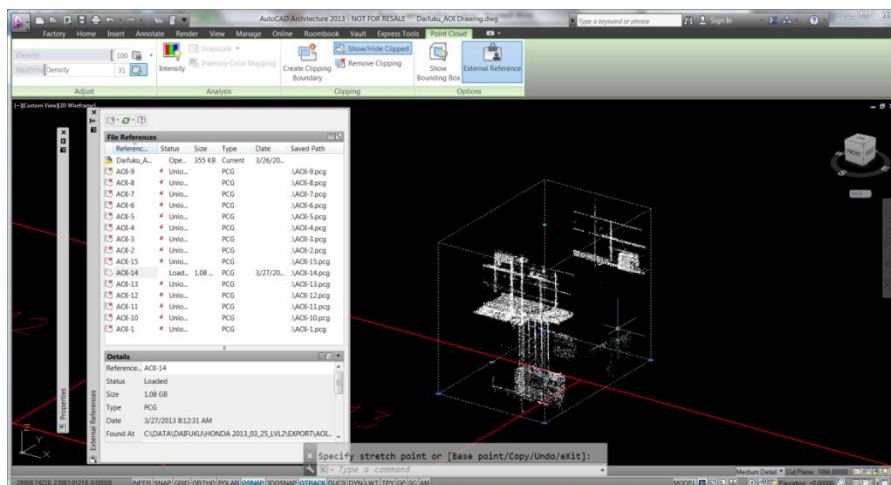
AutoCAD

AutoCAD 2013 – PCG format only. – Use CLIP command to control points displayed. Using 2D Wireframe for best performance.

AutoCAD 2014 – PCG, RCP, RCS. – Use CLIP command to control points displayed. Using 2D Wireframe for best performance.

AutoCAD 2015 – RCP, RCS Only. Dramatic Increase in Point Cloud Density and additional snapping options. CLIP command no longer supported, use PCCROP. 3D Viewing Modes only.

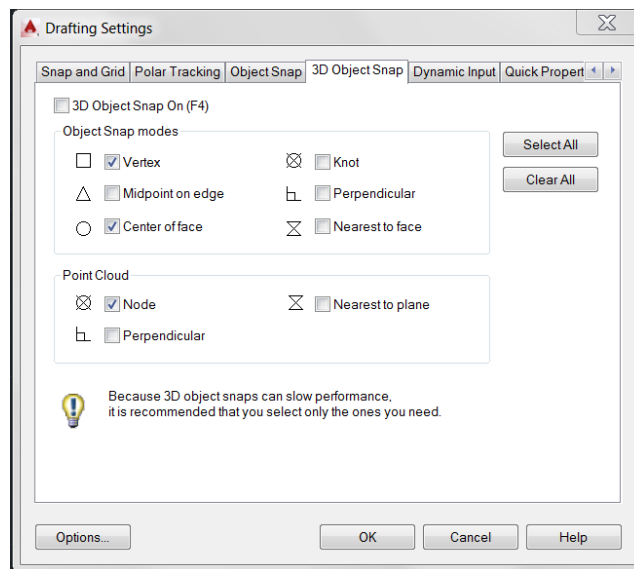
1. Point Clouds can be attached using the X-ref dialog. They can also be loaded and unloaded like dwg files.
 - a. When attaching note that there is 2 file types, RCP and RCS.
 - b. Files should be located on the users C drive for best performance.



2. If working with multiple large point cloud sections, detach or unload it in the same fashion as X-reference drawings.

NOTE: AutoCAD 2013 and 2014 has low limits to the number of points allowed in an AutoCAD Drawing. To increase density of a point cloud, Detach all other point clouds, then a use a clipping box to crop points.

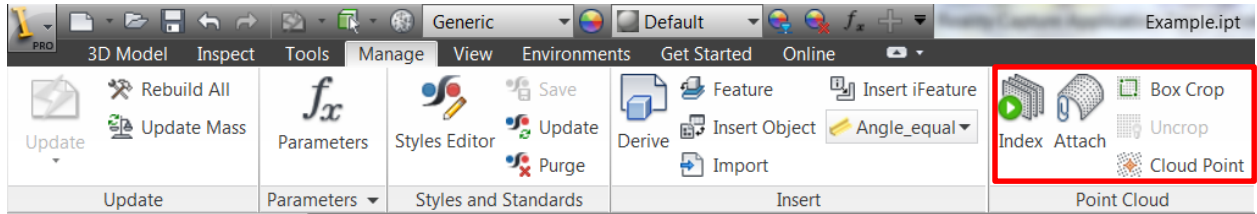
3. To locate Point Cloud Clipping and color choices, select the point cloud and locate the context sensitive menu in the ribbon.
4. To display colors of point clouds, the display mode must be set to shaded or in wireframe. (2013,2014)
5. Crop the Point Cloud:
 - a. Clipping tools are available when the point cloud is selected on the context menu.
 - b. Type “Clip” and use the Clipping Box option to create a 3D cropbox which can be stretched like a polyline. (2013,2014)
6. Snap to points using the **NODE Onsnap**. 2015 has extra snapping options.



Point Cloud Consumption Tips – Inventor 2014 - 2015

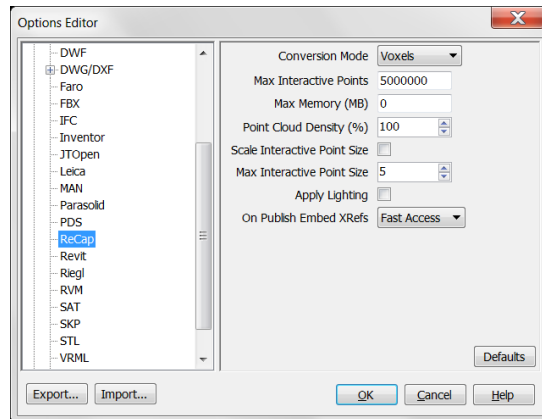
1. Point Clouds are inserted by selecting Attach from the Manage Tab on the ribbon. Once inserted, they appear at the top of the browser.
2. Point Cloud Clipping can be performed in from the Manage Tab using Box Crop.
3. When Inserting you can manually enter the coordinates, or select Insert at Origin to insert it at 0,0.

4. Use the Cloud Point command on the manage tab (shown above) to attach a Work Point to the point cloud. This is the method used to build constraints with the point cloud. The work point will allow you to construct the necessary geometry for assembly constraints.



Navisworks

Navisworks displays the point cloud and merges all types of data sets. One of the most common questions is how to control the preference for quality during navigation. The one that control this is Scale Interactive Points. By unchecking this, the points will not turn into larger blocks.



Consider that ReCap files can also be viewed in Navisworks Freedom.

Adoption Strategies

Keep it Simple and base deliverables on customer comfort level.

Level 1 - Start with viewing, basic measurement, and small projects.

- Rely on the data being reference data.
- Web based viewing is a great starter tool to build confidence.

Level 2 – Use Data to create CAD and replace field measurements.

- 3D may not be a requirement
- Explain Real World vs CAD World
- Clash Detection

Level 3 – Use Point Cloud as CAD data.