From Point Clouds to BIM Models

With FARO PointSense for Revit

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Agenda

- Scan to BIM with Revit
  - PointClouds in Revit
  - Advanced Workflow with PointSense for Revit
  - What’s new in Version 18.0
- Live Demo PointSense for Revit
  - Toposurface creation
  - MEP Pipe Modelling
  - Steel Work from PointSense Plant to Revit
Scan to BIM with Revit

- Overview
- PointClouds in Revit
Laser scanning process

Capturing
Scans from different positions

Registration
Combine the individual scan positions into one common reference system

Pre Process
Clean and filter the raw scan data

Post Process
Interpretation and modelling

On site

In the office

Create RCP / RCS

Export RCP/RCS

PointSense for Revit

FARO SCENE

AUTODESK RECAP
Scan to BIM Workflow

1. **Insert point cloud**
2. **Define levels for building storeys**
3. **Model overall geometry**
4. **Place building components**
5. **Create „as-built“ components**
Behavior of Point Clouds in Revit

View-dependent presentation

- Show / hide
- Different color options

Behave as model elements

- Select, mode, rotate and mirror(!)
- Clipped by section boxes and view ranges
- Point snap on active work plane
Create levels for storeys

1. Vertical section in the point cloud
2. Create levels in the section view
   → Point cloud snap is applicable
Modelling the overall geometry

- Create walls in the individual storeys (manual)
  - Measure wall thicknesses to determine wall type or create new ones

- Point cloud snap is applicable
  - Point snap
  - Planar snap
Place families in aligned views

- Create sections and elevations as needed
- Place components in the view and move them manually / resize them

→ Point cloud snap is applicable
What can Revit **NOT** do with point clouds?

- No real 3D point snapping
  - Snapping works only in the active work plane
- No scan view available
  - Often more intuitive and easier navigation
- No point cloud support in the family editor
  - Necessary to create individual building components
- No automatic object recognition
  - Would speed up the modelling process
- No point cloud to model comparison
  - Important for quality control
Scan to BIM with Revit

- Advanced Workflow with PointSense for Revit
- What’s new in Version 18.0
Evaluation of point clouds with PointSense for Revit

What are the advantages?

1. Insert PC and adjust project coordinates
2. Define levels for building storeys
3. Model overall geometry
4. Adjust family types and create "as-built" families from point cloud
5. Place family instances in the point cloud

- Acquire coordinates from point cloud
- Define point cloud sections
- Wall and pipe fitting
- Wall and pipe alignment
- Work plane fitting
- Construction guides
- Point cloud regions in the family editor
- Ortho images
- Construction guides from VirtuSurv scan view
- Adjust family types of windows and doors
- Real 3D point cloud snap VirtuSurv scan view
- Type adjustment
Wall fitting

- Create walls quickly and precisely in the point cloud
- Automatic creation of new wall types for different wall thicknesses
Automatic Wall Alignment

- Result of wall fitting
  → Precise shape and position (best fit)

- Requirements of BIM systems:
  - Orthogonal wall axes
  - Minimal number of different wall types
  - Compliance of wall alignment
  - Continuous facade faces

→ Within a user-defined tolerance!
Wall fitting
Automatic wall alignment
Fit pipes and place pipe fittings

- Fast and precise fitting of Revit pipes in the point cloud
- Inserting the best-fitting pipe type (according to diameter) or simply adding new pipe sizes of the detected diameter in the point cloud
- Placing any pipe fitting families (standard and user-defined) between the fitted pipes
- Aligning complex pipe runs to fulfil consistency conditions
Usage of construction aids

- Create fitted work planes in the point cloud
- Create intersection lines and intersection points between any work planes, reference planes or model planes
- Create 3D model lines and construction points using real 3D point snap in the point cloud
- Fitting of line chains in the point cloud
Create „as-built“ components (Revit Families)

- Save model lines from the project directly as 2D or 3D family
- Insert point cloud regions directly in the families editor
- Use scaled ortho images as construction aids
- Use the planar scan view to create construction aids directly in the family editor
Photo like scan view

- Display scan data in a photo like planar scan view
- More intuitive navigation than within the point cloud
- Custom commands to create:
  - walls,
  - door, windows, openings,
  - columns and beams,
  - constructions aids
- Distance and coordinate picking
Photo like scan view
Surface analysis

- To analyze and display deformations
- To visualize the deviation between model and point cloud

Selection of display: average value, minimum, maximum, nearest and point count

Export results as value list (TXT)
Toposurface creation

- Create a ground surface (topo-surface) from construction points and model lines placed in the point cloud
Support of USIBD Standard

- Surface Analysis Tool now displays different levels of Accuracy (LOAs) defined by the USIBD (http://usibd.org/)

- Easy validation of the accuracy of an as-built model compared to the point cloud
Bundles all PointSense products on one license:

- PointSense basic/Pro for AutoCAD®
- PointSense Building for AutoCAD®
- PointSense Heritage for AutoCAD®
- PointSense Plant for AutoCAD®
- PointSense for Revit®

Plug'ins for AutoCAD® and Revit®
Greater flexibility for point cloud modeling across platforms. Deliverables, such as: floor plans, building elements and 3D models can be easily extracted in the Autodesk® platform of choice.

Generic tools for point cloud modeling
Accelerate point cloud processing with generic extraction tools such as sectioning, fit profile, SmartSnap, polygon extraction, plane analysis, colorizing scan data by deviation and many more.

Efficient industry tools for data extraction
Create industry specific deliverables according to the specific documentation task. Extract: 2D plans, stairs, doors, roofs, ceilings, pipe and steel work, tanks, ortho images, new BIM family elements etc.

Industries: Service Providers in Architecture, Engineering, Construction (especially classical surveyors)
Applications: As-built Civil/Survey, As-built architecture, Construction Q/C, As-built MEP/Plant, As-built Heritage
New Getting Started Screen

- PointSense for Revit 18.0 provides a new “Getting Started Screen” pointing to further self-learning material for the software, such as:
  - Tutorial
  - Videos
  - Tips & Tricks
Live Demo PointSense for Revit

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- MEP Pipe Modelling
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Thank you for your Attention!