OG10279-Point Cloud to AutoCAD Plant 3D

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Guest Speaker - FARO

Class summary

Laser scanning and point clouds are quickly becoming essential tools in the engineering/design/construction workflow. This class will examine a real-world scenario that will show you how to achieve typically needed workflows from within Plant Design Suite 2016 software and (FARO) PointSense Plant software (Formerly Kubit).

It will also show how to create intelligent piping models and structural design, and equipment all from point clouds. This class will give you a foundation for how to turn your laser scanning into accurate construction drawings.

Key learning objectives

At the end of this class, you will have:

- Learn how to use laser scans workflows within the 2016 Plant Design Suite.
- Discover how to prepare laser scan projects.
- Learn how to extract engineering deliverable from laser scans.
- Learn from user experiences regarding point cloud conversion.

Our Presentation

- A 3-part presentation will guide you through the Scan to Plant 3D workflow.
- 10 minutes of questions and answers after the demos.
- Why are we showing videos today instead of a live demo?
  - We MUST adhere to the 90 minute limit.
  - Avoid software crashing as much as we can.
  - Videos will be uploaded.

Learning Objective #1

How laser scans workflows fit in 2016 Plant Design Suite

Laser scans workflows & Plant Design Suite

Capture data

- Point clouds
- Images

Process Data

- Registration
- Analyze and measure features
- Export to CAD/BIM software
- Publish to Web for collaboration with clients

SCENE

AUTODESK RECAP

Drafting or Modeling deliverables

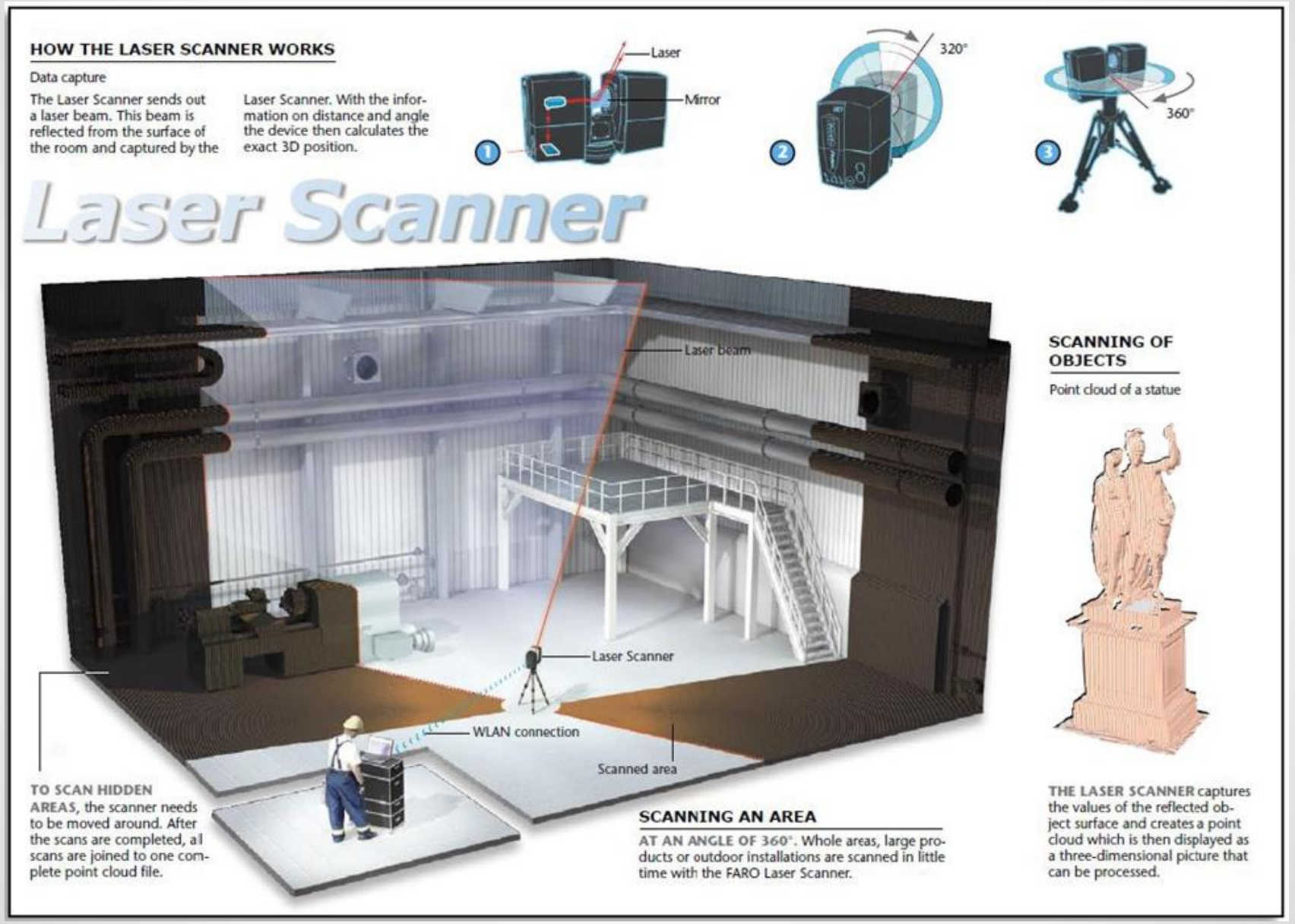
- Import directly to CAD/BIM software packages
- Produce line work, section views and annotations directly from point clouds
- Create full BIM 3D models for even further analysis and re-design

AUTODESK AUTOCAD ARCHITECTURE 2015

AUTODESK REVIT 2015

AutoCAD Plant 3D

Capture Data



Capture Data

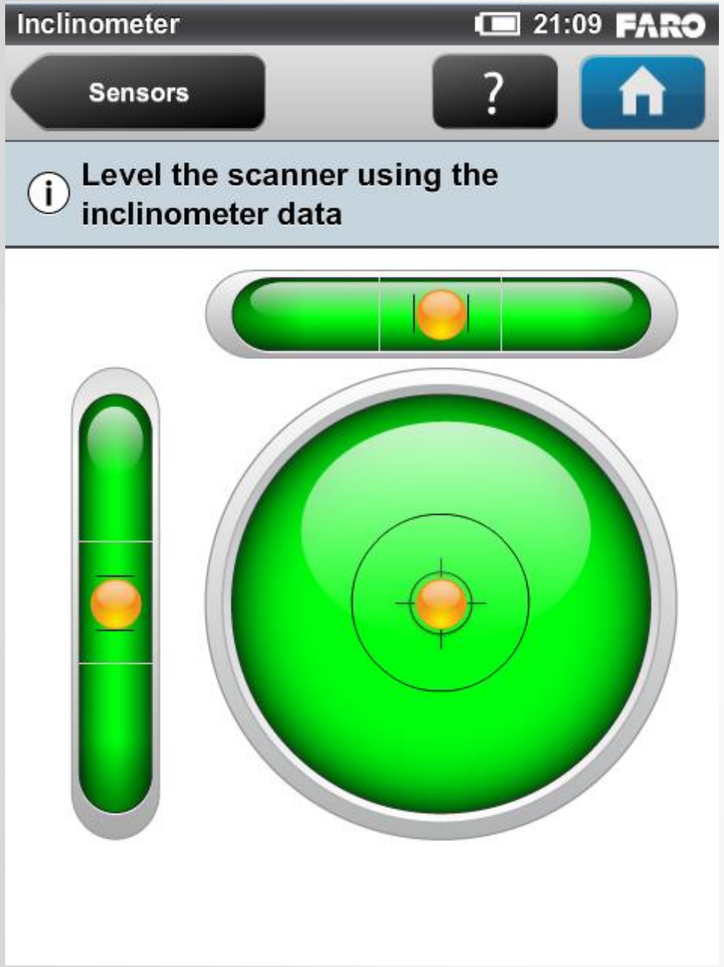
Scanners – A Quick look at FARO Laser Scanner

FARO Focus^{3D} Laser Scanner

Capture Data

How does it work?

Capture Data



Dual Axis Compensation

- *Scanner does not HAVE to be level to operate*
- Digital bubble on the user interface indicates that you are within +-5 degree.

Capture Data

Accuracy

Performance Specifications

ISO 9001 BUREAU VERITAS Certification

GSA Contract Holder

Ranging Unit
Unambiguity Interval: By 122 till 488 Kpts/sec at 614m; by 976 Kpts/sec at 307m
Range Focus3D X 330: 0.6m - 330m indoor or outdoor with upright incidence to a 90% reflective surface
Measurement Speed (pts/sec): 122,000 / 244,000 / 488,000 / 976,000
Ranging Error[1]: ±2mm

Ranging noise[2]	@10m	@10m - noise compressed[3]	@25m	@25m - noise compressed[3]
@ 90% refl.	0.3mm	0.15mm	0.3mm	0.15mm
@ 10% refl.	0.4mm	0.20mm	0.5mm	0.25mm

Accuracy

+-0.080” within 80ft (+-2mm within 25m per FARO Specs)

+-0.160” within 160ft (+-4mm within 50m verified with NIST traceable FARO Laser Tracker)

Capture Data

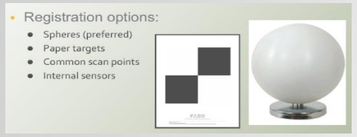
Built for use in all conditions

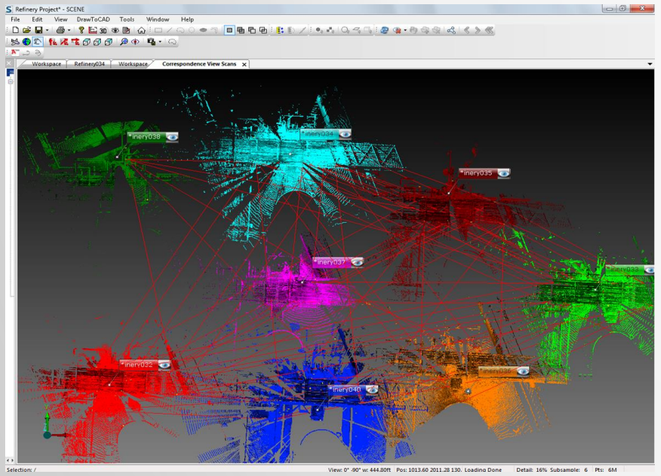
Learning Objective #2

Discover how to prepare laser scan projects

Process Data

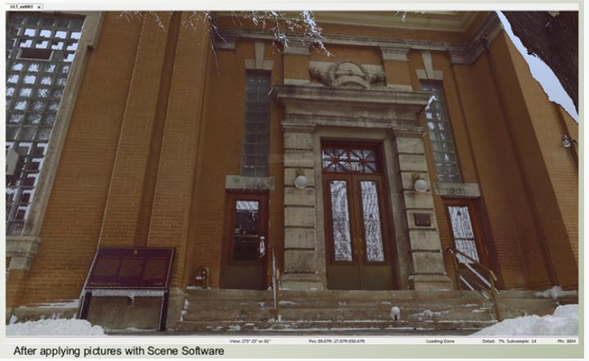
- Registration

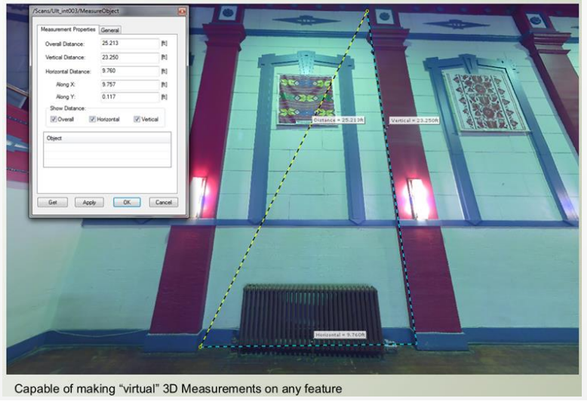




- Analyze and Measuring


Raw data example – Grey scaled intensity


After applying pictures with Scene Software

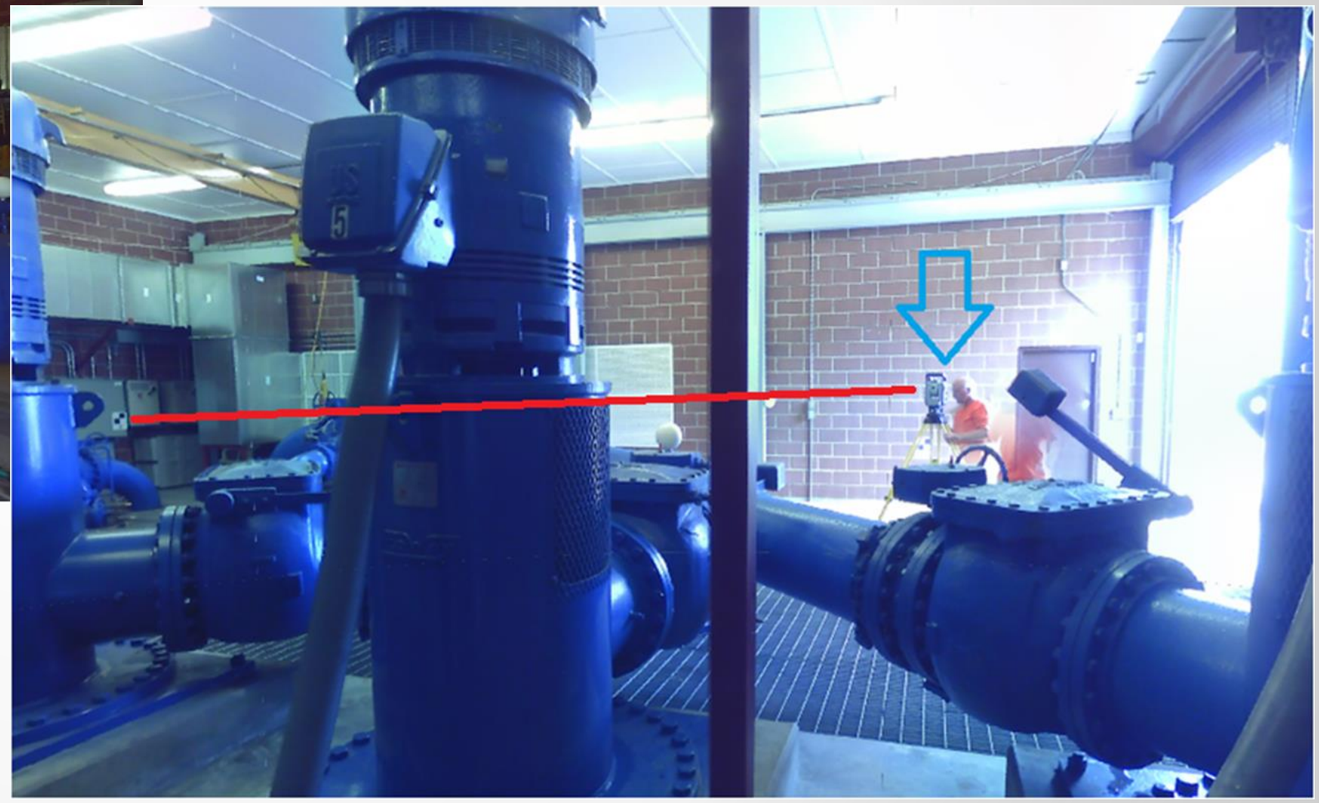

Capable of making “virtual” 3D Measurements on any feature

- Exporting

Autodesk ReCap Scans (*.rcs)
Faro FLS Files (*.fls)
Faro FWS Files (*.fws)
Faro Project Files (*.lsproj)
Leica PTG Files (*.ptg)
Leica PTS Files (*.pts)
Leica PTX Files (*.ptx)
Lidar LAS Files (*.las)
Zoller&Frohlich ZFS Files (*.zfs)
Zoller&Frohlich ZFPRJ Files (*.zfprj)
Ascii ASC Files (*.asc)
TopCon CL3 Files (*.cl3)
TopCon CLR Files (*.clr)
E57 Files (*.e57)
Riegl Files (*.rds)
Text Files (*.txt)
XYZ Files (*.xyz)
Autodesk ReCap Projects (*.rcp)
Autodesk Point Cloud (*.pcg)
Faro XYB Files (*.xyb)

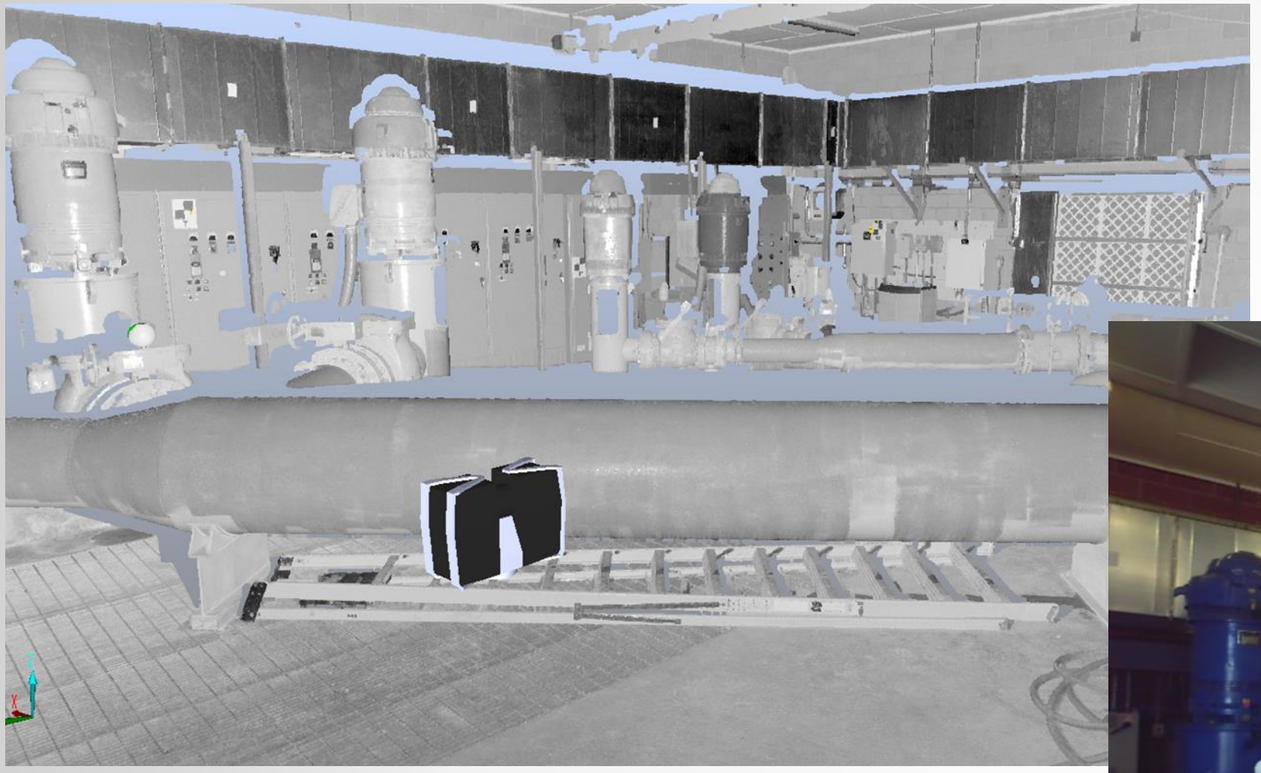
Process Data

Sample Project: Pump Station as-built Sandy, UT



Process Data

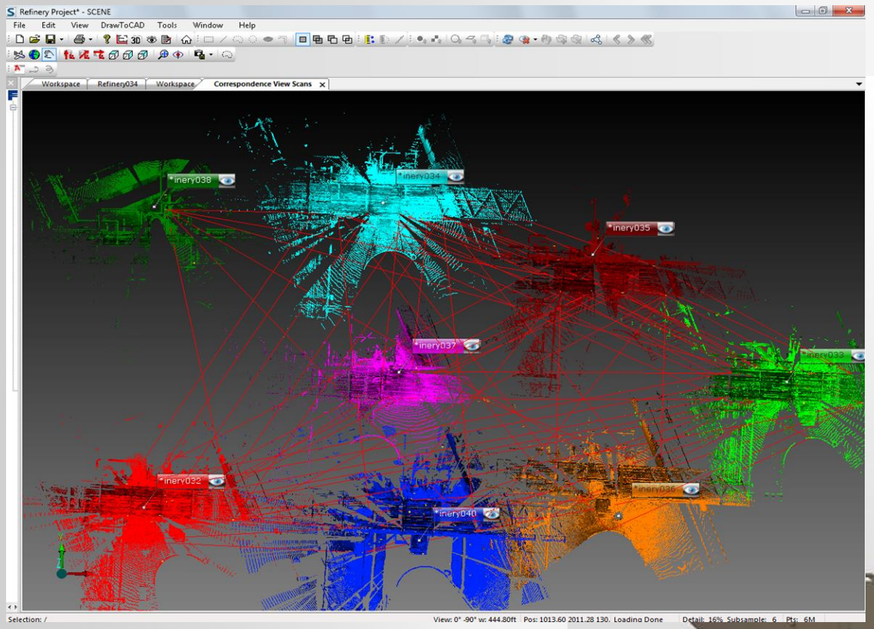
Sample Project: Pump Station as-built Sandy, UT



Process Data

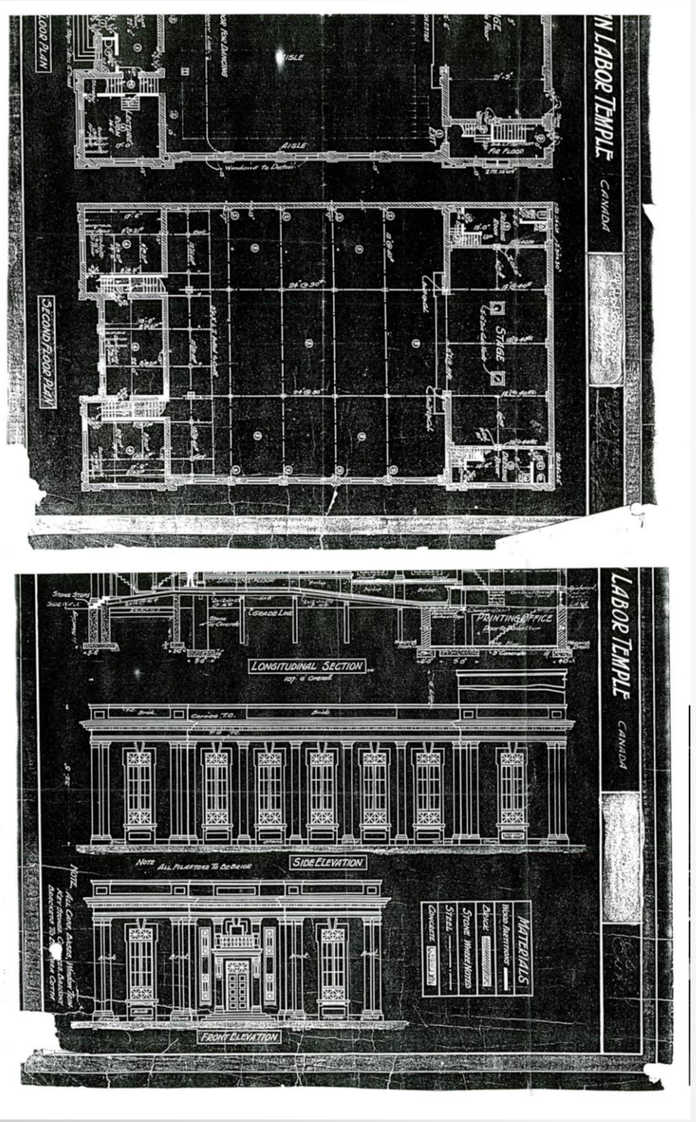
Sample Project: Pump Station as-built

Sandy, UT



Process Data

Sample Project: Ukrainian Labour Temple (Winnipeg, Manitoba, 1918-19)

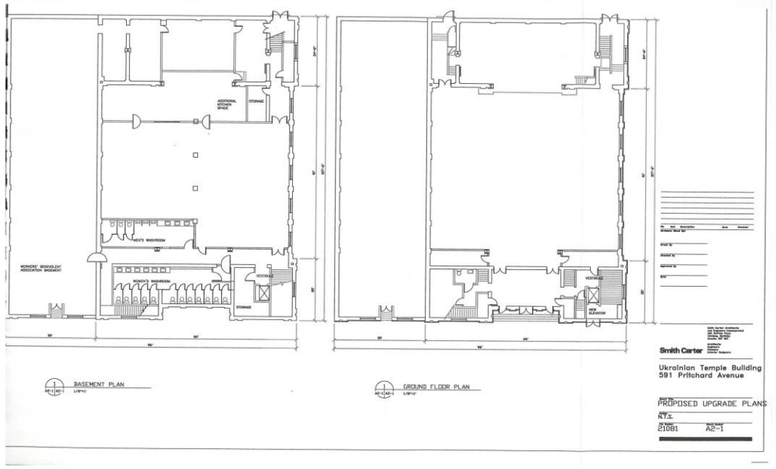


Hand Drawings and photos of original Ukrainian Labour Temple. Has undergone many modifications.

Largest Ukrainian Labour Temple in Canada built primarily by volunteer labour and financed by donations. The Temple was the focus for Ukrainian culture and worker/farmer political activism.

Process Data

Sample Project: Ukrainian Labour Temple (Winnipeg, Manitoba, 1918-19)

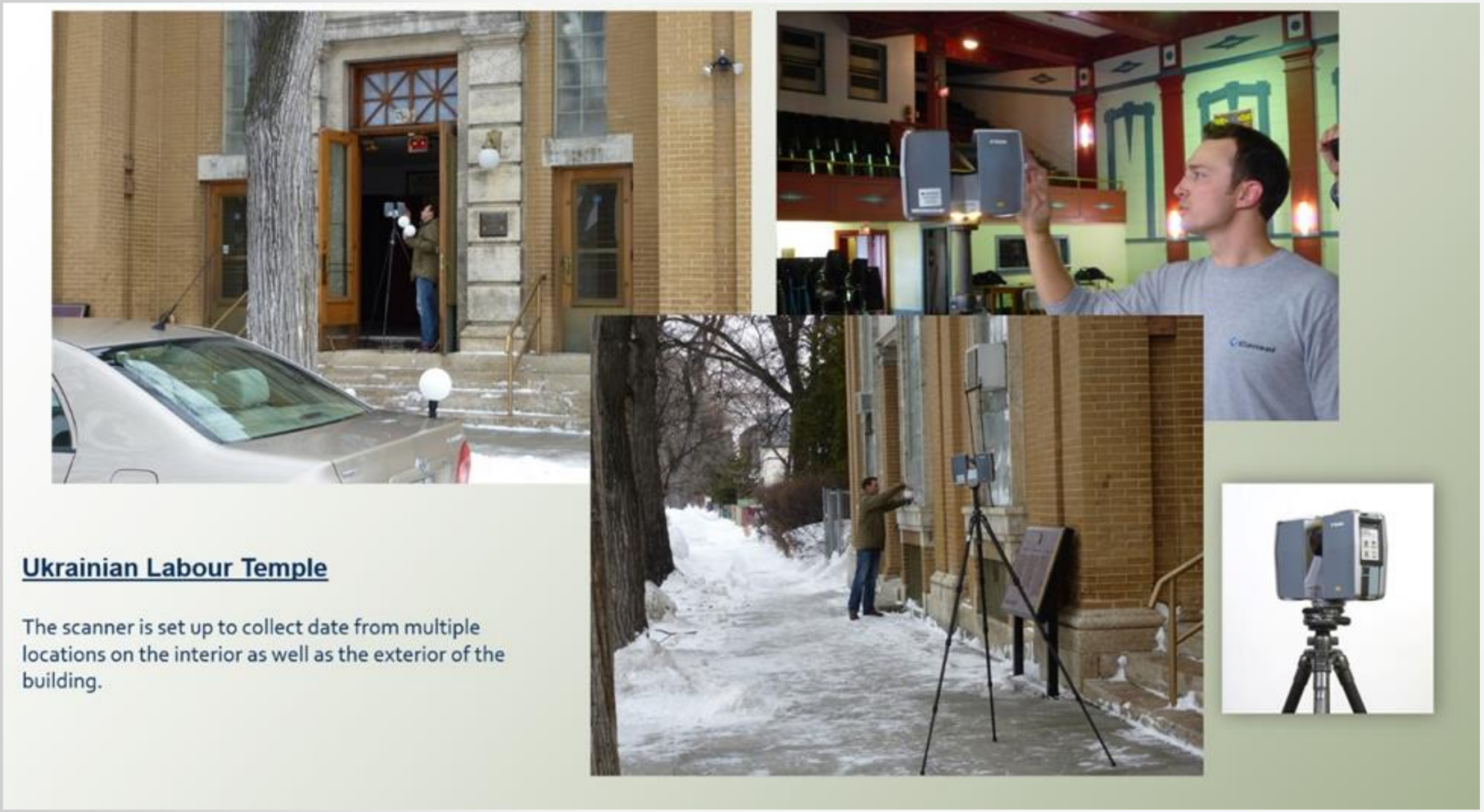


Building measured in the 1990's with a zoom boom, lift stages would be required for taller buildings c/w fall arrest and other safety requirements. Daily equipment rental add significant expenses.

Visuals – scope of work mapped on photographs and digital plans produced from hand measured site conditions.

Process Data

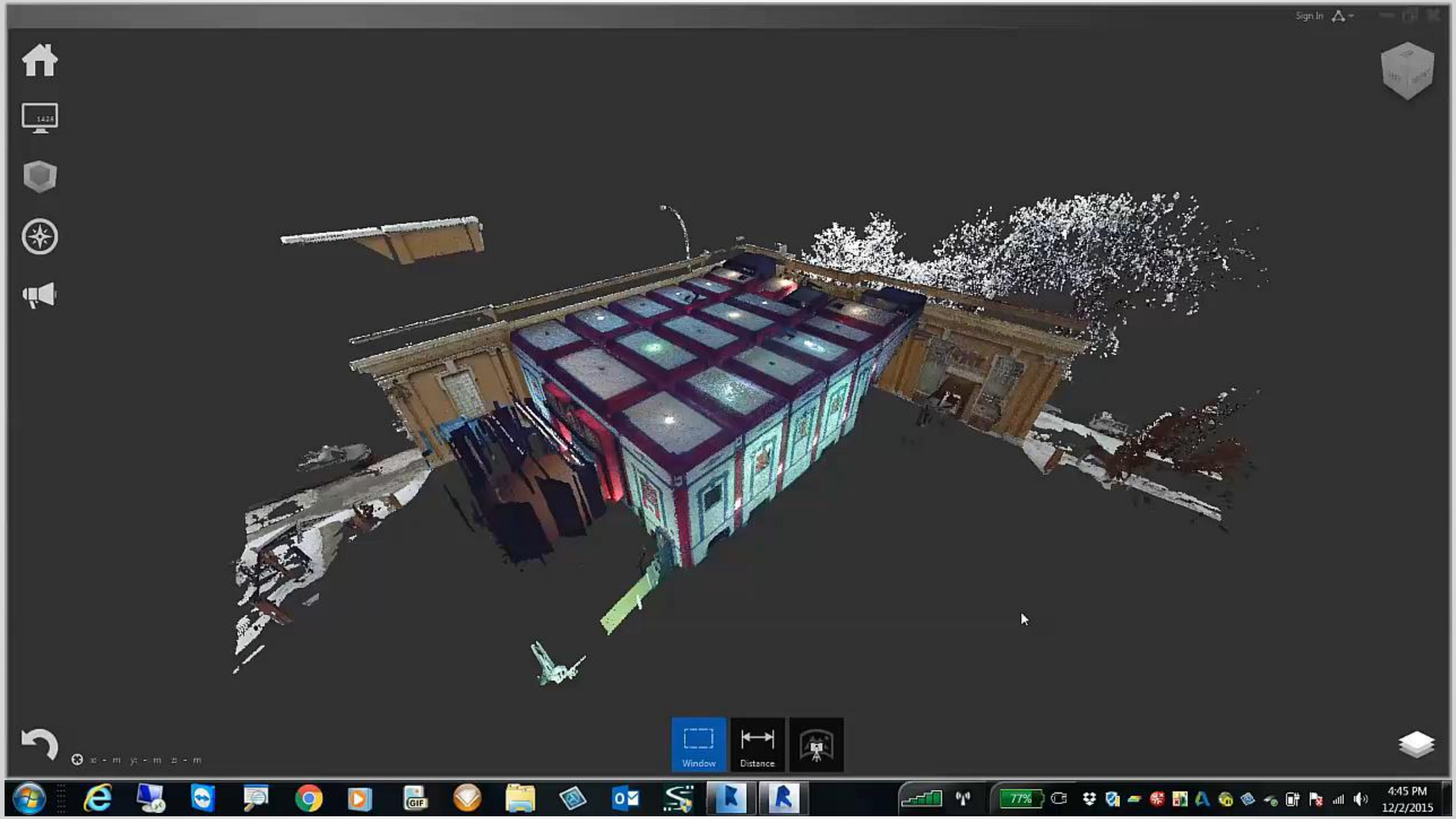
Sample Project: Ukrainian Labour Temple (Winnipeg, Manitoba, 1918-19)



- Equipment: Trimble TX5
- 15 Scans
- Temperature -25C (-13F)
- Scanning time 4 hours

Process Data

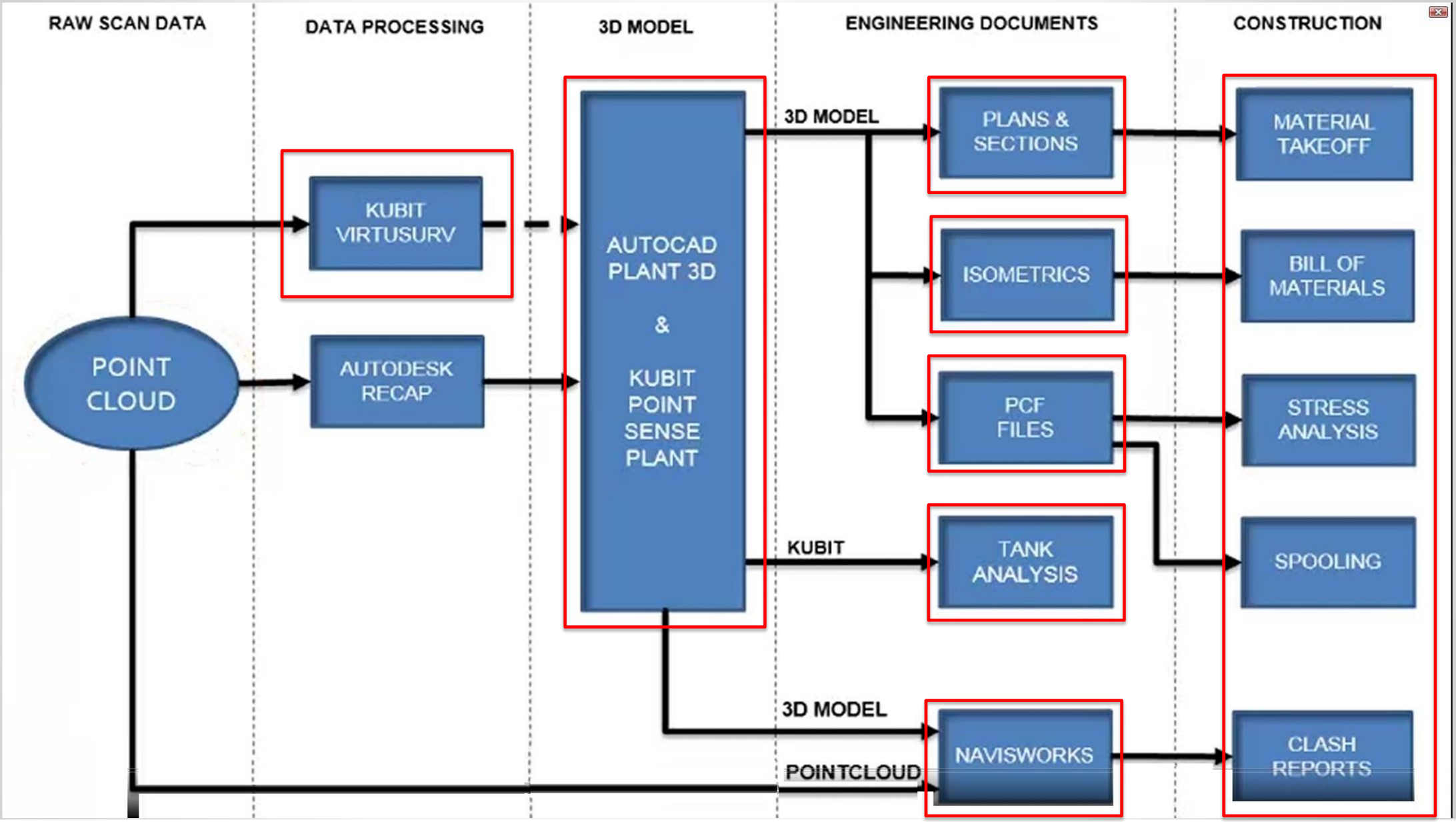
Sample Project: Ukrainian Labour Temple (Winnipeg, Manitoba, 1918-19)



Learning Objective #3

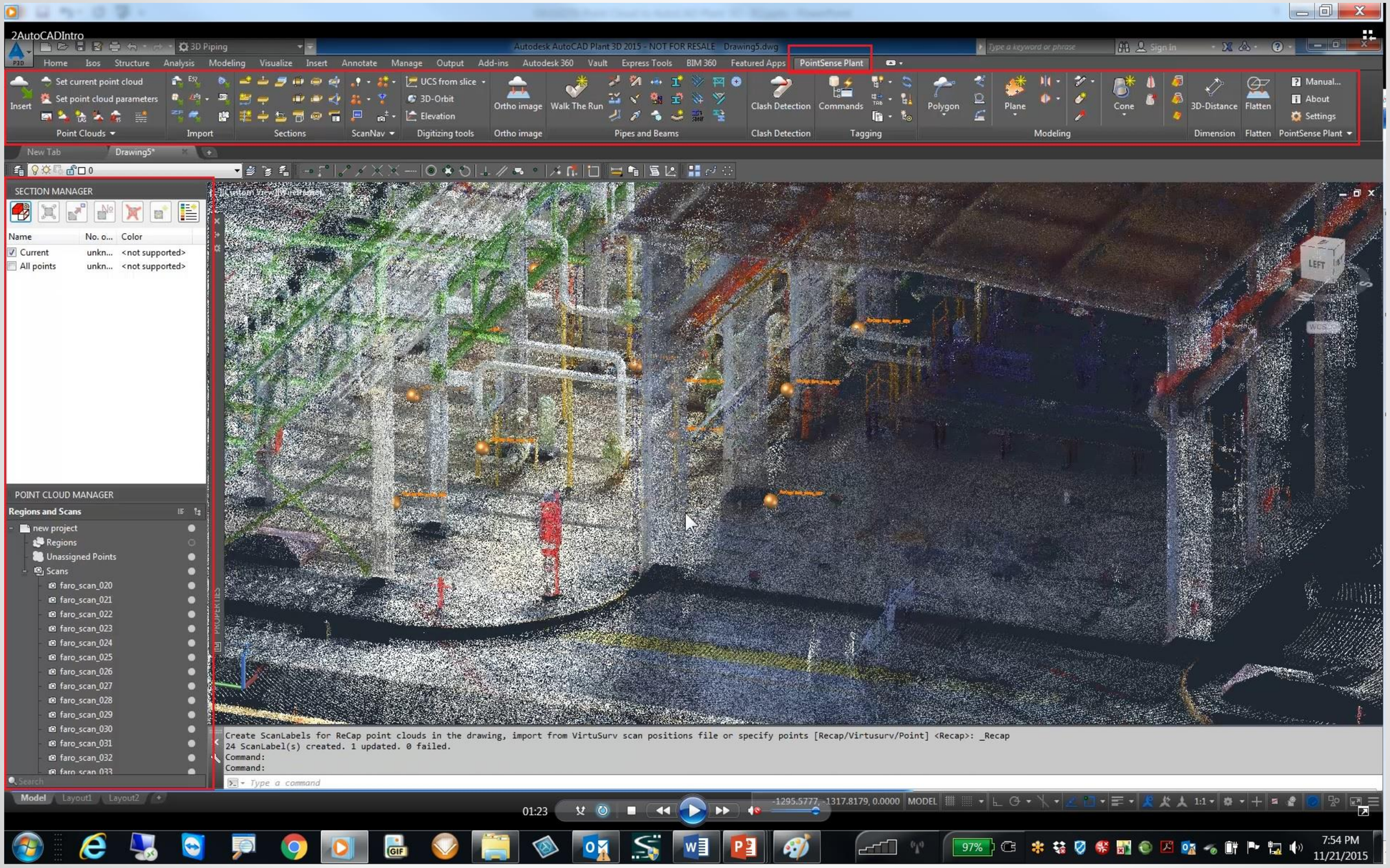
How to extract typical engineering deliverable from laser scans, such as Isos, Orthos and Material Take-off's

The Workflow



KUBIC VIRTUSURV

FARO PointSense Plant



Learning Objective #4

User experiences regarding converting point cloud

Demo #1

- Register scan positions within Faro's Scene software
- Using Autodesk Recap, index scan files to export to Plant 3D
- Import to Kubit's VirtuSurv product to enhance viewing quality of scan data
- Begin identifying and extracting tie-in points via PointSense Plant
- Model new pipe runs based on existing conditions
- Extract Isometric drawings to be issued for fabrication
- Use Navisworks Manage to check for interferences to ensure that new scope fits into the existing plant conditions.

Demo #2

- Isolate the points on the circumference of the tank
- Clean up defects or “noise” which may return false values in the analysis.
- Run the analysis using Kubit fit cylinder

Demo #3

- Clip the point cloud to isolate the run to be used.
- Eliminate background noise in 3d scan data.
- 1st method of modeling flange from point cloud using VirtuSurv.
- 2nd method of modeling flange directly in the point cloud.

Demo #4

- Introduction to SCENE
- Register raw scan data with SCENE
- Processing and colorizing raw data
- Importing registered scan data to Autodesk Recap
- Importing point cloud to Advance Steel with PointSense
- Using PointSense to clean up point cloud
- Creating railing with Advance Steel

Questions

Laser Scanning Workflow

Capture data

- Point clouds
- Images

Process Data

- Registration (optional)
- Analyze and measure features
- Export to CAD/BIM software
- Publish to Web for collaboration with clients

Drafting or Modeling deliverables

- Import directly to CAD/BIM software packages
- Produce linework, section views and annotations directly from point clouds
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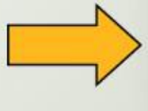

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