Getting Control of the Project: Improving model-based layout using survey control

Zach Crumal
Product Support Specialist

Shayne Hamel
Product Developer

Shannon Lightfoot
BIM Manager

William Palmgren
BIM Professional Services Mngr.

Class summary

Establishing control on the jobsite is essential for doing layout with a total station. Without control points, the BIM data can’t be referenced to the physical jobsite. Control can be established many different ways. The object is to establish the most accurate control that you can to ensure efficient multi-trade model-based layout. This hands-on lab highlights the new features of the Autodesk® Point Layout® plug-in for improving survey control workflows within Autodesk® AutoCAD®, Autodesk® Revit®, and Autodesk® Navisworks® Manage software.

Key learning objectives

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

- Distinguish between State Plane and Project coordinate systems
- Set up a project for aligning coordinate systems between multiple-trade BIM models
- Create and align to a shared coordinate system in AutoCAD and Revit-based software
- Establish survey control for an improved model-based layout workflow

McCarthy Building Companies, Inc.

- 150 Years in Business
- Largest, Oldest Privately–Held Firm in US
- Experience in 45 States
- 100% U.S. Employee Owned
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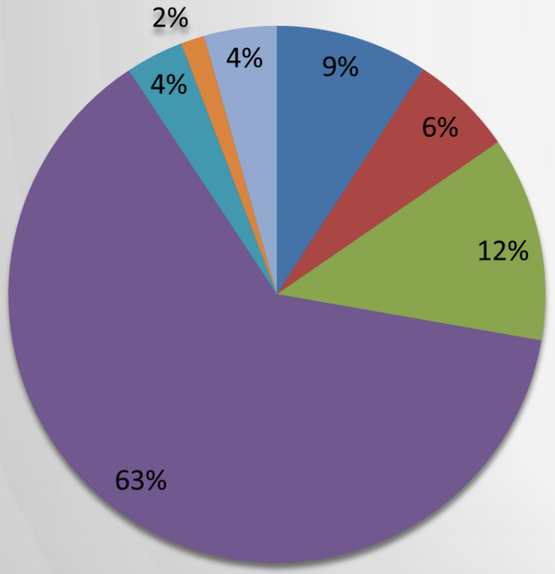


- EDU K12
- EDU HIGHER EDUCATION
- HEAVY CIVIL
- HEALTHCARE
- SCIENCE & TECH
- INDUSTRIAL
- OTHER

Field BIM

Joplin Replacement Hospital

- Integrated model-based layout into BIM workflow
  - Self-Perform Concrete Layout
  - As-built Verification
  - QA/QC

TOPCON® Positioning Systems, Inc.

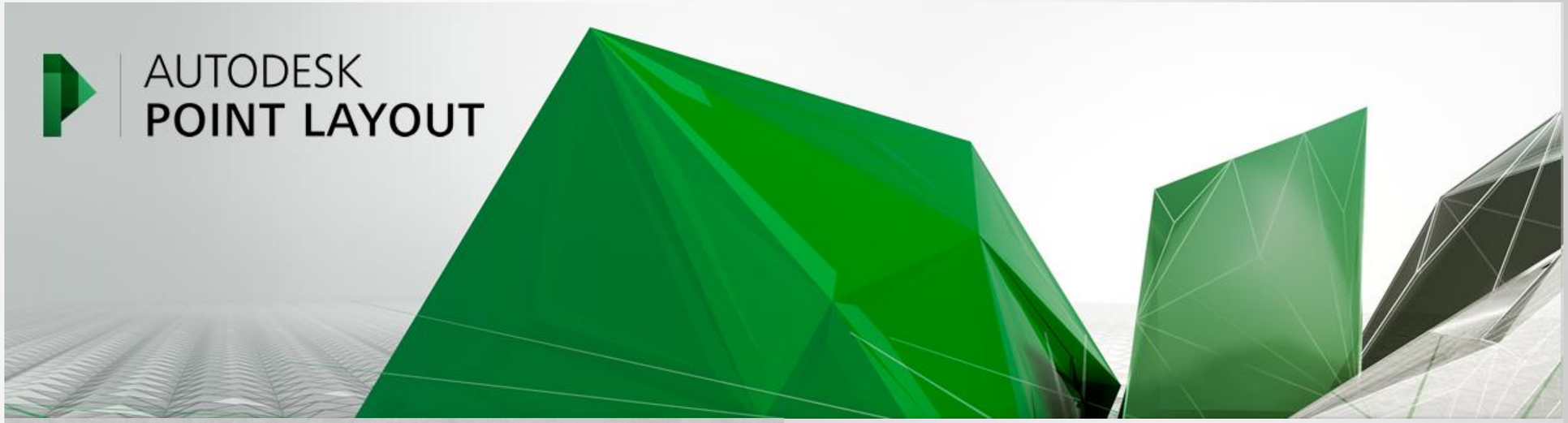
William Palmgren
BIM Professional Services Manager

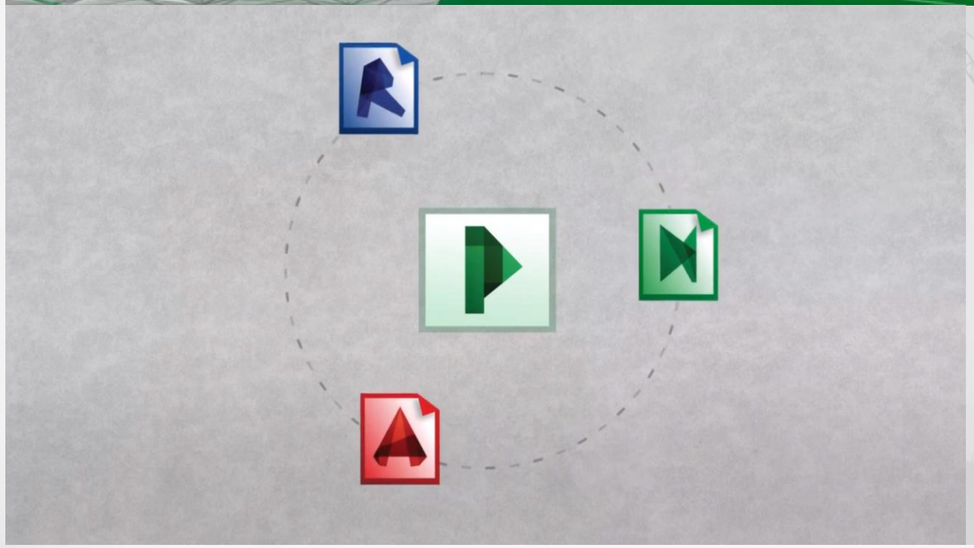
Topcon is a global solutions provider that is committed to developing new solutions based on over 80 years of optical experience, leading GNSS technology, and field proven software interfaces.

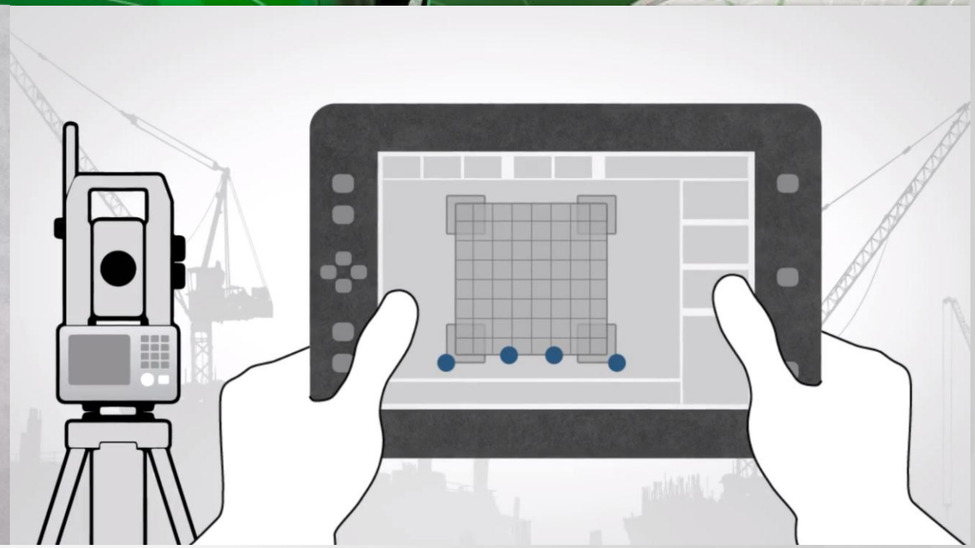
TOPCON

Autodesk®

- Shayne Hamel
  - Product Development
- Zach Crumal
  - Product Support







range sensors

laser scanning

scan to BIM

feature recognition

point survey

photogrammetry

hybrid modeling

mesh healing

survey control

augmented reality

measurement

time delta analysis

machine controlled grading

3d printing

reverse engineering

metrology

range sensors

Capture

feature recognition

Manipulation

point survey

photogrammetry

mesh healing

Reality Computing

#RealityComputing

survey control

measurement

time delta analysis

Realization

Analysis

machine controlled grading

metrology

Reality Computing is about the many ways

data is captured from the physical world;

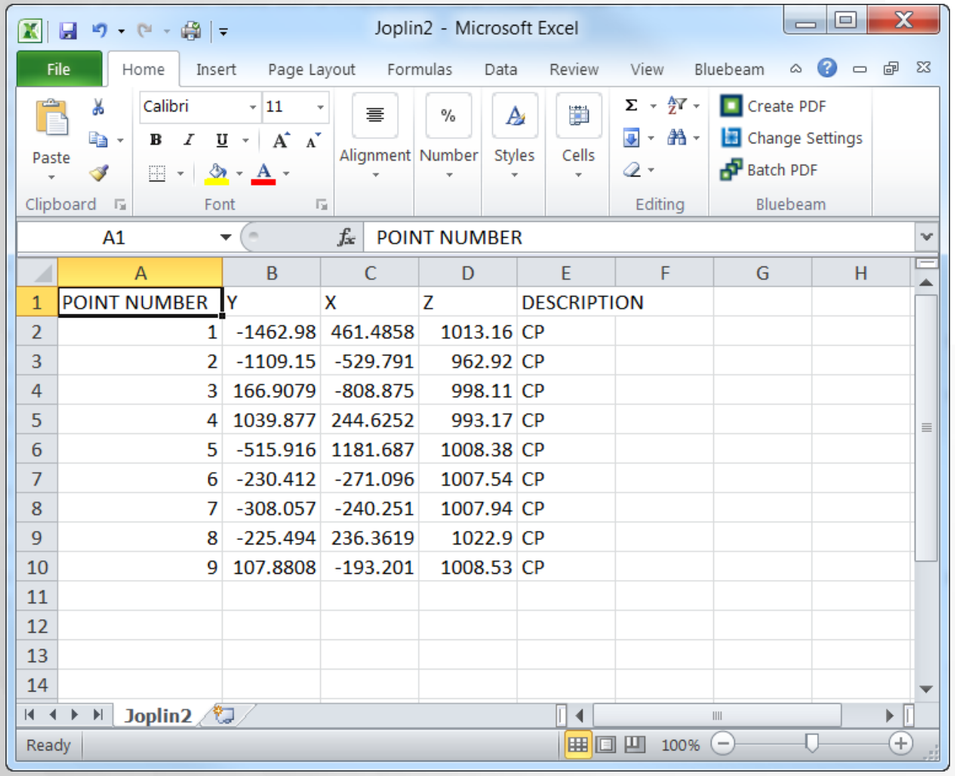
put to use with digital tools for the creation of designs and new information;

and ultimately put to work back in the physical world.

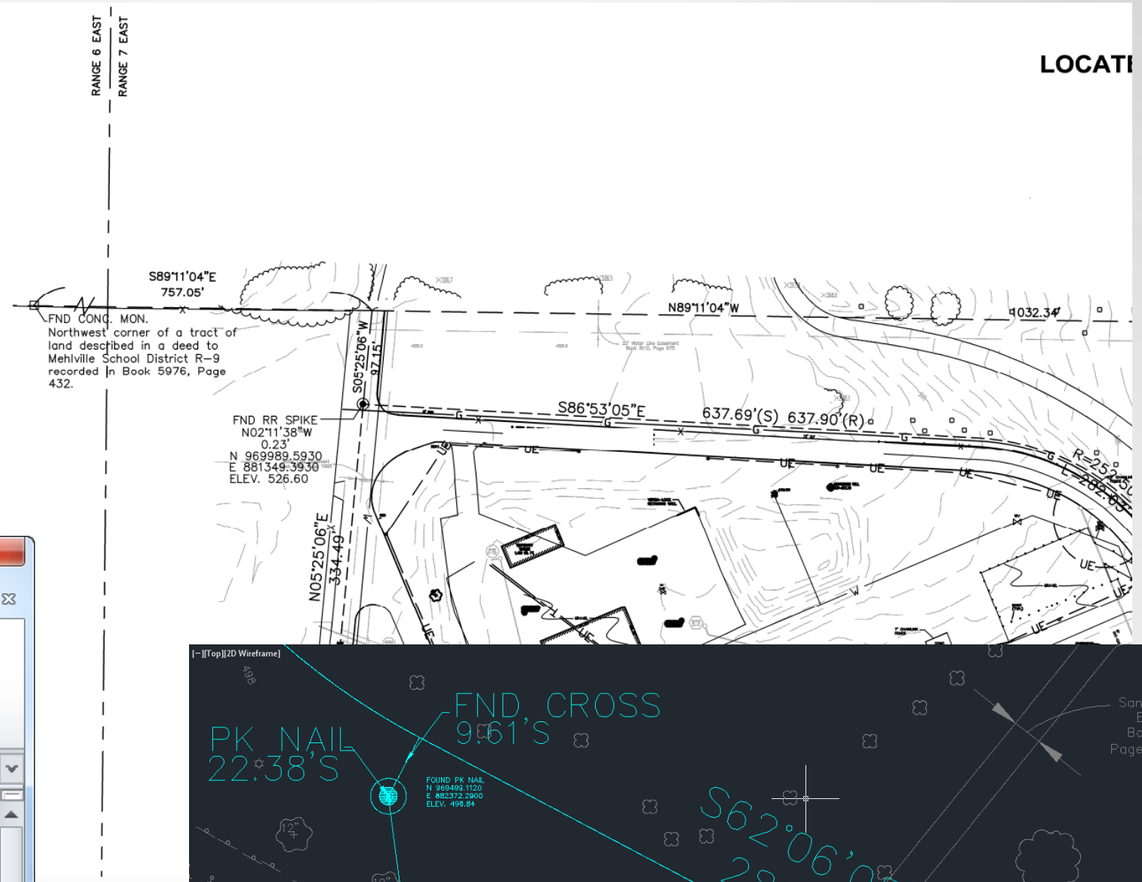
How do we get control?

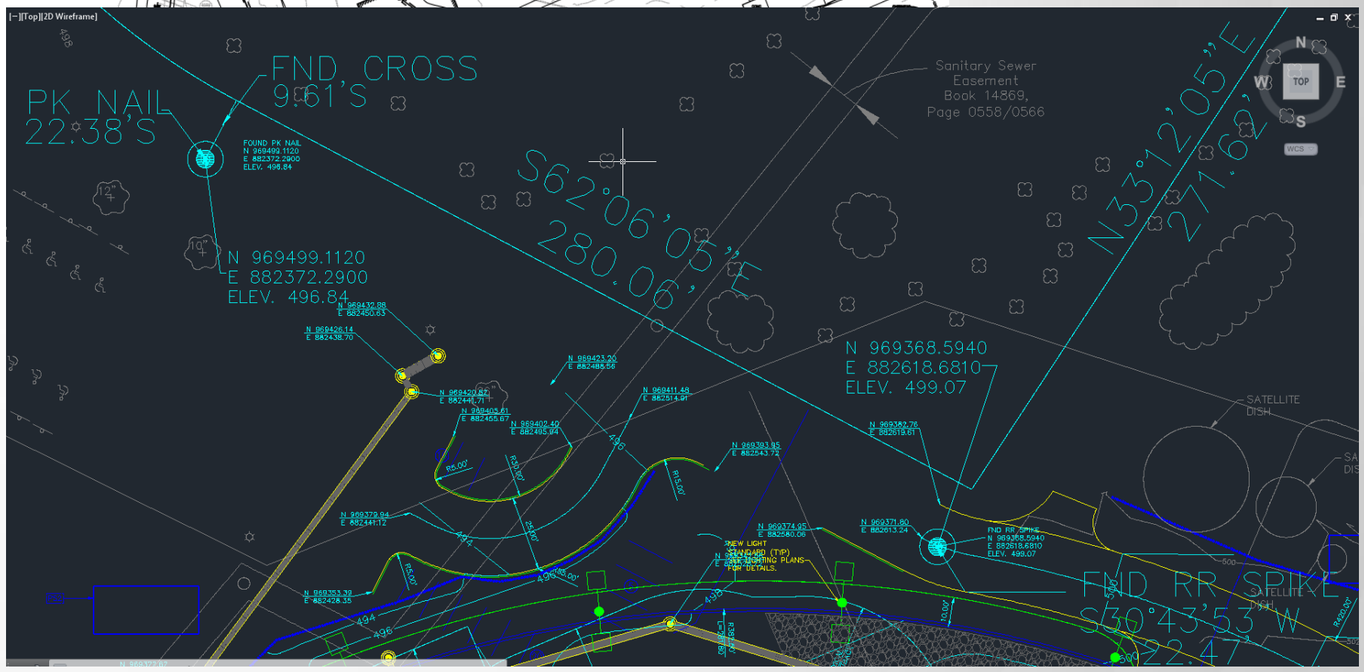
Survey Control

- CAD/DWG
- CSV
- PDF



	A	B	C	D	E
1	POINT NUMBER	Y	X	Z	DESCRIPTION
2	1	-1462.98	461.4858	1013.16	CP
3	2	-1109.15	-529.791	962.92	CP
4	3	166.9079	-808.875	998.11	CP
5	4	1039.877	244.6252	993.17	CP
6	5	-515.916	1181.687	1008.38	CP
7	6	-230.412	-271.096	1007.54	CP
8	7	-308.057	-240.251	1007.94	CP
9	8	-225.494	236.3619	1022.9	CP
10	9	107.8808	-193.201	1008.53	CP
11					
12					
13					
14					





Survey Control

Best Practices

- Try to set up your total station on solid ground like concrete. When setting up in dirt or on pavement, the ground will expand and contract with sun and temperature moving your total station out of level throughout the day.
- Use a tri-pod stabilizer and weigh down your tri-pod; it takes a lot less wind then you would think to blow over a total station.
- Check your set up and level of your total station every 40 shots or so.
- Try to use the same control points each day this will minimize the propagation of error.
- Try to measure your control points in the same order each day.
- After completing a setup routine (Occupy Point or Ref Points), always try to stake out another known point to verify your set up is correct.
- Shoot long control and work close to your total station. If you have the choice to use two control points that are 50’ apart and two control points that are 200’ apart use the longest set.
- Do not shoot past your control set up. If your control points used are only 200’ apart you should not layout or store points past 200’ from the total station.
- When using the Reference Point routine to set up, try and use at least three points and 90 to 120 degrees of angle.
- Calibrate your total station per manufactures recommendations to avoid instrument error.
- Calibrate the level bubble on your survey poles to avoid error.
- Check your optical plummet on the Total Station once a day and calibrate if necessary.
- Make sure you are exporting to Navisworks from CAD/Revit as ‘Shared Coordinates’.

Getting Started: Autodesk Point Layout

Questions ?

range sensors
laser scanning
scan to BIM
feature recognition
Capture
point survey
Manipulation
photogrammetry
hybrid modeling
mesh healing

Reality Computing

#RealityComputing

(post on AU 2013 mobile app!)

survey control
augmented reality
rick.rundell@autodesk.com
@rcklr
measurement
time delta analysis
Realization
machine controlled grading
Analysis
3d printing
reverse engineering
metrology

Remember to fill out the class survey.

CR3095-L: Getting Control of the Project – Improving model-based Layout using survey control

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Thanks for attending