AutoCAD Plant 3D, Civil 3D, and Revit Together: Cross-Platform Design with BIM 360

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Outline

OVERVIEW

LEARNING OBJECTIVES

SOFTWARE INFORMATION

DIFFERENCES BETWEEN THE PLATFORMS

CONCLUSIONS
About the speaker

Patrick Flora – Pickering Associates
Chemical Engineer/Project Manager

Patrick Flora is currently the Piping Engineering Department Manager at Pickering Associates, a design firm located in Parkersburg, WV. Since he started there in 2014, Patrick has implemented Plant 3D to assist industrial clients in taking full advantage of BIM. He places a strong emphasis on utilizing technology on piping and plumbing design. His skill in combining 3D scanning of existing conditions with an accurate 3D model of new designs reduces installation time and field rework. A native of Mason County, West Virginia, Patrick graduated from West Virginia University with a BS in Chemical Engineering and a MS in Engineering Management through Marshall University.
About the speaker

Chris Algmin – Pickering Associates

BIM Manager/Architect

Chris Algmin is a registered Architect in West Virginia, Ohio, Illinois, and South Carolina, and is the BIM Department Manager for Pickering Associates. Chris leads multi-discipline teams in using technology to help develop and communicate designs. His focus is to find better ways for teams to efficiently coordinate, improve detail of deliverables, and communicate design solutions - within the team and for clients and contractors. Chris has earned a Master of Architecture from the University of Illinois at Urbana-Champaign and a Master of Science in Technology Management from Marshall University.
About the speaker

John Bentz – Pickering Associates
Branch Manager/Civil Engineer

John Bentz is a licensed Civil Engineer in Ohio, West Virginia, and Kentucky. Working out of the Pickering Associates’ Athens office, he currently holds the position of Branch Manager, as well as the role of Project Manager, Civil Engineer and resident FAA Part 107 Commercial Drone Operator. His focus is to broaden company offerings, increase service territory, and ensure exceptional services for new clients, John also works to improve current BIM standards in the Civil Engineering department and integrating new technologies. John graduated with a BS in Civil Engineering from Ohio University in 2011 and took graduate courses at Ohio University until beginning his employment at Pickering Associates in 2013. In 2018, he received a Master of Science in Engineering Management from Marshall University.
Learning Objectives

• Discover differences between similar workflows in different software

• Learn how to establish permission settings so that read/write capabilities are correct per group

• Discover current constraints between coordination.

• Discover benefits of utilizing cloud collaboration for multidiscipline teams
Plant 3D

By putting some thought into Project Setup, we are able to organize Plant 3D more efficiently for Collaboration

- Project Setup
- File Structure
- Coordinate System
- Powershell
Constraints in Plant 3D

While great strides have been made in Collaboration for Plant 3D, some areas are still lacking for a seamless approach.

- Model Compatibility
- Revit Files
- Design Collaboration
- Powershell
Civil3D Discussion
Civil3D - Introduction

Site Development works to combine:

- Existing Conditions
- Building Models
- Grading Models
- Utility Models
Civil3D File Management & Structure

- **Site Plan**
  - **Design Purpose**
    - General Site Arrangement and Orientation
  - **External Reference**
    - Revit Model (3D Arch)
    - Existing Conditions
  - **Data Shortcut**
    - None

- **Grading Plan**
  - **Design Purposes**
    - Alignment
    - Corridor
    - Proposed Surface
  - **External Reference**
    - Revit Model (3D Arch)
    - Existing Conditions
  - **Data Shortcut**
    - Existing Surface

- **Utility Plan**
  - **Design Purpose**
    - Sanitary
    - Electrical
    - Domestic Water
    - Gas
  - **External Reference**
    - Revit Model (3D Arch w/ Plumbing and Structural)
    - Existing Conditions
  - **Data Shortcut**
    - Existing Pipe Networks
    - Existing Surface
    - Proposed Surface

[Basic Data Management for AutoCAD Civil3D Projects](http://example.com) (Jason Ferrelli, AU 2015 Article)
Civil3D – Existing Conditions

**Existing Condition Contents:**

- Topographic Survey – Elevation Data
- Boundary Survey – Project Boundary
- Underground / Above Utilities in 2D
  - Used to generate existing pipe networks for tie-ins
- Surveying Benchmarks
  - Used for Shared Coordinates in Revit

*Wise to build existing utility pipe networks in Utility plan.*
Civil3D – Building / Grading

- Building Models imported from Revit.

- Helps to position / orient building with existing conditions.

- Generate site plan to start grading.

- Proposed grading can be output to BIM360 using the Publish Surfaces command.

- **Note:** Must paste surfaces together to get seamless grading profile, otherwise graded surfaces will not include existing conditions, slopes, etc.
Civil3D – Utility Coordination

- Utility Coordination with:
  - Structural Model
  - Architectural Model
  - Plumbing Model

- Ensures correct tie-in locations and sizing of pipes.

- Verify special foundation requirements due to pipe penetrations.

- Visualize piping conflicts

- Can export 3D pipe network to incorporate into Navisworks for clash detection.
Civil3D – Utility Coordination (Continued)

What you don't want to see in the field!!!
Revit Setup

- Coordinates
- Coordination Views
- Shared Content
  - Discipline Models
  - Link Shared Content
Revit Worksets

ABOVE GROUND EXTERIOR
- Building Envelope
- Exterior equipment

ABOVE GROUND INTERIOR
- Space layouts
- Building systems
- Rooms & Spaces
- Interior Equipment

UNDERGROUND EXTERIOR
- Utility trenches & piping
- Foundations
- Building Pad & Slab on Grade

UNDERGROUND INTERIOR
- Interior underground piping
- Interior trenches
- Underground ductwork
  (Excavated after pad prepped)
Constraints in Revit

Additional setup is needed since .rvt files cannot be linked directly, and limits with shared content display in Revit.

- Coordinate system setup/alignment
- Additional Models & Coordination Views
- Meshes and Wireframes
- Coordination Model constraints
BIM 360 Discussion
Benefits of BIM 360

- Central place for files and information
- Supports remote teams
- Access to model information - outside of design software
- Standard platform across project disciplines.
- Issue and submittal tracking
BIM 360 Document Management

**HIGH TRUST LINK**

**MEDIUM TRUST LINK**

**MANAGED TRUST LINK**

**Collaboration for Civil 3D**

- Autodesk Civil 3D
- WCS 3D Piping.dwg
- Final Proposed Surface.dwg
- WCS
- Shared
- STR-UGX.DWG.dwg
- ARC-AGX.DWG.dwg
- MEC-AGX.DWG.dwg
- MLU-UGX.DWG.dwg
- ELE-UGX.DWG.dwg

**World UCS - Feet**

**Collaboration for Plant 3D**

- Autodesk AutoCAD Plant 3D
- WCS
- STR-UGX.DWG.dwg
- ARC-AGX.DWG.dwg
- MEC-AGX.DWG.dwg
- MLU-UGX.DWG.dwg
- ELE-UGX.DWG.dwg

**Collaboration for Plant 3D**

- Autodesk AutoCAD Plant 3D
- WCS
- STR-UGX.DWG.dwg
- ARC-AGX.DWG.dwg
- MEC-AGX.DWG.dwg
- MLU-UGX.DWG.dwg
- ELE-UGX.DWG.dwg

**Autodesk Desktop Connector**

- Local UCS - Inches
- Link Topography
- Link CAD (Mass)
- Manual Center
- Align Coord Prism

**Autodesk Revit**

- Civil 3D.rvt
- Structural.rvt
- Architectural.rvt
- Mechanical.rvt
- Electrical.rvt
- Plumbing.rvt
- REVIT Files

**BIM 360 Design Collaboration / Collaboration for Revit**
Folder Structure

• Work In Progress Folders
  o Plant 3D
  o Civil 3D
  o Revit

• Shared Files Folder with
  o Revit Exports
  o Civil 3D Exports

• Design Collaboration Files (BIM 360)
  o Working space for teams
  o (Revit only)
Shared Content
Process Equipment.dwg

BIM 360

PLANT 3D

CIVIL 3D

REVIT
Piping 3D.dwg

REVIT

BIM 360

PLANT 3D

CIVIL 3D
Grading Plan.dwg

REVIT

CIVIL 3D

PLANT 3D

BIM 360

FinalProposedGrade.dwg
Constraints

PLANT 3D
- Limited options and workflows
- Powershell

REVIT
- File Setup and View Management
- Meshes and Wireframes

CIVIL 3D
- Projecting linework for site plan to surface for 3D polylines.
- Zoom Extents sometimes is not helpful.