

Autodesk Civil 3D, Dynamo or the API. Why and When?

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Technical Specialist, Autodesk



[Phuc Le Hieu Hong](#)



About the speaker

Phuc Le Hieu Hong (Ken)

Phuc Le is a Digital Consultant, BIM Advisor, BIM Application Expert & Forge Developer.

He currently serves as Technical Specialist at Autodesk Asean, supporting organizations in Architecture, Engineering and Construction sector to successfully implement Building Information Modelling, Cloud Collaboration, Computational Design and Generative Design.

Class Description

Are there some tasks you want to automate for more precision and speed while working in AutoCad Civil 3D software? When should you flex Dynamo's abilities or develop a custom Add-in with .NET API?

If you have ever wondered when or why you should use one solution over the other, then this session will help clarify your choices. Some typical scenarios will be discussed, examining two options, and assessing their pros and cons.

In this session, you will be inspired and equipped to bring automation to your AutoCAD Civil 3D models.

Agenda

1



CIVIL 3D
AUTOMATION

2



DYNAMO FOR CIVIL 3D

3



THE CIVIL 3D API

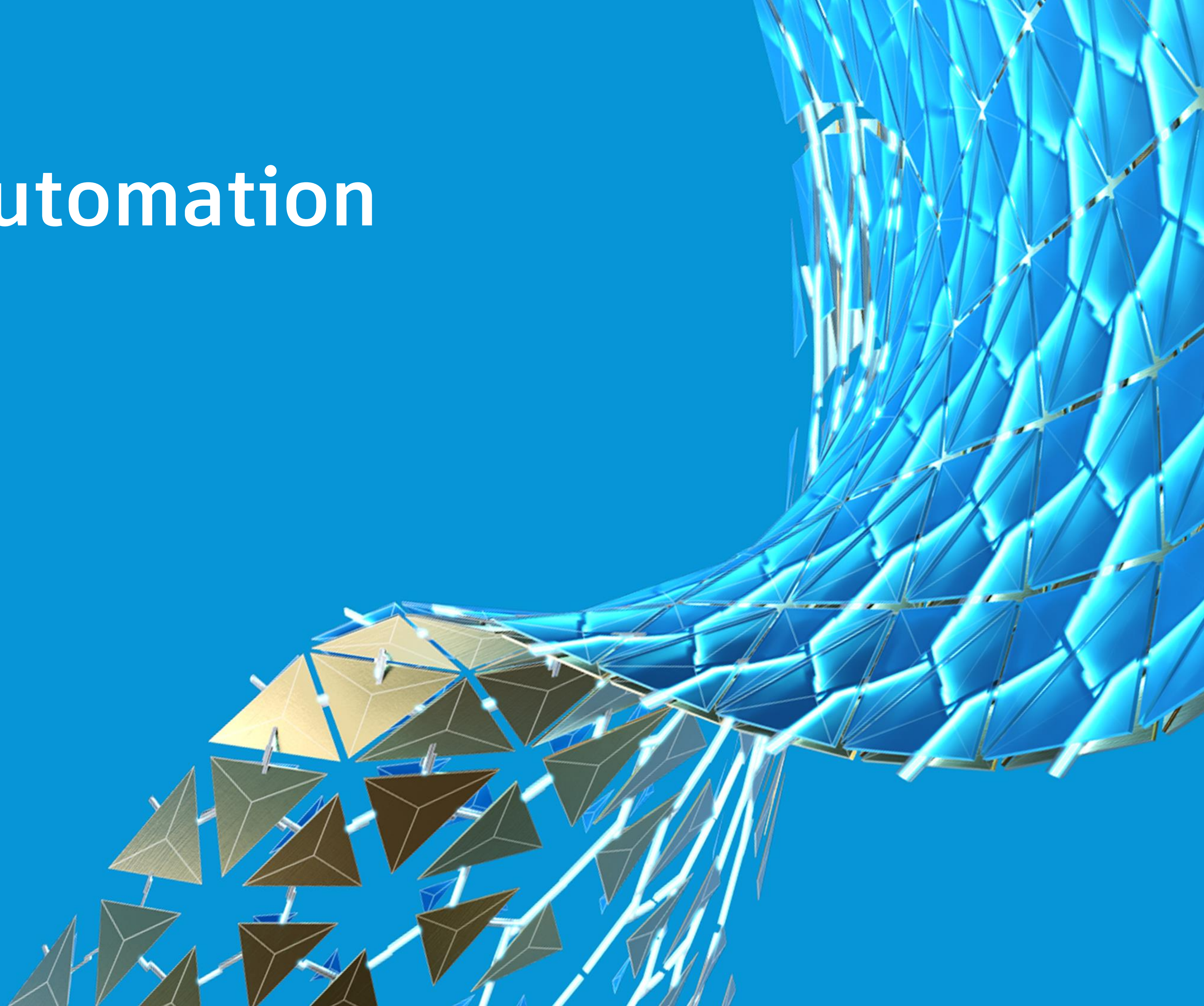
4



CONCLUSION



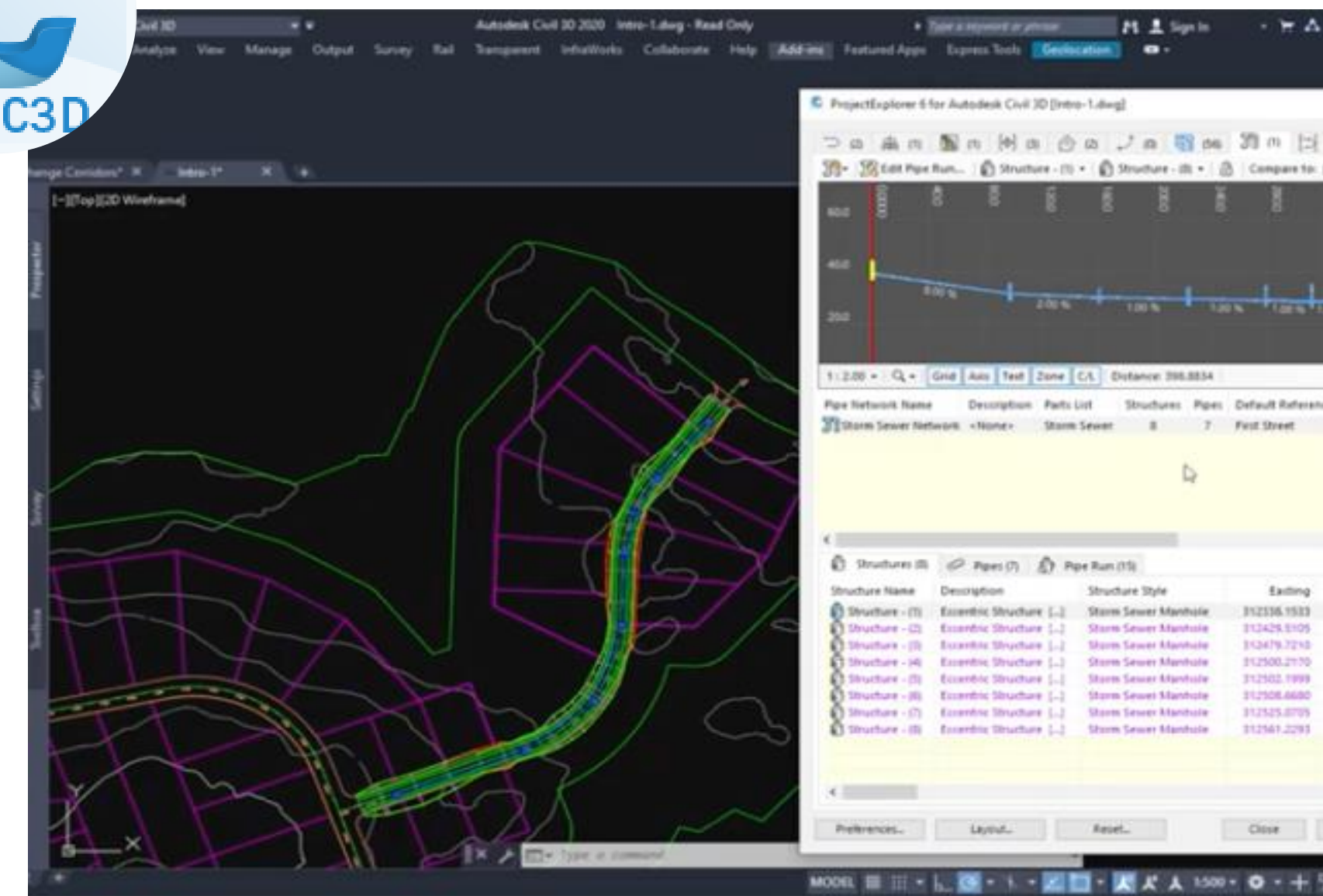
Civil 3D & Automation



Autodesk Civil 3D

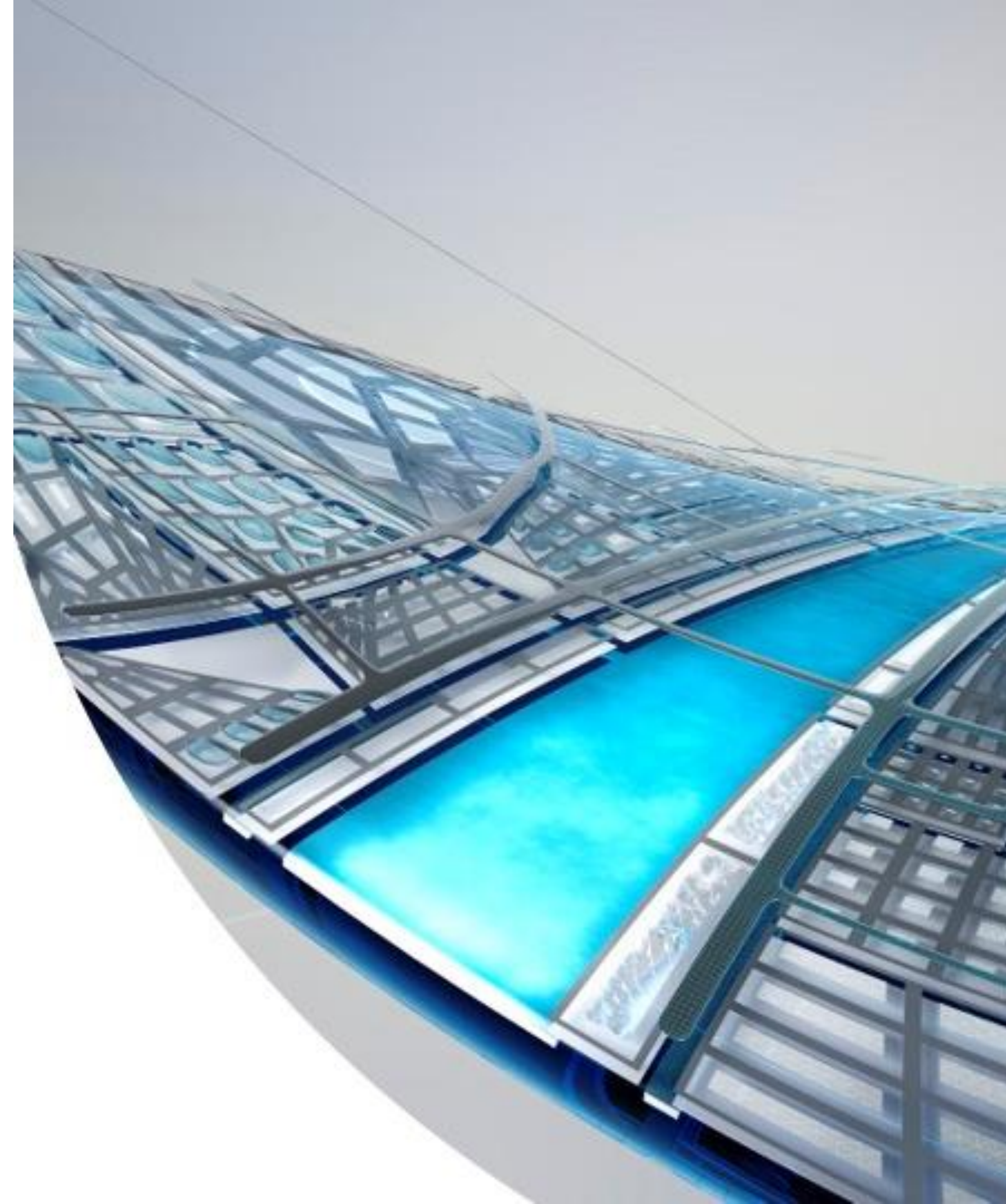
Civil 3D is a civil infrastructure **design and documentation** software supports BIM (Building Information Modeling) with integrated features to accelerate design efficiencies, automate construction documentation, and improve project delivery.

- Streamlines work
- Redefines construction documentation
- Facilitates data exchange
- Supports BIM to integrate processes



What's new: Civil 3D 2021.1

- Project Explorer
- Pressure Network Enhancements
- Rail Profile View Bands
- Connector for ArcGIS Enhancements
- BIM 360 Collaboration for Civil 3D Enhancements
- Feature Line Editing Tools
- Generic Object Layer Support
- API Additions



Automation in Civil 3D



Automation in Civil 3D

Each option - Dynamo and the .NET API:

Power

Skill Required

Time to Build

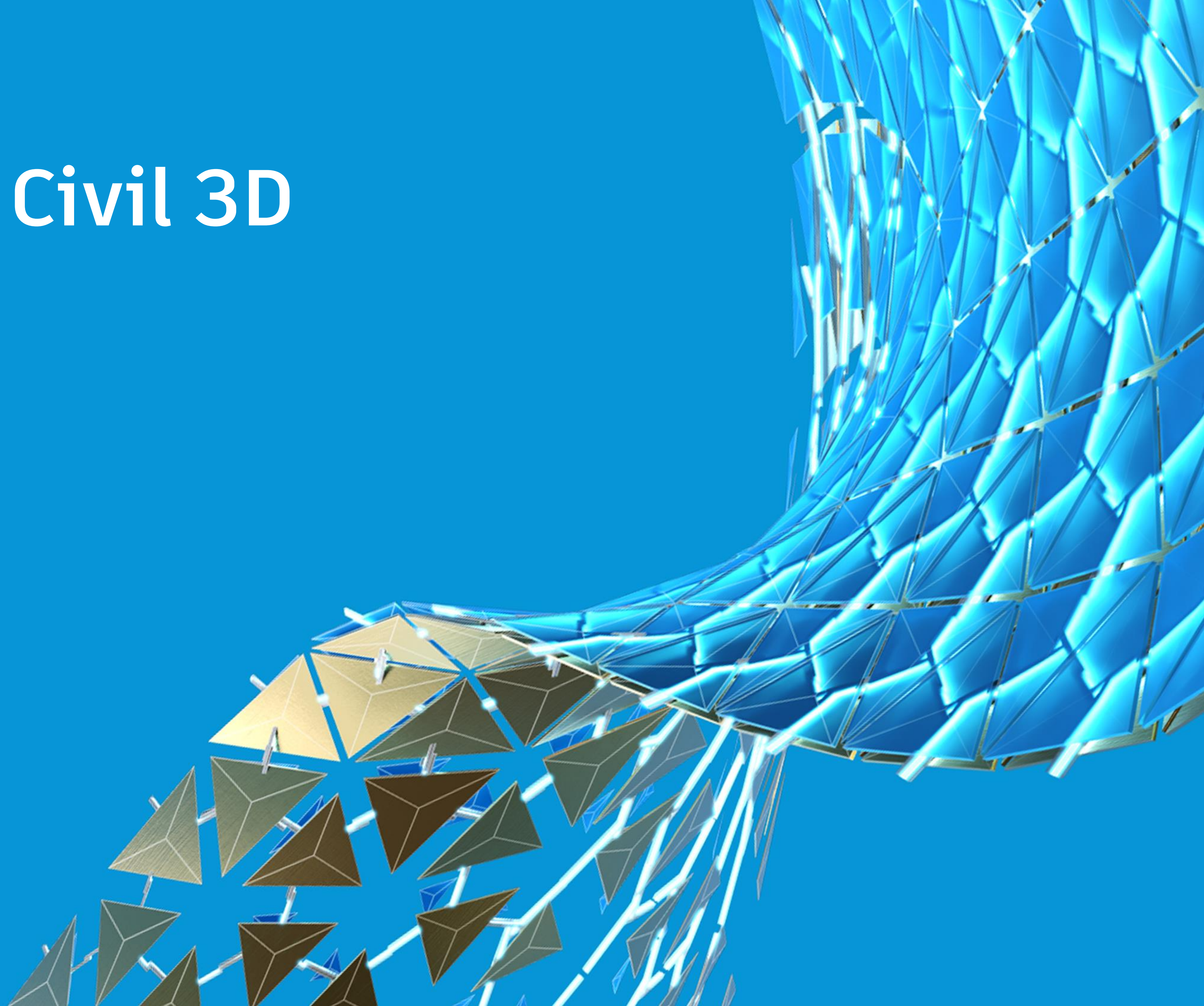
Flexibility

Robustness

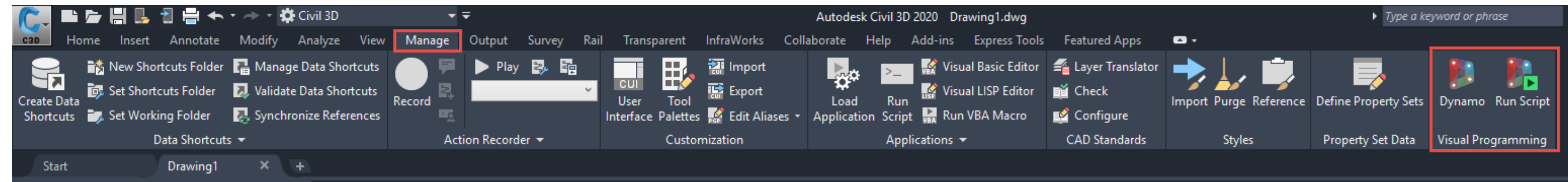
Deployment



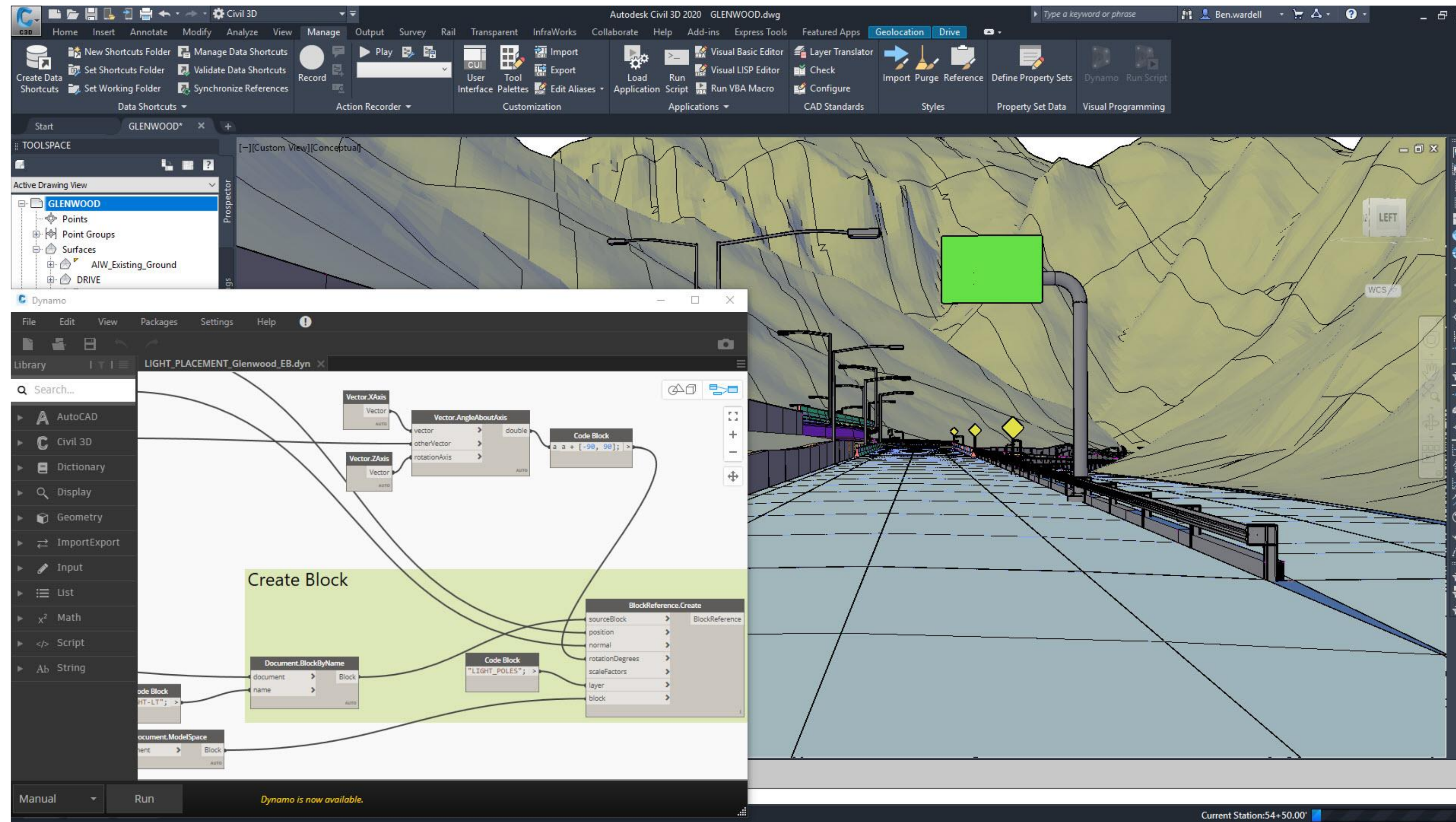
Dynamo for Civil 3D



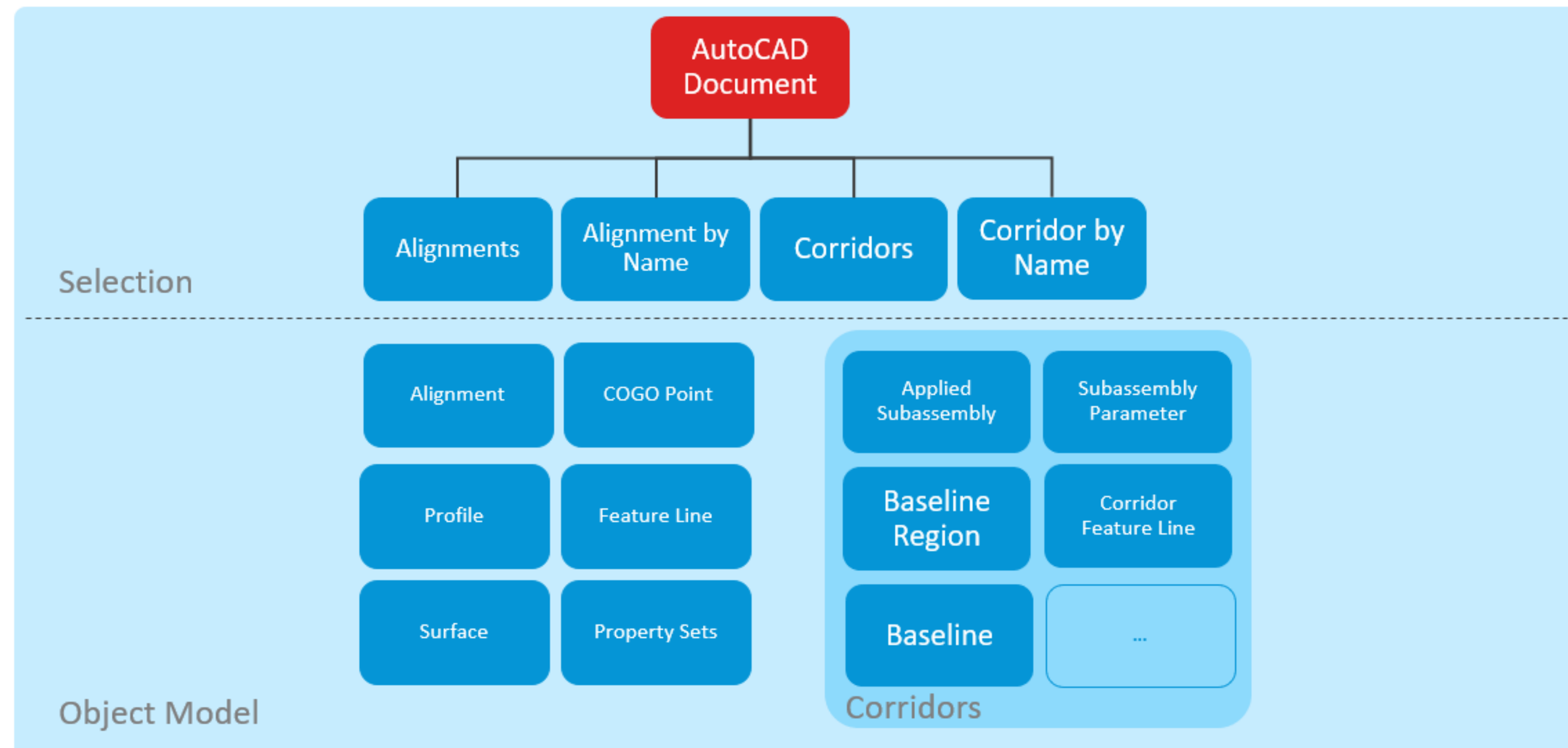
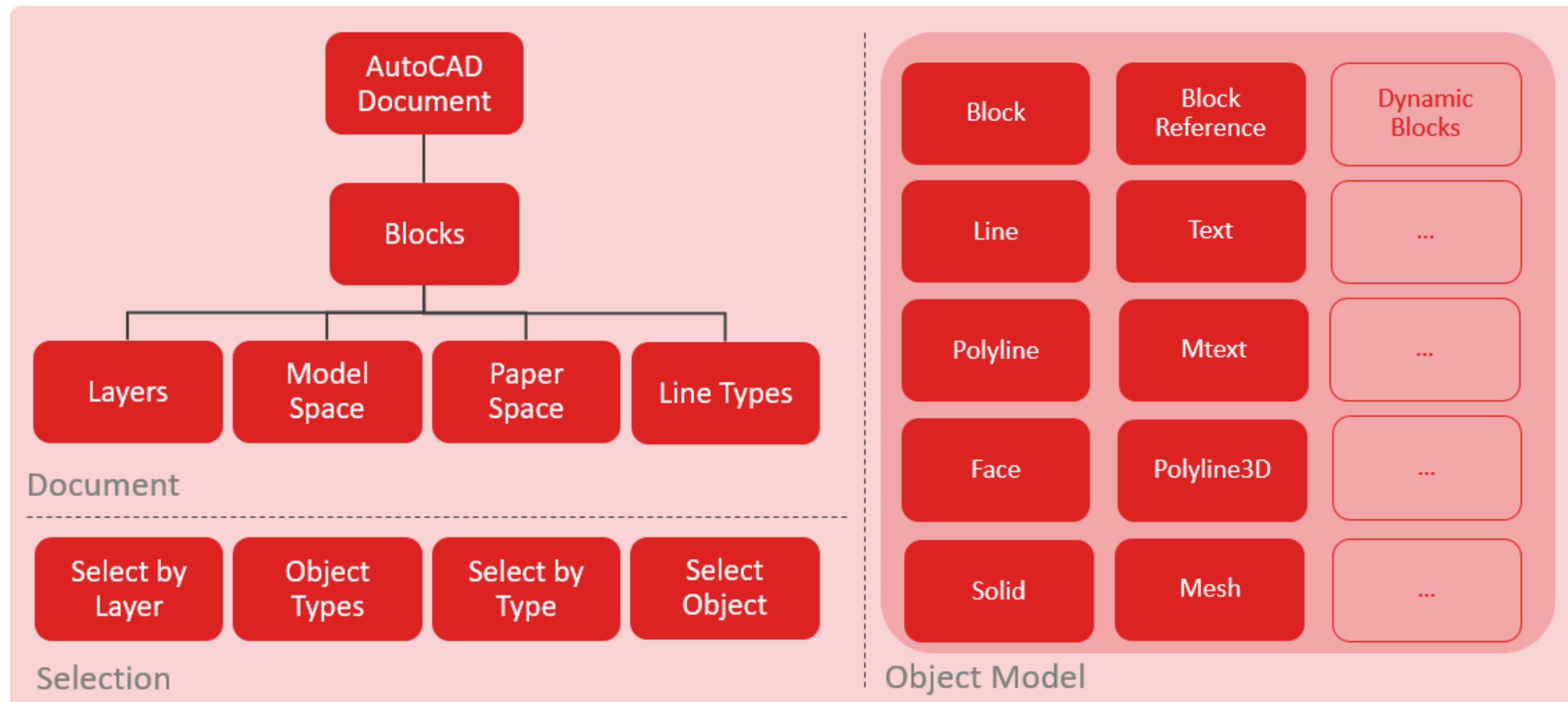
What is Dynamo



Visual Programming



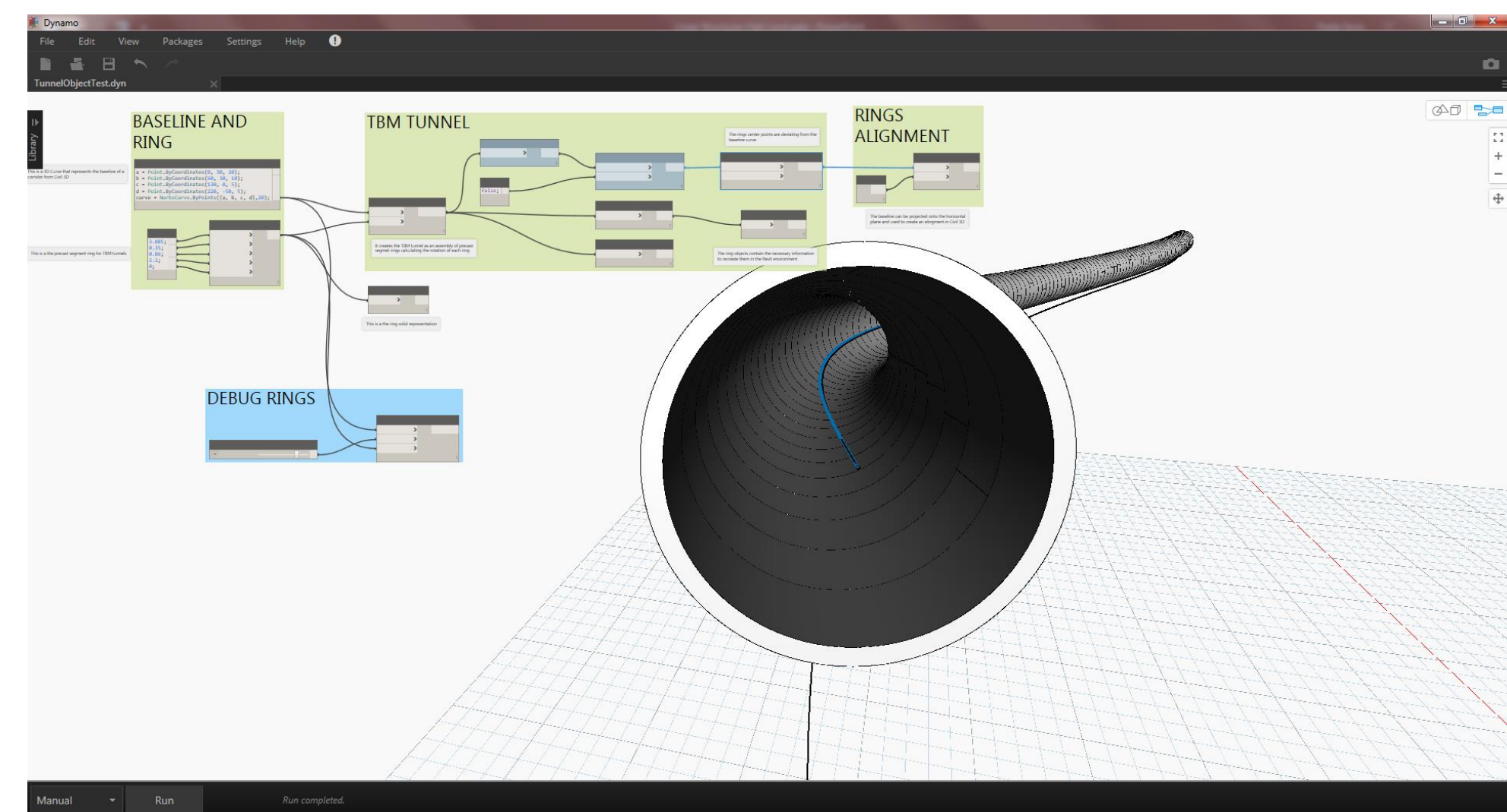
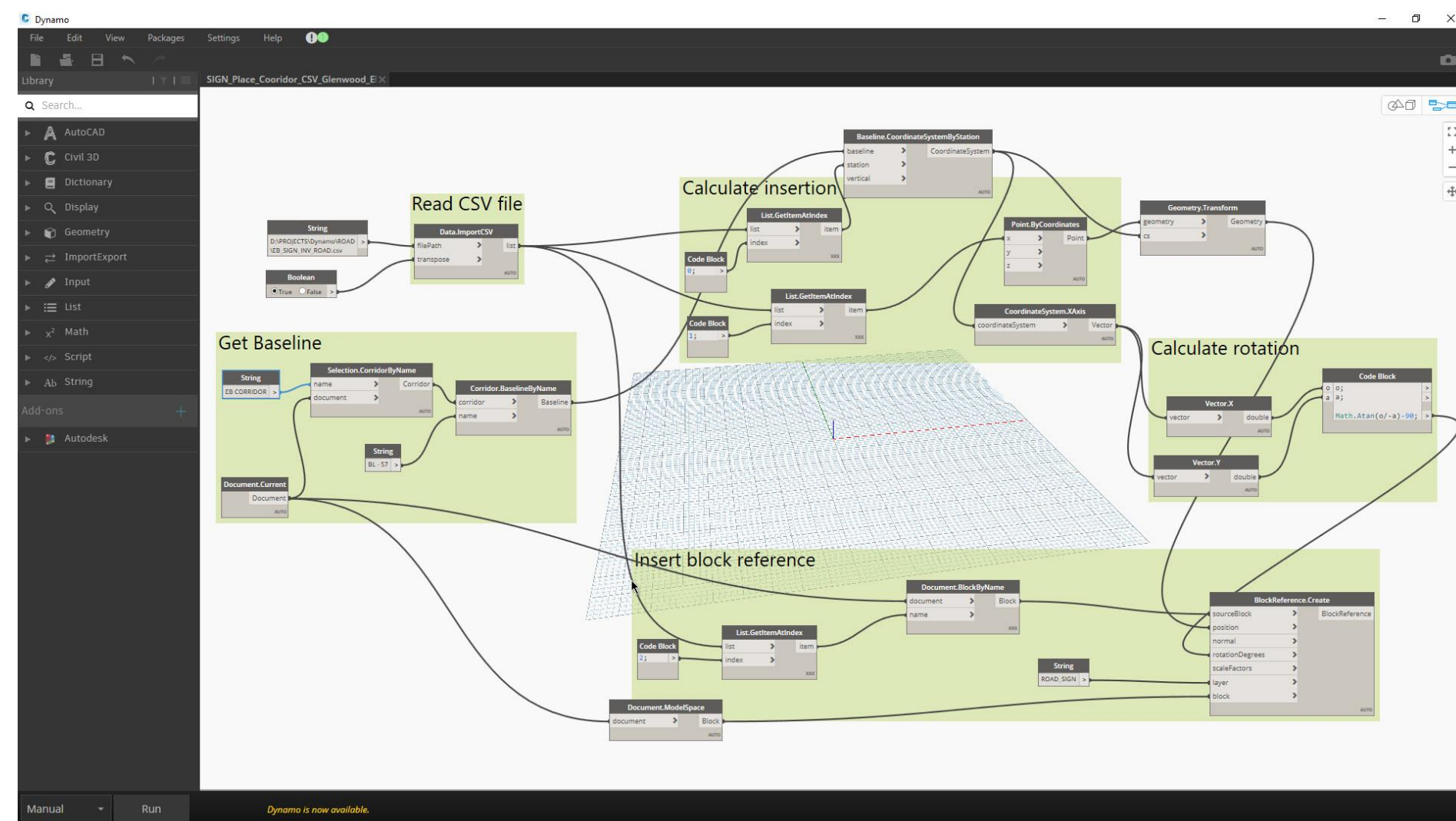
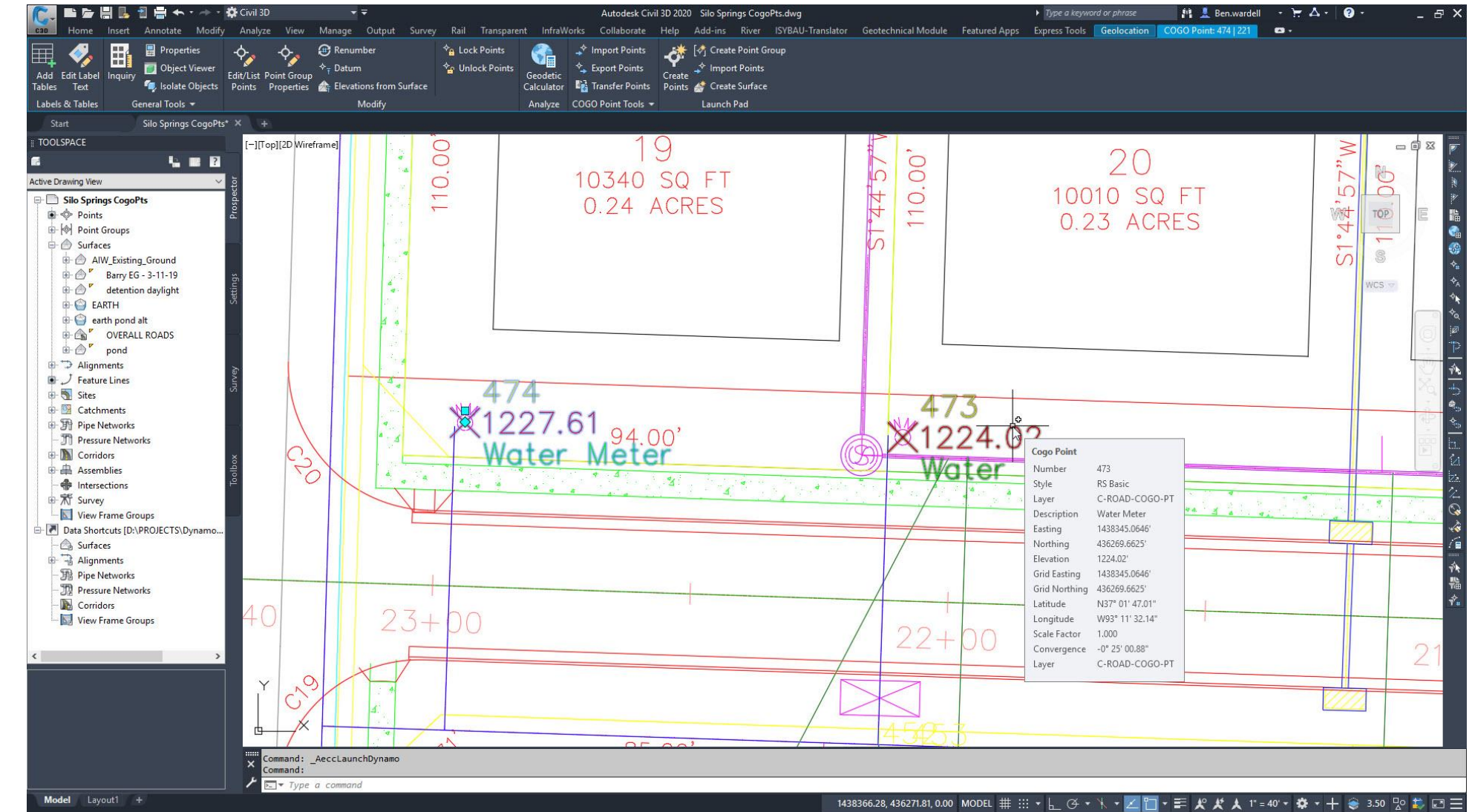
Dynamo for AutoCad & Civil 3D



Use Cases

- Road Design
- Site Design
- Rail Design
- Integration
- Civil 3D Toolkit

...



Dynamo for Civil 3D – Rail Design



AUTODESK® ARCHITECTURE,
ENGINEERING & CONSTRUCTION
COLLECTION

Dynamo for Civil 3D

Design Automation



Dynamo for Civil 3D – Parametric Array

The screenshot displays the Autodesk Civil 3D 2020 interface with a Dynamo parametric array workflow. The workflow is titled "ParametricArray.dyn*" and is set up to create a grid of blocks on a 3D plane. The inputs are:

- Select Object:** A "Nothing selected." message.
- Overall Width:** A slider set to 150.
- Distance Between Blocks X:** A slider set to 20.
- Overall Height:** A slider set to 250.
- Distance Between Blocks Y:** A slider set to 30.
- Rotation:** A slider set to 0.
- Layer Name:** A dropdown menu set to "C ROAD_BLOCK".

The workflow uses the following nodes:

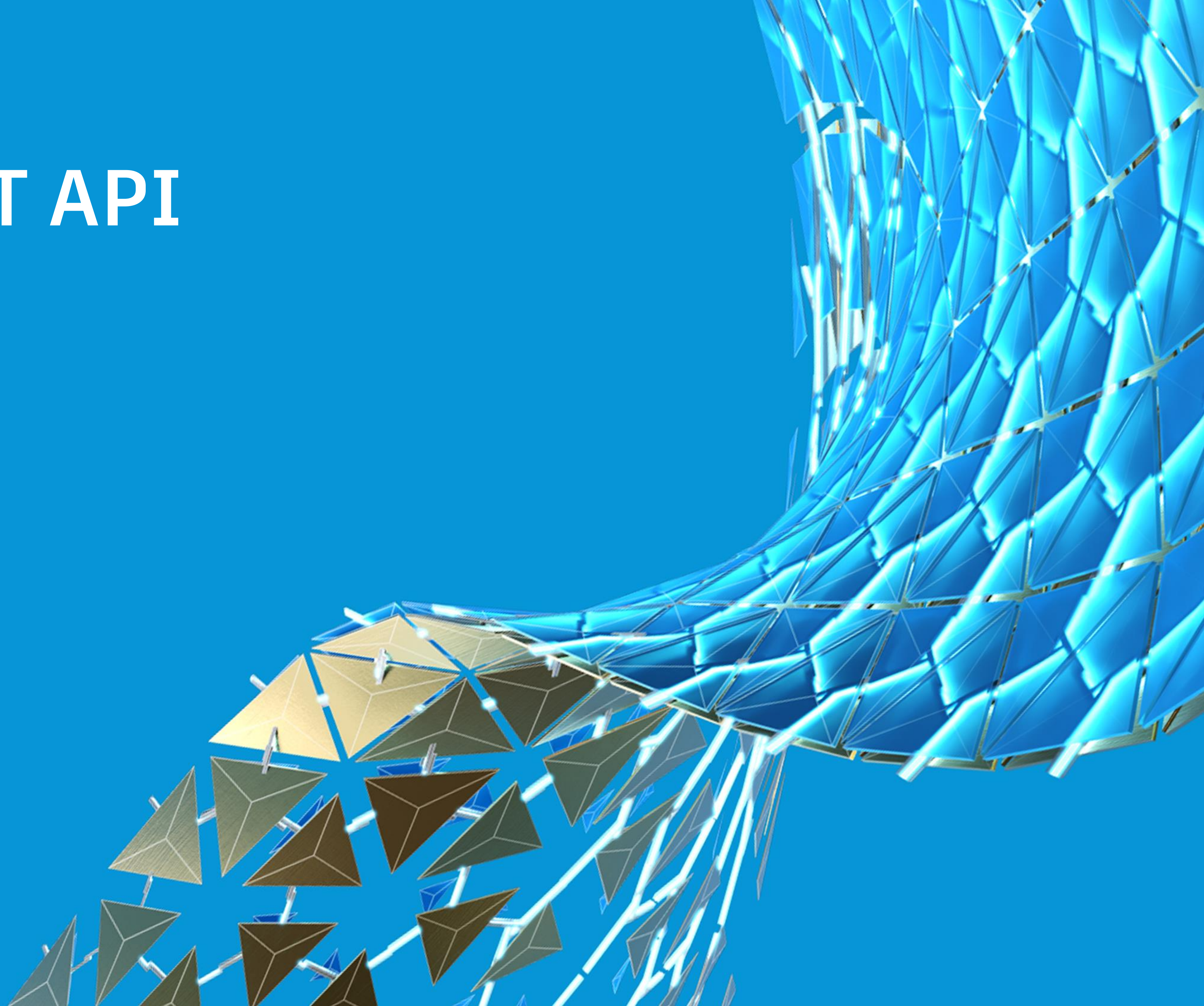
- BlockReference.Block:** A node that takes a block reference as input.
- Code Block:** Two code blocks that take the width and distance X inputs and output the x and y coordinates for the blocks.
- Point.ByCoordinates:** A node that takes the x and y coordinates and outputs a point.
- BlockReference.Create:** A node that takes a source block, position, normal, rotation degrees, scale factors, layer, and block as input.
- Document.Current:** A node that takes the current document as input.
- Document.ModelSpace:** A node that takes the current model space as input.

The workflow is executed, and the result is a grid of blocks on a 3D plane. The command line shows the command: `_AeccLaunchDynamo` and the message: `Specify scale factor or [Copy/Reference]: 2`.

Dynamo for Civil 3D

Power					
Skill Required					
Time to Build					
Flexibility					
Robustness					
Deployment					

Civil 3D .NET API



Civil 3D .NET API

Direct Link
Collapse All Code: All

Autodesk.Civil Namespace

- AccelerationUnitType Enumeration
- AlignmentDesignCheck Class
- AlignmentDesignCheckCollection Class
- AlignmentDesignCheckRoot Class
- AlignmentDesignCheckType Enumeration
- AlignmentDividedPivotType Enumeration
- AlignmentLockModeType Enumeration
- AlignmentMedianTreatmentType Enumera
- AlignmentPointType Enumeration
- AlignmentTransitionSegmentType Enumer
- AlignmentUndividedPivotType Enumeratio
- AlignmentUpdateModeType Enumeration
- AnchorLocationType Enumeration
- AnchorPointType Enumeration
- AngleFormatType Enumeration
- AngleUnitType Enumeration
- AreaUnitType Enumeration
- ArrowHeadFitType Enumeration
- ArrowHeadSizeType Enumeration
- ArrowHeadType Enumeration
- AssemblyDisplayStyleType Enumeration
- AssemblyGroupNameType Enumeration
- BandLocationType Enumeration
- BandType Enumeration
- BearingQuadrantType Enumeration
- BlockAttachmentType Enumeration
- CantPivotMethodType Enumeration
- CantPointType Enumeration
- CantStationRoundingType Enumeration
- CantViewDisplayStyleType Enumeration
- CapitalizationType Enumeration
- CatchmentObjectType Enumeration
- CatchmentRainfallTravelTimeUnitType Enu
- CatchmentShallowConcentratedFlowSurfa
- CatchmentTimeOfConcentrationMethodTy
- CatchmentWatershedObjectType Enumera
- CivilException Class
- CivilVersion Enumeration
- Constant Class
- CorridorAlongCurveOption Enumeration
- CorridorAlongOffsetTargetCurveOption En
- CorridorRegionLockType Enumeration
- CrossingBreaklinesElevationType Enumera
- CrossSectionShapeType Enumeration
- CurbReturnType Enumeration
- DecimalCharacterType Enumeration
- DeprecatedVersionAttribute Class
- DesignCheck Class
- DesignCheckCollection<Autodesk::Civil::I
- DesignCheckCollection<Autodesk::Civil::I
- DesignSpeedLookupMethodType Enumera
- DimensionAnchorOptionType Enumeratio
- DimensionAnchorType Enumeration
- DirectionDisplayType Enumeration
- DirectionNameDisnlayType Enumeration

Civil 3D .NET API Reference

Autodesk.Civil Namespace

[Send Feedback](#)

Classes









	Class	Description
	AlignmentDesignCheck	The Alignment design check class.
	AlignmentDesignCheckCollection	The AlignmentDesignCheckCollection class.
	AlignmentDesignCheckRoot	The AlignmentDesignCheckRoot class.
	CivilException	Base class for all Civil exceptions.
	Constant	Constants used by the Civil API.
	DeprecatedVersionAttribute	Marks the program elements' version when they are deprecated.
	DesignCheck	The abstract design check class.
	DesignCheckCollection<Autodesk::Civil::AlignmentDesignCheck ^>	
	DesignCheckCollection<Autodesk::Civil::ProfileDesignCheck ^>	
	EntityNotFoundException	The exception that's thrown when an attempt is made to access a non-existent entity. For example, calling ProfileEntity.EntityBefore() on the first entity.
	ErrorStatusText	
	GeometryPointLabelOption(T)	This class controls the selection state of a point type. The class is implemented as a generic that can be parameterized on the point type to manage.
	GeometryPointSelector(T)	This class encapsulates the functionality to allow selecting and un-selecting point types.
	InternalC3DPipesToStmMigration	
	PointNotOnEntityException	The exception that is thrown when there is an attempt to use point coordinates that do not exist. For example, calling Alignment.PointLocation() for a negative station number.
	ProfileDesignCheck	The Profile design check class.
	ProfileDesignCheckCollection	The ProfileDesignCheckCollection class.
	ProfileDesignCheckRoot	The ProfileDesignCheckRoot class.
	ProjectionUtil	
	Property<Autodesk::AutoCAD::Colors::Color ^,AcCmColor,Autodesk::Civil::CastOp<Autodesk::AutoCAD::Colors::Color ^,AcCmColor> >	
	Property<Autodesk::AutoCAD::DatabaseServices::ObjectId,AcDbObjectId,Autodesk::Civil::CastOp<Autodesk::AutoCAD::DatabaseServices::ObjectId,AcDbObjectId> >	
	Property<Autodesk::AutoCAD::DatabaseServices::ObjectIdCollection ^,std::vector<AeccAttribute,std::allocator<AeccAttribute> >,Autodesk::Civil::CastOp<Autodesk::AutoCAD::DatabaseServices::ObjectIdCollection ^,std::vector<AeccAttribute,std::allocator<AeccAttribute> > > >	
	Property<bool,bool,Autodesk::Civil::CastOp<bool,bool> >	
	Property<double,double,Autodesk::Civil::CastOp<double,double> >	
	Property<int,int,Autodesk::Civil::CastOp<int,int> >	

Use Case




Apps Publishers

Search Apps Autodesk Civil 3D Show All

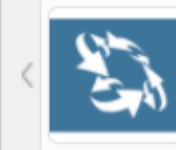
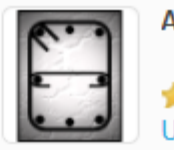

Featured Apps

 Husson Tool - Crossing Pipe Label ★★★★★(9) Free	 CAD-Earth ★★★★★(19) Trial	 Pressure Network PE catalog for EU market ★★★★★(6) Free	 Style Component Find and Replace ★★★★★(5) Free
 SmartDraft Associate Survey Working Folder Trial ★★★★★(0) Trial	 Planting F/X ★★★★★(0) Trial	 DWGintVer ★★★★★(0) USD 19.00	 Zero Level Pro ★★★★★(5) USD 25.00




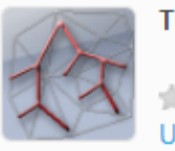

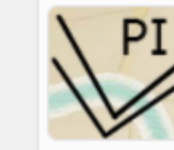




Most Popular Apps

 Drawing Purge ★★★★★(204) Free	 Civil Table E... ★★★★★(44) Free	 SketchUp Im... ★★★★★(7) Free
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Most Popular Paid Apps

 AVCAD ★★★★★(6) USD 50.00/M	 AutoRebar ★★★★★(11) USD 112.00	 JTB SSMPro... ★★★★★(6) USD 95.00
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Featured Paid Apps

 Lot Grading Tools ★★★★★(0) USD 100.00/M	 Auto Road Corridor ★★★★★(1) USD 5.00	 TTH Quick Pipe Slope ★★★★★(2) USD 24.99/Y	 TL Grade Tree ★★★★★(0) USD 20.00/Y	 Pipes Toolbox ★★★★★(2) USD 100.00
 PI Station Label ★★★★★(1) USD 5.00	 Convert To Point ★★★★★(0) USD 3.00	 JTB VPLayer Tools ★★★★★(0) USD 10.00	 One Key Shortcuts ... ★★★★★(0) USD 15.80	 Helmert Transform... ★★★★★(1) USD 150.00/Y

Autodesk Civil 3D ribbon menu:

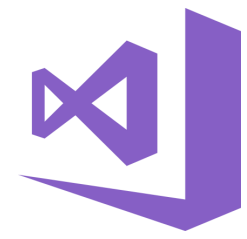
- Home: Style Lựa chọn, V3-Style, Nhập dữ liệu, Điểm Point, Địa chất, V3-Khảo sát
- Annotate: Tính toán, V3-San Nền
- Modify: Hỗ trợ, Thống kê
- Analyze: Bề mặt, Tuyến, Trắc ngang, Trắc dọc, V3-Thiết kế
- View: Bình đồ, Trắc ngang, Thoát nước
- Manage: Trắc ngang, Thoát nước
- Output: Trắc ngang, Thoát nước
- Survey: Trắc ngang, Thoát nước
- Rail: Trắc ngang, Thoát nước
- Transparent: Hãm ga-Cống
- InfraWorks: Thoát nước, Giao thông
- Collaborate: Thoát nước, Giao thông
- Help: AutoCAD, Civil3D, V3-Hỗ Trợ
- Add-ins: Thư Viện, V3-Thư Viện
- Express Tools: - In bản vẽ hàng loạt, V3-In ấn
- Featured Apps: Quản lý thông tin, V3-Thông tin
- V3ToolsE 1.0: Quản lý thông tin, V3-Thông tin
- V3Tools 2020 V5: Chat hỗ trợ, V3-Chat

.NET API – Multiple profileviews for Alignment

CREATE MULTIPLE PROFILEVIEWS
AND
AUTOMATIC CREATE DESIGN BY LAYOUT

.NET API – Multiple profileviews for Pressure Networks

CREATE MULTIPLE PROFILEVIEWS
FOR PRESSURE NETWORKS
V3TOOLS



.NET API

Power



Skill Required



Time to Build



Flexibility



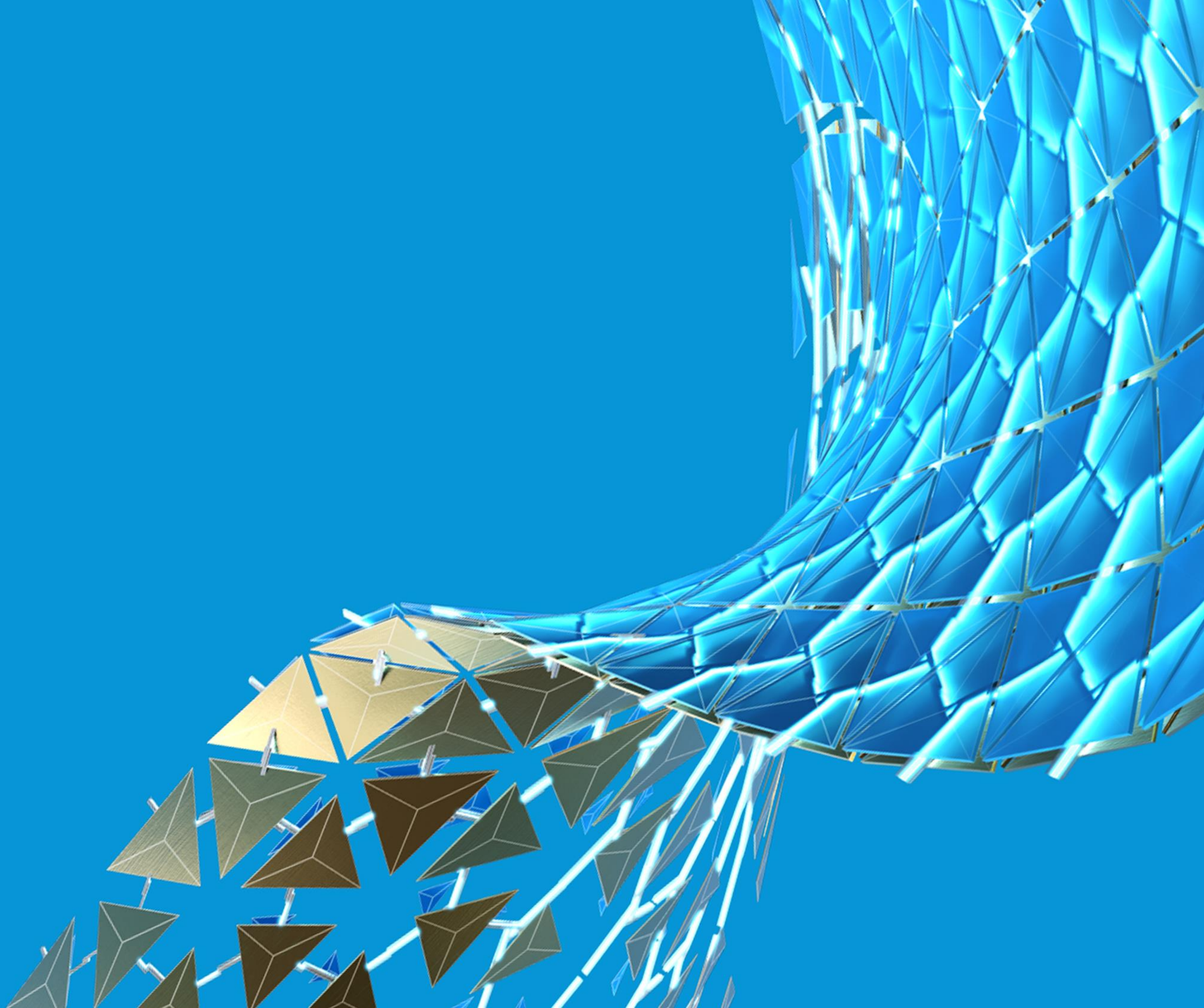
Robustness



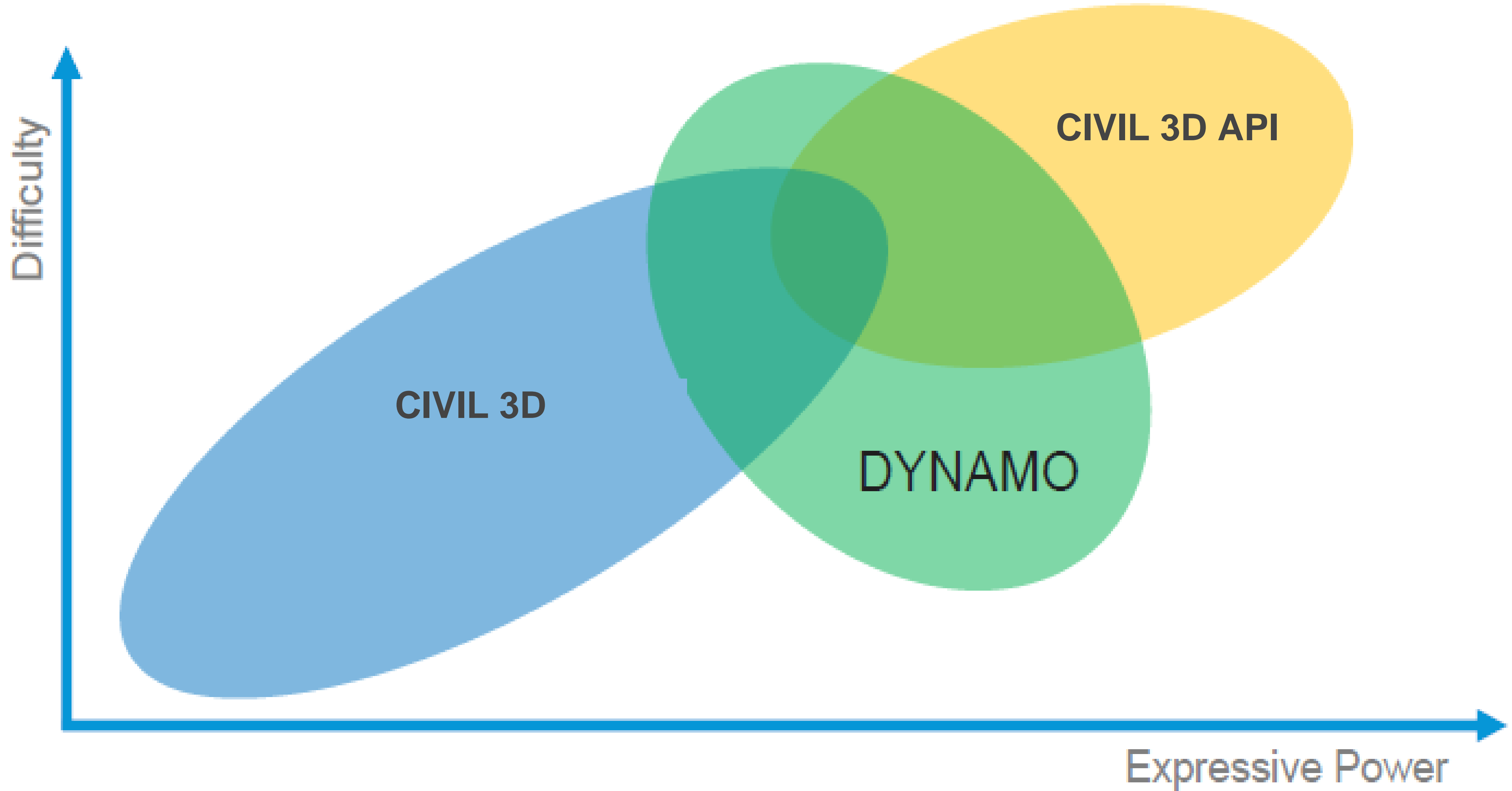
Deployment



Conclusion



Automation in Civil 3D





Summary



	Power	
	Skill Required	
	Time to Build	
	Flexibility	
	Robustness	
	Deployment	

The goals and complexity of your task, along with many of the factors discussed will help you decide which option (Dynamo or .NET API) is most suitable for your company and situation.

**BEGIN WITH THE
END IN MIND.**

And **KEEP LEARNING!**

Learning Objectives

1

AUTOMATION

Learn how automation can help us achieve more, better with less in Civil 3D

2

DYNAMO

Learn how to use Dynamo for Civil 3D to automate repetitive tasks

3

.NET API

Learn how to develop an Autodesk Civil 3D add-in with the .NET API

4

SUITABLE SOLUTION

Understand which solution is more suitable to do tasks in some typical cases



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