AUTODESK. UNIVERSITY

The Evolution of a Digital Factory

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Veera Pandian

Sr. Technical Specialist – D&M | @UnivGem

Keerti Malavooru

Sr. Technical Specialist – D&M

About the speakers

Sanjeev Ghosh

A mechanical engineer by training, Sanjeev has an experience in design in manufacturing packaging products for FMCG, Agro Chemicals, Healthcare and Lubricant industry functions. At Autodesk, Sanjeev is member of the Technical Specialists team and supports sales efforts with MMA and D&M territory customers.

Veera Pandian

Senior Technical Specialist at Autodesk for India & SAARC countries with 20 years of experience in the Manufacturing Industry. In his current role at Autodesk, he works with Manufacturing OEMs and Vendors to assess their current Design, Engineering & Manufacturing processes and put together the right set of solutions to help them improve and implement best practices.

Keerti Malavooru

Keerti is a mechanical engineer graduate with 15+ years of Industry experience in design and thermal management. At Autodesk, he is responsible for the overall technical strategy to support sales effort in ensuring customer success.

Agenda

A stepwise approach to creating true Digital factory. This course intends to showcase the journey right from concept to the commissioning of the factory.

Areas covered

- Site Planning
- Building design integration
- Factory Layout
- Coordination and Review
- Interactive Visualisation of the Digital Factory

Factory Facilities Model – Current State

CIVIL ENGINEERING

LAND DEVELOPMENT

APPROACH / INTERNAL ROADS

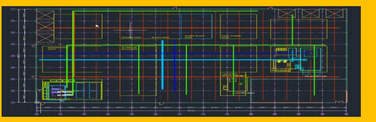
FACTORY SITE

GENERAL CONTRACTOR

ARCH. ENGG. FIRM

BUILDING AND BUILDING SUPPORT EQUIPMENT

MFG BUILDING

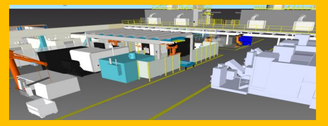


MFG ENGINEERING

SYSTEMS INTEGRATION

MFG EQUIPMENT

MFG FLOOR



Factory Facilities Model – Desired State

CIVIL ENGINEERING

LAND DEVELOPMENT

APPROACH / INTERNAL ROADS

GENERAL CONTRACTOR

ARCH. ENGG. FIRM

BUILDING AND BUILDING SUPPORT EQUIPMENT

MFG ENGINEERING

SYSTEMS INTEGRATION

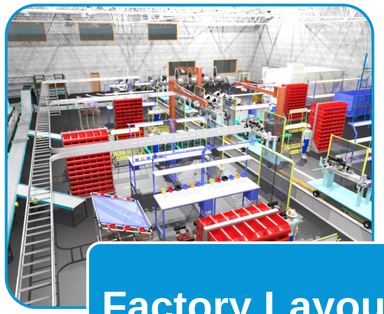
MFG EQUIPMENT

MANUFACTURING FACILITY

The Journey

Site Planning

Building Model Integration



Factory Layout

Coordination & Review

Interactive Visualisation

Factory Layout image courtesy - Vimek

Coordination and Installation image courtesy - Packaging Automation layout provided by Barry-Wehmiller Design Group, Inc

The Journey

Site Planning

Building Model Integration

Factory Layout

Coordination & Review

Interactive Visualisation

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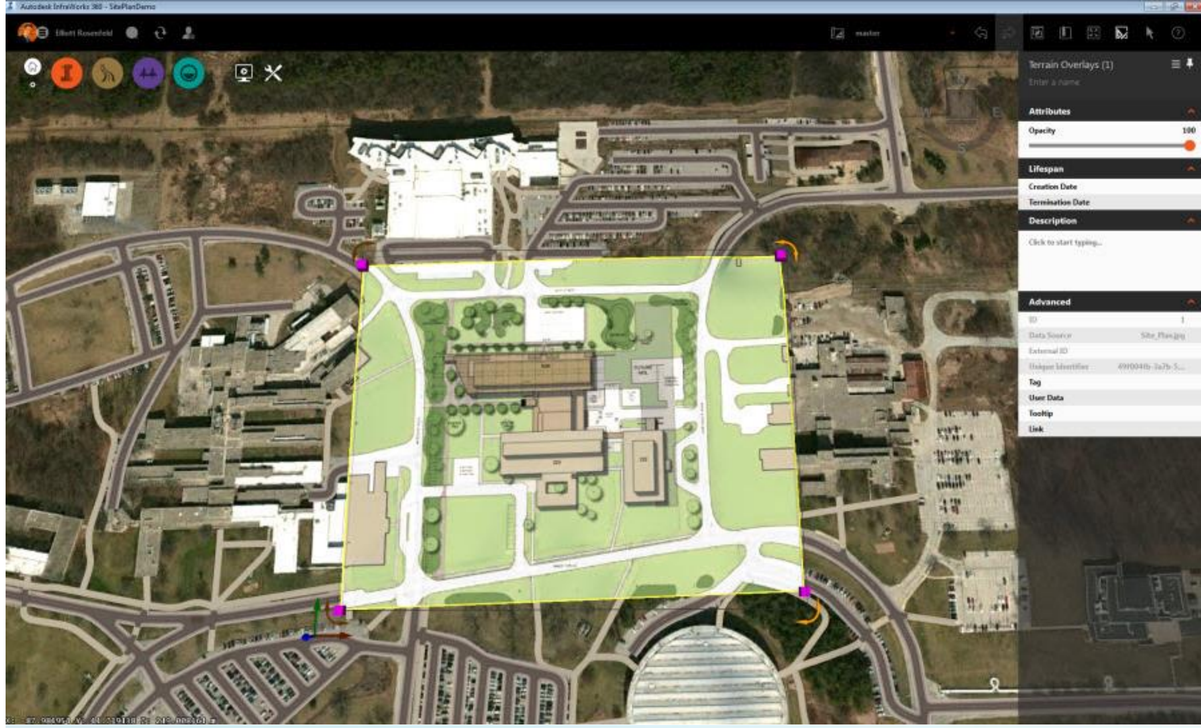
Site Planning

Why

- A Factory is not just a building and a collection of equipment. It is a facility connected to the ecosystem around it.

How

- InfraWorks® civil infrastructure conceptual design software lets AEC professionals model, analyse and visualise their design concepts within a real-world context of the built and natural environment —improving decision making and project outcomes.
- Using Infraworks we locate the area where we want to set up our factory.



AUTODESK®
INFRAWORKS®

Open...

New...

Model Builder...

Recent

BIM 360

What's new

Online Help

Community

Online Training Offers

Recent

Roads Tutorial (July 2020)

16 Oct 2020 12:13:58

Charlotte NC (July 2020)

https://youtu.be/94o4uAB58KE

The Journey

Site Planning

Building Model integration

Factory Layout

Coordination & Review

Interactive Visualisation

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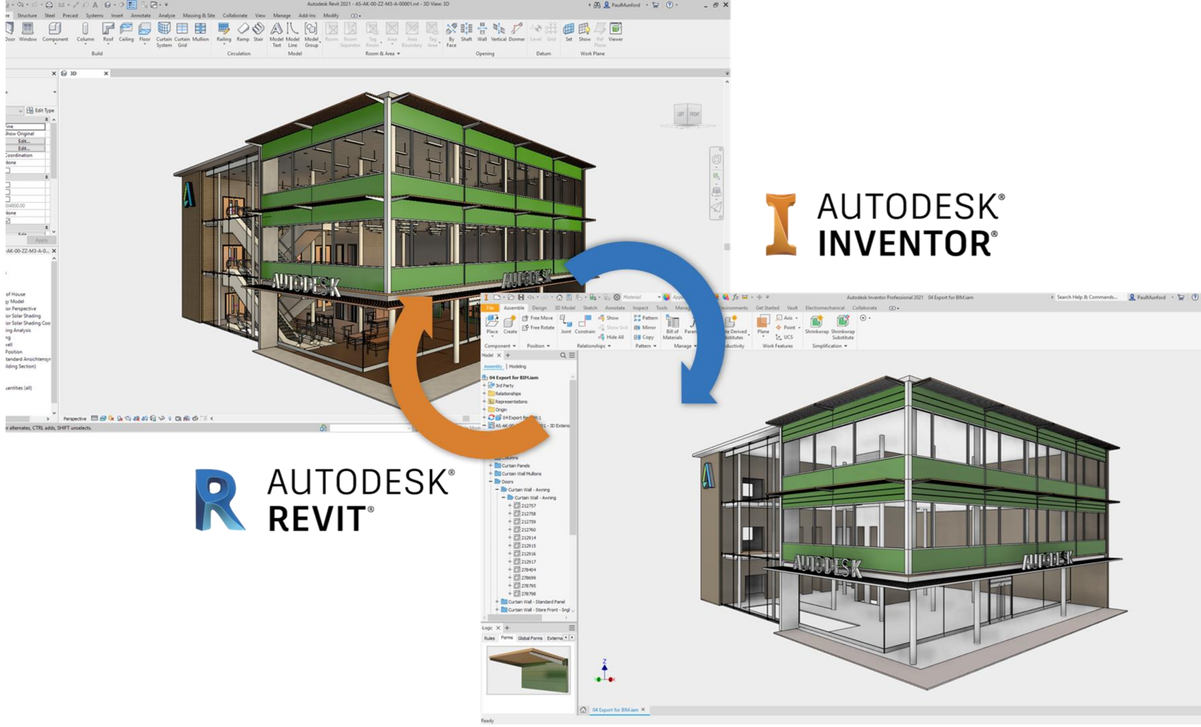
Building Design integration

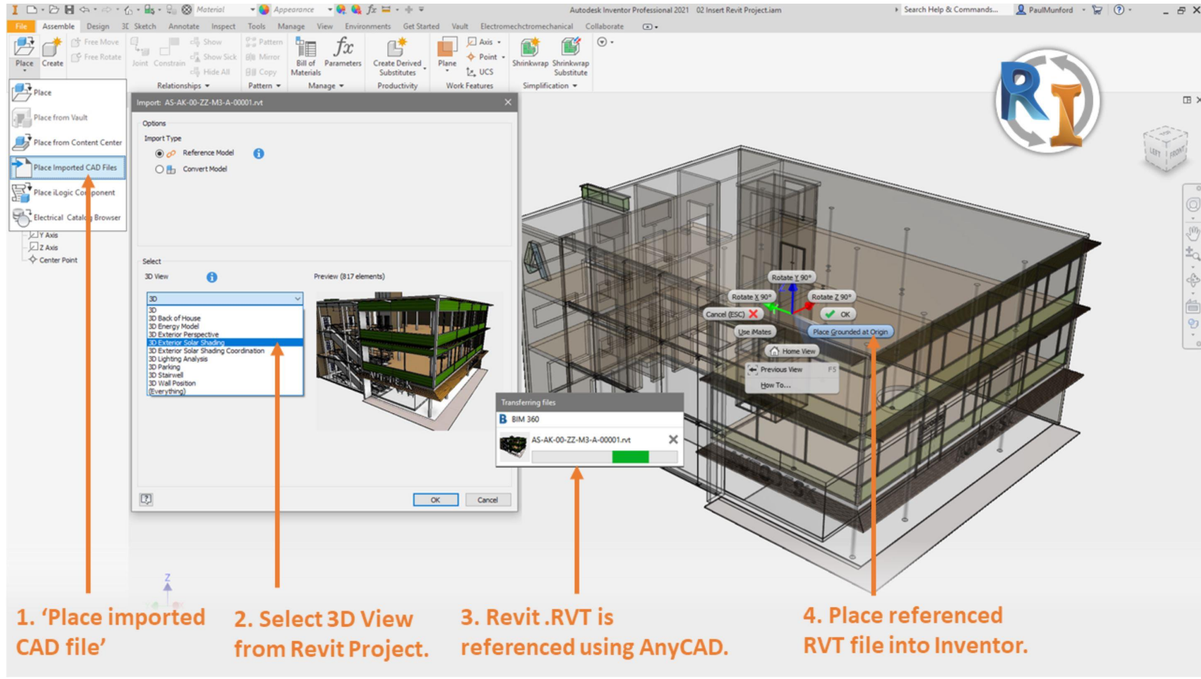
Why

- Building model needs to be referenced for custom manufacturing of building components
  - chimneys, railings, staircases, awnings, etc
- Enables integrated, connected and configurable design elements

How

- Reference Revit Project files into Inventor through AnyCAD
- 3D views created within Autodesk® Revit® models can be used for import into Inventor.
- Users can use these views to filter out non-essential data.
- Ensures the mechanical design can be built in-context and reference a common building origin.
- AnyCAD for Revit enables changes made in Revit model to update inside of Inventor





Autodesk Revit 2021 - ManufacturingBuilding.rvt - 3D View: 3D Whole Building

veerap

File | Architecture | Structure | Steel | Precast | Systems | Insert | Annotate | Analyze | Massing & Site | Collaborate | View | Manage | Add-Ins | Vault | Modify

Modify | Select

View Templates | Visibility/ Graphics | Filters | Thin Lines | Show Hidden Lines | Remove Hidden Lines | Cut Profile — Graphics

Render | Render in Cloud | Render Gallery — Presentation

3D View | Section | Callout | Plan Views | Elevation | Drafting View | Duplicate View | Legends | Schedules | Scope Box — Create

Sheet | View | Title Block | Revisions | Guide Grid | Matchline | View Reference | Viewports — Sheet Composition

Switch Windows | Close Inactive | Tab Views | Tile Views — Windows

User Interface

Properties

3D View

3D View: 3D Whole Building | Edit Type

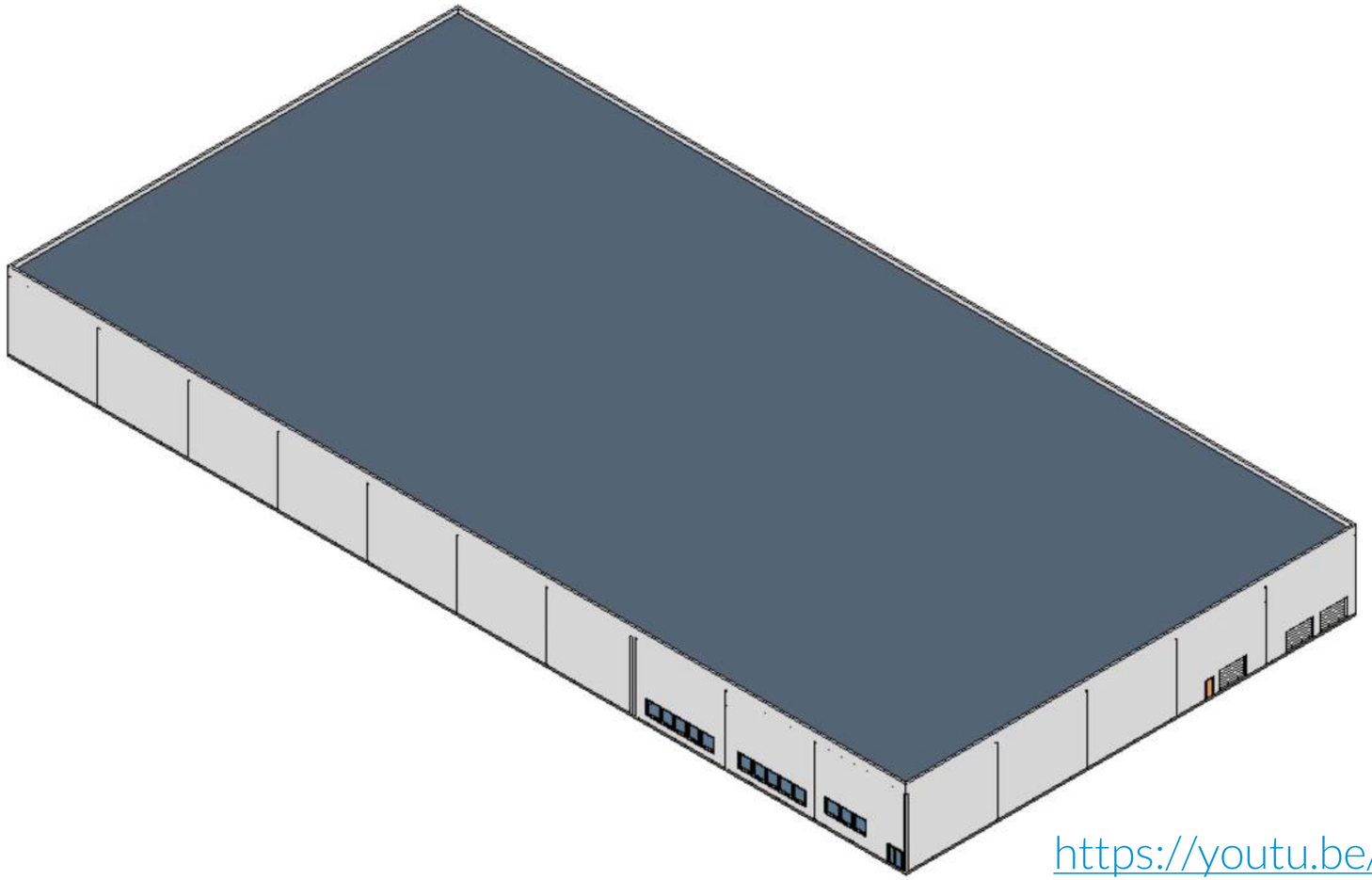
Graphics	
View Scale	1/8" = 1'-0"
Scale Value 1:	96
Detail Level	Fine
Parts Visibility	Show Original
Visibility/Graphic...	Edit...
Graphic Display ...	Edit...
Discipline	Architectural
Show Hidden Lines	By Discipline
Default Analysis ...	None
Sun Path	☐
Extents	

Properties help | Apply

Project Browser - ManufacturingBuilding.rvt

- Level 1
- Level 2
- Site
- Top of Truss
- Ceiling Plans
  - Level 1
  - Level 2
  - Top of Truss
- 3D Views
  - **3D Whole Building**
  - No Trusses
  - NoRoof
- Elevations (Building Elevation)
  - East
  - North
  - South
  - West
- Sections (Building Section)
  - Section 1

3D Whole Building | No Trusses | NoRoof



https://youtu.be/A63sUqQ34eQ

1/8" = 1'-0"

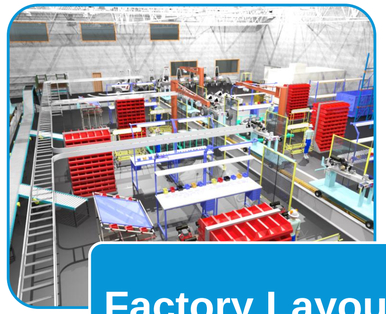
Click to select, TAB for alternates, CTRL adds, SHIFT unselects.

Main Model

The Journey

Site Planning

Building Model integration



Factory Layout

Coordination & Review

Interactive Visualisation

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Coordination and Installation image courtesy - Packaging Automation layout provided by Barry-Wehmiller Design Group, Inc

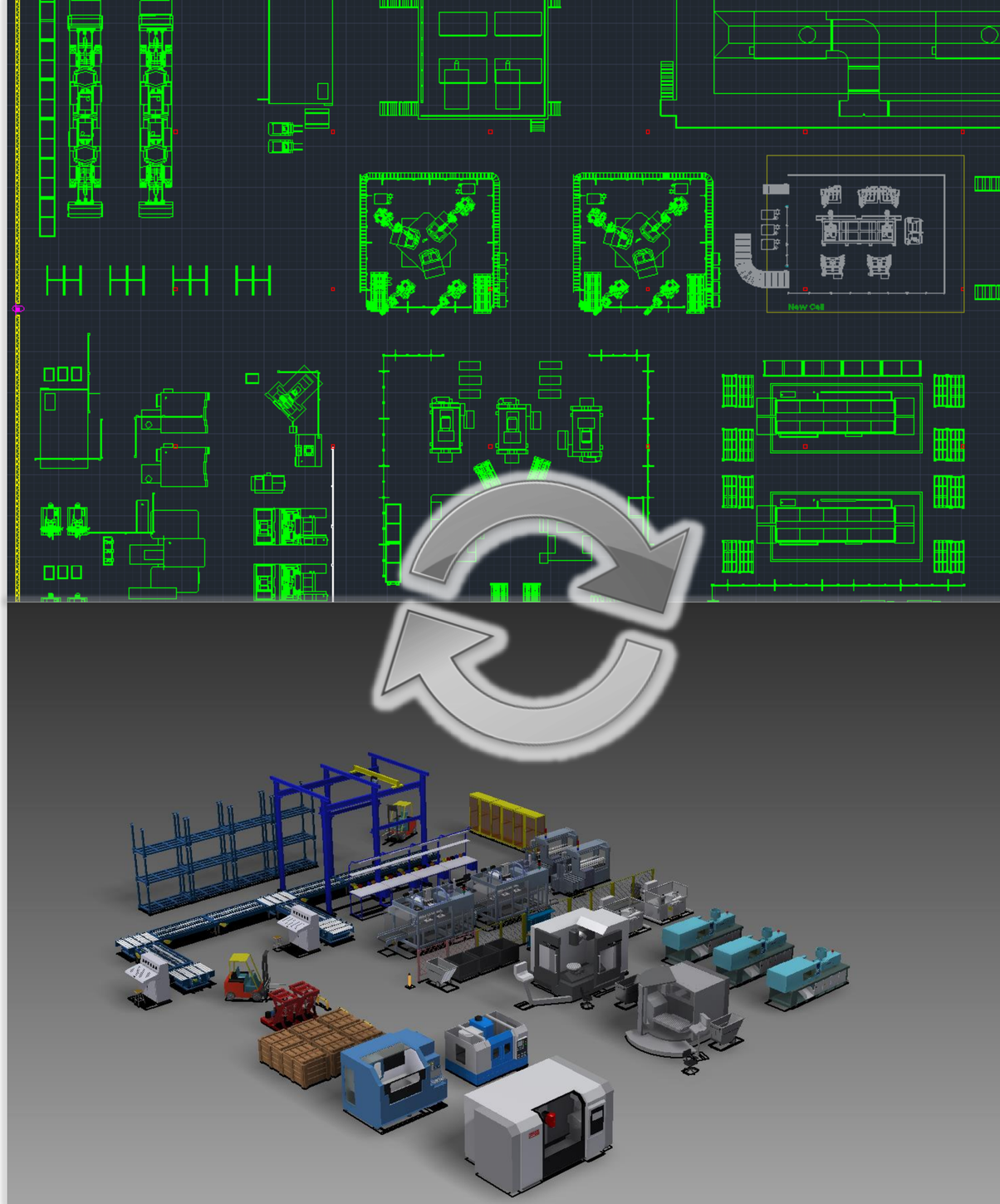
Factory Layout

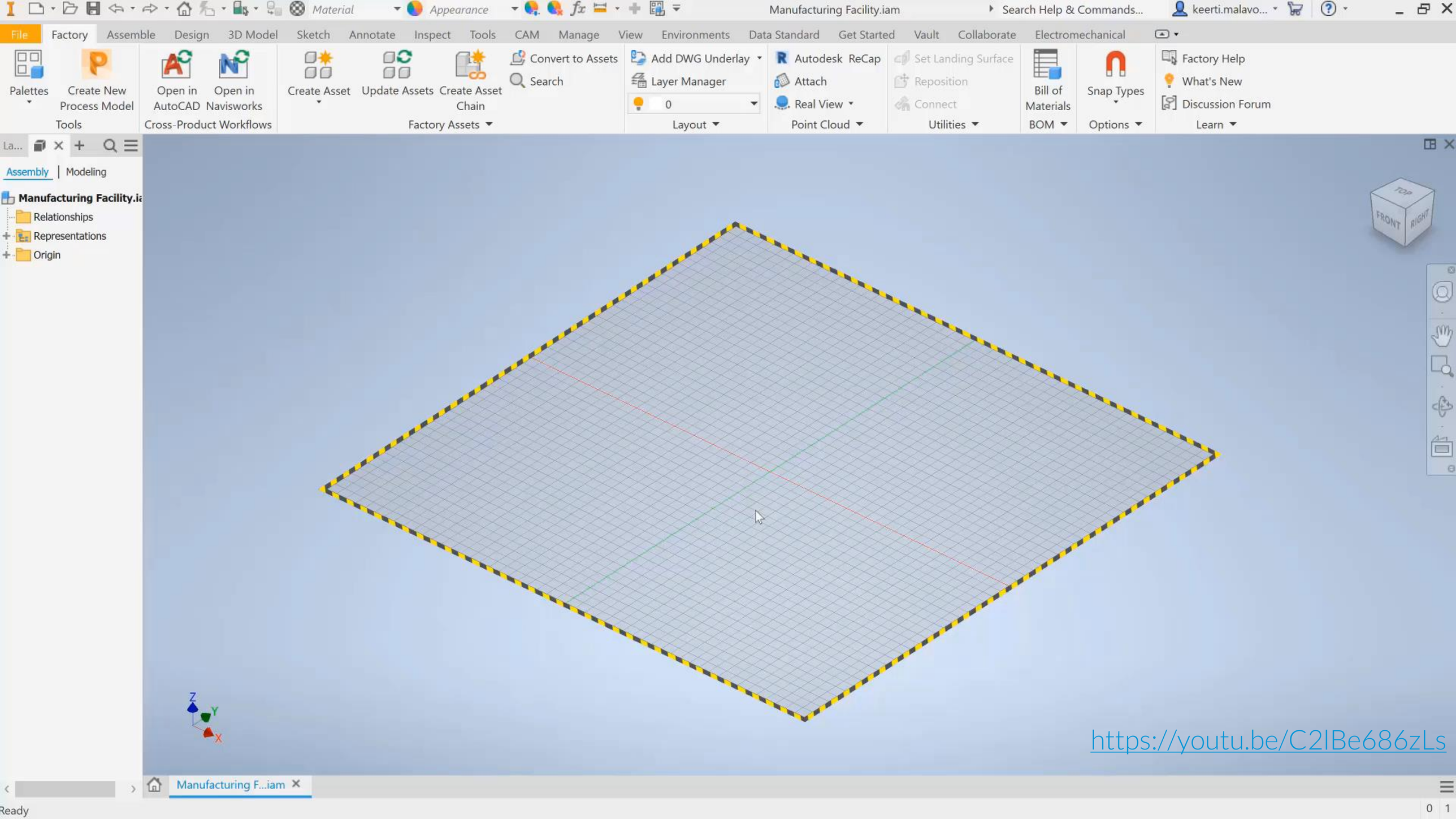
Why

- Easy communication of layout concepts
- Avoid common factory line change issues
- Ability to respond quickly to changing customer requirements
- Existing technologies are Discrete

How

- Leverage Smart Assets rich with metadata
- Reference Revit Building model for Factory Layout
- Easy drag and drop placement of factory components on the factory floor
- Convert 2D layouts into 3D layouts with a single click
  - Ensure form & fit
  - Sync Inventor - Interoperable 2D-3D layout workflows with 1:1 bidirectional associativity

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Data Standard
Get Started
Vault
Collaborate
Electromechanical
Palettes
Create New Process Model
Tools
Open in AutoCAD
Open in Navisworks
Cross-Product Workflows
Create Asset
Update Assets
Create Asset Chain
Convert to Assets
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Factory Assets
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Layer Manager
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Attach
Real View
Point Cloud
Set Landing Surface
Reposition
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Manufacturing F...iam
Ready

The Journey

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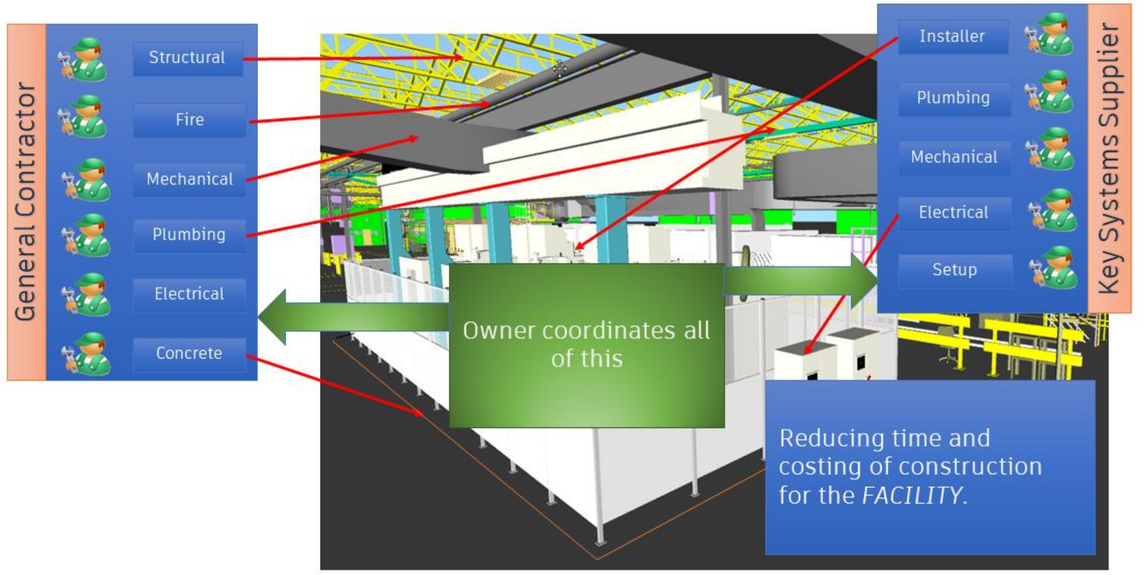
Coordination & Review

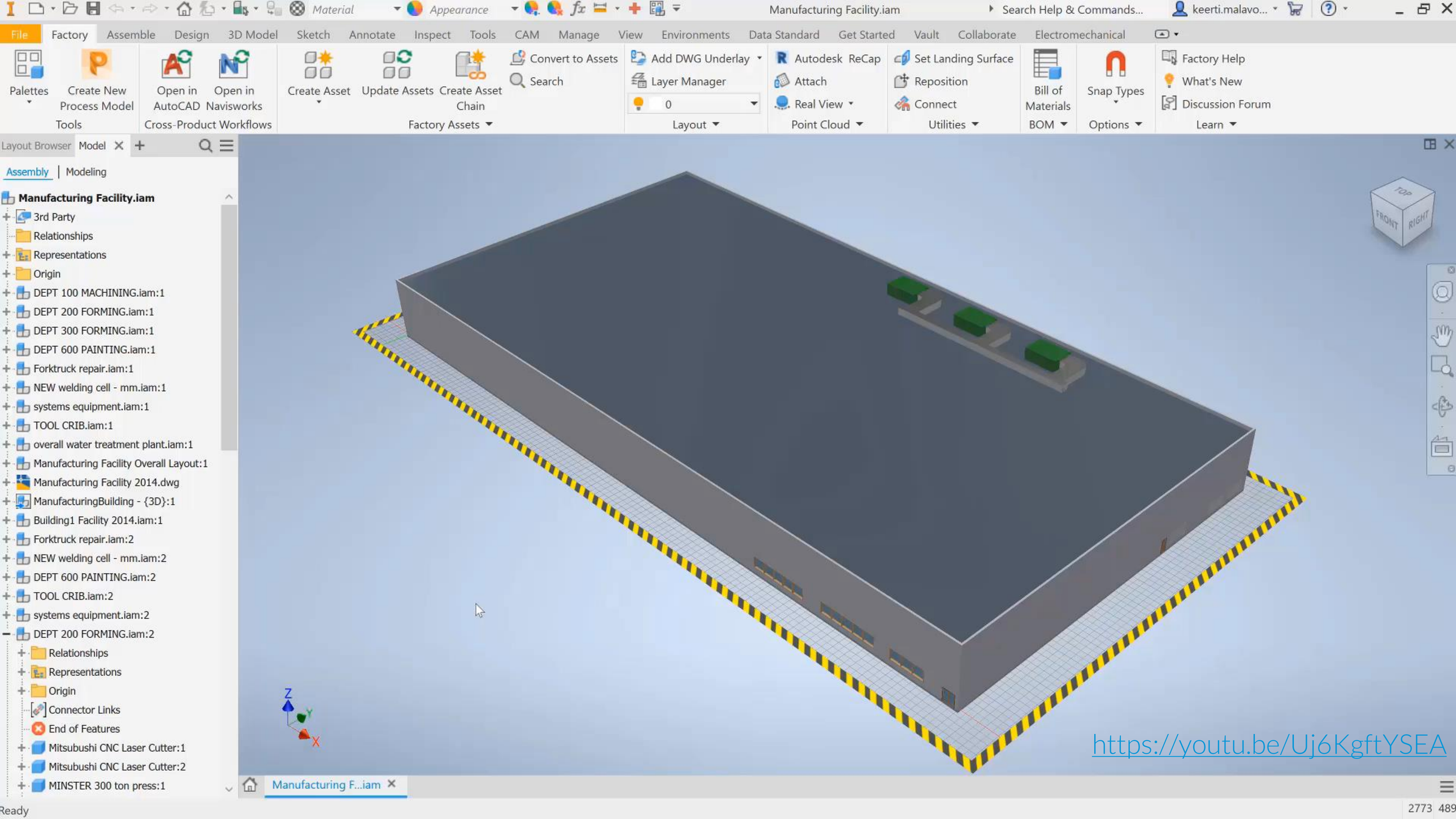


Why

- Enable efficient Collaboration and Communication across various stake holders
- Robust Design review of the Factory
- Detect clashes and collisions before project starts
- Pre-construction planning and sequencing

How

- Integrate equipment, production line layouts, building designs, and reality capture data as a single database of project information.
- Real-time navigation
- Review & Clash management
- Construction Planning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Collaborate
Electromechanical
Palettes
Create New Process Model
Tools
Open in AutoCAD
Open in Navisworks
Cross-Product Workflows
Create Asset
Update Assets
Create Asset Chain
Convert to Assets
Search
Factory Assets
Add DWG Underlay
Layer Manager
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Layout
Autodesk ReCap
Attach
Real View
Point Cloud
Set Landing Surface
Reposition
Connect
Utilities
Bill of Materials
BOM
Snap Types
Options
Factory Help
What's New
Discussion Forum
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Layout Browser
Model
Assembly
Modeling
Manufacturing Facility.iam
3rd Party
Relationships
Representations
Origin
DEPT 100 MACHINING.iam:1
DEPT 200 FORMING.iam:1
DEPT 300 FORMING.iam:1
DEPT 600 PAINTING.iam:1
Forktruck repair.iam:1
NEW welding cell - mm.iam:1
systems equipment.iam:1
TOOL CRIB.iam:1
overall water treatment plant.iam:1
Manufacturing Facility Overall Layout:1
Manufacturing Facility 2014.dwg
ManufacturingBuilding - {3D}:1
Building1 Facility 2014.iam:1
Forktruck repair.iam:2
NEW welding cell - mm.iam:2
DEPT 600 PAINTING.iam:2
TOOL CRIB.iam:2
systems equipment.iam:2
DEPT 200 FORMING.iam:2
Relationships
Representations
Origin
Connector Links
End of Features
Mitsubishi CNC Laser Cutter:1
Mitsubishi CNC Laser Cutter:2
MINSTER 300 ton press:1
TOP
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Manufacturing F...iam
Ready
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The Journey

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Interactive Visualisation

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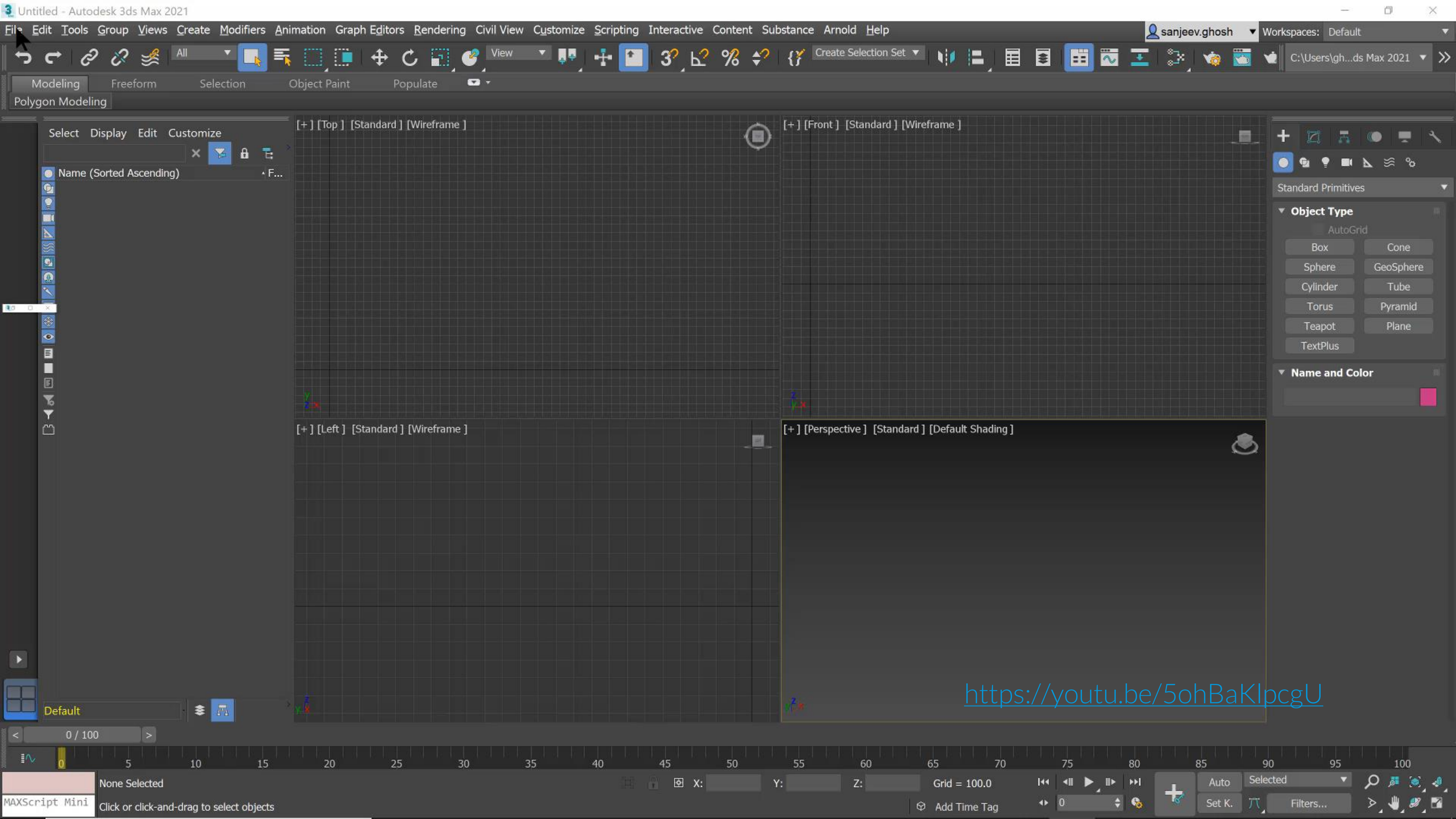
Interactive Visualisation

Why

- Design review in an immersive environment with life-size elements giving an opportunity to interact with the factory before it is built.

How

- Leverage data from multiple sources such as REVIT, INVENTOR and also 3rd party formats in 3DS Max Interactive.
- 3DS Max Interactive allows you to create output where you can interact with the factory similar to a video game.
- Use the same output for an immersive Virtual Reality experience.


Untitled - Autodesk 3ds Max 2021
File Edit Tools Group Views Create Modifiers Animation Graph Editors Rendering Civil View Customize Scripting Interactive Content Substance Arnold Help
sanjeev.ghosh
Workspaces: Default
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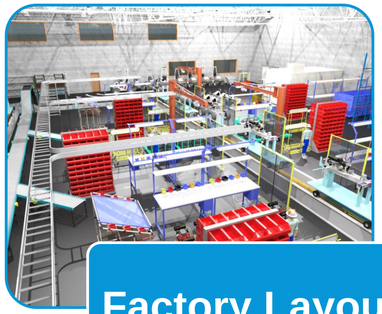
Summary

Site Planning

Building Model Integration



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