# Data transfer between CAD and DCC Applications

ПРИ ПОДДЕРЖКЕ

Rendered image by Dmitry «dimson3d» Chekhlov
Client: Solikamsk Museum of Local Lore
Interior design by Julia Morokhina

# Theme

In modern engineering processes we are use 2D drawing and 3D parametric modeling, based on 2D drawings and links between parts.

All geometry based on NURBS-surfaces with parametric links

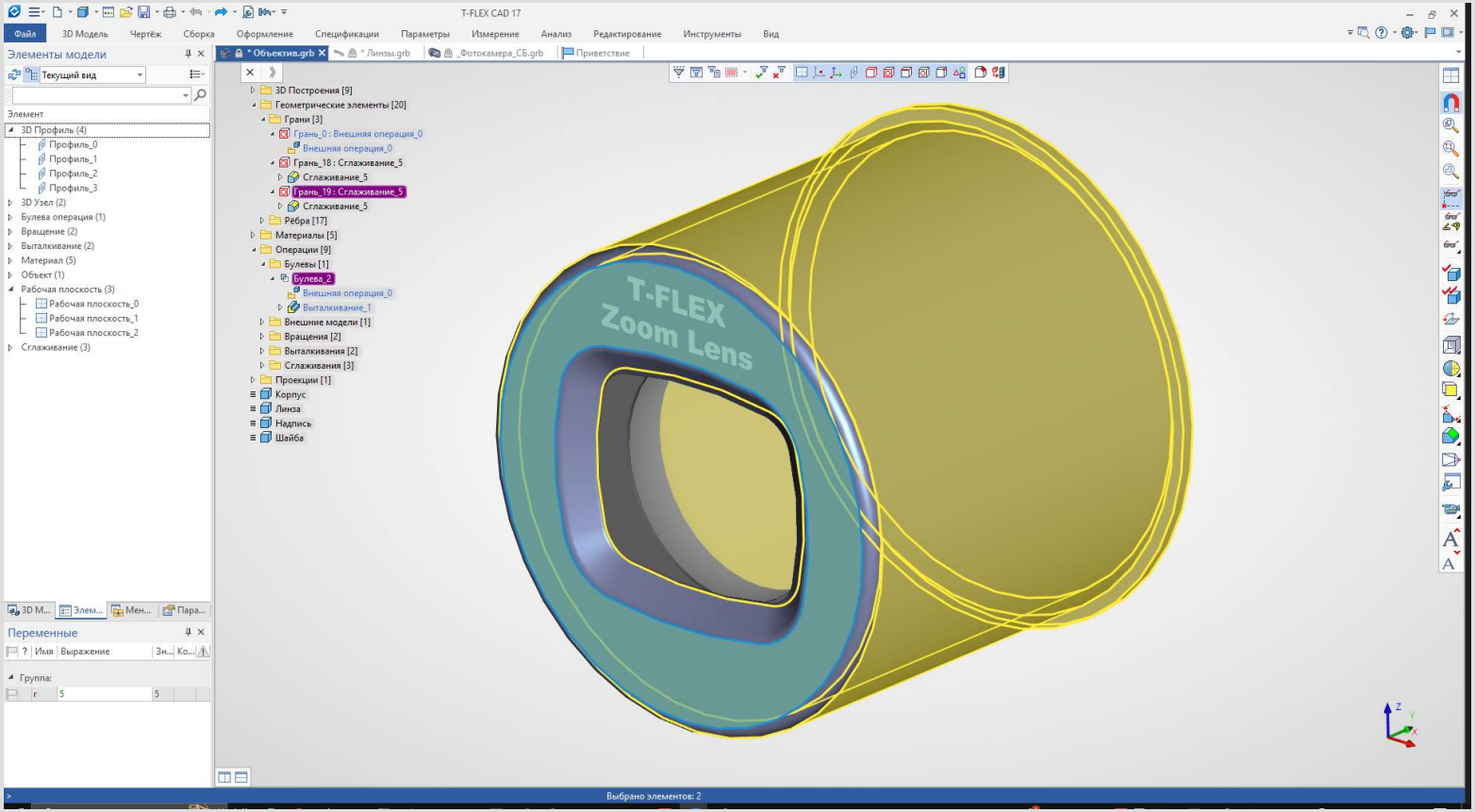
Model parts contain attributes, parameters and over information

Attributes in one part, can be linked and affect over attributes in over parts.

**Key problem in Rendering workflow** — correct transfer 3D model data and it's information (instances, lights, materials, textures etc.) between applications.

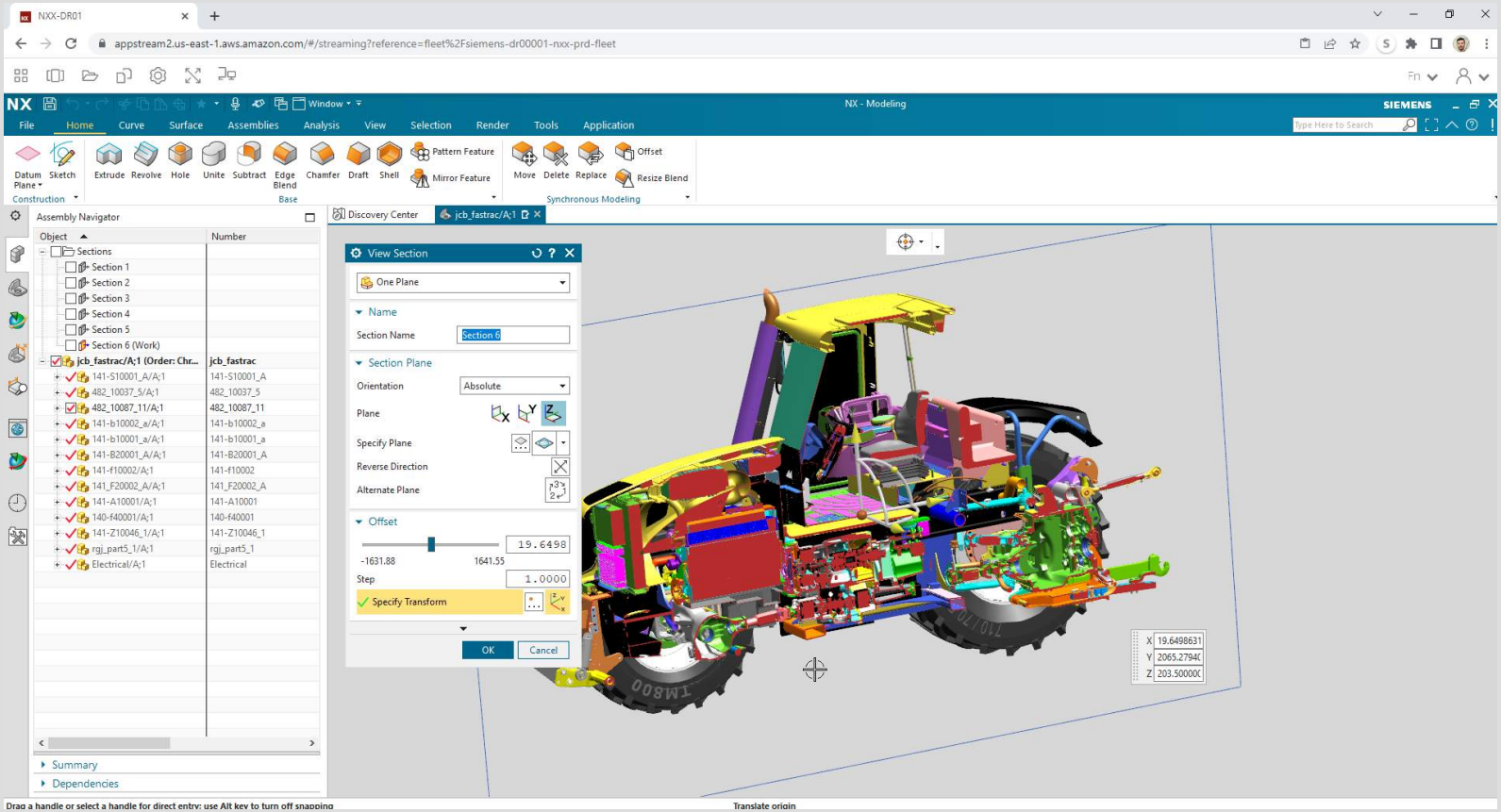
# Modern CAD applications

# Modern CAD applications




T-FLEX CAD — Modern CAD for modeling, analysis, simulations and rendering products.

# Modern CAD applications




Siemens NX (running in web view) — Legendary CAD for mechanical engineering.

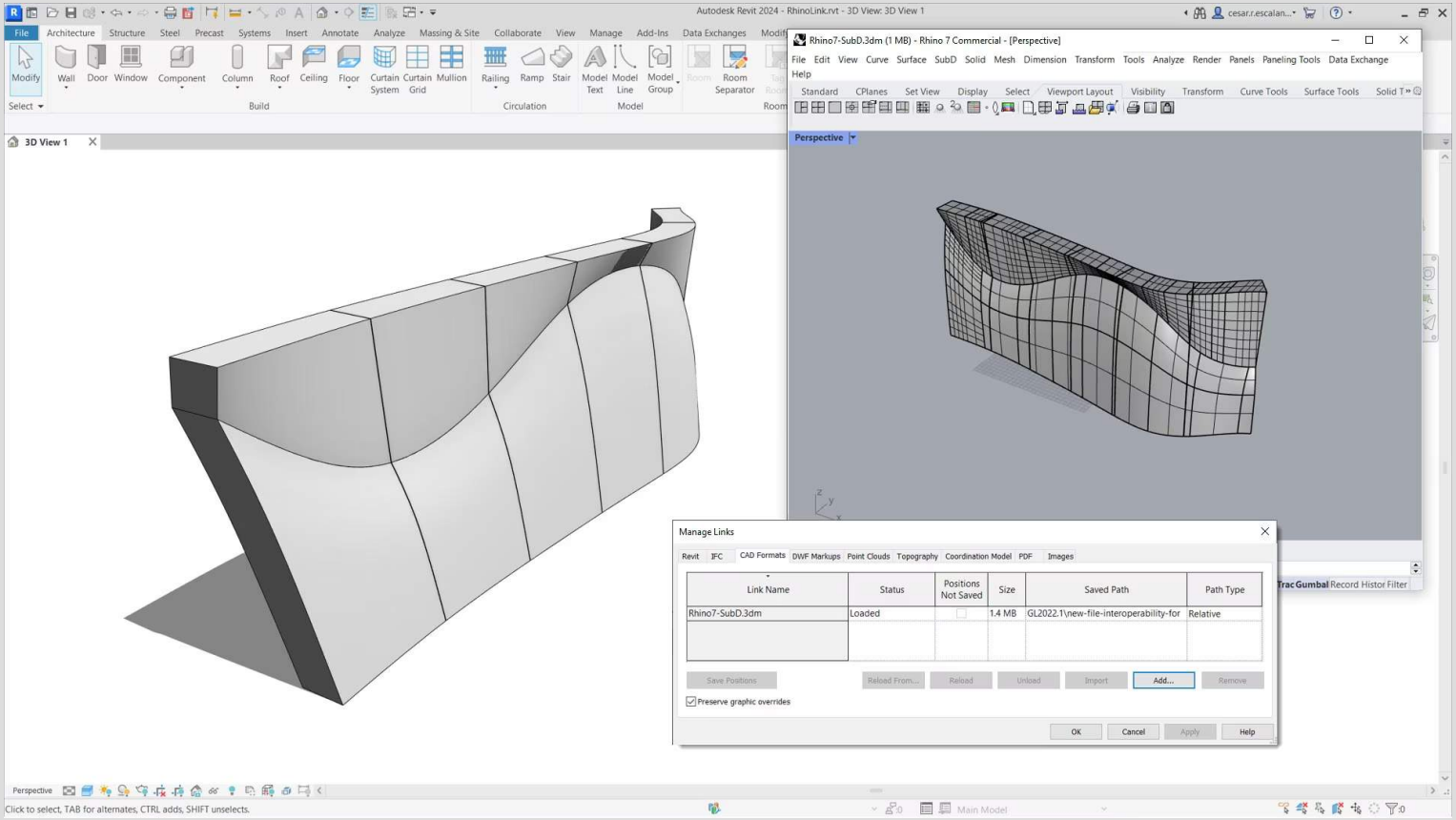
Image courtesy of Siemens

# Modern CAD applications


CATIA from Dassault Systèmes SE — CAD for large scale mechanical engineering and industrial design.

Image courtesy of Dassault Systèmes SE

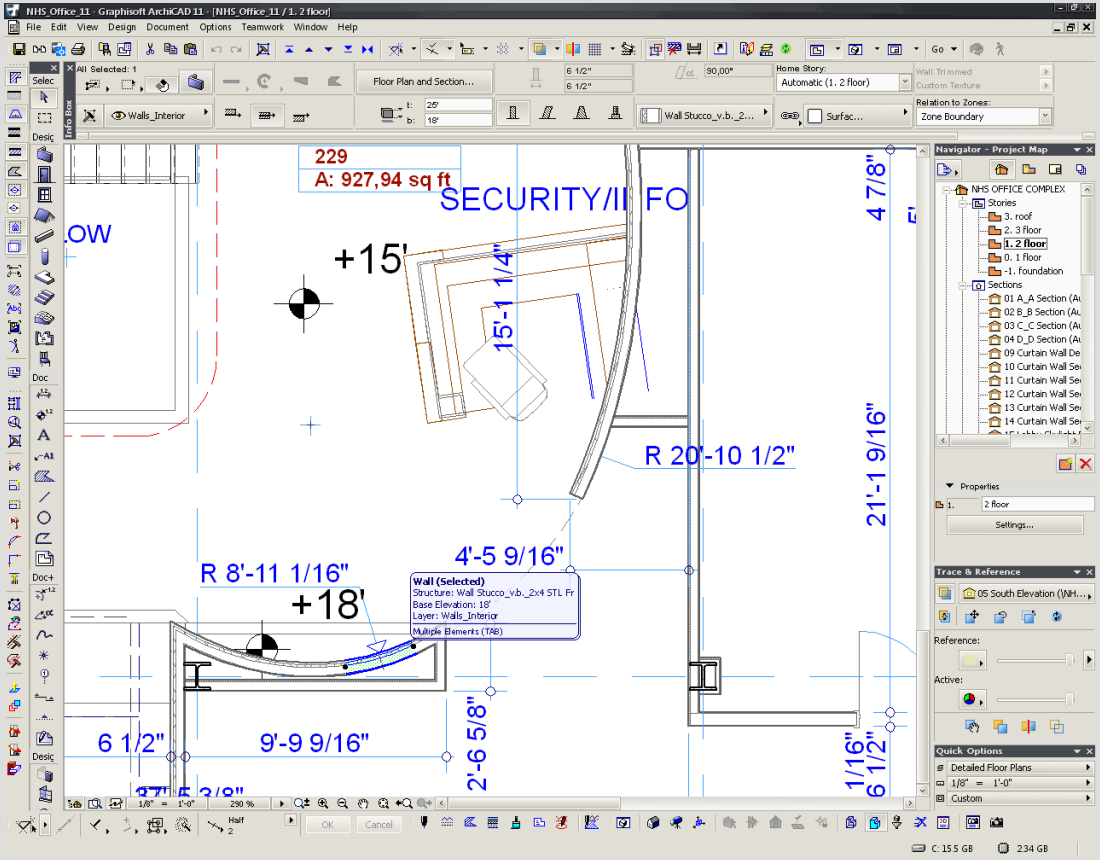
# Modern AEC CAD applications




Autodesk Revit – modern 3D architectural modeling and engineering CAD.

Image courtesy of Autodesk Inc.

# Modern AEC CAD applications




Archicad – modern AEC CAD with powerful features in modeling, data exchange and planning.

Image from Wikipedia

# Progressive technologies in modern modeling

Parametric and procedural modelling

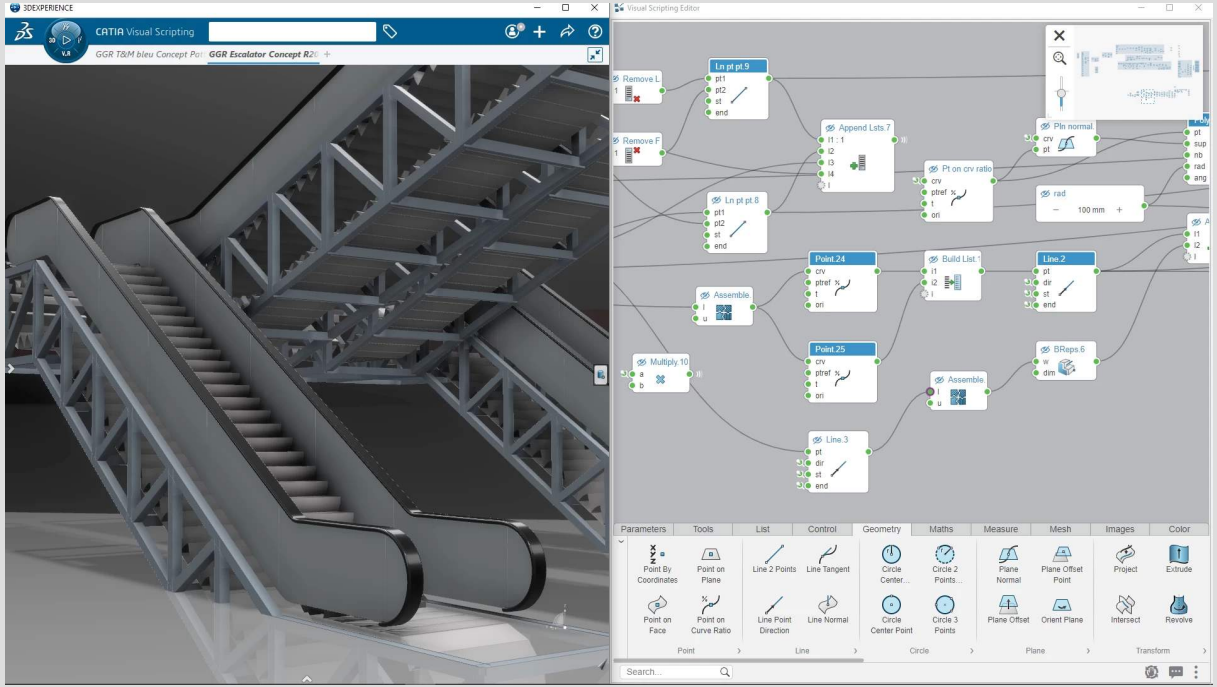



Image courtesy of Dassault Systèmes SE

# Progressive technologies in modern modeling

## Parametric and procedural modelling

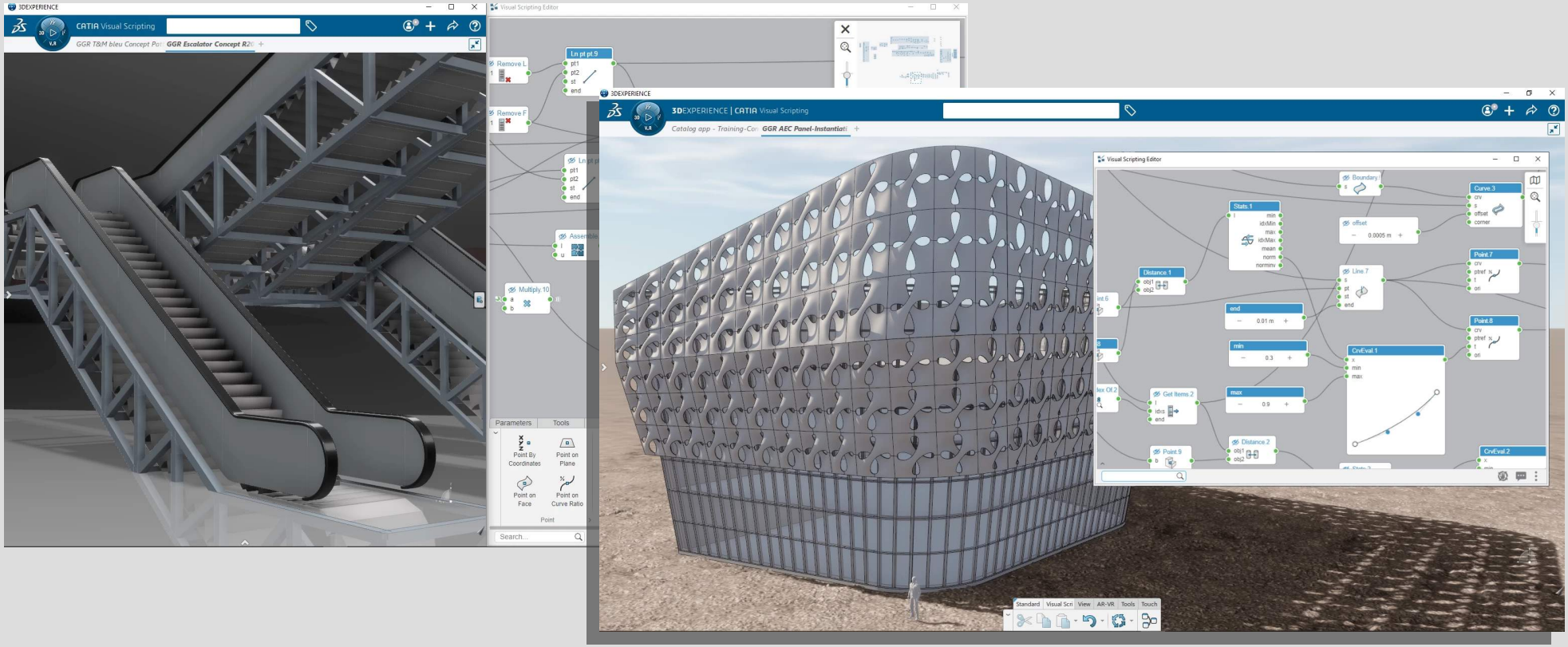
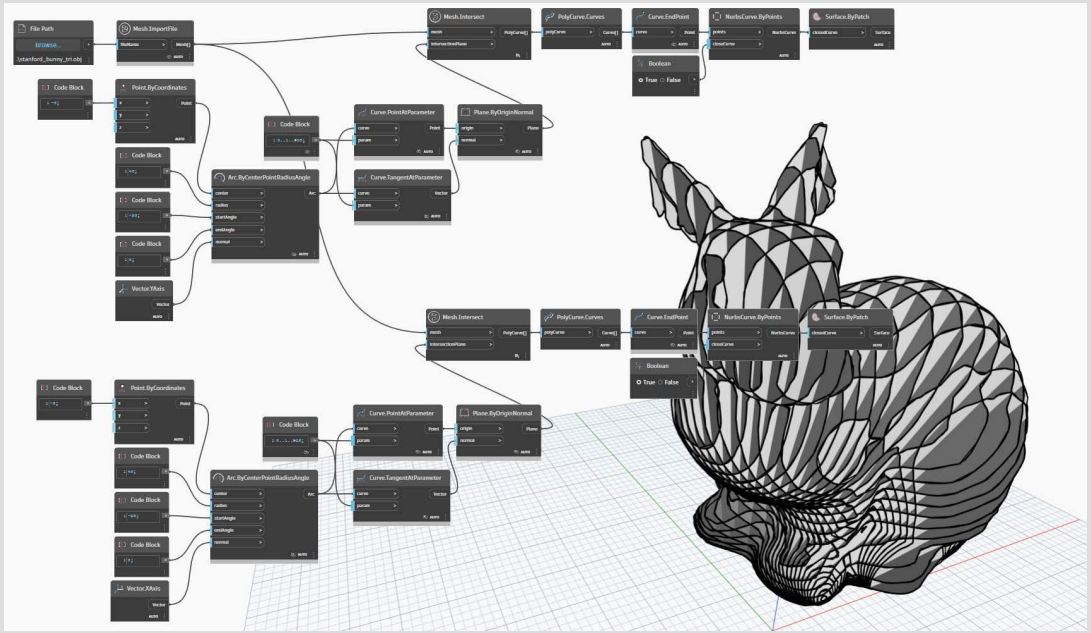



Image courtesy of Dassault Systèmes SE

# Progressive technologies in modern modeling

Parametric and procedural modelling benefits



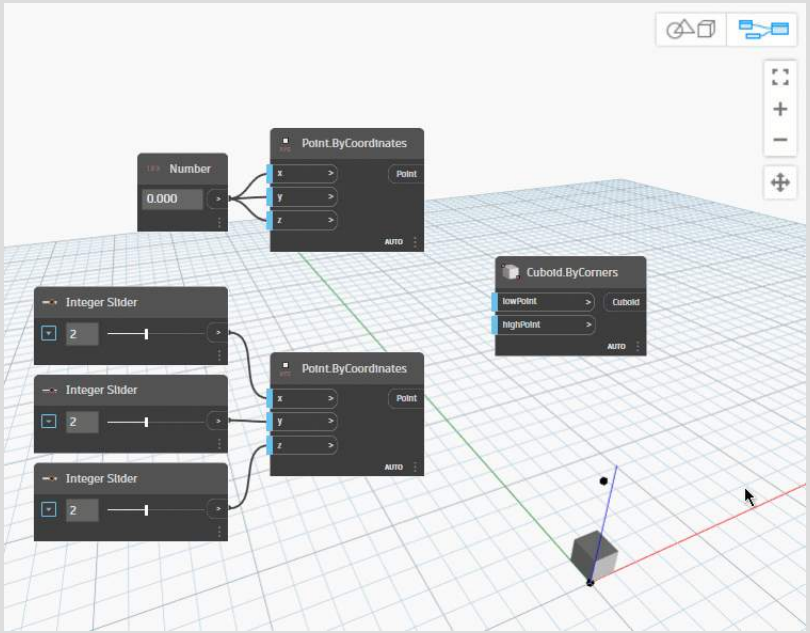



Image courtesy of Autodesk Inc.

# Key problems in data transfer

# Key problems in data transfer

If you work with one or two CAD applications, transferring data between them can be straightforward. Especially if you are working with products of the same line.

*For example, Autodesk Revit.*

Data between applications in a single format is easier to save and transmit than between different platforms with different data formats.

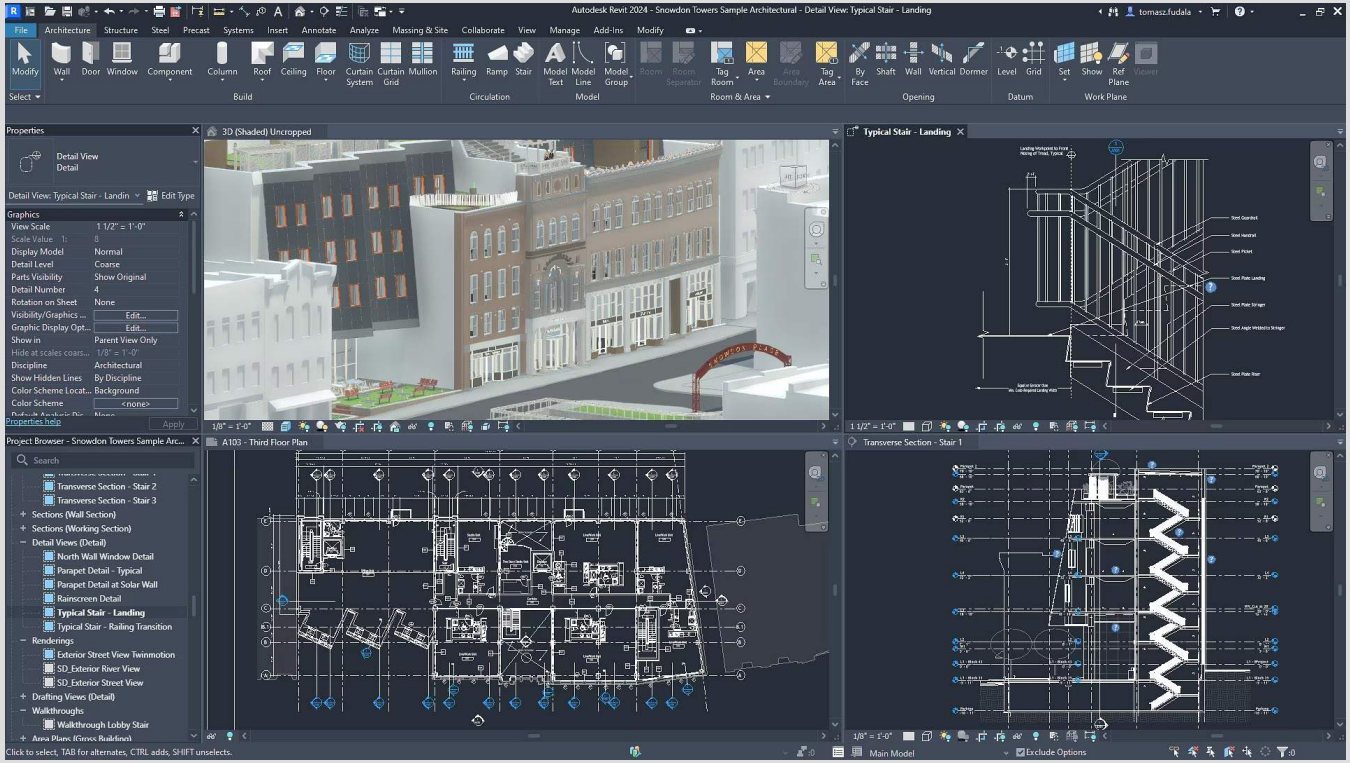



Image courtesy of Autodesk Inc.

# Key problems in data transfer

An important condition is to prepare the data in one application and export the data to a format supported by the target application.

*For example, Autodesk Revit and Bentley Microstation (*.dgn) or Autodesk AutoCAD (*.dwg).*

The model can be exported in its entirety, but this can create many problems.

*For example: hi-detaled geometry, non-correct styles, lost additional data, dependencies between elements and many moore.*

For correct export, I recommend preparing the model and data in accordance with the requirements of the target format and supported by the target application.

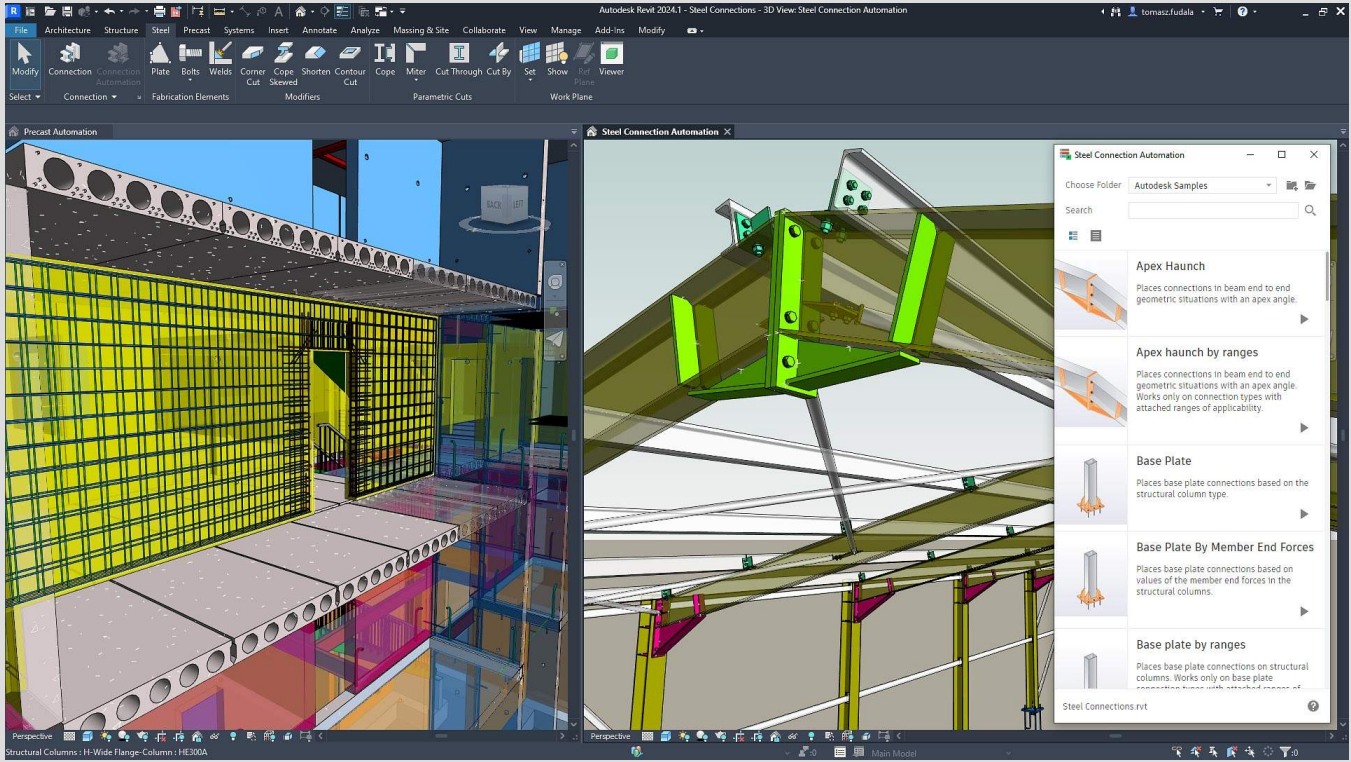
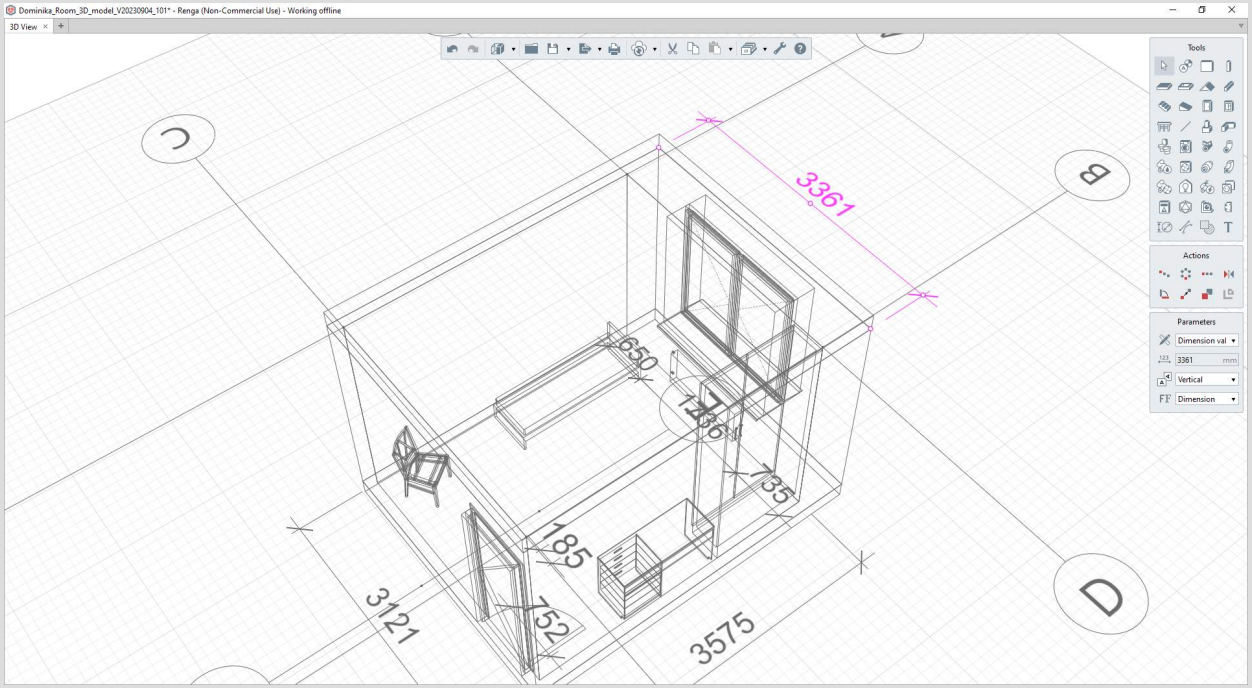



Image courtesy of Autodesk Inc.

# Example workflow graph

# Example workflow graph | CAD to CAD

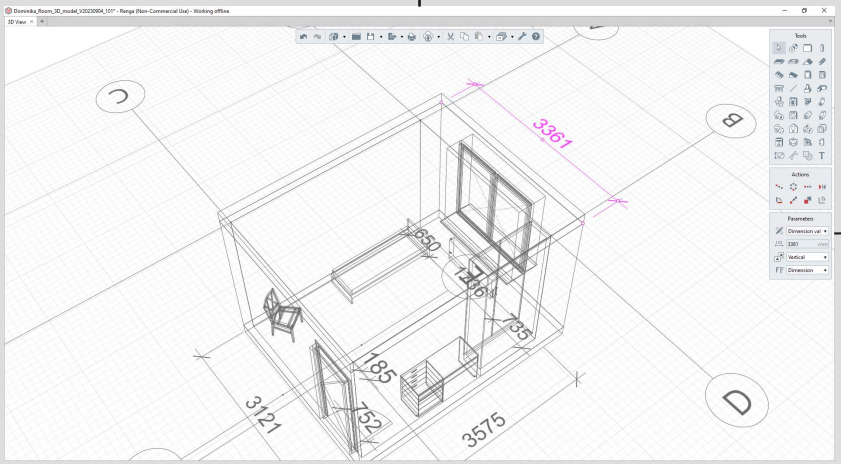



3D Model in AEC CAD

*Renga BIM as example*

# Example workflow graph | CAD to CAD

Solid-surfaces
Geometry
*.sat
*.stp
*.ifc
*.stl
Parasolid
*.jt

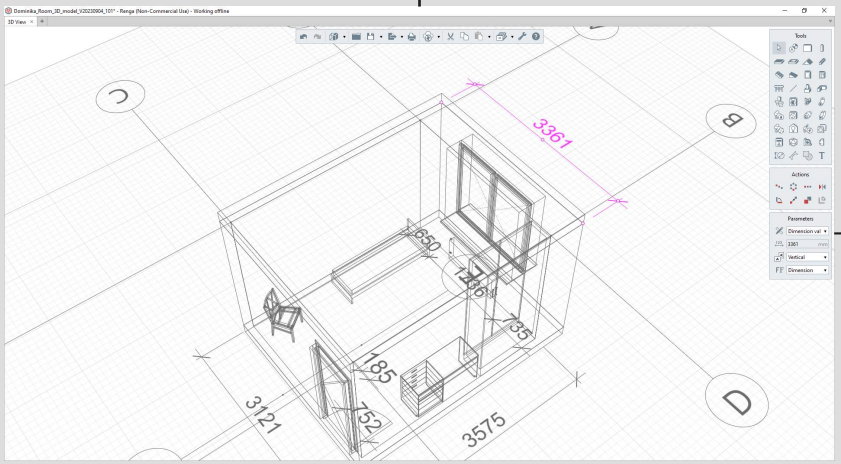



3D Model in AEC CAD
*Renga BIM as example*

Suplemental data
- Materials
- Textures
- Drawings
- Parameterization
- Construction history

# Example workflow graph | CAD to CAD

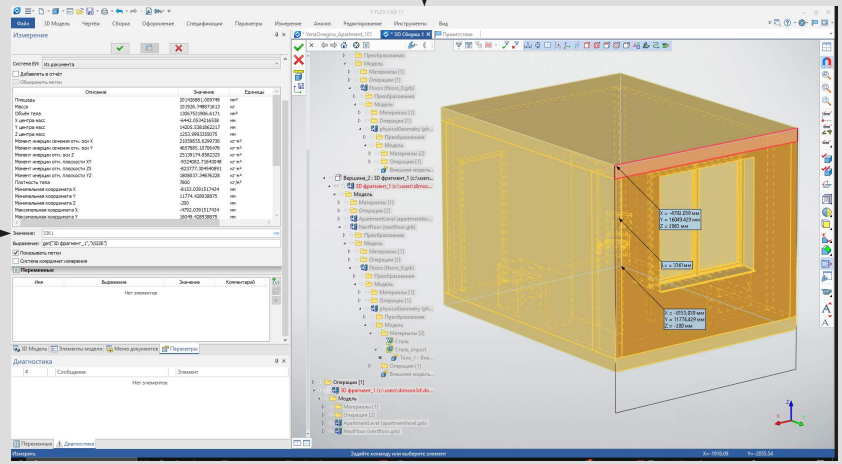
Solid-surfaces
Geometry
*.sat
*.stp
*.ifc
*.stl
Parasolid
*.jt




3D Model in AEC CAD

*Renga BIM as example*

Suplemental data
- Materials
- Textures
- Drawings
- Parameterization
- Construction history

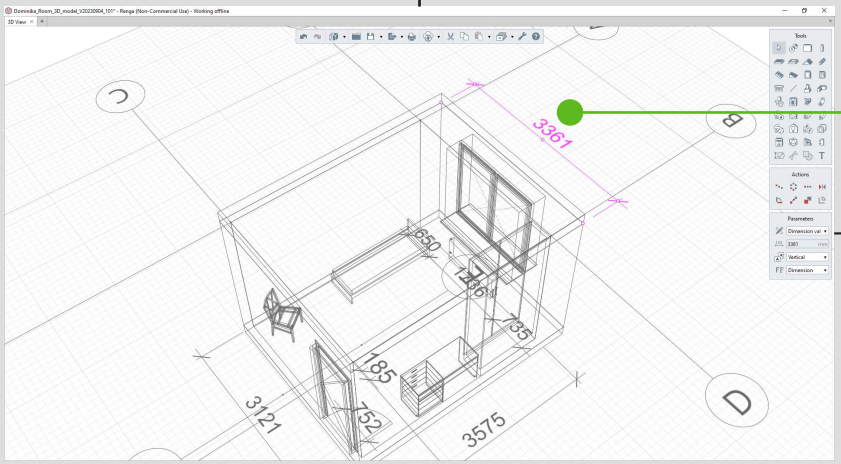


AEC 3D Model in mechanical engineering CAD

*T-FLEX CAD 17 as example*

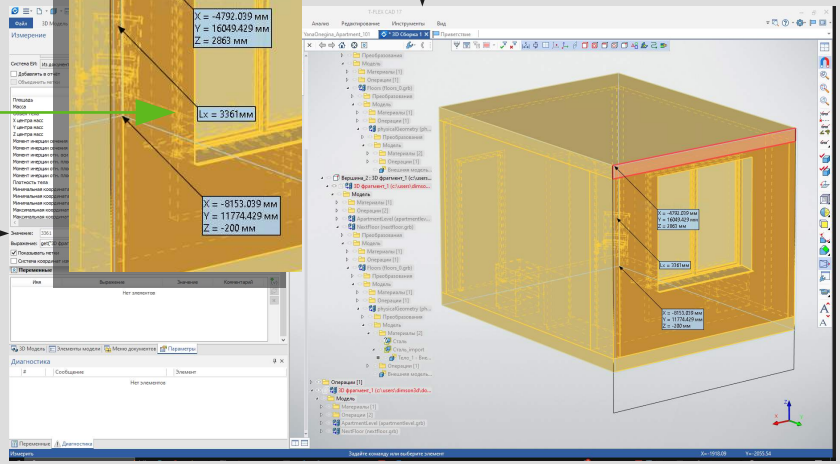
# Example workflow graph | CAD to CAD

Solid-surfaces Geometry
*.sat
*.stp
*.ifc
*.stl
Parasolid
*.jt



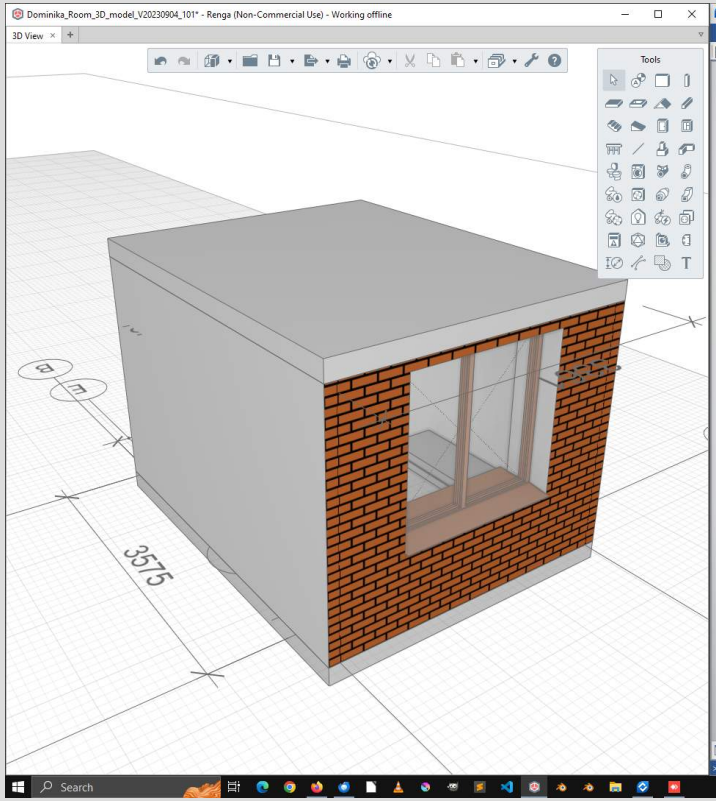

3D Model in AEC CAD
*Renga BIM as example*

Suplemental data
- Materials
- Textures
- Drawings
- Parameterization
- Construction history

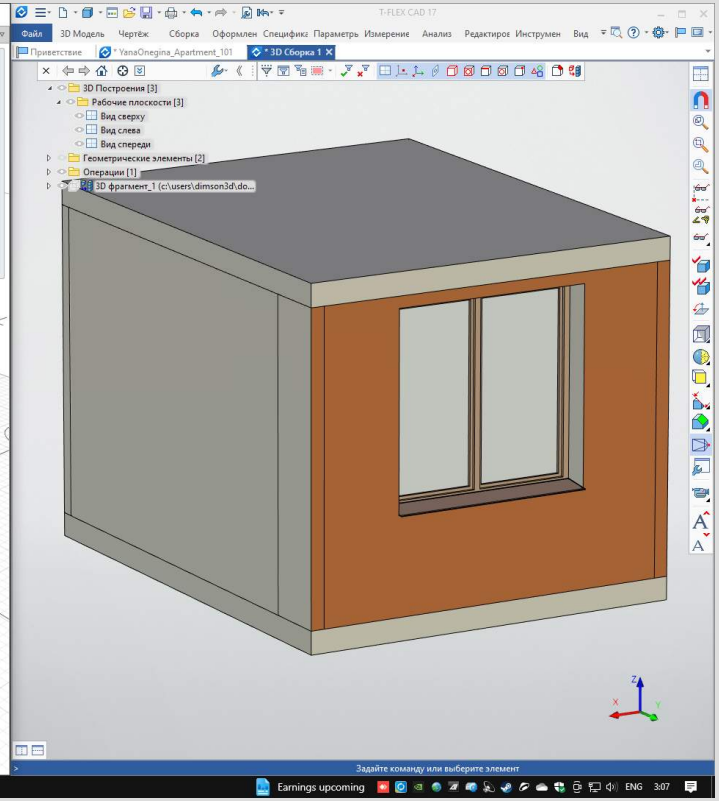



AEC 3D Model in mechanical engineering CAD
*T-FLEX CAD 17 as example*

# Example workflow graph | CAD to CAD




3D Model in AEC CAD
*Renga BIM as example*



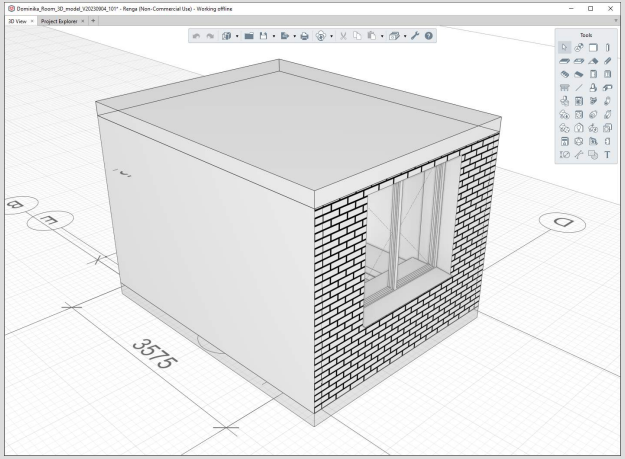

AEC 3D Model in mechanical engineering CAD
*T-FLEX CAD 17 as example*

# Workflow recommendations | CAD to CAD

Here are some recommendations for transferring data between CAD applications:

- To transfer geometry between CAD systems, use solid geomtry formats used in the industry.
  - These formats are: *.stp, *.stl (polygonal), ACIS (*.sat), *.iges, Parasolid, Industry Foundation Classes (*.ifc).
- Check model for duplicates.
- Select the optimal level of detail (LOD`s).
  - This is especially important when working with architectural models.
- Try to exclude geometry with high element density.
- If it is possible to export elements as curves, export them!
  - Modern rendering kernels allow you to render curves as polygonal objects.
- Materials can be exported either as part of the model or separately if the CAD system supports exporting materials to a material representation format.
- Other model data can be shared through a single database or collaboration system.
- Before transferring your model to another CAD system, be familiar with the specifics of exporting data to the selected data format.

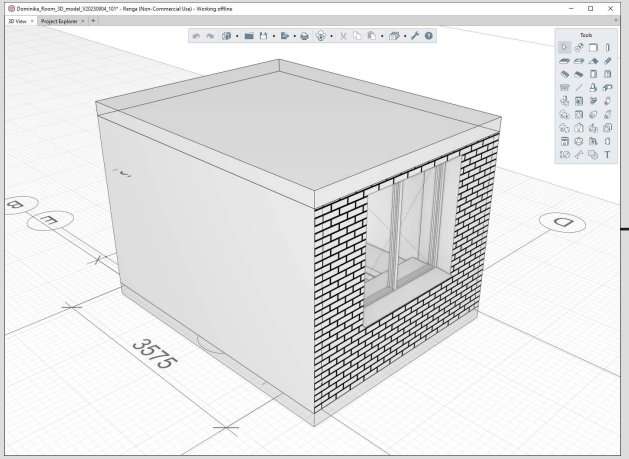
# Example workflow graph | CAD to DCC




3D Model with data in CAD

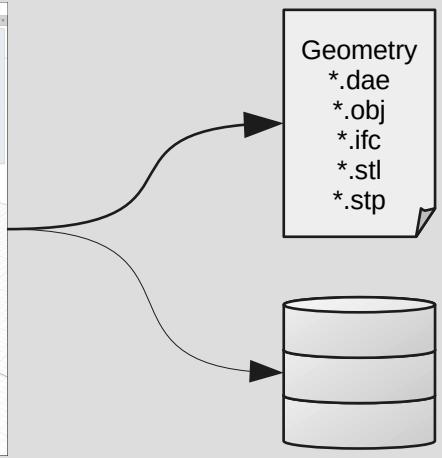
*Renga BIM as example*

# Example workflow graph | CAD to DCC




3D Model with data in CAD

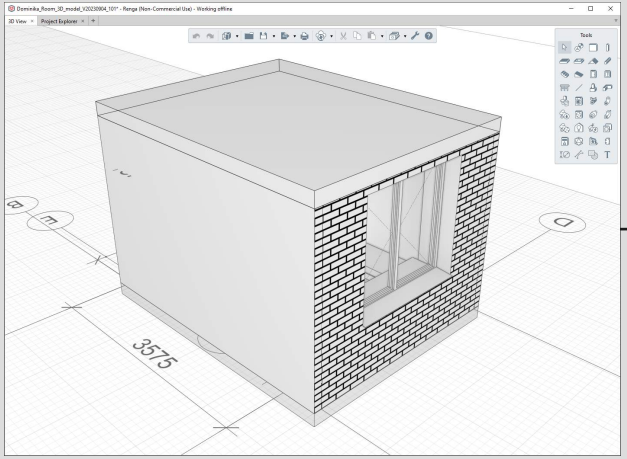
*Renga BIM as example*




Suplemental data

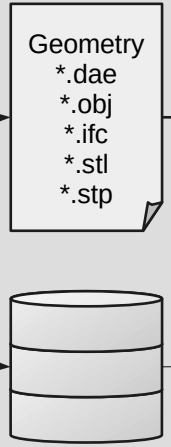
- Materials (*mtl)
- Textures
- Lights (*.ies)
- Links
- Drawings (*dxf)
- Parameterization

# Example workflow graph | CAD to DCC



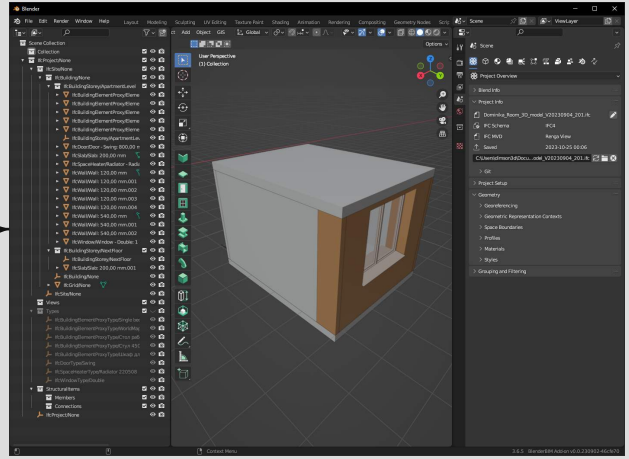
3D Model with data in CAD

*Renga BIM as example*




Suplemental data

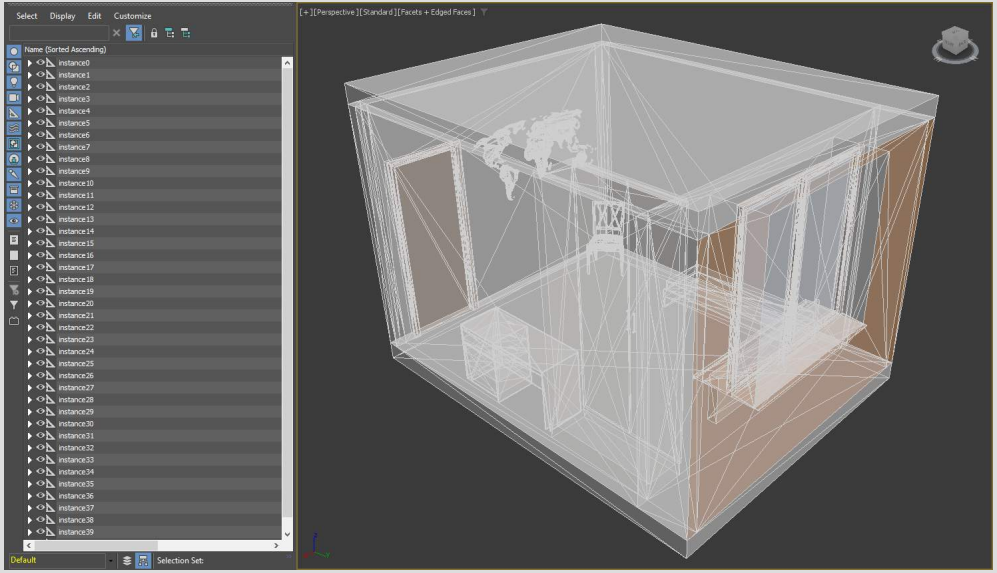
- Materials (*mtl)
- Textures
- Lights (*.ies)
- Links
- Drawings (*dxf)
- Parameterization



3D Model in Blender with data in IFC format

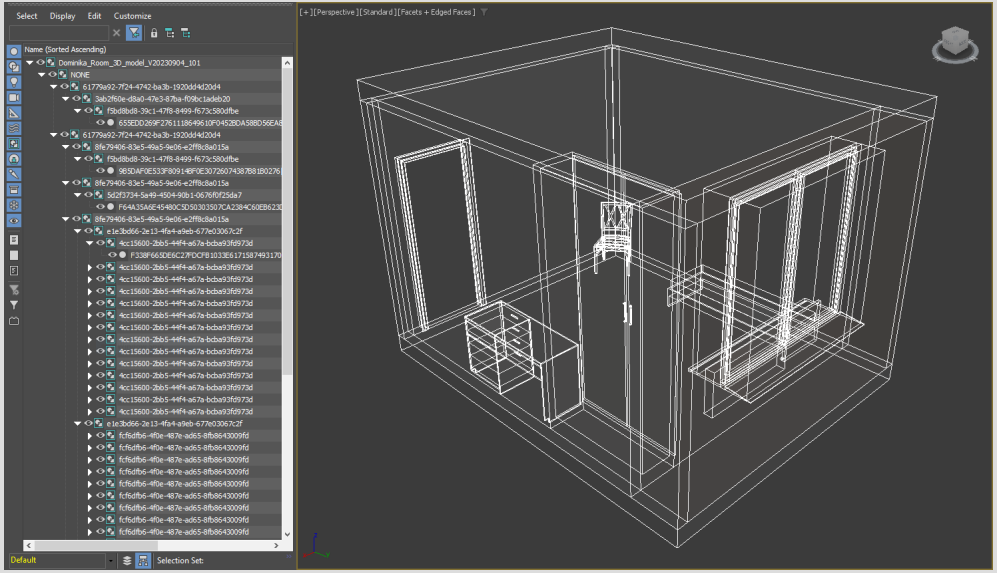
*BlenderBIM addon used for example*

# Example data transfer result | CAD to DCC




Result import model from Collada *.dae format

*Renga BIM to 3ds Max*

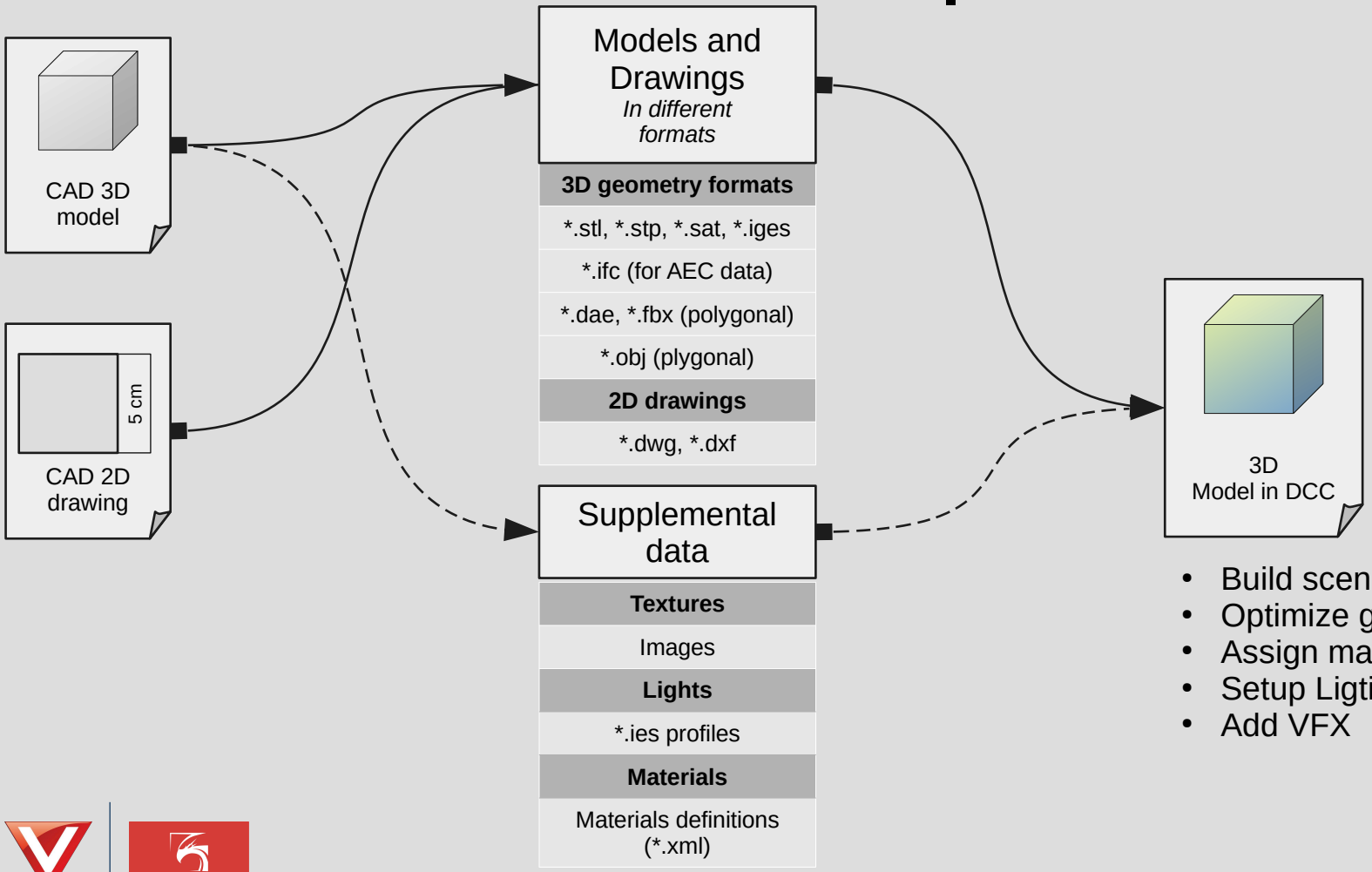



Result import model from ISO 10303-21 *.stp format

*Renga BIM to 3ds Max*

# Workflow recomendations

# Workflow recommendations | CAD to DCC




- Build scene
- Optimize geometry
- Assign materials
- Setup Ligting
- Add VFX

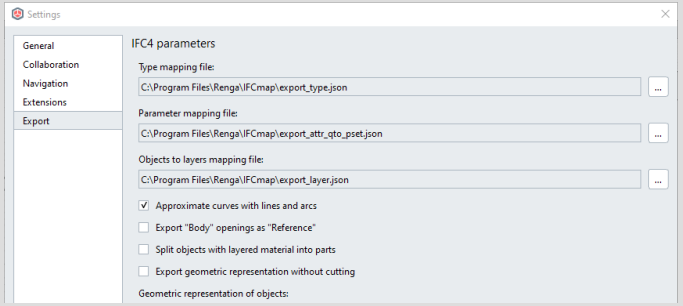
# Workflow recommendations | CAD to DCC

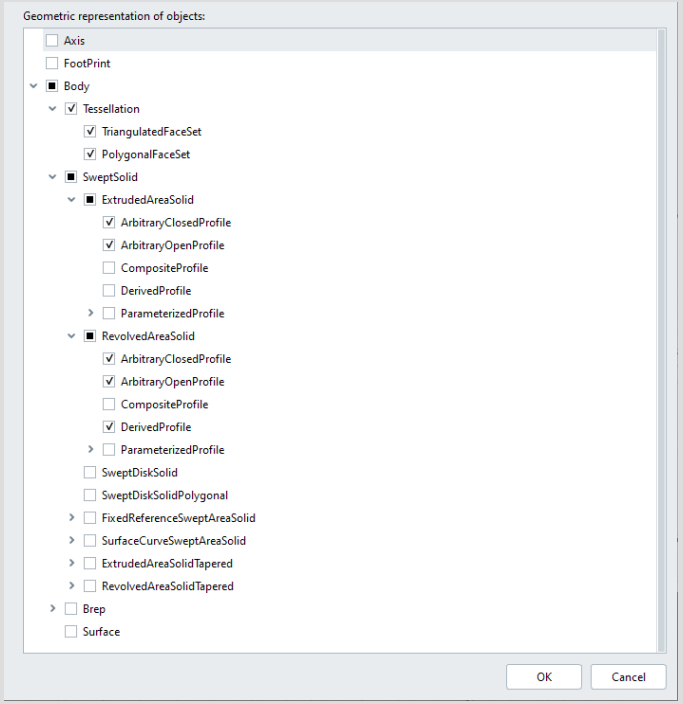
In table below I`m compare few different formats and its result after import in DCC app.

| Data format | Type of geometry | Import geometry types |
|---|---|---|
| *.dwg | • Solids<br>• 2D Curves (lines)<br>• 3D Curves (lines) | • Splines<br>• PolyGeometry (triangulated) |
| *.stp | • Solids | • SolidGeometry<br>• PolyGeometry (triangulated, after conversion) |
| *.obj and *.mtl | • Solids<br>• Materials description<br>• Textures | • PolyGeometry (triangulated)<br>• UV coords<br>• Materials description |
| *.dae, *.fbx | • Solids<br>• Texures<br>• Materials description<br>• Lights<br>• Light profiles | • PolyGeometry (triangulated)<br>• UV coords<br>• Textures<br>• Materials<br>• Lights with IES profiles |
| *.ifc | • Solids<br>• 3D Curves (lines)<br>• Materials<br>• Textures | • PolyGeometry (triangulated)<br>• Curves<br>• UV coords<br>• Materials<br>• Textures |

# Workflow recommendations | CAD to DCC

In this section we will look at the Renga configuration for exporting IFC to a Blender with the BlenderBIM add-on.




In the program settings, Export section, you can determine how the model will be exported to the IFC format.

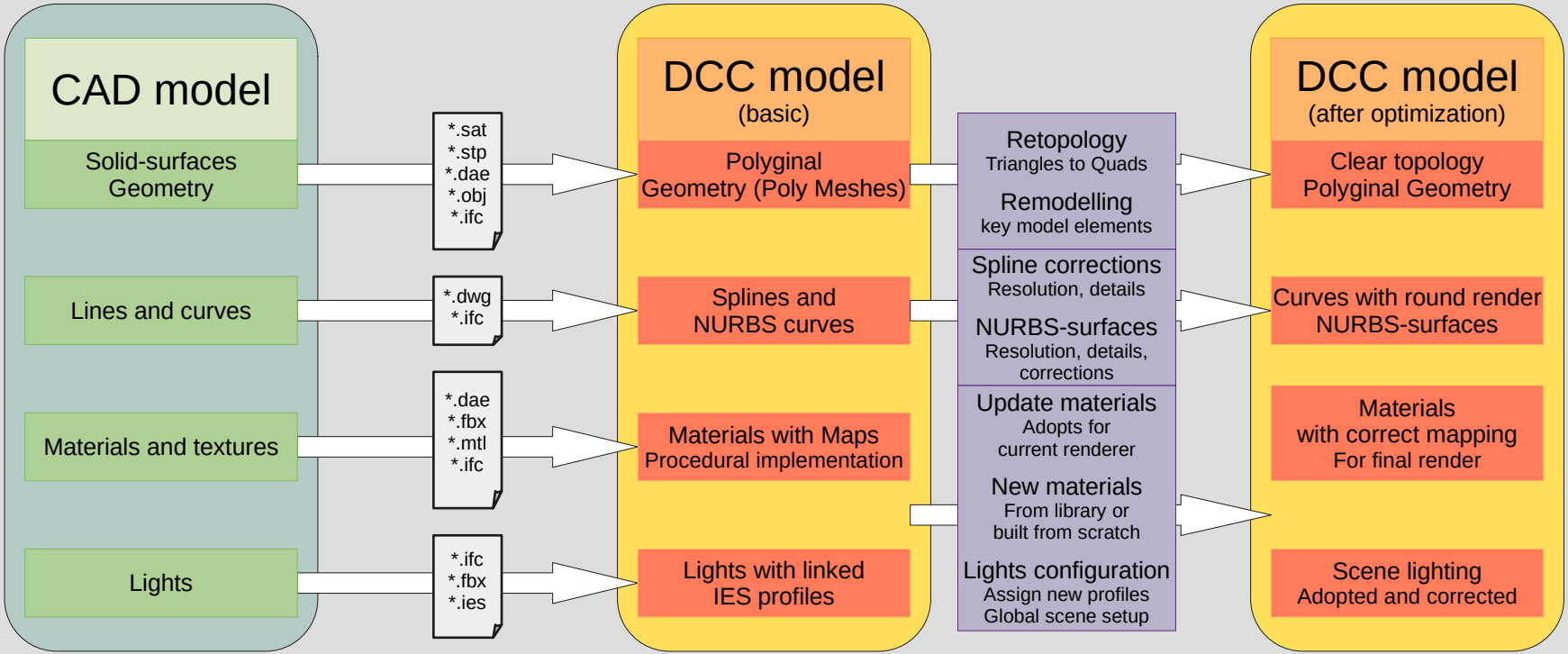
The settings shown on the slide will help you correctly export the model for subsequent import into Blender.

To support the IFC format, use the BlenderBIM addon.

# Pipeline data transfer

# Pipeline for data transfer | CAD to DCC

Pipeline in below, demonstrate basic process of transfer data between CAD and DCC applications.



# DEMO

# IN NEXT VIDEO

In next video we talk about work with Matte ID`s and Cryptomatte passes in Blender Cycles renderer.

Visit my complete on-line course
«**Rendering in Blender with Cycles Renderer**»
on Vysotskiy Consulting — BIM.VC.

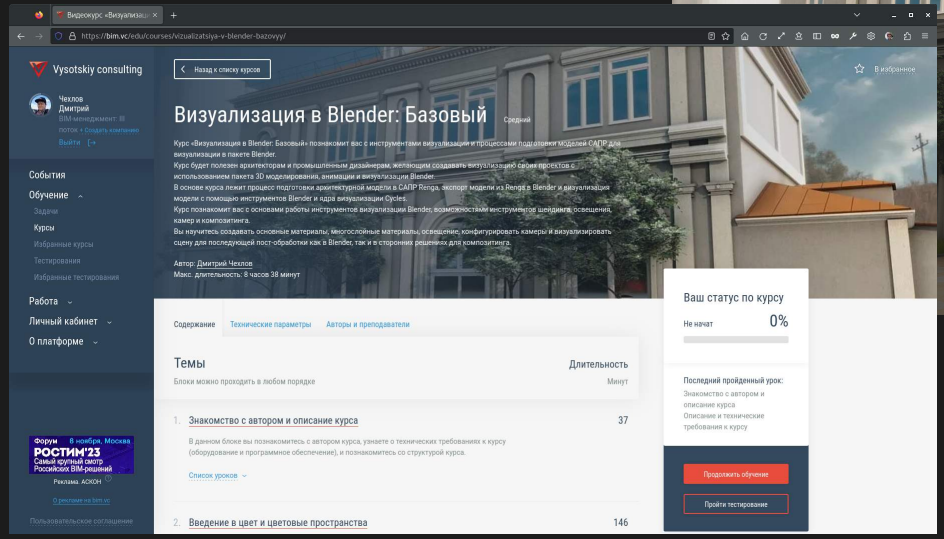



Image by Dmitry «dimson3d» Chekhlov from Course Project