Revit to Advance Steel Collaboration Via SMLX.

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AUTODESK. UNIVERSITY

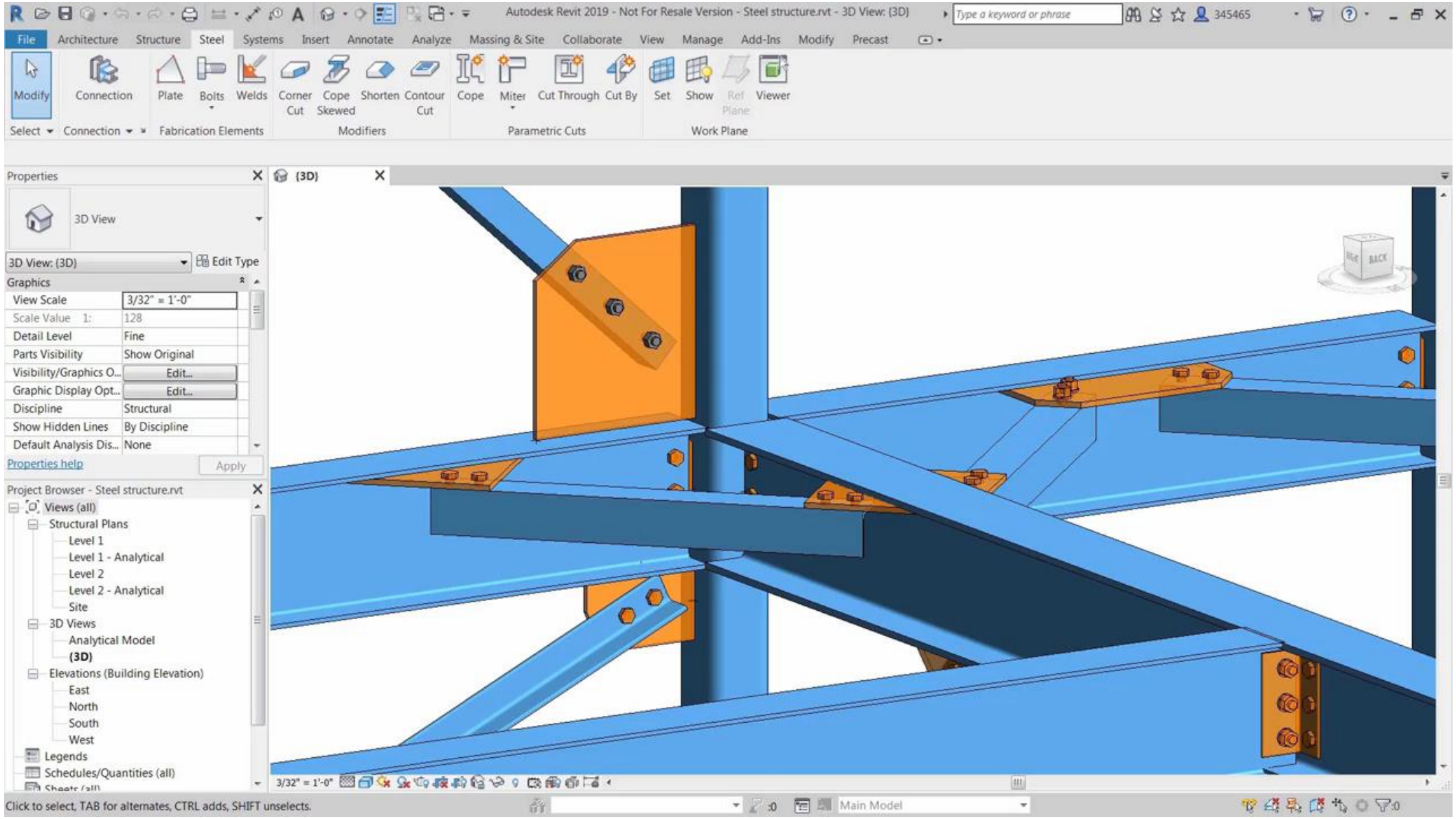
About the speaker

MY BACKGROUND

John Bennett has a structural engineering and fabrication background. He worked as a steelwork detailer then progressed to CAD manager and then moved into the role of application engineer/CSM for Advance Steel software training, sales, and implementation. He has recently been working with various companies for the integration of Advance Steel into plant engineering and structural markets.

Introduction & Key Learning

Revit 2019 – New Tools



Introduction- Revit to Advance Steel (Advance to Revit)

We see this question many times recently and are asked where to find the information.

- How do we do this, what is the best method, What is the SMLX file.
- What will be transfer. Where do we find the information.

We have many questions over the route used and the settings required, can we create a template in Revit, what should we look for.

With so many questions it is not always easy to see the workflow or even understand it, what is happening in the background. This was the idea for this class coming from the 2018 version, with its several updates and different file locations and changes.

Key Learning Objectives

REVIT ADVANCE STEEL EXTENSION

- What is the Extension, were is it found, why is it required?

SMLX FILE

- An understanding of the SMLX file and what it is doing to transfer the meta Data from Revit to Advance Steel/ Advance Steel to Revit. Look at the different mechanisms used in the file

ELEMENTS TRANSFER

- Understanding the limits of what can be transfer, how this is changing each release to include more compatibility between the platforms. Insight into the Connections and New Customs Connections

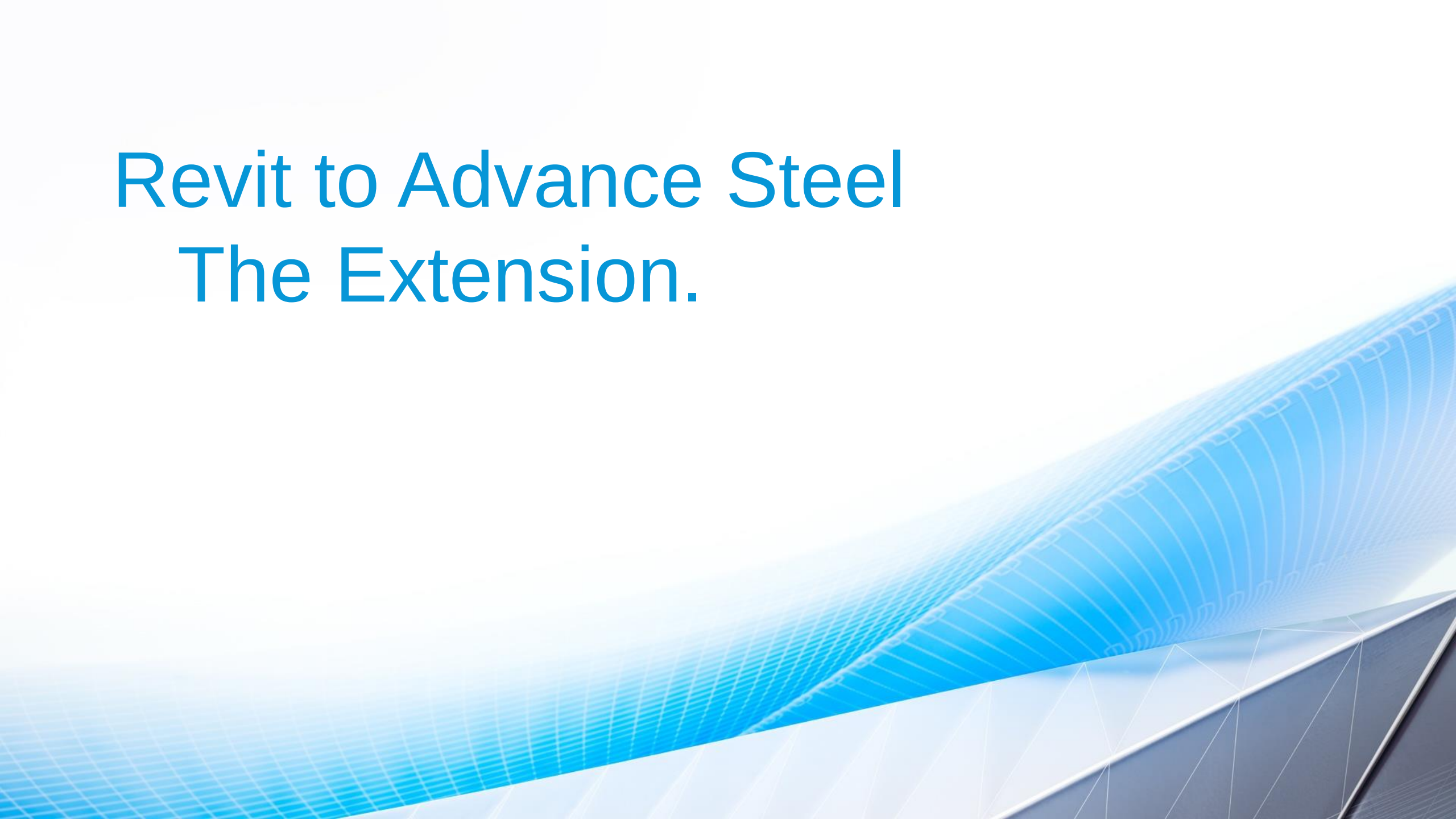
CONNECTION TRANSFER

- What can be created in the Recent Versions, the Changes made in the 2019.
- How do you install it/ do you need to install it.

TIPS AND TRICKS

- Tips along the way, we think Engineering and detailing work together easier.

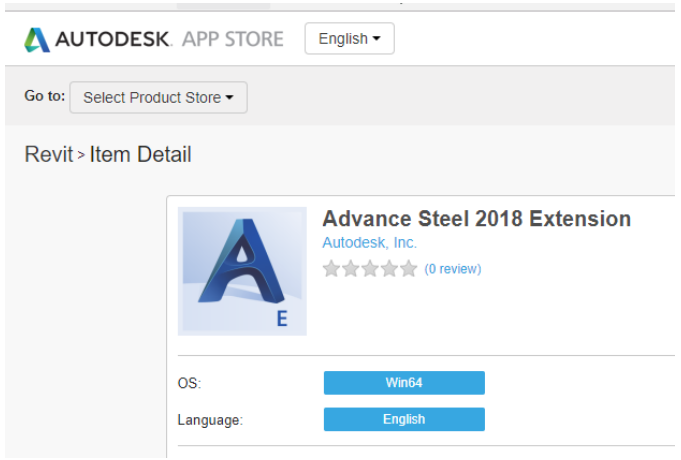
Revit to Advance Steel
The Extension.

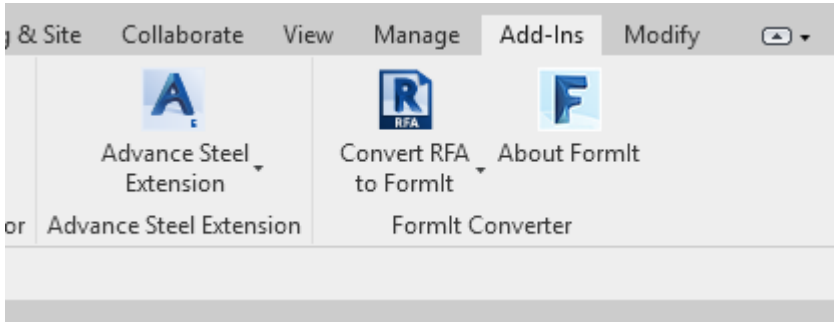


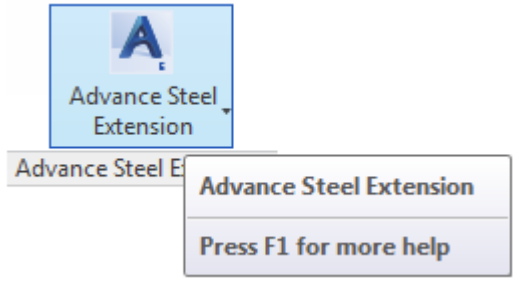
Revit Advance Steel Extension. – Install and Version

WHERE DO WE FIND IT:

- On the Autodesk Apps Store
- In your Autodesk account.
- Where is it on the ribbon
- Help files







ARE THE VERSIONS DIFFERENT:

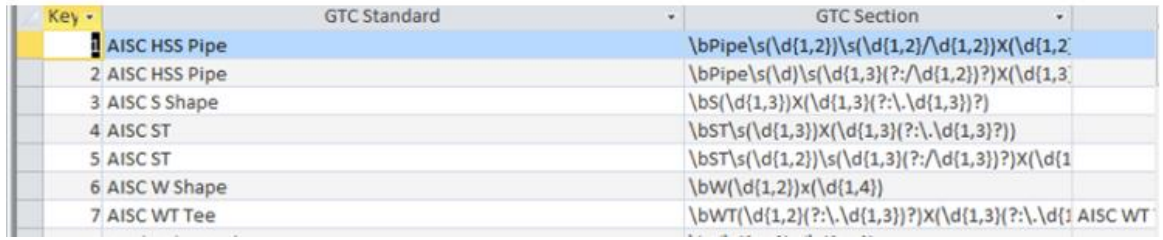
- Yes each build of Revit and Advance Steel have a specific extension install.
- Recently each year we have seen improvements to interoperability of the Extension to handle different elements of Steel Fabrication and connections, as well as main beams and columns.

- Revit 2018 – apps store link
- Revit to Advance Steel 2018 Help.
- Revit to Advance Steel 2019 Help

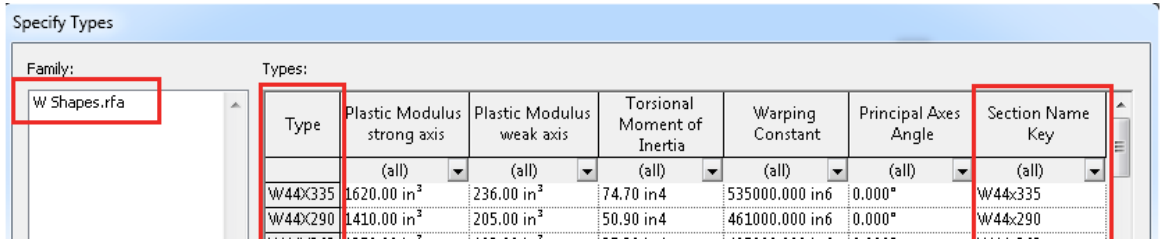
Revit Advance Steel Extension. – How does it work

MECHANISMS BEHIND THE EXTENSION:

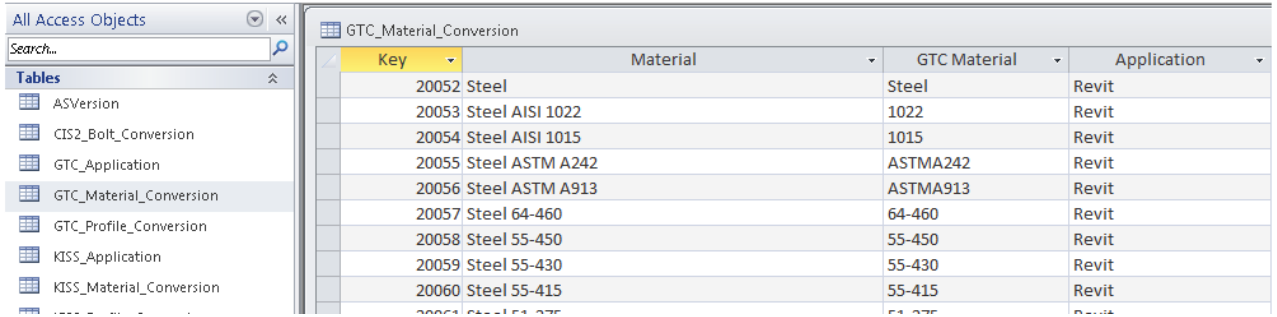
- What is the SMLX File : Steel markup language file format.
- Within the extension there are several different ways it Transfers this data:
- Sections Mapping – based upon Expression rules from object shape references, Direct 1 to 1 mapping.
- Revit Family based section mapping (Section Key)
- Custom Profiles Mapping as Dynamic
- Materials Mapping



Key	GTC Standard	GTC Section
1	AISC HSS Pipe	\bPipe\s(\d{1,2})\s(\d{1,2}/\d{1,2})X(\d{1,2
2	AISC HSS Pipe	\bPipe\s(\d)\s(\d{1,3}(?:/\d{1,2})?)X(\d{1,3
3	AISC S Shape	\bS(\d{1,3})X(\d{1,3}(?:\.\d{1,3})?)
4	AISC ST	\bST\s(\d{1,3})X(\d{1,3}(?:\.\d{1,3}?))
5	AISC ST	\bST\s(\d{1,2})\s(\d{1,3}(?:/\d{1,3})?)X(\d{1
6	AISC W Shape	\bW(\d{1,2})x(\d{1,4})
7	AISC WT Tee	\bWT(\d{1,2}(?:\.\d{1,3})?)X(\d{1,3}(?:\.\d{1 AISC WT

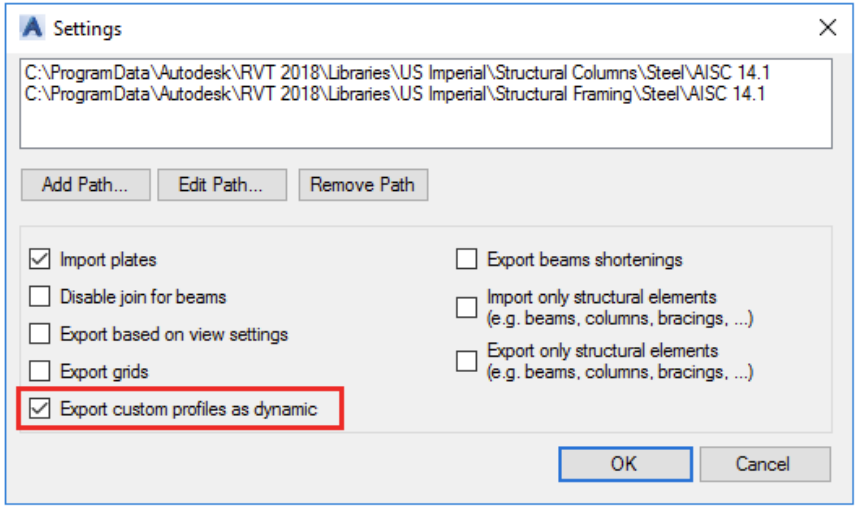


Type	Plastic Modulus strong axis	Plastic Modulus weak axis	Torsional Moment of Inertia	Warping Constant	Principal Axes Angle	Section Name Key
	(all)	(all)	(all)	(all)	(all)	(all)
W44X335	1620.00 in³	236.00 in³	74.70 in4	535000.000 in6	0.000°	W44x335
W44X290	1410.00 in³	205.00 in³	50.90 in4	461000.000 in6	0.000°	W44x290



GTC_Material_Conversion

Key	Material	GTC Material	Application
20052	Steel	Steel	Revit
20053	Steel AISI 1022	1022	Revit
20054	Steel AISI 1015	1015	Revit
20055	Steel ASTM A242	ASTMA242	Revit
20056	Steel ASTM A913	ASTMA913	Revit
20057	Steel 64-460	64-460	Revit
20058	Steel 55-450	55-450	Revit
20059	Steel 55-430	55-430	Revit
20060	Steel 55-415	55-415	Revit



Revit Advance Steel Extension. – Mechanism -1

SECTIONS MAPPING – BASED UPON EXPRESSION RULES FROM OBJECT SHAPE REFERENCES.

- Sections Mapping –Use the object shape references for the profile transfer, use a Formulae entry
- These entries are stored in the Advance steel GTC mapping database, under two tables.

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Key	Standard	Section	GTC Standard	GTC Section	ObjectType	Application	UseReqEx	Country	Versio
365	Sections_square_cold BS EN10219-2 1997	\bSHScf(\d{2,3})X(\d{1,2}(?:\.\d{1})?)	UK Square Cold	UK SHScf %1X%2	1	1	1	NULL	NULL
366	Sections_square_cold BS EN10210-2 1990	\bSHS(\d{2,3})X(\d{1,2}(?:\.\d{1})?)	UK Square Warm	UK SHS %1X%2	1	1	1	NULL	NULL
367	Sections_square_cold BS EN10210-2 1990	\bSHS(\d{2,3})X(\d{1,2}(?:\.\d{1})?)	UK Square Warm	UK SHS %1X%2	1	1	1	NULL	NULL
368	Sections_square_cold BS EN10210-2 1990	\bSHS(\d{2,3})x(\d{1,2}(?:\.\d{1})?)	UK Square Warm	UK SHS %1X%2	1	1	1	NULL	NULL
369	Sections_square_cold BS EN10210-2 1990	\bSHS(\d{2,3})X(\d{1,2}(?:\.\d{1})?)	UK Square Warm	UK SHS %1X%2	1	1	1	NULL	NULL
370	UK_BS_Square								
371	Sections_StructuralTeesUB BS EN10210-2 1990								
372	Sections_StructuralTeesUC BS EN10210-2 1990								
373	Universal Beam BS EN10210-2 1990								
374	Universal Beam BS EN10210-2 1990								
375	UniversalColumn BS EN10210-2 1990								
376	UniversalColumn BS EN10210-2 1990								
377	UniversalBearingPiles BS EN10210-2 1990								

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Key	GTC Standard	GTC Section	Standard	Section	ObjectType	Application	UseReqEx
6672	UK Square Sections Cold Formed	\bSHScf(\d{1,5})[x-xX-X](\d{1,5})[x-xX-X](\d{1,4})	UK Square Sections Cold Formed	SHScf%1x%2x%3	1	0	1
6673	UK Square Sections Cold Formed	\bSHScf(\d{1,5})[x-xX-X](\d{1,5})[x-xX-X](\d{1,4}(?:\.\d{1,3})?)	UK Square Sections Cold Formed	SHScf%1x%2x%3	1	0	1
6674	UK Square Sections Warm Formed	\bSHS(\d{1,5})[x-xX-X](\d{1,5})[x-xX-X](\d{1,4})	UK Square Sections Warm Formed	SHS%1x%2x%3	1	0	1
6675	UK Square Sections Warm Formed	\bSHS(\d{1,5})[x-xX-X](\d{1,5})[x-xX-X](\d{1,4}(?:\.\d{1,3})?)	UK Square Sections Warm Formed	SHS%1x%2x%3	1	0	1
6676	UK Structural Tees UB	\bUBT(\d{1,4})[x-xX-X](\d{1,4})[x-xX-X](\d{1,4})	UK Structural Tees UB	UBT%1x%2x%3	1	0	1
6677	UK Structural Tees UC	\bUCT(\d{1,3})[x-xX-X](\d{1,3})[x-xX-X](\d{1,3})	UK Structural Tees UC	UCT%1x%2x%3	1	0	1
6678	UK Universal Beams	\bUB(\d{1,5})[x-xX-X](\d{1,5})[x-xX-X](\d{1,5})	UK Universal Beams	UB%1x%2x%3	1	0	1
6679	UK Universal Bearing Piles	\bUBP(\d{1,5})[x-xX-X](\d{1,5})[x-xX-X](\d{1,5})	UK Universal Bearing Piles	UBP%1x%2x%3	1	0	1
6680	UK Universal Columns	UC152x152x30n	UK Universal Columns	UC152x152x30n	1	0	0
6681	UK Universal Columns	\bUC(\d{1,4})[x-xX-X](\d{1,4})[x-xX-X](\d{1,4})	UK Universal Columns	UC%1x%2x%3	1	0	1
6682	UK Advance Angle - Equal	\bUKEA(\d{1,4})[x-xX-X](\d{1,4})[x-xX-X](\d{1,3})	UK Advance Angle - Equal	UKEA%1x%2x%3	1	0	1
6683	UK Advance Angle - Unequal	\bUKUA(\d{1,4})[x-xX-X](\d{1,4})[x-xX-X](\d{1,4})	UK Advance Angle - Unequal	UKUA%1x%2x%3	1	0	1
6684	UK Advance Beams	\bUKB(\d{1,5})[x-xX-X](\d{1,5})[x-xX-X](\d{1,5})	UK Advance Beams	UKB%1x%2x%3	1	0	1
6685	UK Advance Bearing Piles	\bUKBP(\d{1,4})[x-xX-X](\d{1,4})[x-xX-X](\d{1,4})	UK Advance Bearing Piles	UKBP%1x%2x%3	1	0	1
6686	UK Advance Columns	\bUKC(\d{1,5})[x-xX-X](\d{1,5})[x-xX-X](\d{1,5})	UK Advance Columns	UKC%1x%2x%3	1	0	1

[Rules based Transfer Help link]

Revit Advance Steel Extension. – Mechanism -1.2

SECTIONS MAPPING – BASED UPON RULES FROM OBJECT SHAPE REFERENCES.

- **Sections Mapping** –Use the object shape references for the profile transfer, use a Expression Formulae entry
- **Rule based mapping**, where a certain rule (using tokens) will allow the mapping of an entire

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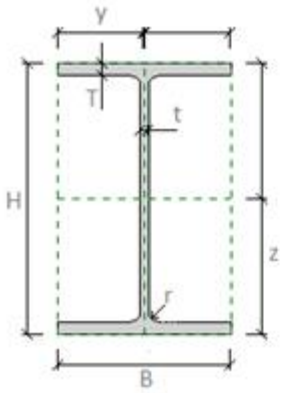
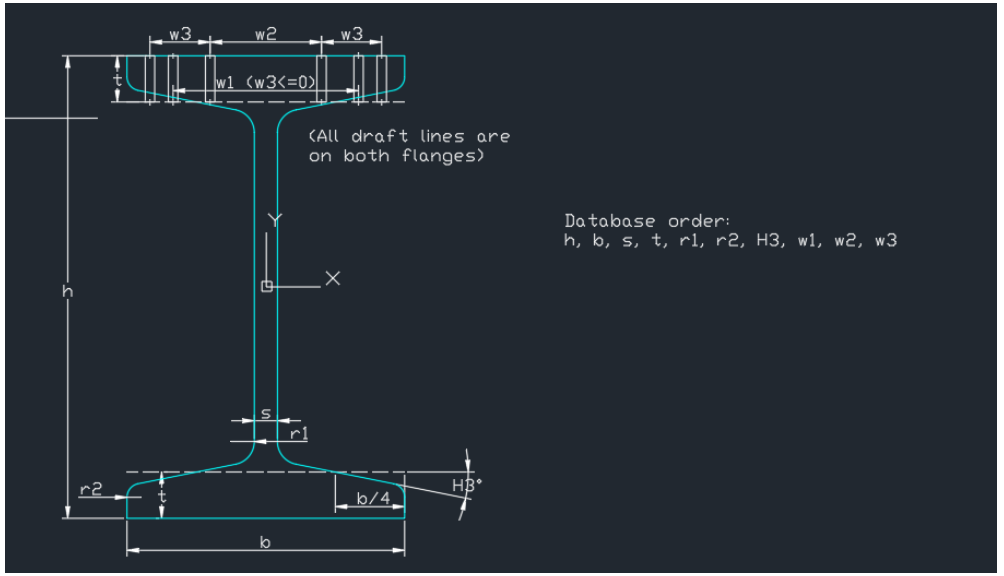
	Key	Standard	Section	GTC Standard	GTC Section	ObjectType	Application	UseReqEx
	373	Universal Beam BS EN10210-2 1990	\bUB(\d{3})X(\d{2,3})X(\d{2,3})	UK Structural UB	UK UB %1X%2X	1	1	1

I-shape Parallel Flange



B. Width: the external width of the section shape.
H. Height: the external height of the section shape.
T. Flange Thickness: the distance between the exterior surfaces of the flange in the section shape.
t. Web Thickness: the distance between the exterior surfaces of the web in the section shape.
r. Web Fillet: the radius of the fillet between the web and flange.
y. Centroid Horizontal: the distance from the centroid of the section shape to the left extremities along the horizontal axis.
z. Centroid Vertical: the distance from the centroid of the section shape to the lower extremities along the vertical axis.



Revit Advance Steel Extension. – Mechanism -1.3

SECTIONS MAPPING – 1 TO 1 REFERENCES.

- **1 to 1 mapping**, where each section size is mapped individually.
- All manual mappings requested by Advance Steel or Revit during import are saved in the database for further use as one to one mapping.
- Mapping configuration can be made country-dependent; this allows specific selectable country mapping during import / export.

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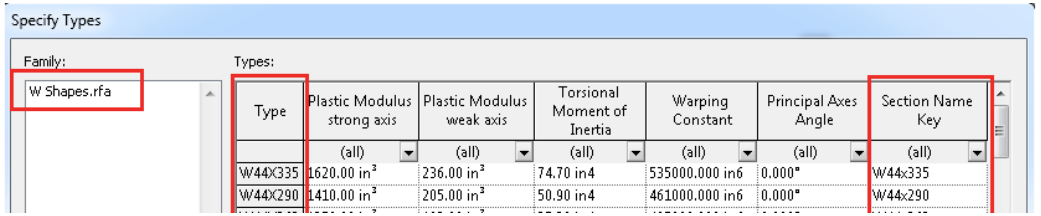
Key	Standard	Section	GTC Standard	GTC Section	ObjectType	Application	UseReqEx	C
3388	CISC Tube Shapes-Column	HS102x51x8.0	CISC HSS	HSS 127X50.8X7.94	3	10	0	NU
3389	CISC Tube Shapes-Column	HS89x64x8.0	CISC HSS	HSS 88.9X63.5X7.94	3	10	0	NU
3390	CISC Tube Shapes-Column	HS89x64x8.0	CISC HSS	HSS		10	0	NU
3391	CISC Tube Shapes-Column		CISC HSS	HSS		10	0	NU
3392	CISC Tube Shapes-Column		CISC HSS	HSS		10	0	NU
3393	CISC Angle Shapes	L51x38x3.2	CISC Angle unequal	L51X38X3.2	2	10	0	NU
3394	CISC Angle Shapes	L64X64X13	CISC Angle equal	L64X64X12.7	2	10	0	NU
3395	CISC Angle Shapes	L76X51X13	CISC Angle unequal	L76X51X12.7	2	10	0	NU
3396	CISC Angle Shapes	L76X64X13	CISC Angle unequal	L76X64X12.7	2	10	0	NU

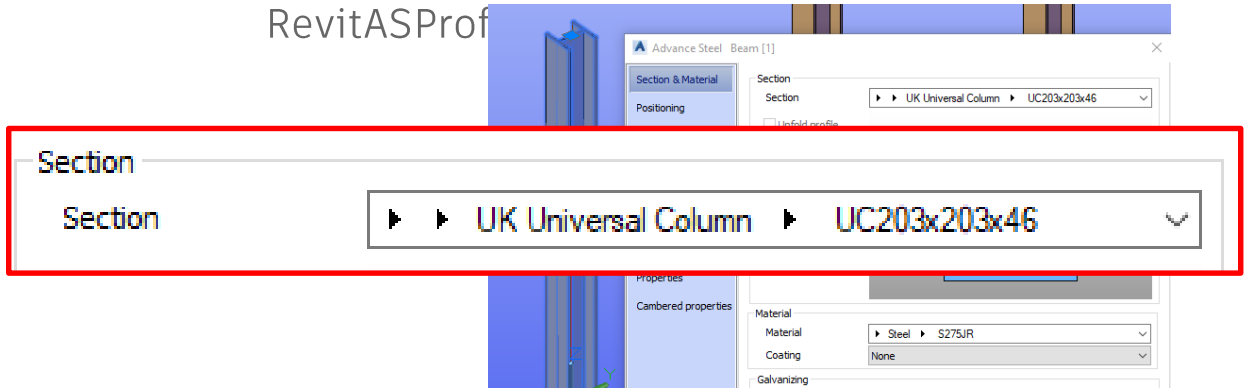
Tip : In order for the country column to be used in the transfer, the version column must be filled with a value, inside the GTC_Profile_Conversion and Profile_Export_Conversion tables of the GTCMapping database.

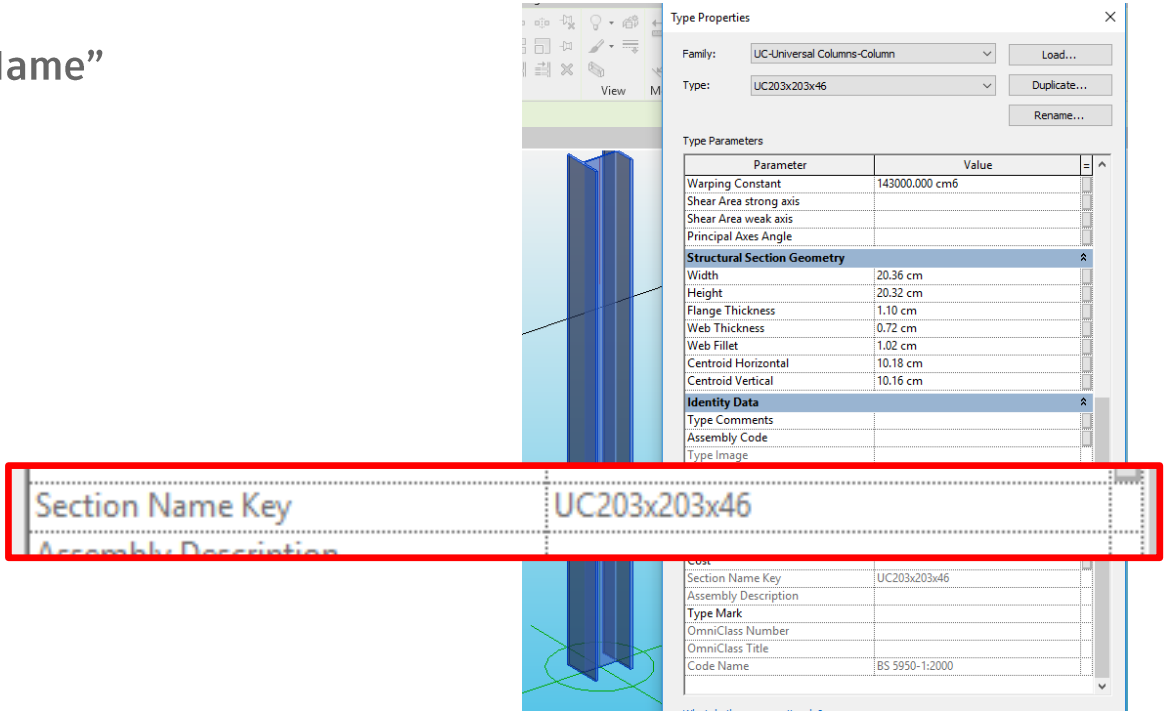
Revit Advance Steel Extension. – Mechanism - 2

REVIT FAMILY BASED SECTION MAPPING

- This process uses the internal Section name inside Adva Steel links it to the Approved Revit Family.
- The link is via the Section class and the key is the **“Name”**
- These families contain 2 parameters:
  - Family Name Key ,Section Name Key
- Table inside AstorProfiles database, called RevitASProf



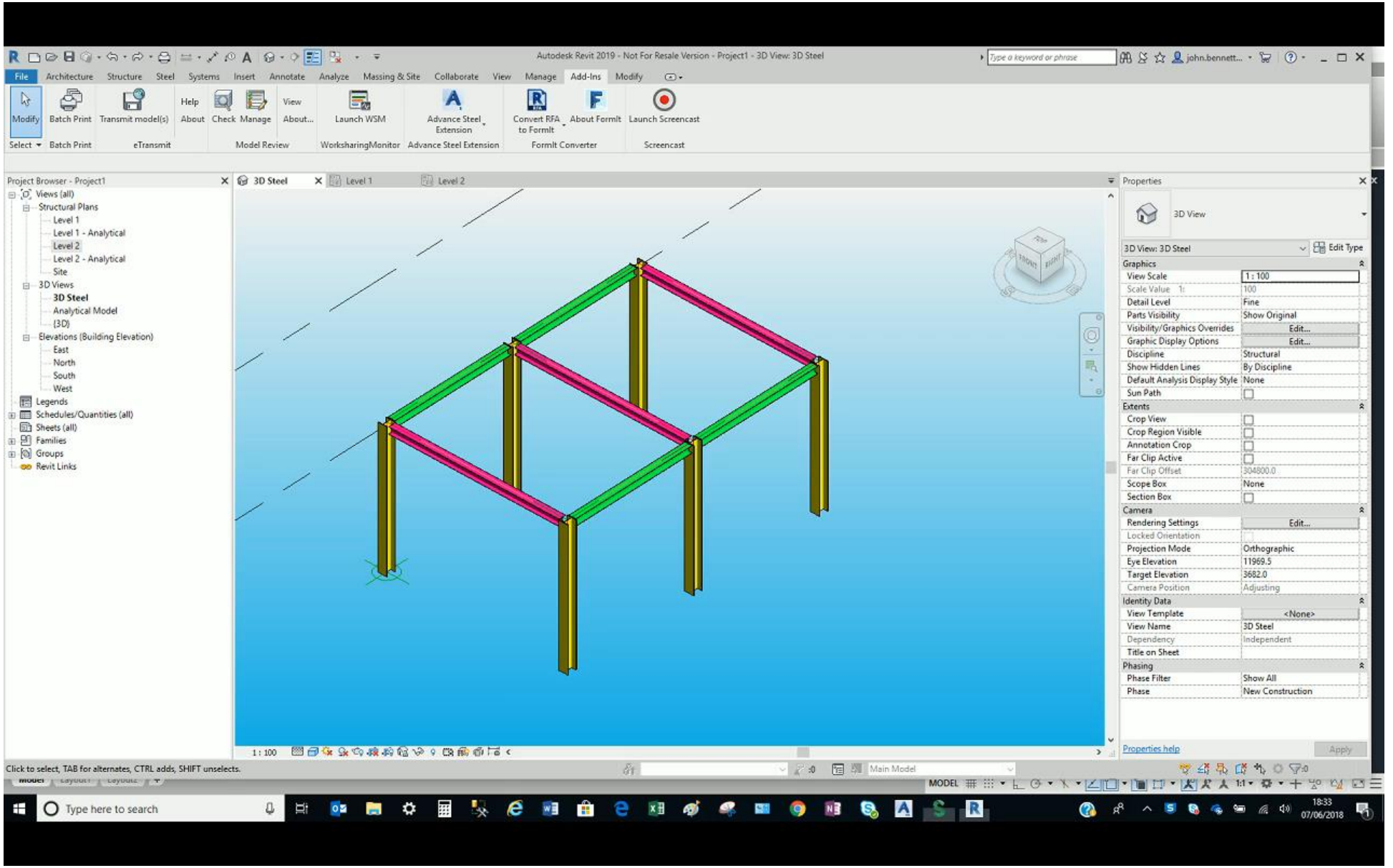




Tip : if the Revit project uses Structural Steel, Try first to use the designated approved Families provide by Autodesk, this makes collaboration workflow smoother.

Revit Family based mapping help link

Revit to AS – Basic Section Transfer

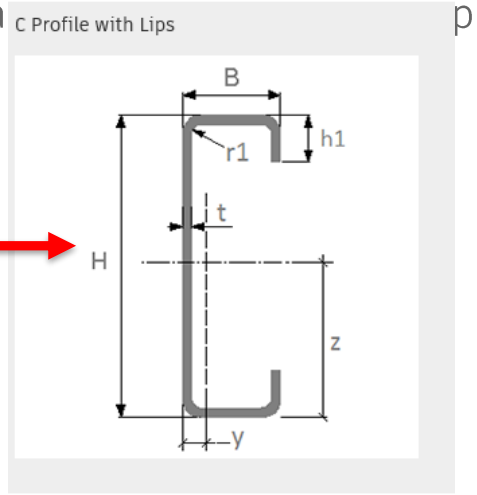


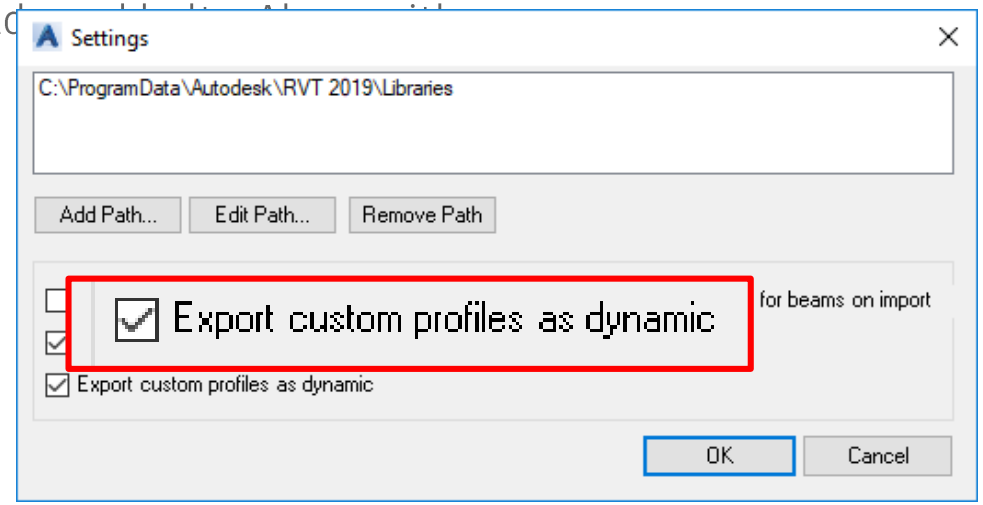
Revit Advance Steel Extension. – Mechanism - 3

CUSTOM PROFILES MAPPING AS DYNAMIC

- This is for profiles that are from approved Structural family shape references, but do not exist in Advance steel, the Profile is mapped as Dynamic type.
- This method places a profile inside advance steel model, it is not added to the Advance steel database.
- 2019 improvement , this mechanism is used as the basis for the Steel Fabrication Format

Type	Description
C	Channel Cold Formed
CEx	Channel with Fold, Cold Formed
F	Flat
H	Rectangular Hollow Section
I	I Shape
IAsym	I Shape Asymmetrical
LA	Angle Cold Formed
LZ	Zed Cold Formed
R	Circular Hollow Sections (Pipe)
S	Round Bars
T	Tees
U	Channel
W	Angle

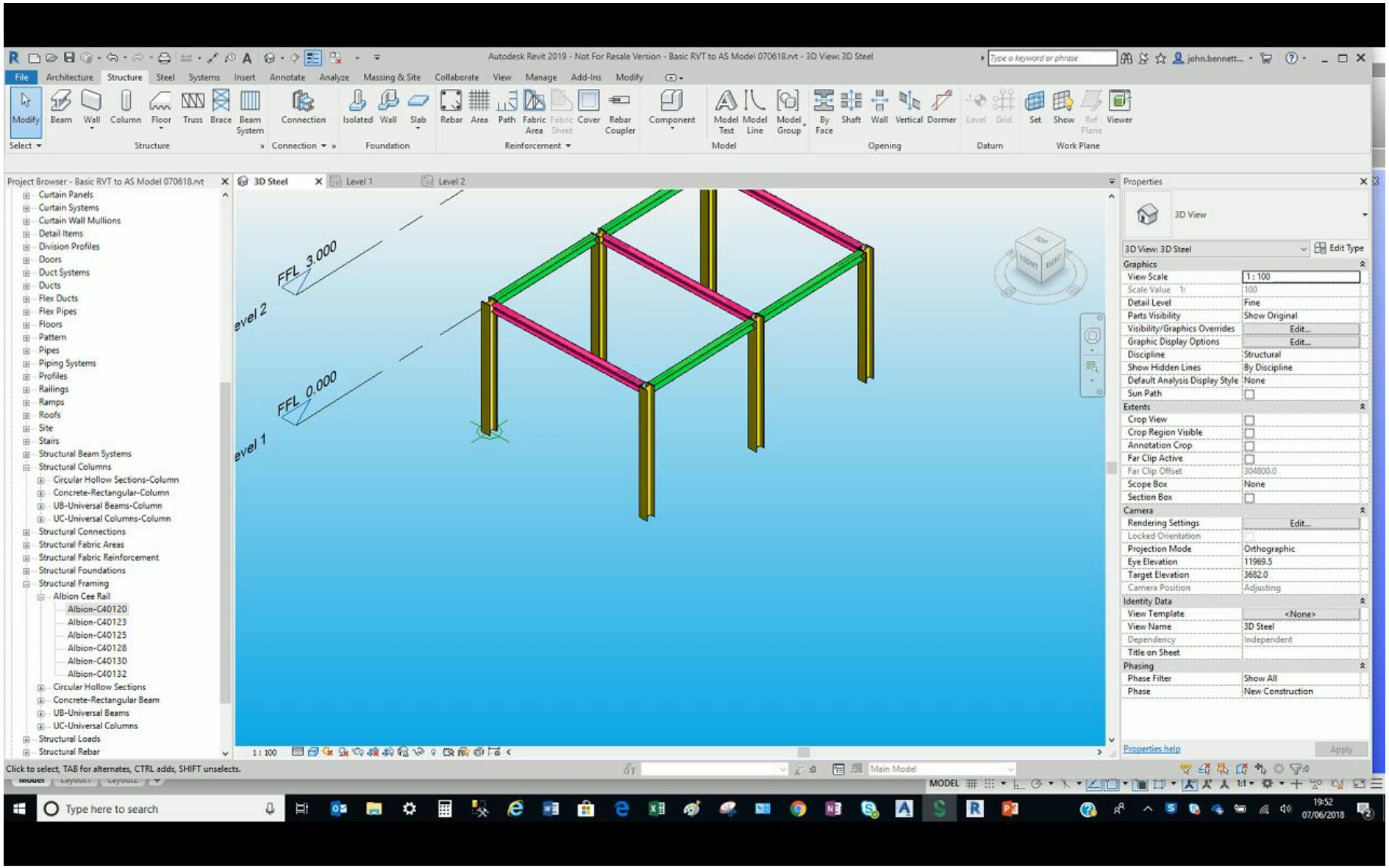




Tip : Dynamic profiles are transferred in Advance Steel and saved inside the model. There are no entries created inside the AstorProfiles.mdf

Revit Dynamic Profile Transfer help

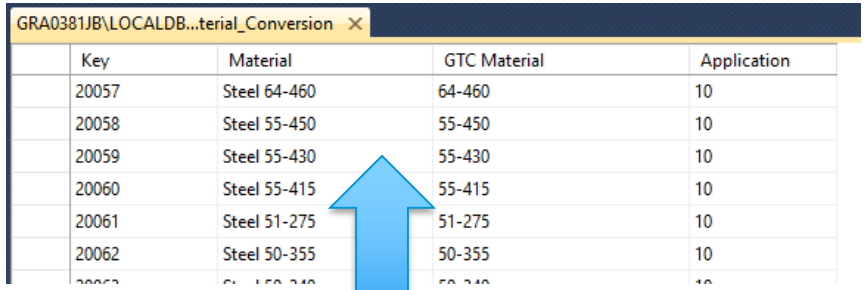
Revit to AS – Dynamic Transfer.

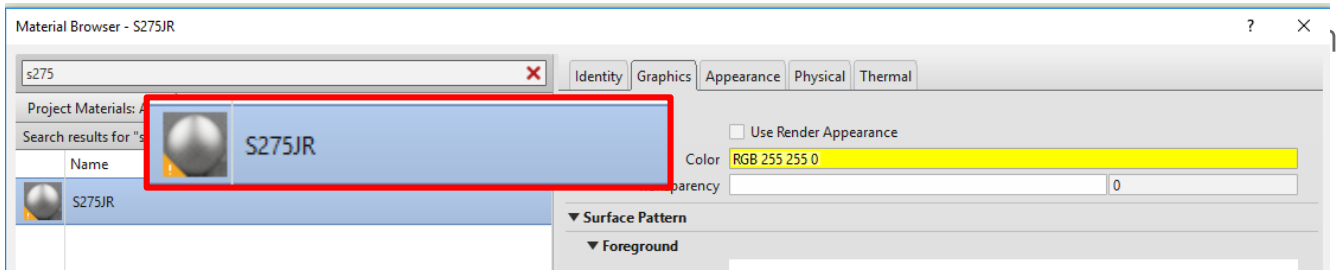


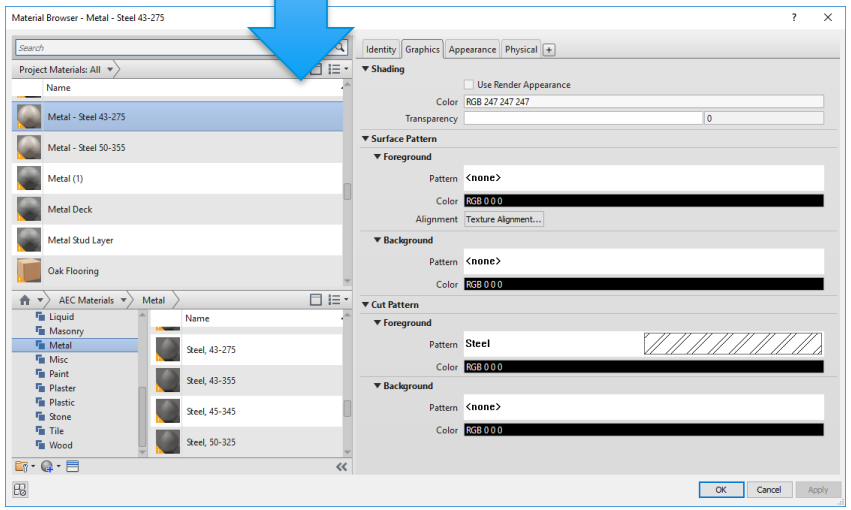
Revit Advance Steel Extension. – Materials

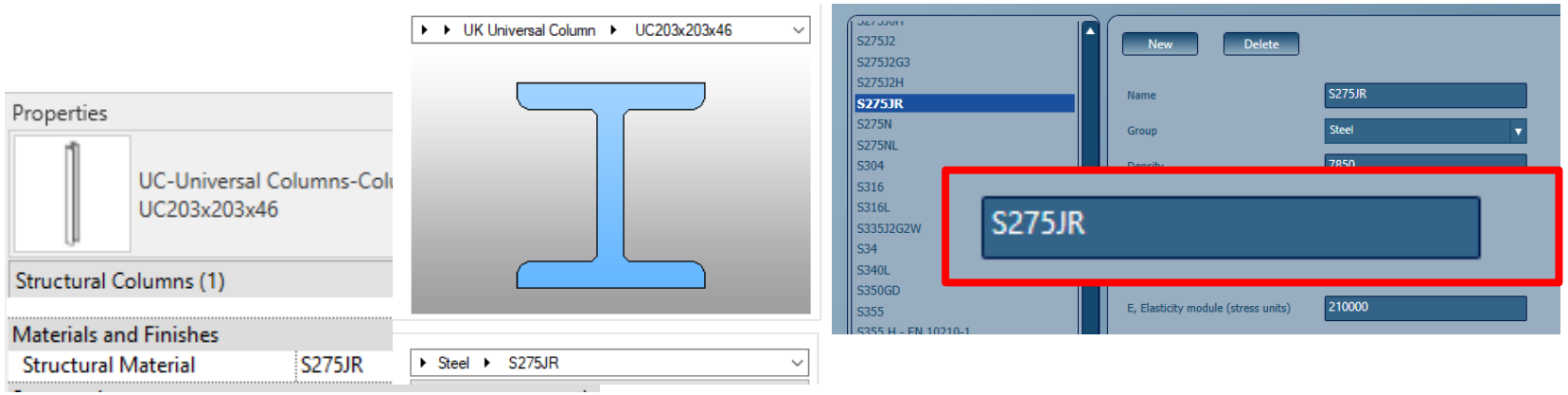
MATERIALS MAPPING

- Materials Mapping – uses the AEC materials in Revit as a Basis.
- Link is via a materials table in the GTC Database inside AS.







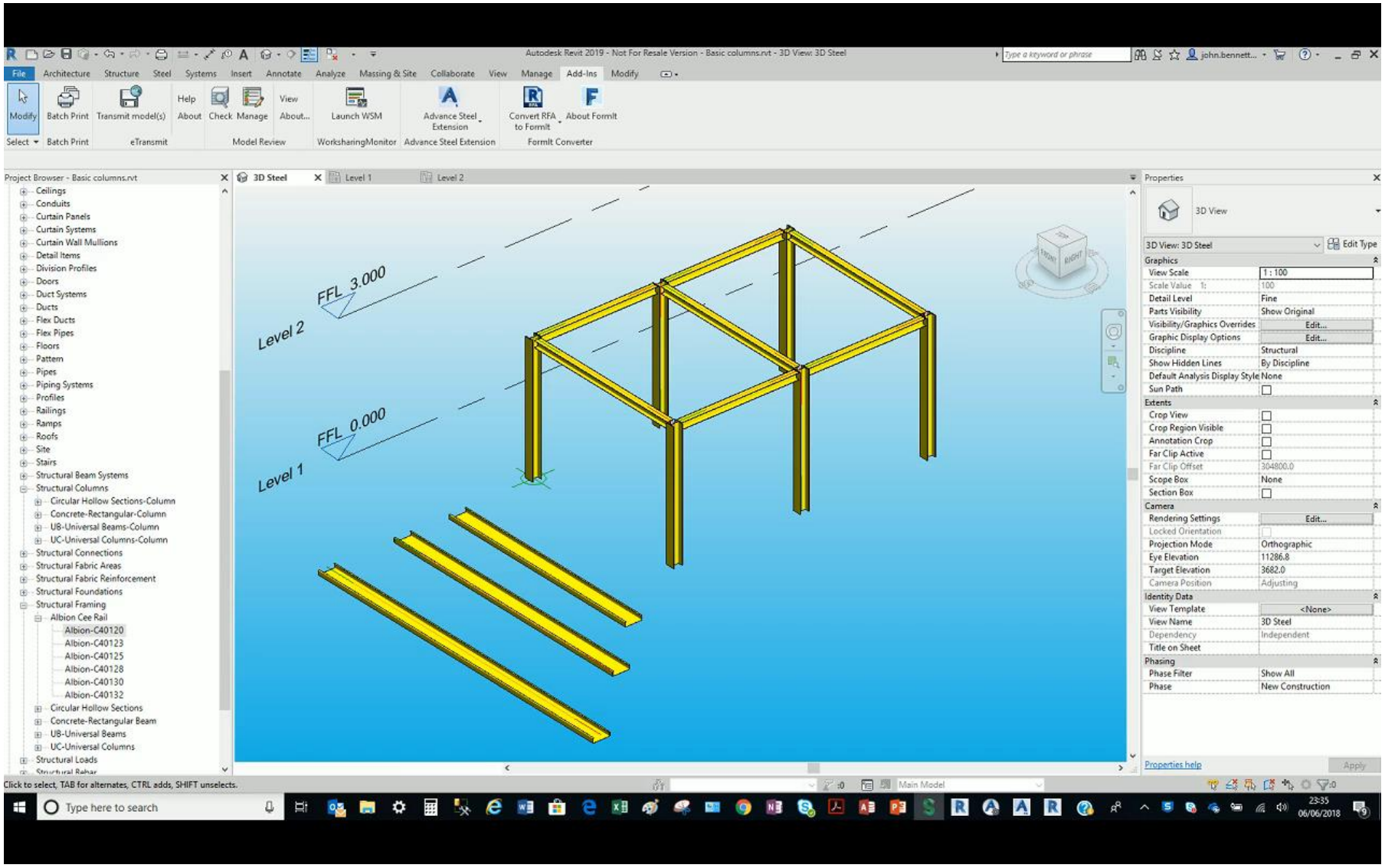


Note : AS to Revit will create a material if not found in Revit Material browser

Tip : Materials Mapping – creating new material in Revit, note that and explain to detailer, they can create corresponding materials in Advance steel, to help the mapping dialog. Use the Key Name in AS if known, make key name same as Revit MATLs.

Revit AS Extension Mapping help link

Revit to AS – Materials Mapping



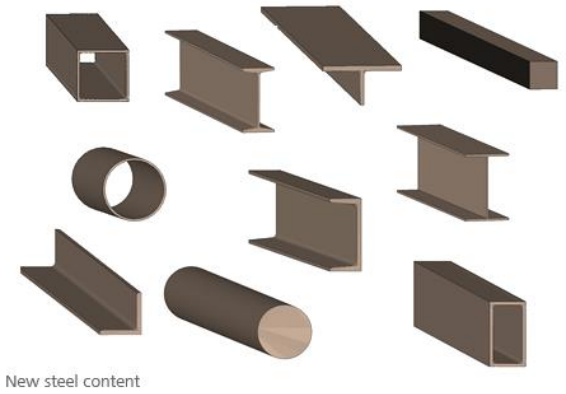
Revit to Advance Steel Approved Families.

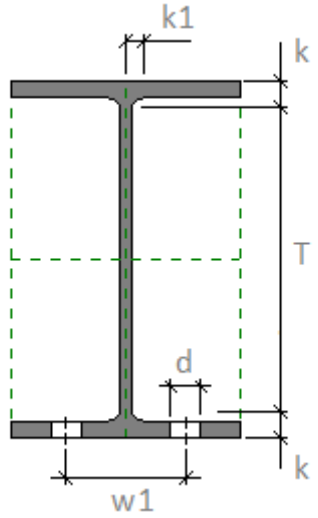
Revit Approved Families

FAMILIES LOCATIONS - 2018

- These are the ones with the Section keys.
- Linked to standard structural shapes in Revit and Advance Steel
- Approved families found via blog link, to into Revit 2018.1
  - Revit 2018.1 update

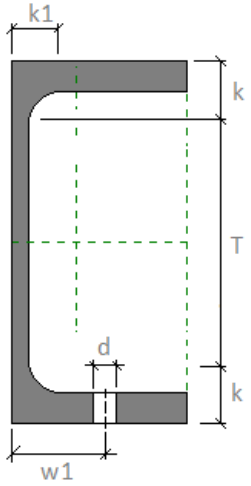
Structural Section Shapes in Revit





FAMILIES 2019

- Only **Structural steel columns and framings** are supported in the **steel fabrication workflow.**
- Framing Elements need to meet a series of requirements for the steel fabrication workflow
  - Material for Model Behaviour parameter - must be set to Steel
  - Section Shape parameter must be set to a supported shape.



Supported Structural Steel Shapes and Families for Steel Fabrication

Tip : Try To use the approved families for Revit Structural beams and columns , these are the only ones with the Section keys.

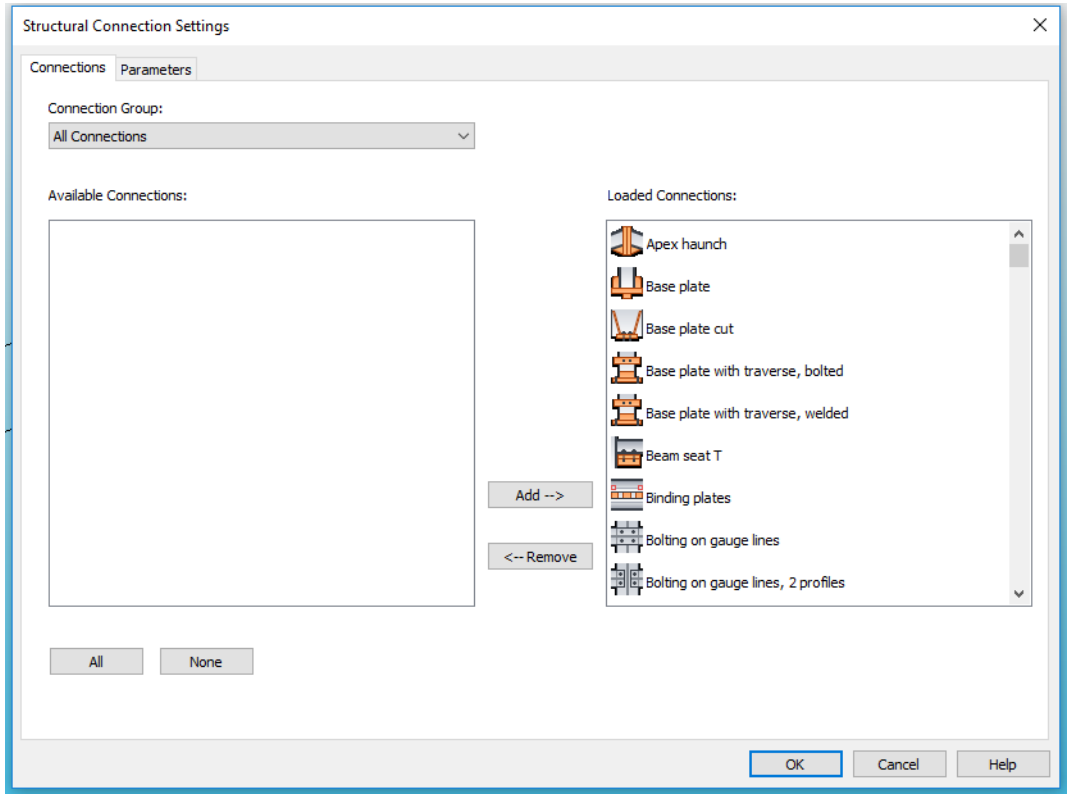
Help: Family And Category

Revit Steel Connections
Where and Why.

Revit – Steel Connections – 2017/8 Slide 1.1

STEEL CONNECTIONS

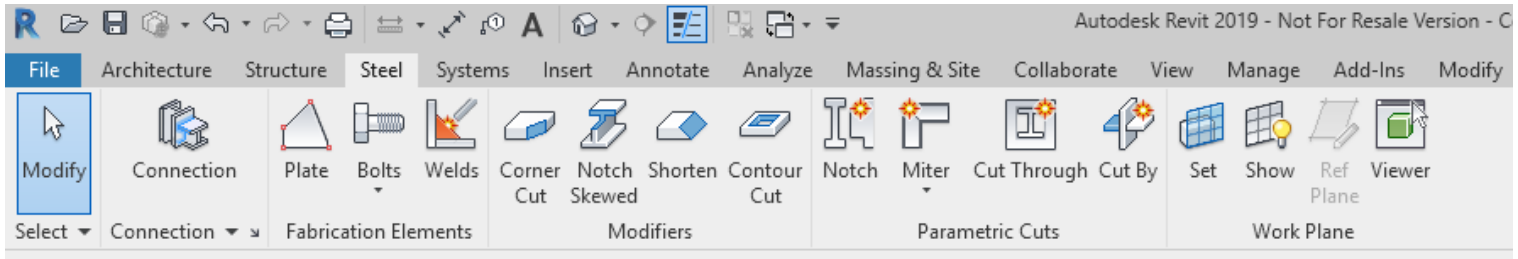
- Available as a additional download and install to the Revit 2018 platform, from your Autodesk account
- Revit 2019 – ***Steel connections are installed with the delivery***.
  - Now found on the Steel Ribbon tab.
  - Also on the Structure Tab.
    - 130 no standard connections
  - **Transfer as part of the SMLX.** (We see the new “steel Fabrication format” come into play.



[Revit Structural connections help]

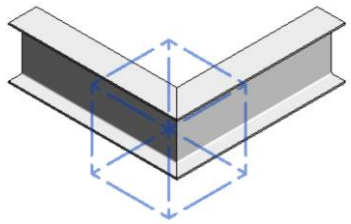
Revit Steel Tools 2019
New Tools and Transfer Method.

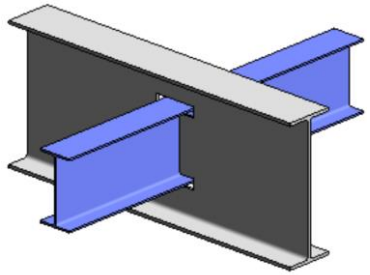
Revit – Steel Tools - 2019

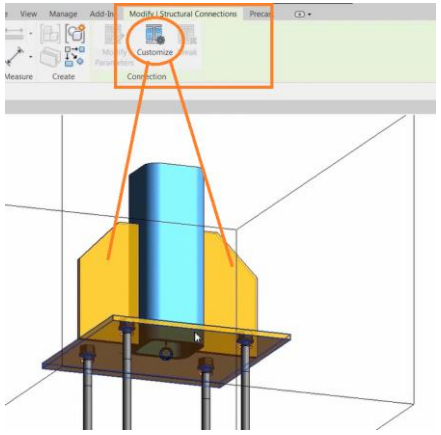


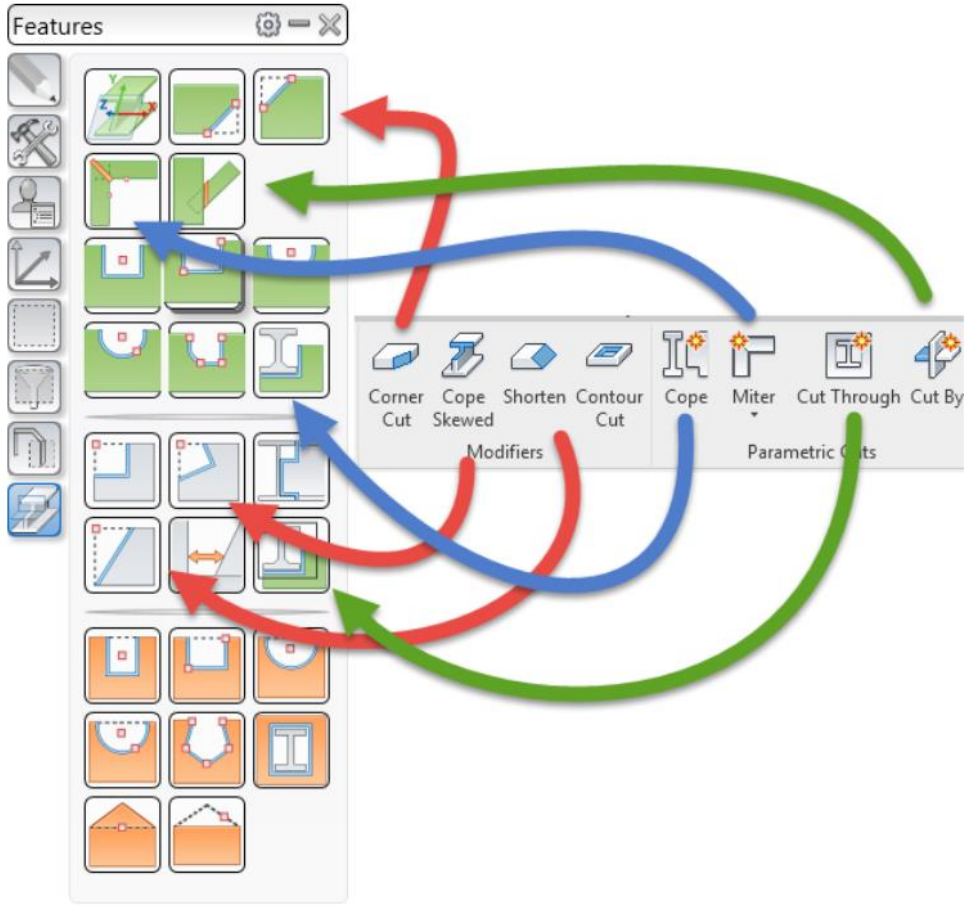
STEEL TOOLS 2019

- New Steel Ribbon. With Tools for Notch (Cope), Miter, shorten, and many other options
- Revit Elements change when using these Tools to **Steel Fabrication format.**
- With 2019, these New tools, replicate the tools that we already have inside AS, a clear message for connection collaboration.
- Also the Ability for custom connections now added via this new development.





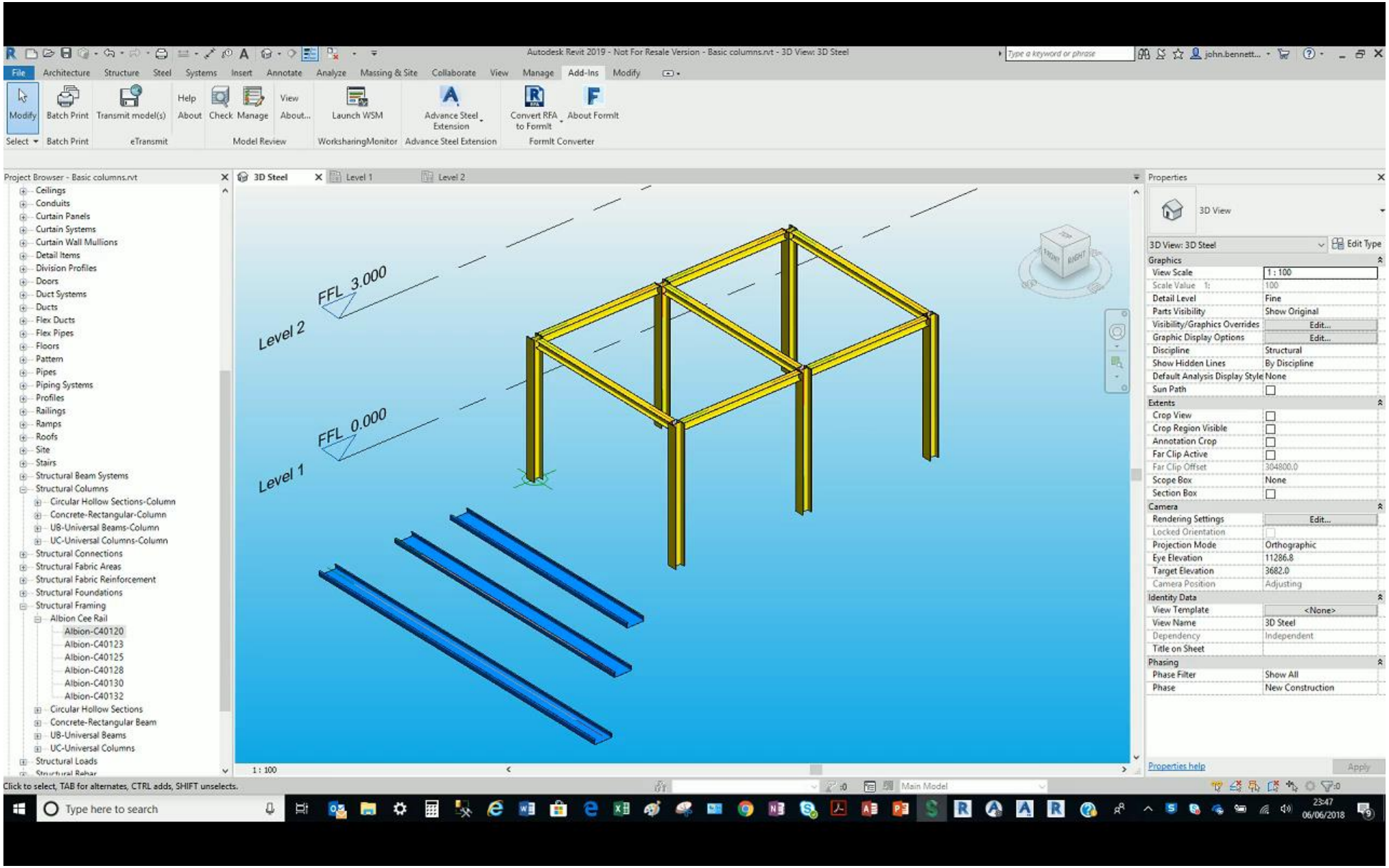




Tip : Blog post,Grumpy's Article on LinkedIn.

Graitec Blog - New tools in Revit 2019 , Stephan's LinkedIn Article

Revit to AS – Steel Fabrication Format

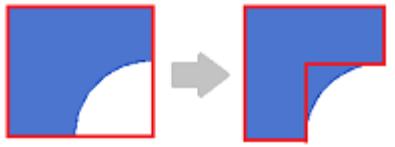


Revit 2019
Steel Fabrication Transfer.

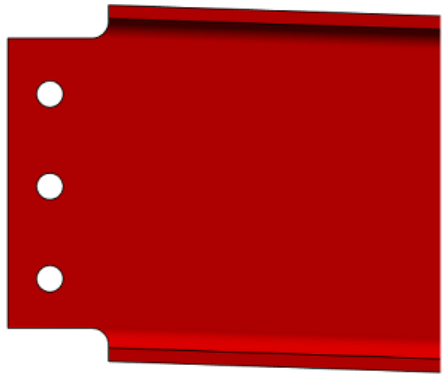
Revit – Steel Fabrication Element Transfer.

STEEL FABRICATION TRANSFER METHOD 2019

- With 2019, The Copes/Cuts/Shortens are now transfer via the Steel fabrication elements. This is taken into the SMLX via this format.
- This works with the Steel Fabrication Format, transferring the Structural Beams as the Steel fabrication Shape into Advance Steel With the Connections.



Note: Any structural framing or column, exported from Revit or Advance Steel that has an associated cut in the SMLX file, will be imported in Revit as a structural framing or column with a Steel fabrication shape.



Revit 2019 Supported Structural Steel Shapes and Families for Steel Fabrication

Revit 2018 Supported Structural Steel Shapes and Families for Steel Fabrication

Note: the 2018 method is Different, the supported list is different, this is a new approach in 2019.

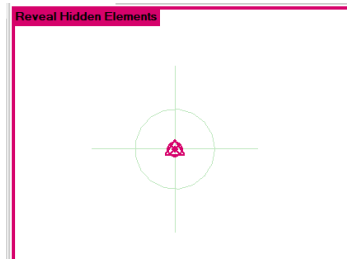
Tip : Note that this is New format for 2019, SMLX is different structure in 2019 to accommodate the change in Shape format and connections. Note fabrication shape displays the exact shape of the element and the process of creating it is irreversible

Steel Fabrication Element Transfer

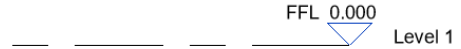
Revit 2019/ Advance Steel 2019 Template Ideas for Modelling.

Revit – Template Ideas. Slide 1.1

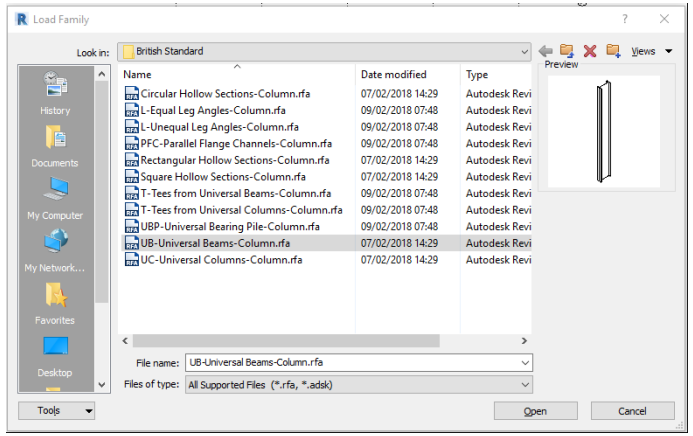
TEMPLATE : CREATION ELEMENTS



- **Origin** - In AS, try to model about the 0,0,0. modelling in Revit at this reference makes the transfer easier.
- **Levels**
  - Use them, place beam on them, they are transferred providing they have Beams elements on them
  - Try not to use large offsets for beams, affects in the transfer.



- **Grids**
  - **Transferable,** but watch if coming from AS, as you only need the level 1, multi levels used in AS, can lead to confusion.
- **Steel Sections/Families**
  - C:\ProgramData\Autodesk\RVT 2019\Libraries\UK\Structural Framing\Steel\British Standard
    - Personal View –load the correct country libraries, all of them, just makes it easier to model steel in Revit.



Revit – Template Ideas. – Slide 1.2

TEMPLATE : CREATION ELEMENTS

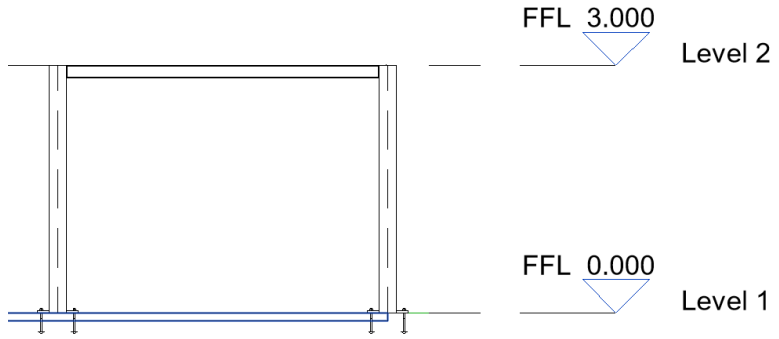
- **Steel Connections -** just load them all, is easier, then use search feature.
- **Steel Materials** – there are some in the system, by default Revit is mapped to AS via the AEC materials, but you can add you own, If you have access to steel guide then look, if New materials, Create the same in AS.
- **Colours** - Revit is different to AS, New users need to get to grip with materials and also Visual graphics and the overrides.
    - Personal view, try to make the steel and connection elements different base colours, just helps to see them in model.
    - When creating materials, use this as the basis to change the colour for steel, if working with AS, try to match what you would expect to see.

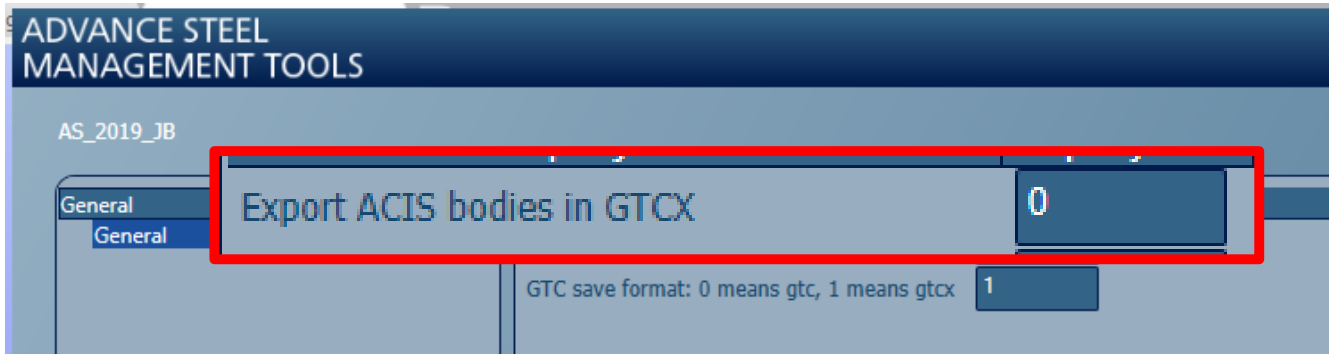
Tip: when you create your template, then add it to you list of preferred templates, so selection and use is easier.
Revit Help - Setting you default template adding to list

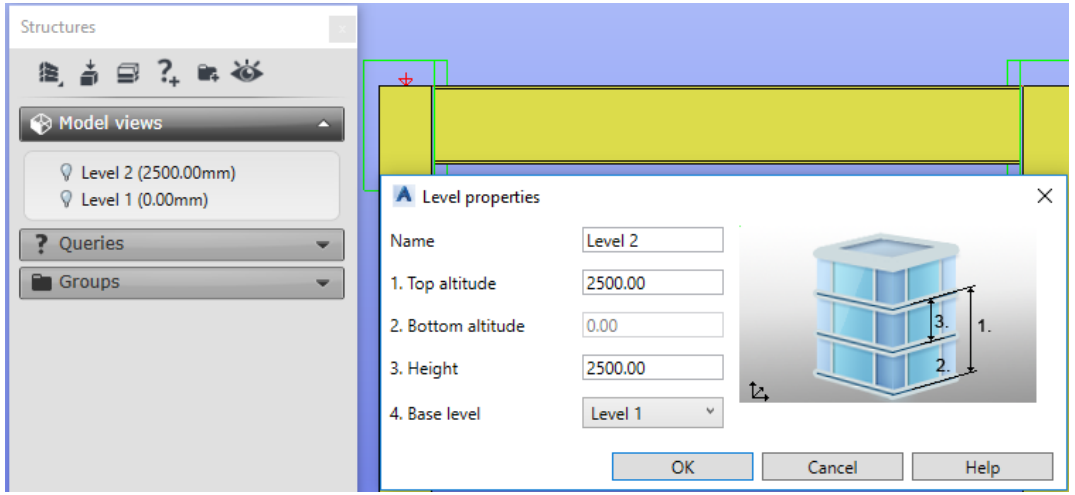
Advance Steel – Model Settings – Slide 1.1

MANAGEMENT TOOL SETTINGS

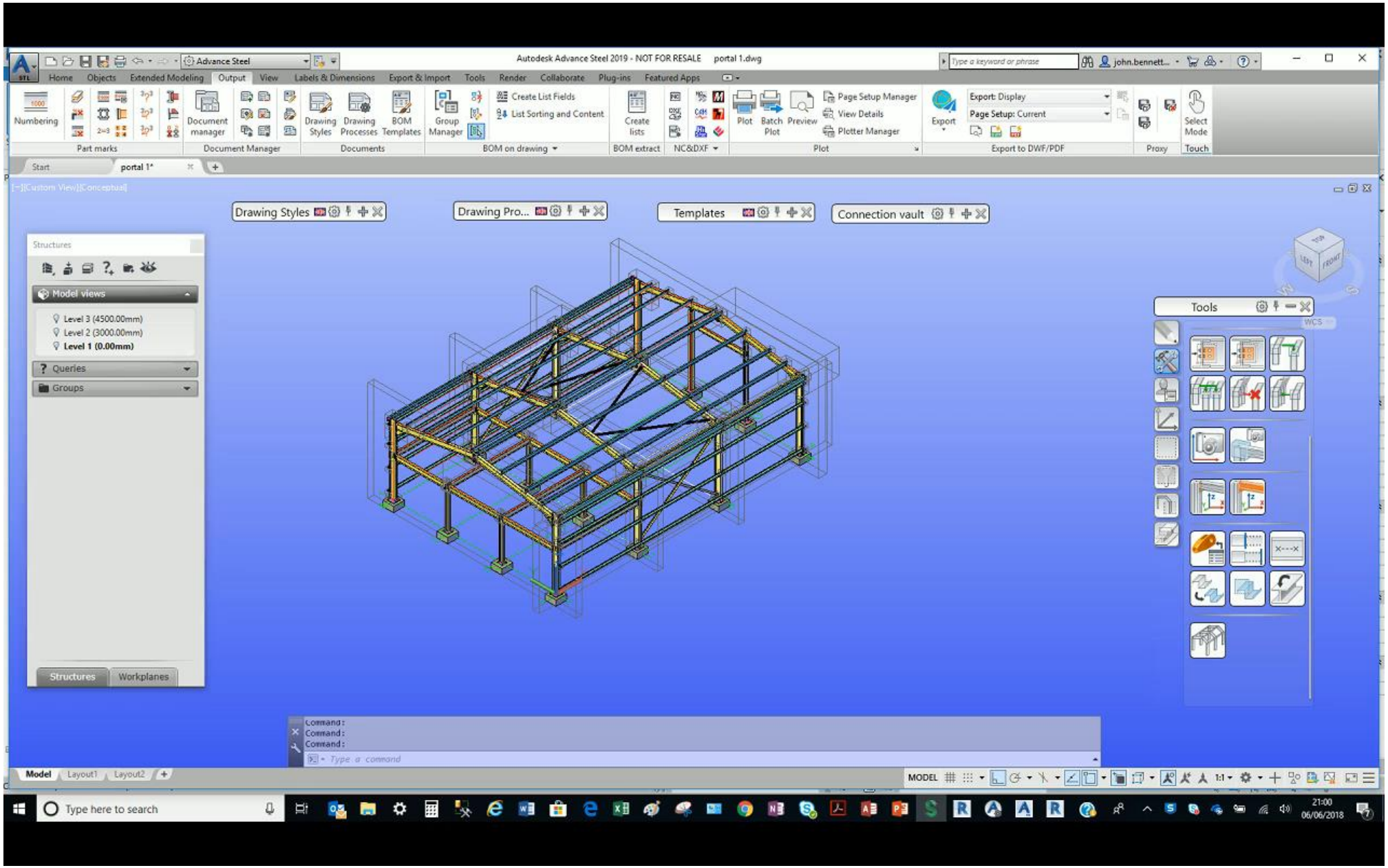
- **GTC AS Defaults Settings-** Change this (UK) so you do not need to number the model before the export.
- **AS Levels**– Use levels in the project explorer, if working with Revit, attach beams to levels, the levels are transferred into Revit.
- **Origin** - In AS try to start your model at the WCS , 0,0,0 position, this helps when transferring to Revit. As the levels are based around that reference point.







AS to Revit – SMLX Transfer.



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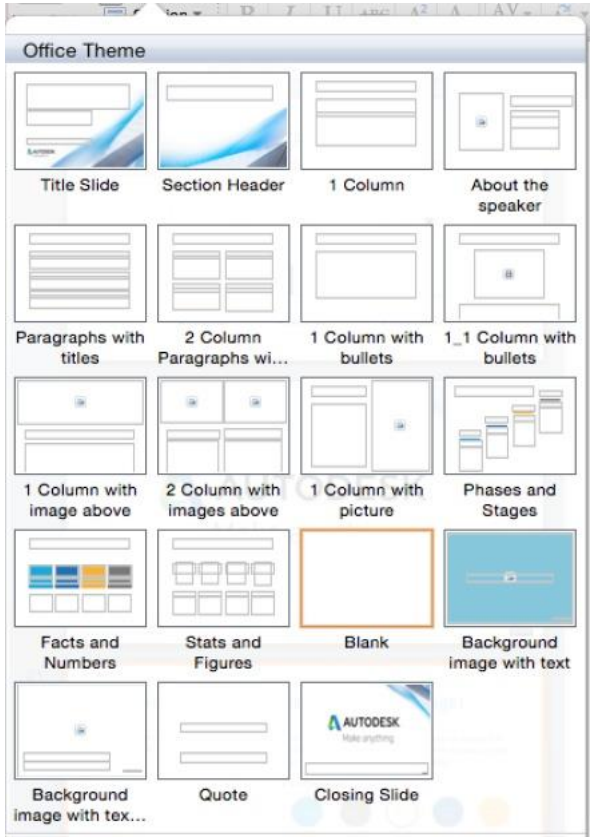
Make anything.

Instructions and resources (Delete page)

- Access the slide layouts for this template on the Home tab under Slides/Layout.



- AU 2018 Fonts: We recommend downloading our Artifakt font if you do not already have it on your machine. Please use Arial as a backup font when Artifakt is unavailable.

- AU 2018 Colors

ADK Blue	Gray	white	Dark blue	Orange
R 6 G 150 B 215 HEX: 0696D7	R 102 G 102 B 102 HEX: 666666	R 255 G 255 B 255 HEX: FFFFFF	R 24 G 88 B 168 HEX: 1858A8	R 250 G 162 B 27 HEX: FAA21B

- AU Resources
  - Images and video content – DAM
  - Branding and editorial guidelines – Brand Hub

Main Title – 1 column with bullets

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- First-level bullet: closed circle. Text style: gray, 1.4 spaced, Artifakt Element 30pt font.
  - Second-level bullet: open circle. Text style: gray, 1.4 spaced, Artifakt Element 30pt font.
    - Third-level bullet: closed square. Text style: gray, 1.4 spaced, Artifakt Element 30pt font.

Main Title – 2 column bullets

LOREM IPSUM

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1 column with image

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  - Second-level bullet: open circle. Text style: gray, 1.4 spaced, Artifakt Element 30pt font.
    - Third-level bullet: closed square. Text style: gray, 1.4 spaced, Artifakt Element 30pt font.

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Title 2

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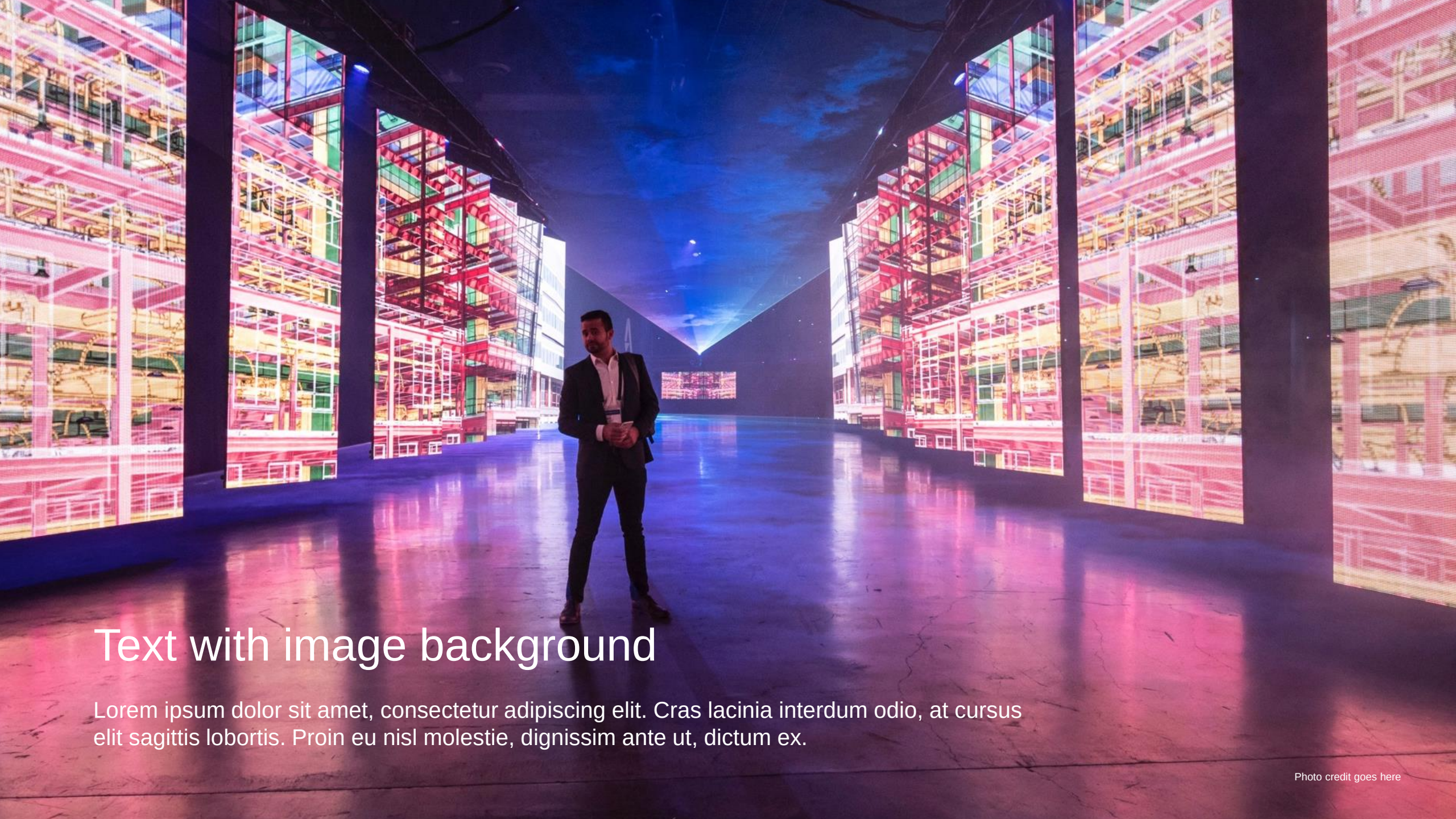
Text with image background

Image caption goes here



Text with image background

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Photo credit goes here

Main title – video page

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This is where a keyword or important quote could go

ATTRIBUTION

Facts & Numbers

97	104	58	12
CLIENTS	PROJECTS	APPS	WEBSITES
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Phases/Stages

STAGE A

YOUR TITLE

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STAGE B

YOUR TITLE

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STAGE C

YOUR TITLE

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STAGE D

YOUR TITLE

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Stats & figures

WRITE HERE

Right click on the chart for an excel spreadsheet to populate your figures and automatically update this chart

WRITE HERE

Right click on the chart for an excel spreadsheet to populate your figures and automatically update this chart

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WRITE HERE

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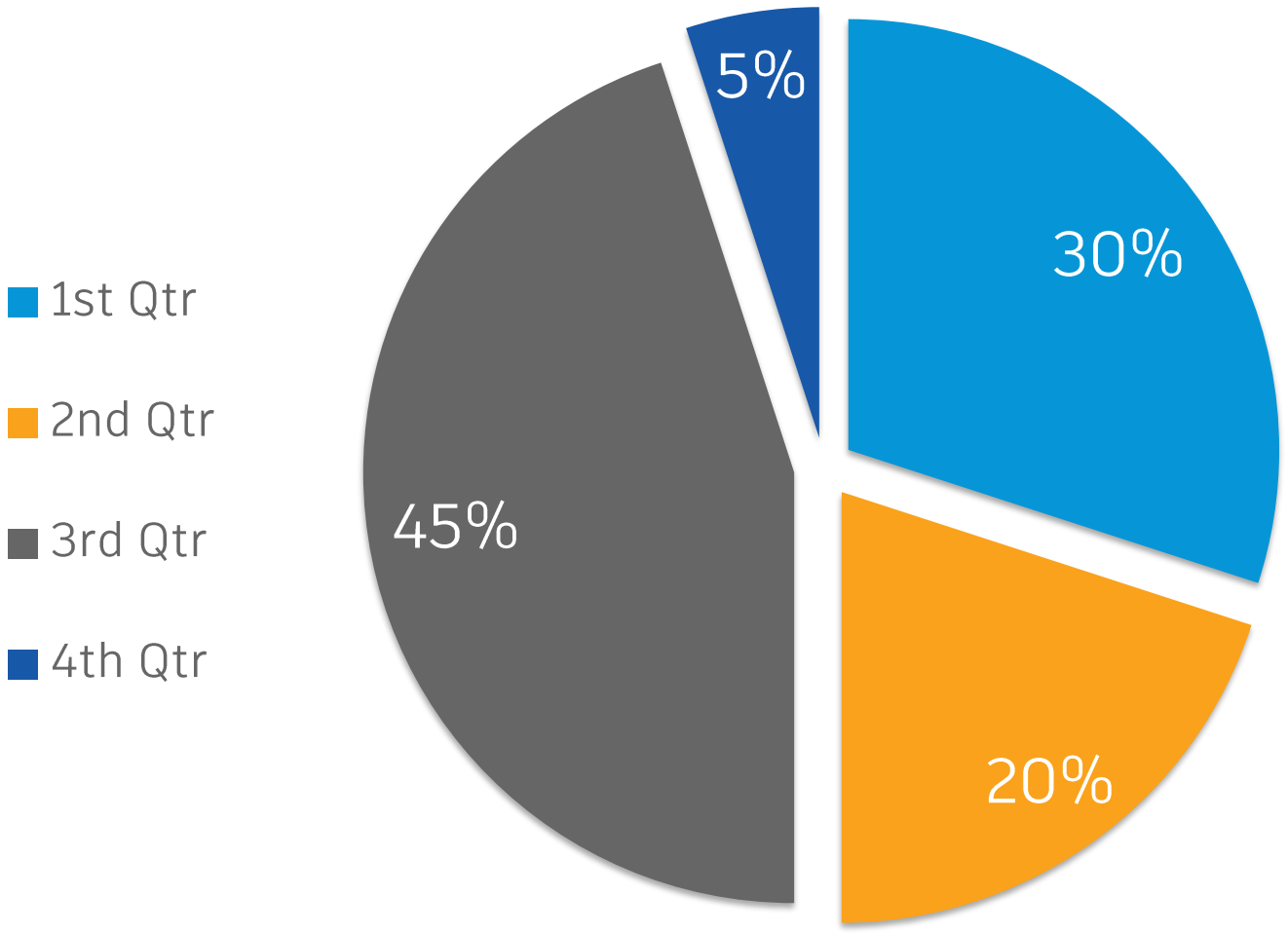
Pie chart



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Right click on the chart for an excel spreadsheet to populate your figures and automatically update this chart

Bar graphs

Right click on the chart below for an excel spreadsheet to populate your figures and automatically update this chart