AUTODESK UNIVERSITY

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Extended workflows with Autodesk Advance Steel

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Learning Objectives

- Understand the Autodesk structural offerings
- Understand the integrated workflow with Autodesk Advance Steel
- Look at recent enhancements to the portfolio
- Learn where Dynamo can assist your design process

Description

In this class, we will explore extended workflows that lead to enhanced fabrication details with Autodesk Advance Steel. We will see the advantages of an integrated approach with Autodesk Revit, Autodesk Robot Structural Analysis Professional and ultimately Autodesk Navisworks. We will also be introducing how we can link to general connection design through an Autodesk Structural Partnering solution. Finally, in this class we will explore the use of Dynamo with Autodesk Advance Steel through discussion and worked examples. This session features Autodesk Advance Steel, Autodesk Revit and Autodesk Robot Structural Analysis Professional. AIA Approved

Your AU Expert(s)

My name is Ralph Pullinger. I have been with Autodesk for almost nine years. My role is that of a Solutions Engineer for the Structural Fabrication team within EMEA (Europe Middle East & Africa). I am also a Structural Engineer but don't let that worry you as I have been on both sides of the design 'fence' having used and managed a large AutoCAD base for several years before my journey with Autodesk. My love of CAD and in particular AutoCAD started with Release 10. I have over thirty years' worth of experience in the AEC industry and my role now allows me to help and assist customers, large and small, with their workflows and problems. I enjoy thinking and working outside of the box…

What is Structural Engineering?

Dr A R Dykes sums this up quite eloquently: “Engineering is the art of modelling materials we do not wholly understand, into shapes we cannot precisely analyse so as to withstand forces we cannot properly assess, in such a way that the public has no reason to the suspect the extent of out ignorance.”

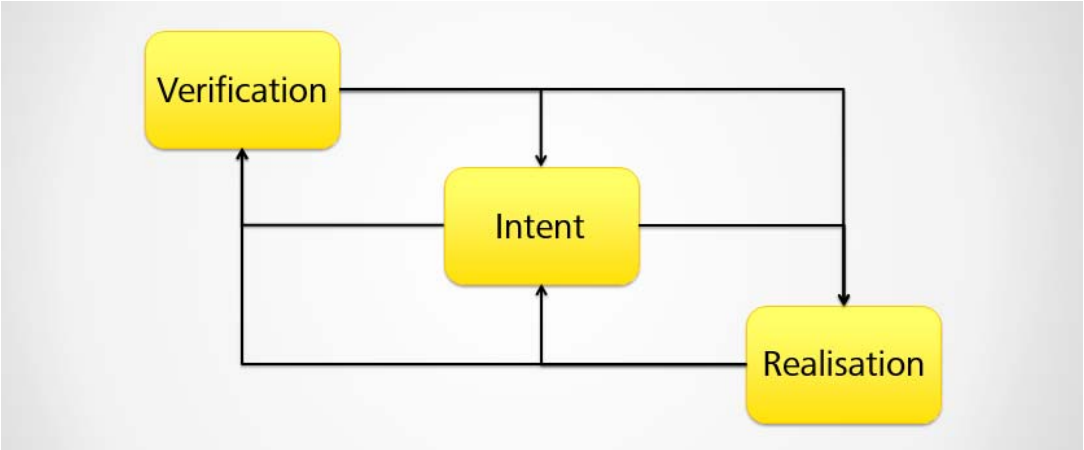
There are many more quotes out there that attempt to define a profession that has been around since the dawn of man. The term engineer, however, is a relatively recent title.

Perhaps the earliest example of pre-fabricated parts coming together to form a structure is that of Stonehenge in England. Admittedly the shapes were crude, their size large and small but logistically a great undertaking. Ultimately the Stonehenge’s creators were designers, specifiers and planners – in their own way engineers.

Over the years materials have evolved, designs have changed, standards have been written and tools improved. Today we have very powerful computers able to process information in a fraction of the time it took ten or even five years ago. The role of the engineer in today’s society has never been more relevant.

Why an integrated workflow?

The engineering process does not exist in a series of unconnected silos and it never has. There has always been a link from concept to realisation through verification.

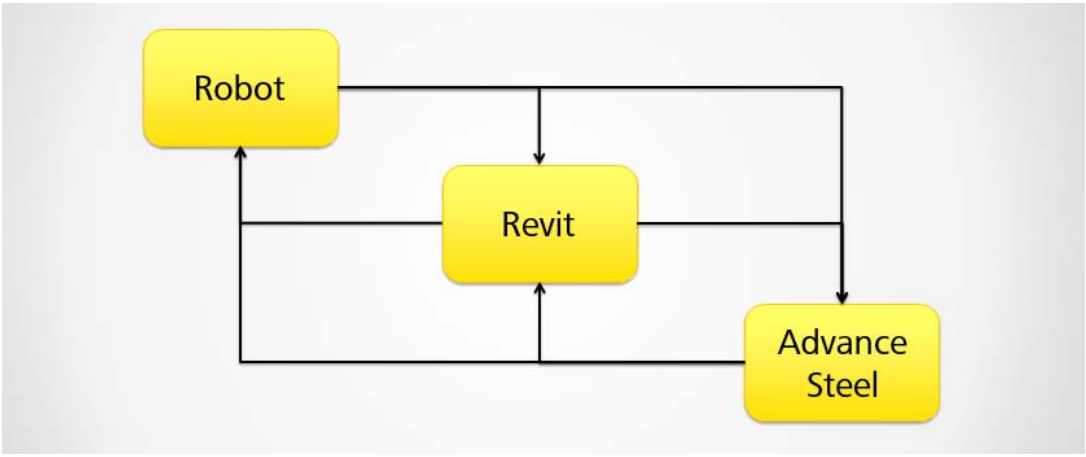


A project starts of solely within Intent. At some point some verification needs to take place. The results of this verification are passed on to the Intent model and the level of information it contains grows in size, complexity and assurance. Realisation occurs as the Intent model reaches sufficient maturity that the information it contains must be enhanced to enable the project to be built – otherwise there would be no point to the project surely? There may be an additional requirement for further verification as a result of the realisation stage for example in connection design or column 'lift' design.

Autodesk has many offerings covering the structural engineering sector:

- Autodesk Revit;
- Autodesk Robot Structural Analysis Professional;
- Autodesk Advance Steel;
- Autodesk Simulation Mechanical*;
- Autodesk Nastran*.

* – not discussed here but could be part of a larger more complex workflow.



The connected processes look like the above diagram from an Autodesk perspective. Each link takes information and adds to it to move it on to the next stage with no data loss. The primary format in use is SMLX. There is a direct transfer from Autodesk Revit to Autodesk Robot Structural Analysis Professional if required.

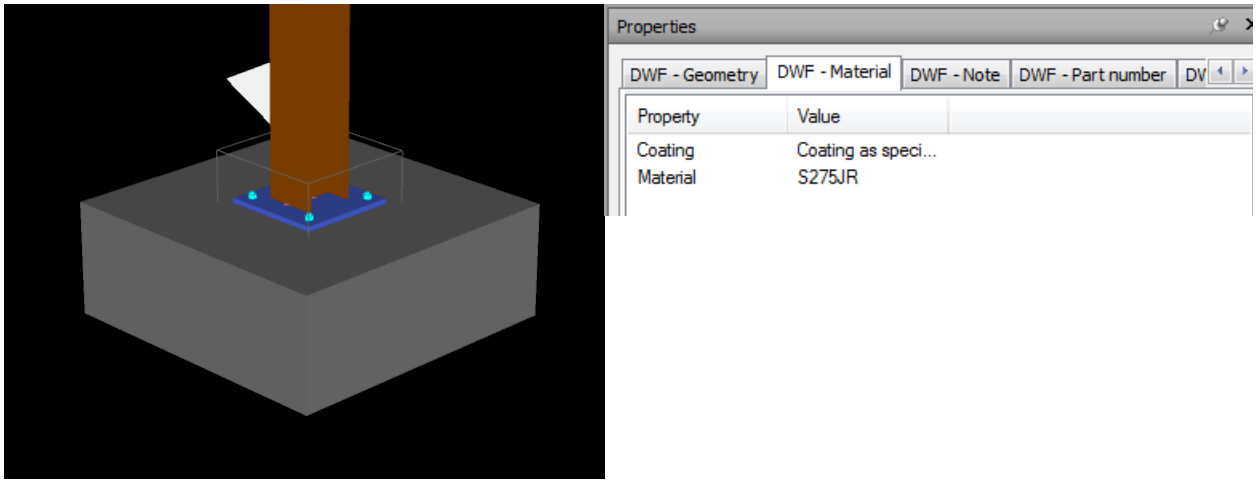
There is also an additional requirement that the engineering process must be able to give and receive data to other disciplines such as architectural, mechanical and electrical, plumbing, plant and even highways. So exchanging information with Autodesk Revit and Autodesk Advance Steel is of prime importance.

At the hub of any project is a coordinated, consolidated model that can be interrogated by parties that do not necessarily have the intelligent host applications. So for this we have Autodesk Navisworks. It allows parties to see what is being designed and comment freely on those designs.

Autodesk has improved the links between these applications since the acquisition of Advance Steel with each release comes new enhancements. We have also started to develop a series of connections that are available in both Autodesk Revit and Autodesk Advance Steel that allows designers to visualise some of their connections that are intended for fabrication within the main design model. Autodesk Advance Steel will remain the choice for documentation to fabrication level information. This ultimately allows for a very flexible and agile solution.

Integration with Navisworks

To overcome file formats and the need to have Autodesk Advance Steel there is the Export to Navisworks option which publishes a 3D dwf file with intelligence. This can also be combined with other files for any given project and can be issued to anyone with the free viewer.



All of the properties are published together with the basic objects that make up the model.

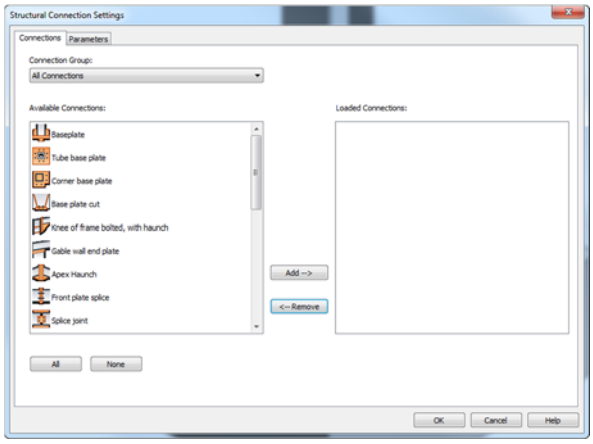
As an alternative new for the 2017 release comes an enhanced object enabler which allows users with Autodesk AutoCAD to read Autodesk Advance Steel objects and drawings.

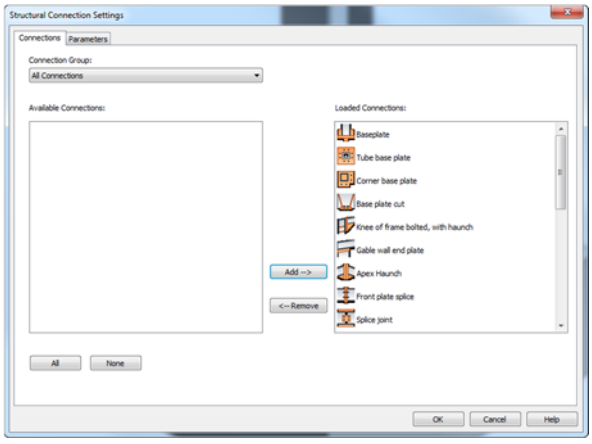
Connections in Autodesk Revit

With this release came tighter integration with Autodesk Advance Steel. Several steel connections are now available in both applications with the same level of control and access to design codes.

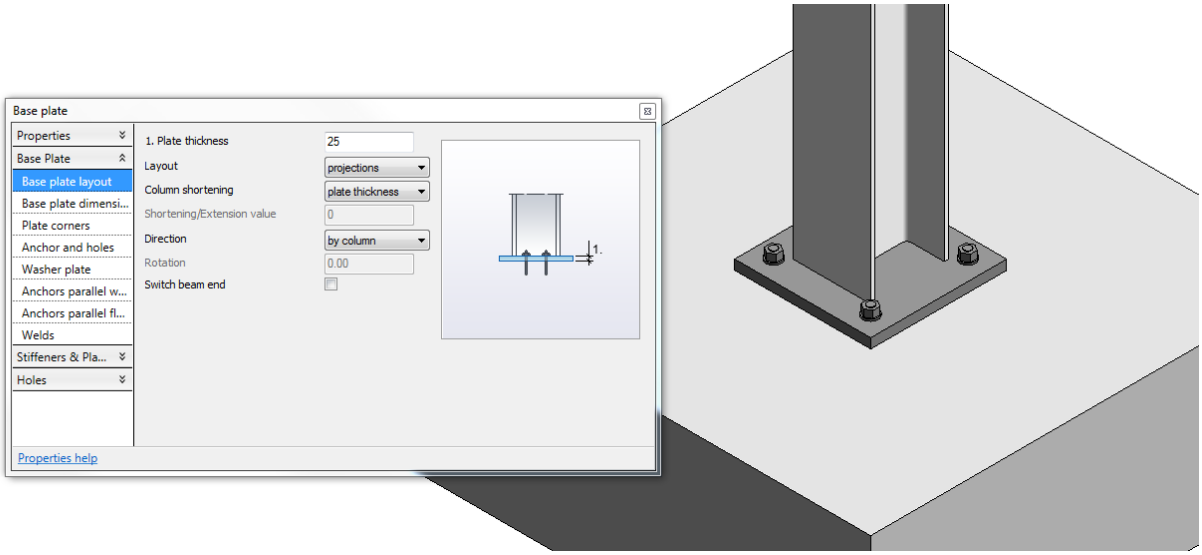
These connections are available for Autodesk Revit subscribers through their Autodesk Account.

Connections are added to the current project as required and then applied to the relevant members. Only valid connections will be applied to valid members which essentially mean that you cannot apply a connection to members that cannot take the connection type in question.

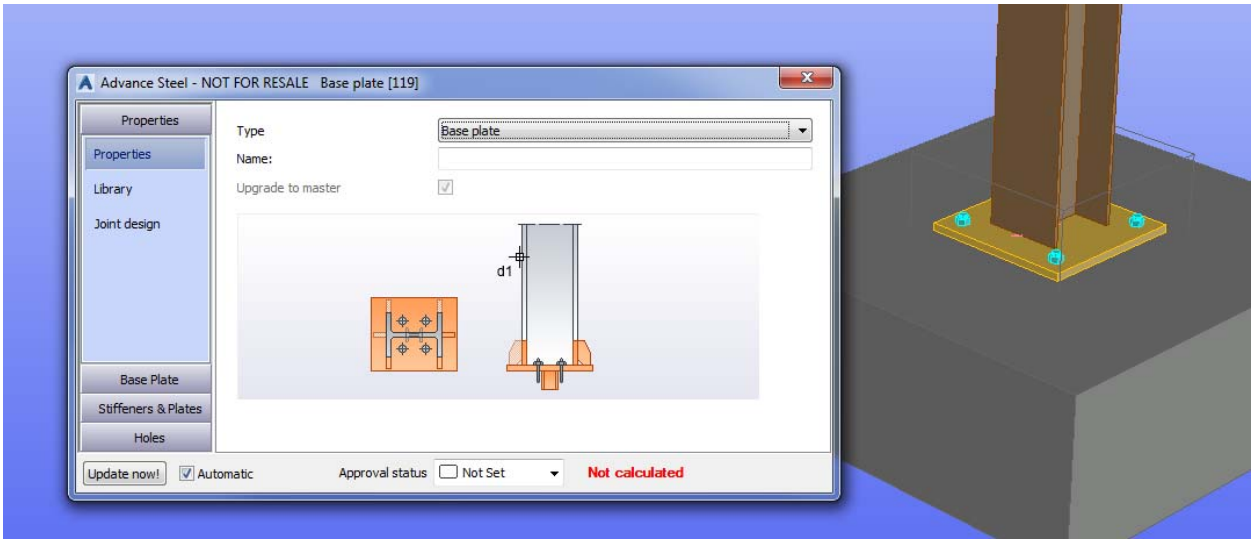




Once a connection is applied it can be edited in a similar manner to the equivalent connection in Autodesk Advance Steel.



Compare the screenshot of a baseplate connection in Autodesk Revit above with the same baseplate in Autodesk Advance Steel below.



The intelligence embedded into the Autodesk Revit connection will transfer to Autodesk Advance Steel and vice versa.

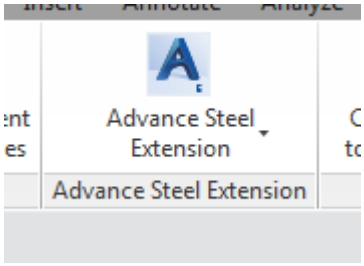
Currently twenty two steel connections are available for this 2017 release. The matrix below shows the object types that can be transferred from Autodesk Advance Steel to Autodesk Revit.

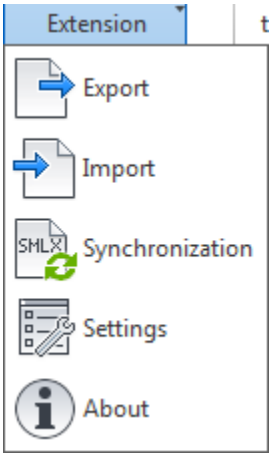
Some of the gaps below can be plugged by future versions of the Autodesk Advance Steel Add-In and others require Autodesk Revit to evolve.

Autodesk Advance Steel objects	Autodesk Revit objects
Level	Level
Grid	X
Beam	Structural framing
Column	Structural column
Wall	Basic wall
Slab	Floor
Isolated footing	Structural foundation
Continuous footing	Structural framing
Plate	Generic model
Grating	Generic model
Folded plate	Generic model (individual elements)
Twisted folded plate	Generic model (individual elements)
Folded beam	Generic model
Special part	X
Bolts	X
Anchors	X
Holes	Holes (on plate only)
Shear studs	X
Welds	X

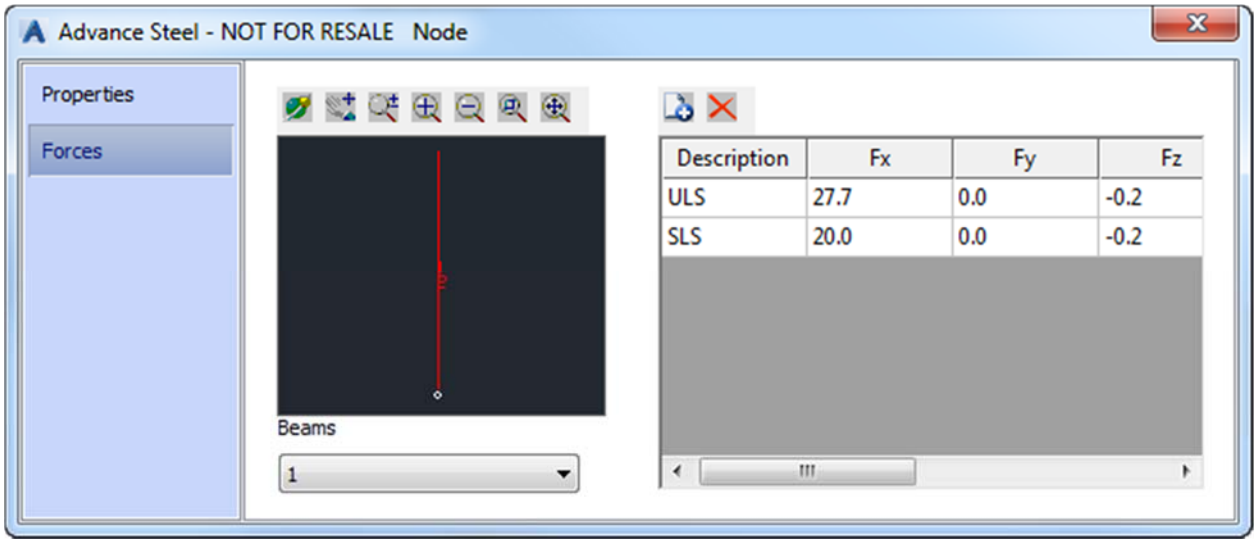
The Autodesk Advance Steel Add-In for Autodesk Revit

The add-in functions are an extension to Autodesk Revit and provide a way of exporting intelligent information from Autodesk Revit to Autodesk Advance Steel using the SMLX format.

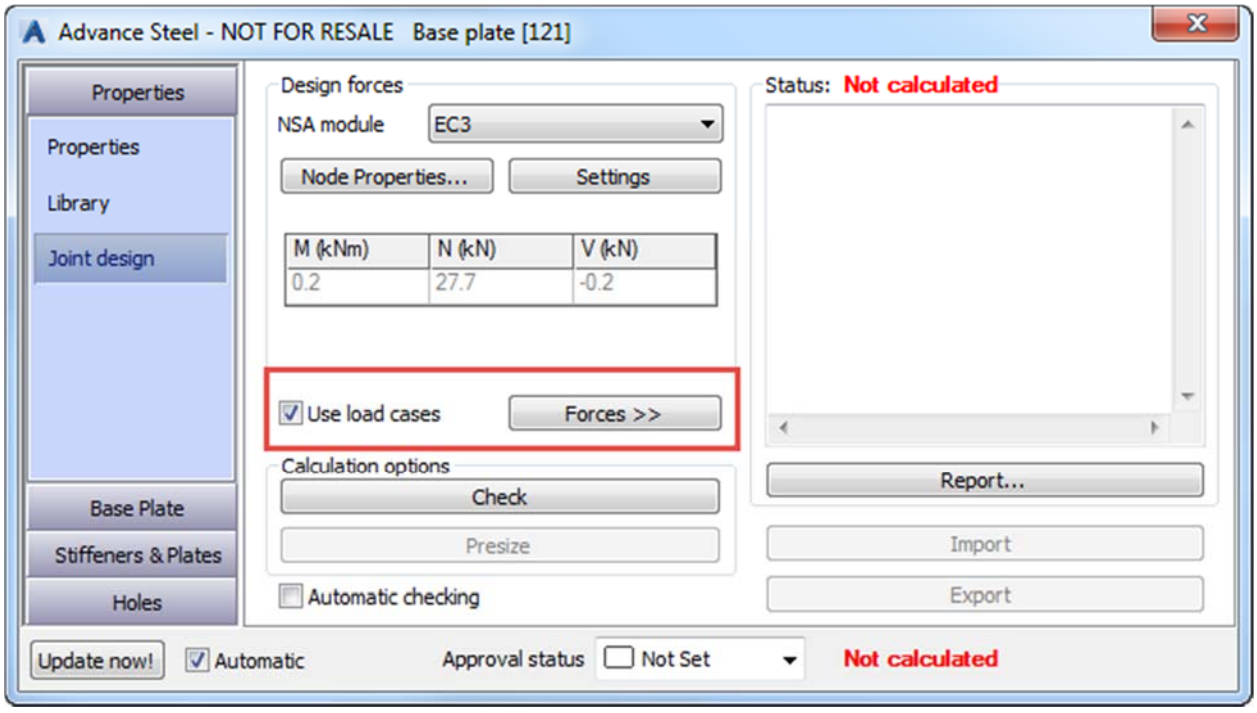




The link is not an all-out and an all-in type of link like others. After the initial export the data is synchronized between the applications enabling information to be built on as the design progresses. If the structural design process incorporates Autodesk Robot Structural Analysis Professional, and if the results from this application are posted to the Intent model as described at the beginning, then these results can be used within Autodesk Advance Steel for design purposes. Why is this a good thing? Usually engineers are notorious for over simplifying forces for connection design. Using the actual forces from the load case combinations results will result in a more realistic and possibly efficient connection design. These forces appear in the Autodesk Advance Steel model as Nodes.

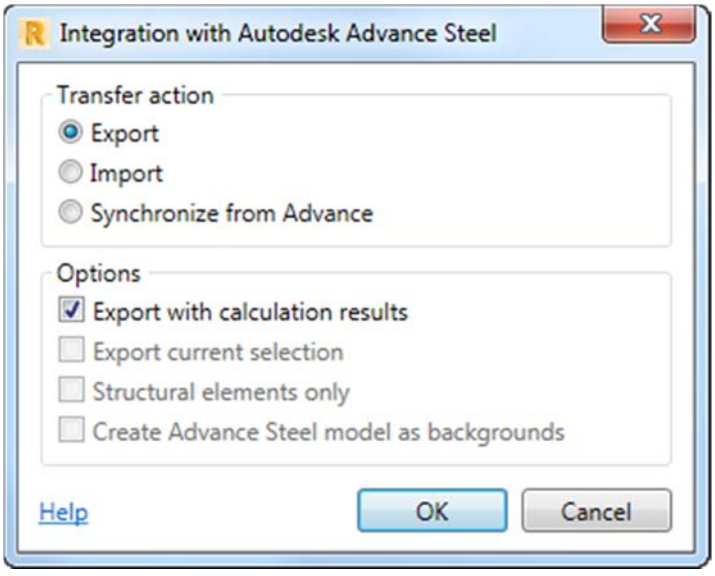


If present these can be used in the Joint design module for the connection.



This eliminates the manual entry of possibly erroneously enveloped forces and allows the connection to be checked using the actual forces for each design load case combination. This approach saves time, helps to prevent errors and creates a better design.

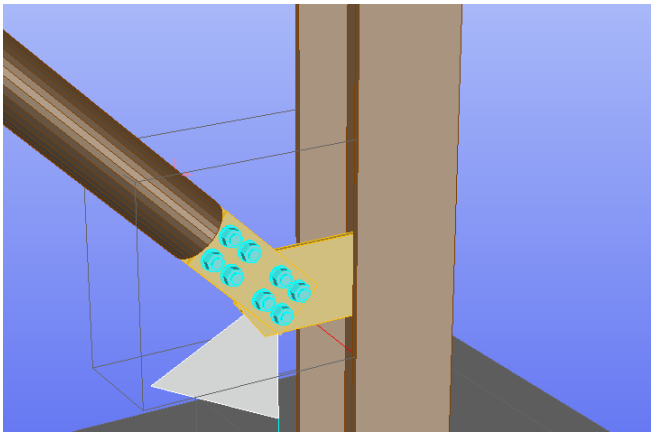
There is also an equivalent extension for Autodesk Robot Structural Analysis Professional which allows the analytical model to be published directly from analysis and design to realisation.



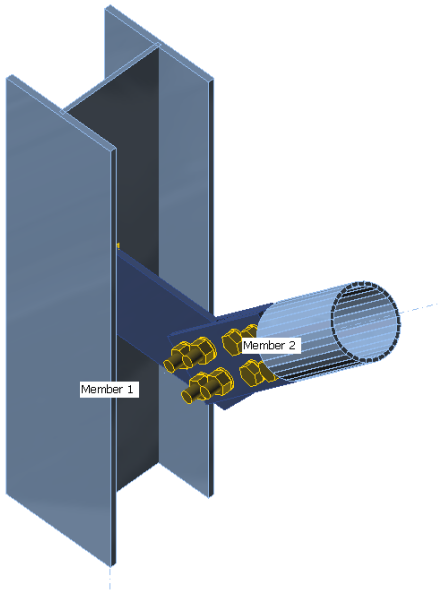
This add-in also Exports, Imports and Synchronizes with the relevant models.

Help – I cannot check my connection as it is too complex…

Not all connections can be checked with Autodesk Advance Steel or traditional hand calculations (this includes Microsoft Excel spreadsheets). What do you do? IDEA-RS have produced IDEA Statica – an application the uses a new method call Component Based Finite Element Modelling (CBFEM). This software allows engineers to build their joint and check it (pass or fail) to Eurocode or AISC standards. As befits their status as an Autodesk Premier Structural Partner they have implemented an interface with Autodesk Advance Steel. This allows the joint geometry to be passed directly to IDEA Statica for analysis.



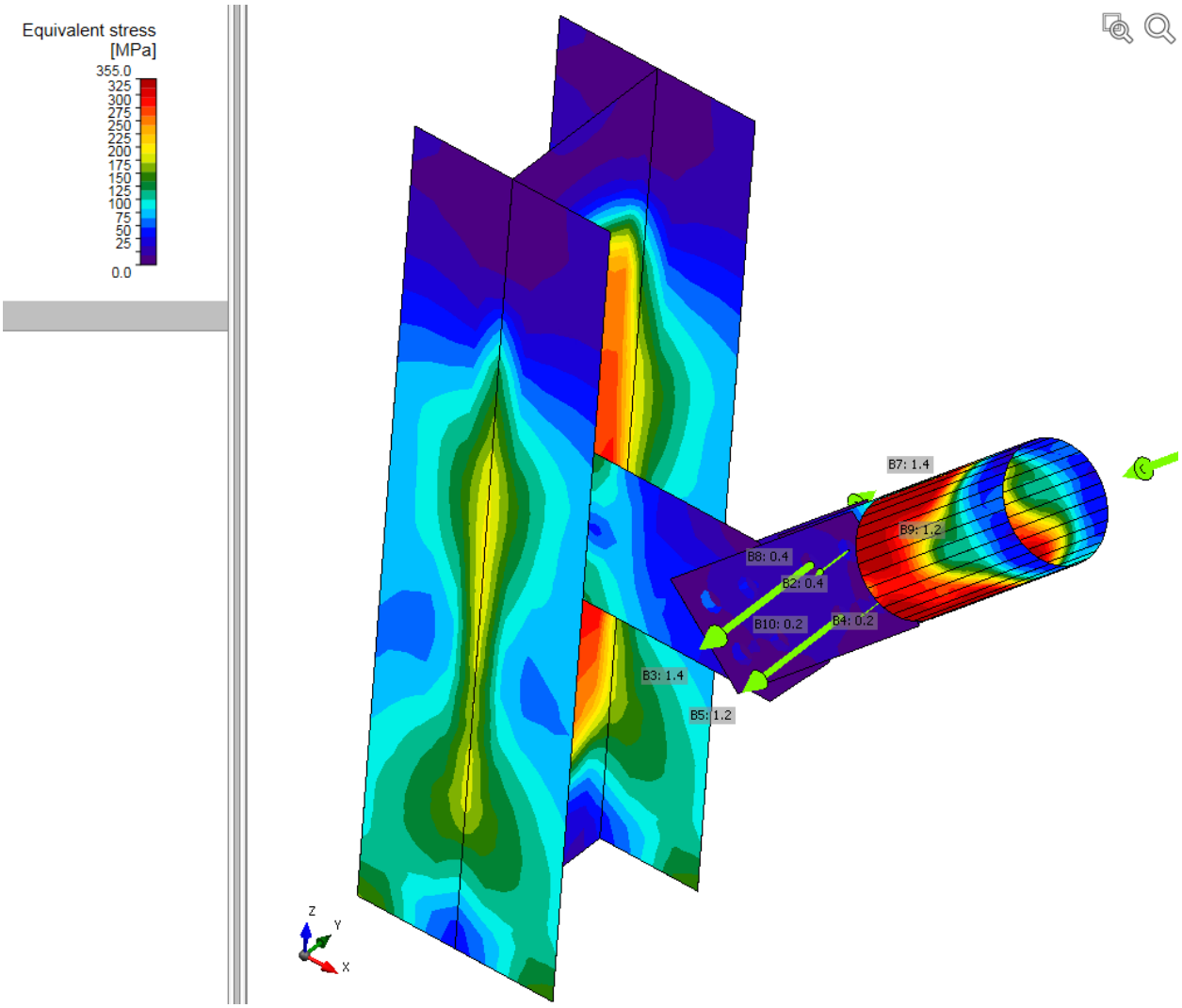
We can go from the above in Autodesk Advance Steel to the same joint below modelled in IDEA Statica very quickly.



Within IDEA Statica we apply loads and then check the system against the desired code. The results are displayed as pass or fail.

Overview of all checks for extreme load effect

	Check item	Value	Status
	Analysis	Applied loads : 100.0%	✓
>	Plates	142.7 > 5%	✗
	Bolts	8.8 < 100%	✓
	Welds	120.9 > 100%	✗

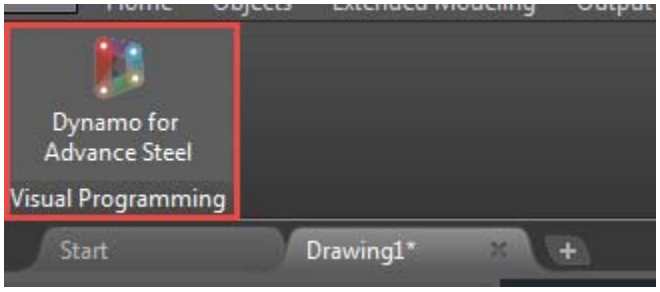


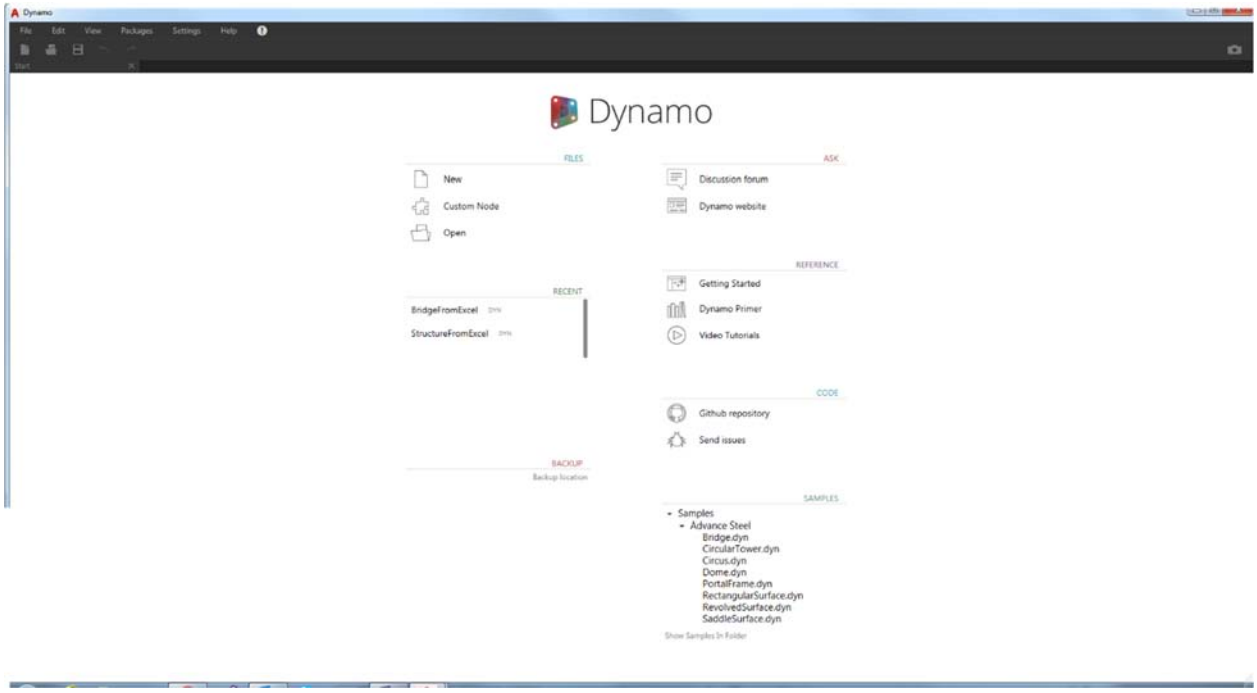
This approach to connection design is revolutionary. I have compared it to the introduction of the abacus!

Computational BIM comes to Autodesk Advance Steel

With the launch of Autodesk Advance Steel 2017.1 comes an implementation of Dynamo. At the time of writing this release is consistent for the Dynamo Core V1.1 – a word of caution: DO NOT UPGRADE ANY DYNAMO INSTALLS THAT RELY ON ANY OTHER CORE RELEASE (THIS INCLUDES AUTODESK DYNAMO STUDIO).

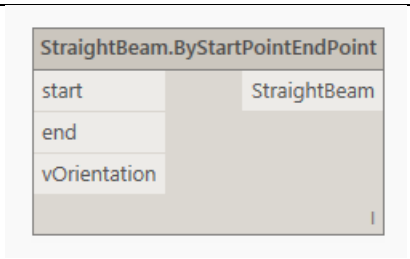
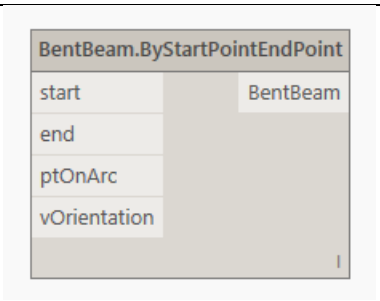
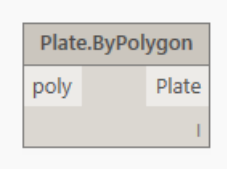
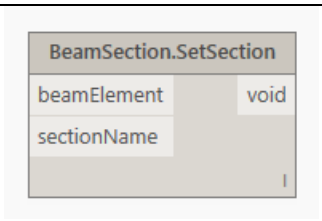
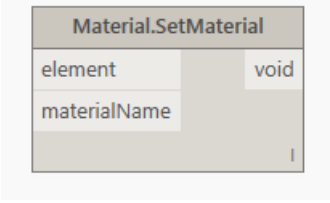
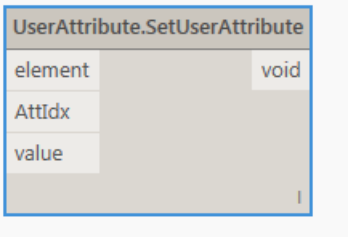
Dynamo for Advance Steel is accessed from the Add-ins tab:





Dynamo can be used to create many different types of mathematically driven shapes. Dynamo can be used to create structures in Autodesk Revit, Autodesk Robot Structural Analysis Professional and now Autodesk Advance Steel purely by changing the way the output is directed.

There are six nodes available for Autodesk Advance Steel to create objects and they are described below.

Node	Description
	This node takes two points one as a start point and one as an endpoint plus an orientation vector to set the angle of the member. It creates a Beam object.
	This node takes three points one as a start point, one as an end point and one as a point on the arc plus an orientation vector to set the angle of the member. It creates a Bent Beam object.
	This node takes a polygon as input. It creates a Plate object.
	This node takes a Beam or Bent Beam object and a formatted section name as input and it assigns the section name to the object. There is no output from this node.
	This node takes a Beam, a Bent Beam or a Plate object and a material name as input and it assigns the material to the object. There is no output from this node.
	This node takes a Beam, a Bent Beam or a Plate object plus a User Attribute number and an associated value and it assigns the value to the user attribute of the object. There is no output from this node.

There are many nodes and node libraries in existence that can greatly enhance what you can create. Dynamo is open source and all of the nodes we have created are available on Github to download and extend.

Included in the install are several examples that create structures based on beams and plates.

However, rather than focus on mathematics and programming (even if it is relatively straight forward) I want to show you how easy it is to create geometry in Autodesk Advance Steel using Microsoft Excel to provide the input. Using this approach you can create a steelwork model directly from a spreadsheet. Autodesk Advance Steel has a limited number of formats it can read: SMLX, SDNF, CIS2 etc. This method opens up its ability to read geometry from any application that can create a table.

Step 1 – Format the Microsoft Excel workbook

For this approach I decided to use a workbook with five sheets:

- Dynamo – which holds all of the required information;
- Nodes – for the node numbers and coordinates;
- Members – for the member numbers, nodal connectivity, section, material and gamma;
- Material Mapping – used to map materials here to materials in Autodesk Advance Steel;
- Section Mapping – used to map sections here to sections in Autodesk Advance Steel.

Nodes

	A	B	C	D
1	Number	X	Y	Z
2	1	0.000	16.500	0.000
3	2	55.000	16.500	0.000
4	3	5.500	0.000	0.000
5	4	60.500	0.000	0.000
6	5	5.500	16.500	0.000
7	6	11.000	0.000	0.000
8	7	11.000	16.500	0.000

Nodes consists of four columns holding an integer followed by three numbers representing the coordinate of the node.

A named range called Nodes is created that starts on the second row and encompasses all of the data.

Members

	A	B	C	D	E	F
1	Member	Node1	Node2	Section	Material	Gamma
2	1	1	2	UC 356x406x634	S275	90
3	2	3	4	UC 356x406x634	S275	90
4	3	1	3	UB 1016x305x487	S275	0
5	4	3	5	UB 1016x305x487	S275	0
6	5	6	7	UB 1016x305x487	S275	0
7	6	8	9	UB 1016x305x487	S275	0
8	7	10	11	UB 1016x305x487	S275	0
9	8	12	13	UB 1016x305x487	S275	0

Members consists of six columns holding three integers, two text fields and one number representing the member number, start node, end node, section, material and gamma.

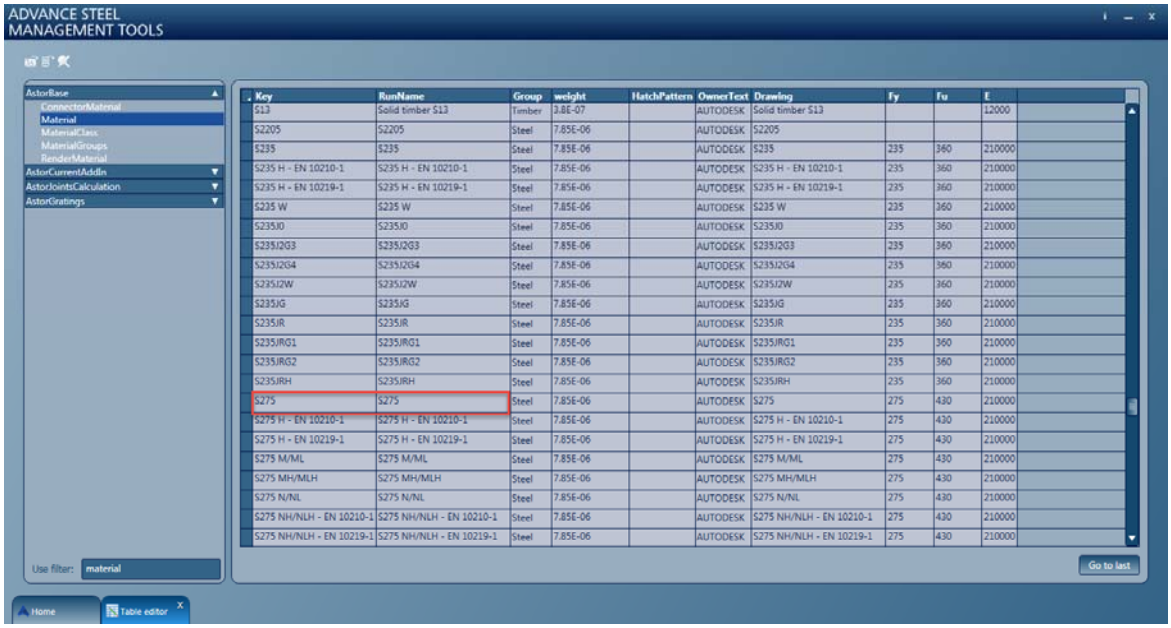
A named range called Members is created that starts on the second row and encompasses all of the data.

Material Mapping

	A	B
1	Marterial	Advance Steel
2	S275	S275

Material Mapping consists of two columns holding two text fields representing the material contained with the Member sheet and the corresponding material in Autodesk Advance Steel which is obtained from the material table in the AstorBase database. Alternatively you may choose to use the Advance Steel Management Tools.

A named range called Materials is created that starts on the second row and encompasses all of the data.



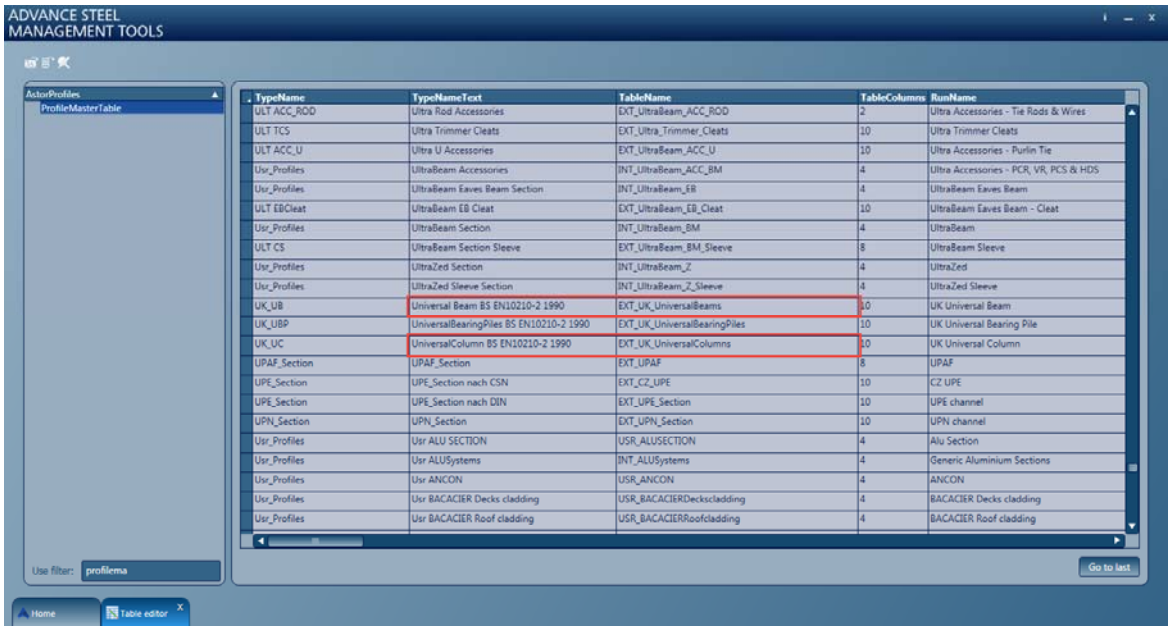
Section Mapping

	A	B	C
1	Section	Advance Steel Catalog	Advance Steel Section
2	UC 356x406x634	UniversalColumn BS EN10210-2 1990	UC356x406x634
3	UB 1016x305x487	Universal Beam BS EN10210-2 1990	UB914x419x388
4	UC 305x305x240	UniversalColumn BS EN10210-2 1990	UC305x305x240
5	UC 254x254x132	UniversalColumn BS EN10210-2 1990	UC254x254x132

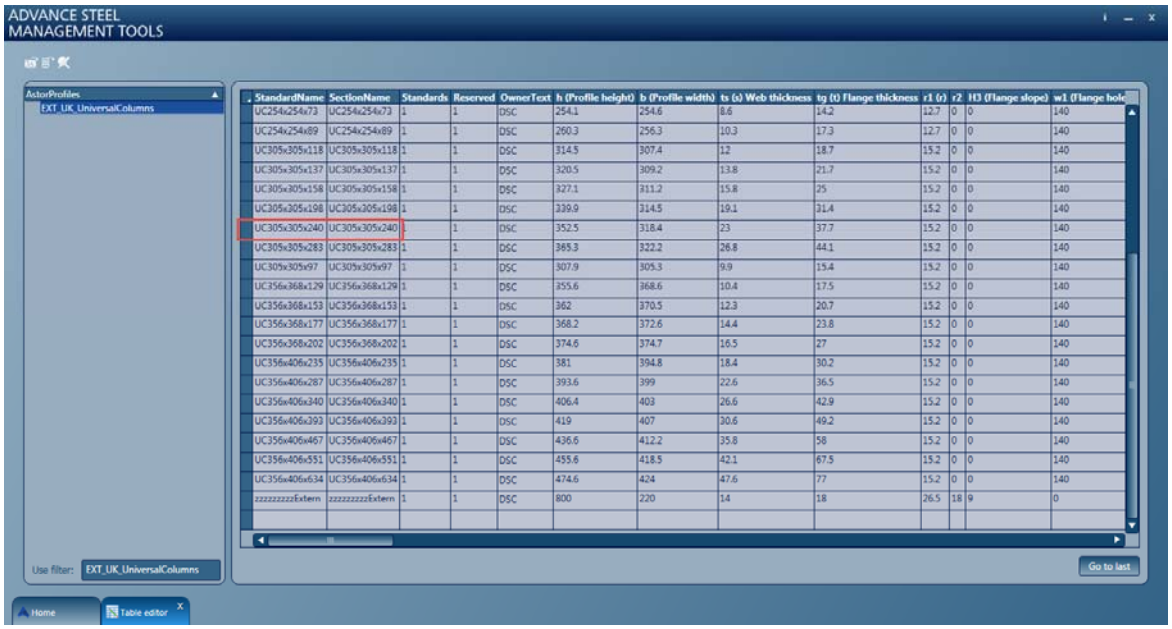
Section Mapping consists of three columns holding text fields representing the section contained within the Member sheet and the corresponding section in Autodesk Advance Steel which is obtained using these steps:

1 Open the AstorProfiles database;
2 Open the ProfileMasterTable;
3 Look in the TypeNameText column for the profile class name – this goes in the second column;
4 Open the table listed in the TableName column;
5 Look in the SectionName column for the desired section size – this goes in the third column.

A named range called Sections is created that starts on the second row and encompasses all of the data.



TypeName	TypeNameText	TableName	TableColumns	RunName
ULT ACC_ROD	Ultra Rod Accessories	EXT_UltraBeam_ACC_ROD	2	Ultra Accessories - Tie Rods & Wires
ULT TCS	Ultra Trimmer Cleats	EXT_Ultra_Trimmer_Cleats	10	Ultra Trimmer Cleats
ULT ACC_U	Ultra U Accessories	EXT_UltraBeam_ACC_U	10	Ultra Accessories - Purlin Tie
Usr_Profiles	UltraBeam Accessories	INT_UltraBeam_ACC_BM	4	Ultra Accessories - PCR, VR, PCS & HDS
Usr_Profiles	UltraBeam Eaves Beam Section	INT_UltraBeam_EB	4	UltraBeam Eaves Beam
ULT EBCleat	UltraBeam EB Cleat	EXT_UltraBeam_EB_Cleat	10	UltraBeam Eaves Beam - Cleat
Usr_Profiles	UltraBeam Section	INT_UltraBeam_BM	4	UltraBeam
ULT CS	UltraBeam Section Sleeve	EXT_UltraBeam_BM_Sleeve	8	UltraBeam Sleeve
Usr_Profiles	UltraZed Section	INT_UltraBeam_Z	4	UltraZed
Usr_Profiles	UltraZed Sleeve Section	INT_UltraBeam_Z_Sleeve	4	UltraZed Sleeve
UK_UB	Universal Beam BS EN10210-2 1990	EXT_UK_UniversalBeams	10	UK Universal Beam
UK_UBP	UniversalBearingPiles BS EN10210-2 1990	EXT_UK_UniversalBearingPiles	10	UK Universal Bearing Pile
UK_UC	UniversalColumn BS EN10210-2 1990	EXT_UK_UniversalColumns	10	UK Universal Column
UPAF_Section	UPAF_Section	EXT_UPAF	8	UPAF
UPE_Section	UPE_Section nach CSN	EXT_CZ_UPE	10	CZ UPE
UPE_Section	UPE_Section nach DIN	EXT_UPE_Section	10	UPE channel
UPN_Section	UPN_Section	EXT_UPN_Section	10	UPN channel
Usr_Profiles	Usr ALU SECTION	USR_ALUSECTION	4	Alu Section
Usr_Profiles	Usr ALUSystems	INT_ALUSystems	4	Generic Aluminium Sections
Usr_Profiles	Usr ANCON	USR_ANCON	4	ANCON
Usr_Profiles	Usr BACACIER Decks cladding	USR_BACACIERDekscladding	4	BACACIER Decks cladding
Usr_Profiles	Usr BACACIER Roof cladding	USR_BACACIERRoofcladding	4	BACACIER Roof cladding



StandardName	SectionName	Standards	Reserved	OwnerText	h (Profile height)	b (Profile width)	ts (s) Web thickness	tg (t) Flange thickness	r1 (r)	r2	H3 (Flange slope)	w1 (Flange hole
UC254x254x73	UC254x254x73	1	1	DSC	254.1	254.6	8.6	14.2	12.7	0	0	140
UC254x254x89	UC254x254x89	1	1	DSC	260.3	256.3	10.3	17.3	12.7	0	0	140
UC305x305x118	UC305x305x118	1	1	DSC	314.5	307.4	12	18.7	15.2	0	0	140
UC305x305x137	UC305x305x137	1	1	DSC	320.5	309.2	13.8	21.7	15.2	0	0	140
UC305x305x158	UC305x305x158	1	1	DSC	327.1	311.2	15.8	25	15.2	0	0	140
UC305x305x198	UC305x305x198	1	1	DSC	339.9	314.5	19.1	31.4	15.2	0	0	140
UC305x305x240	UC305x305x240	1	1	DSC	352.5	318.4	23	37.7	15.2	0	0	140
UC305x305x283	UC305x305x283	1	1	DSC	365.3	322.2	26.8	44.1	15.2	0	0	140
UC305x305x97	UC305x305x97	1	1	DSC	307.9	305.3	9.9	15.4	15.2	0	0	140
UC356x368x129	UC356x368x129	1	1	DSC	355.6	368.6	10.4	17.5	15.2	0	0	140
UC356x368x153	UC356x368x153	1	1	DSC	362	370.5	12.3	20.7	15.2	0	0	140
UC356x368x177	UC356x368x177	1	1	DSC	368.2	372.6	14.4	23.8	15.2	0	0	140
UC356x368x202	UC356x368x202	1	1	DSC	374.6	374.7	16.5	27	15.2	0	0	140
UC356x406x235	UC356x406x235	1	1	DSC	381	394.8	18.4	30.2	15.2	0	0	140
UC356x406x287	UC356x406x287	1	1	DSC	393.6	399	22.6	36.5	15.2	0	0	140
UC356x406x340	UC356x406x340	1	1	DSC	406.4	403	26.6	42.9	15.2	0	0	140
UC356x406x393	UC356x406x393	1	1	DSC	419	407	30.6	49.2	15.2	0	0	140
UC356x406x467	UC356x406x467	1	1	DSC	436.6	412.2	35.8	58	15.2	0	0	140
UC356x406x551	UC356x406x551	1	1	DSC	455.6	418.5	42.1	67.5	15.2	0	0	140
UC356x406x634	UC356x406x634	1	1	DSC	474.6	424	47.6	77	15.2	0	0	140
zzzzzzzzzExtern	zzzzzzzzzExtern	1	1	DSC	800	220	14	18	26.5	18	9	0

Dynamo

	Member	Node1	X1	y1	z1	Node2	x2	y2	z2	Gamma	Material	Catalog	Section	Description
2	1	1	0	16.5	0	2	55	16.5	0	90	S275	UniversalColumn BS EN10210-2 1990	UC254x254x132	
3	2	3	5.5	0	0	4	60.5	0	0	90	S275	UniversalColumn BS EN10210-2 1990	UC254x254x132	
4	3	1	0	16.5	0	3	5.5	0	0	0	S275	Universal Beam BS EN10210-2 1990	UB914x419x388	
5	4	3	5.5	0	0	5	5.5	16.5	0	0	S275	Universal Beam BS EN10210-2 1990	UB914x419x388	
6	5	6	11	0	0	7	11	16.5	0	0	S275	Universal Beam BS EN10210-2 1990	UB914x419x388	
7	6	8	16.5	0	0	9	16.5	16.5	0	0	S275	Universal Beam BS EN10210-2 1990	UB914x419x388	
8	7	10	22	0	0	11	22	16.5	0	0	S275	Universal Beam BS EN10210-2 1990	UB914x419x388	

The front sheet is where all of the information contained behind is accumulated and formatted ready for use by Dynamo.

There are fourteen columns in the Dynamo sheet:

Contents	Formula
Member	=Members!A[ROW]
Node1	=Members!B[ROW]
X1	=VLOOKUP(B[ROW],Nodes,2)
Y1	=VLOOKUP(B[ROW],Nodes,3)
Z1	=VLOOKUP(B[ROW],Nodes,4)
Node2	=Members!C[ROW]
X2	=VLOOKUP(F[ROW],Nodes,2)
Y2	=VLOOKUP(F[ROW],Nodes,3)
Z2	=VLOOKUP(F[ROW],Nodes,4)
Gamma	=Members!F[ROW]
Material	=VLOOKUP(Members!E[ROW],Materials,2)
Catalog	=VLOOKUP(Members!D[ROW],Sections,2)
Section	=VLOOKUP(Members!D[ROW],Sections,3)
Description	

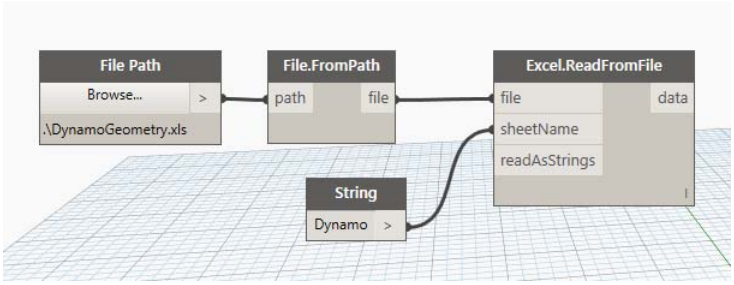
The description column can contain any free remark e.g. a role for the member in question.

There should be the same number of rows in this spreadsheet as the Members spreadsheet.

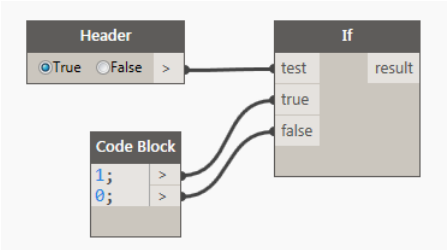
Once a row (signified by [ROW] in the above table) is correct it can be copied down the way to complete the table.

Step 2 – Create the Dynamo graph

The data is read from the Dynamo spreadsheet. That needs to be opened from a file location. A File Path node is used initially from which the File.FromPath is obtained; this is then passed on to the Excel.ReadFromFile node. This node also needs to be passed a String containing the sheetName to be read (i.e. Dynamo).

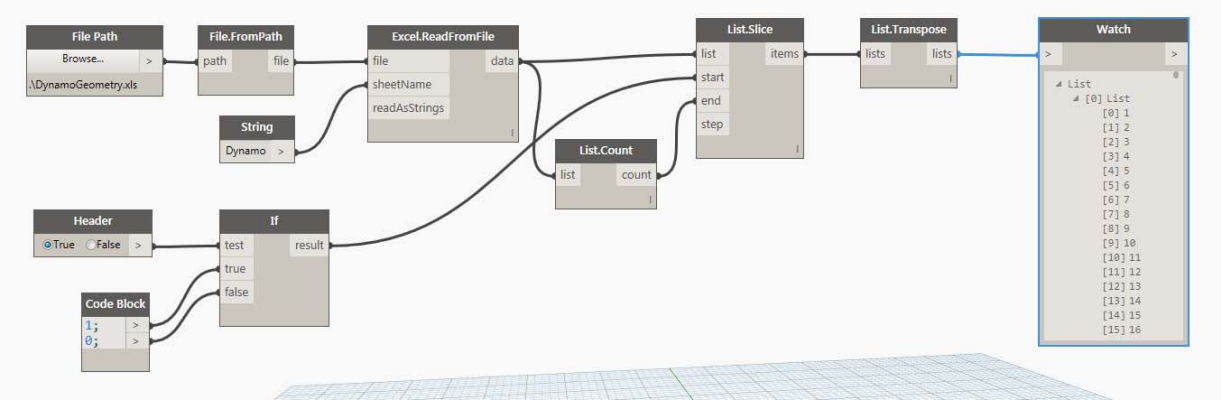


This creates a list of lists. The first entry in the list are the column headers so a toggle could be added to skip this row if it was present and make this graph a generic graph for reading structures from Microsoft Excel to Autodesk Advance Steel.

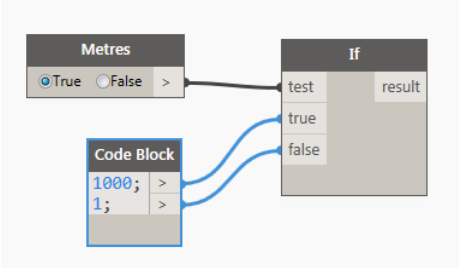


This list needs slicing from the start to the end i.e. all of the members.

To do this we add a List.Slice node. This node needs a start row and an end row. This is where the header toggle comes in and the length of the list (List.Count). To use the results logically a List.Transpose node is added which breaks the data down into columns.

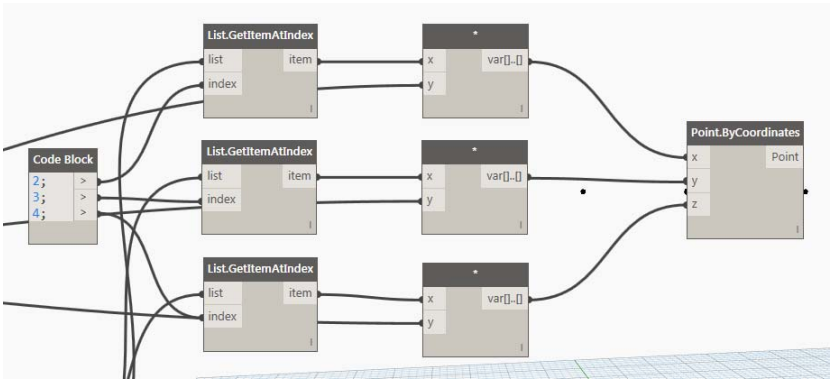


This example project has originated from the United Kingdom which uses SI Units. Another useful toggle here is to be able to switch between metres (m) and millimetres (mm).



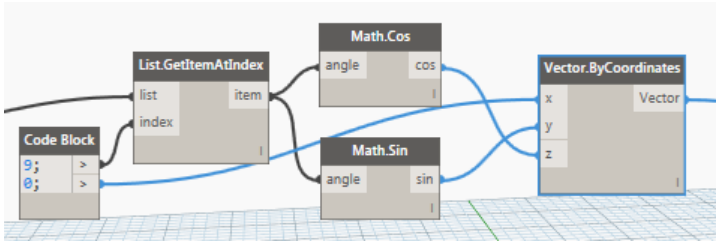
This allows for the conversion factor into mm which is preferred for the UK Install of Autodesk Advance Steel and the results of these three nodes can be used later for formatting the points.

To obtain points a series of List.GetItemAtIndex nodes are used. The results of these will form the x, y and z coordinates for the start and end positions of the members.



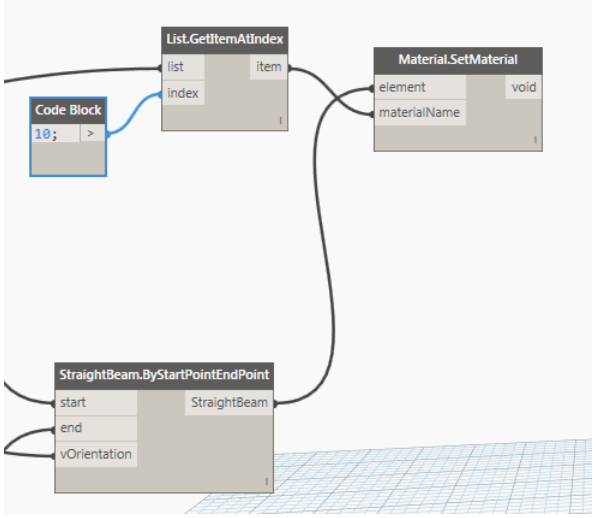
This basic construct uses the results of the Metres option to create the correctly scaled component of the point. This can be copied to create the end point of the member.

The results as they stand now give a series of start point and end points. These can be passed to the StraightBeam.ByStartPointEndPoint node. This node also requires an Orientation for the member which is expressed as a Vector. This next construct shows how to take a Gamma angle from the spreadsheet and format it as a Vector using the components required to replicate the angle.

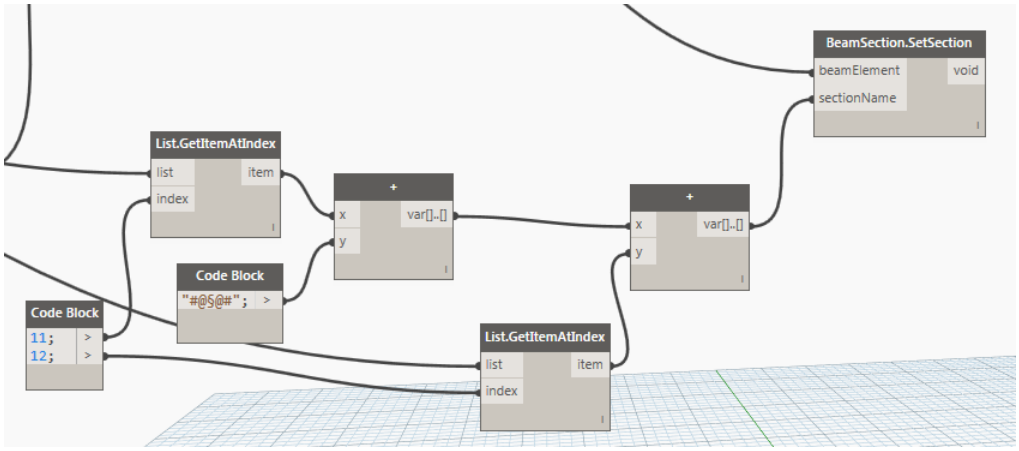


Running the graph as it stands will create Beam objects of the default size and material but in the right 3D space.

To set the material use the Material.SetMaterial node from the Advance Steel library. This needs the member just created and the correct material from the Dynamo sheet.

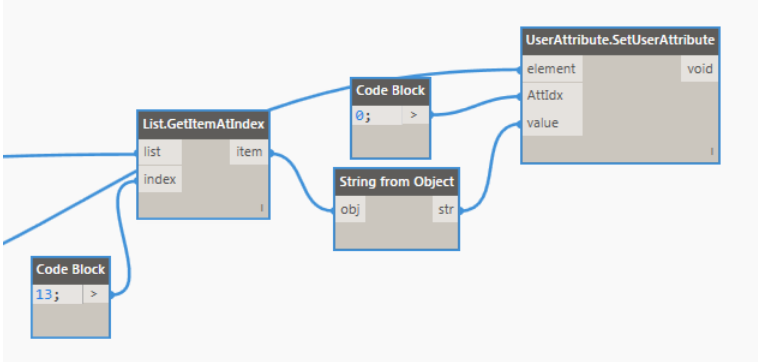


To set the member section correctly a similar approach is required using the BeamSection.SetSection node. This takes the member created and assigns the section but this must be correctly formatted. This next construct shows how.



This takes the catalog and section and places a special delimiter between them ("#@§@#").

The description of the member is added using a UserAttribute.SetUserAttribute node. This takes the member created, a User Attribute number and a string as arguments. The number refers to the attribute number for the member in question.



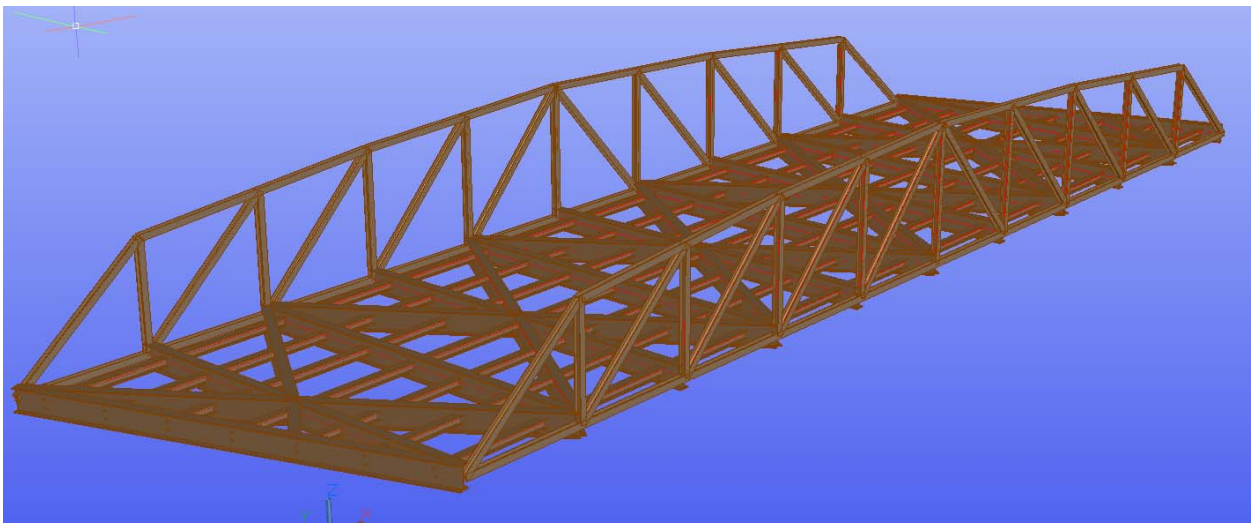
The Description from the Dynamo spreadsheet must also be explicitly formatted as a string hence the String from Object node. These descriptions embedded as User Attributes can be used later within Autodesk Advance Steel to assign roles to the members.

Using a similar approach with slightly more formatting the member numbers and possibly the node numbers could be embedded in each member thus enabling a direct 1:1 association with the originating output.

All of the data emanates from the main list which is a transposition of the Dynamo spreadsheet. Using this basic approach any structure can be built.

This example has been used to create a simple truss bridge.

The Dynamo graph and Microsoft Excel workbook are included in the downloads for this class.



As the implementation stands currently there is no control over the relative positions of the members i.e. they all come in on centre-line. This can be overcome by using the Descriptions embedded above also with a Query setup in Autodesk Advance Steel.

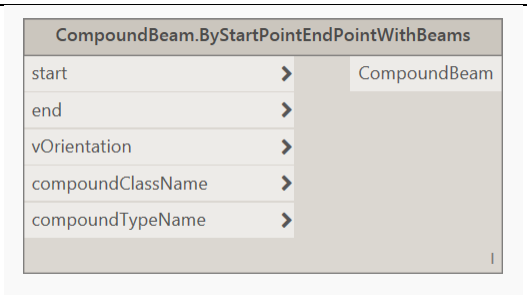
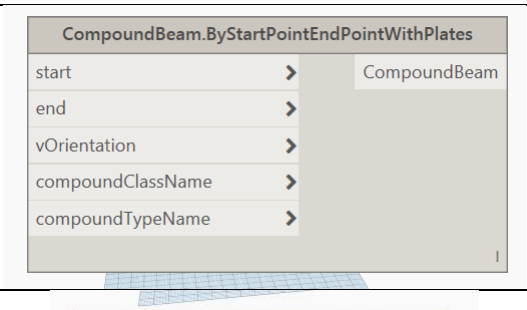
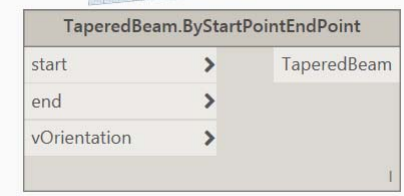
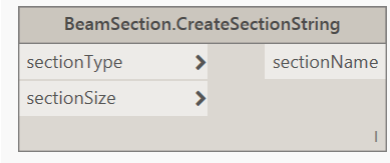
Closing remarks

There is so much more to Autodesk Advance Steel than just a steelwork modelling application that is built on top of Autodesk AutoCAD. It has an API that allows users to create their own add-ins as well as the recently added Dynamo implementation. When used within an extended workflow integrating analysis and design greater efficiencies can be obtained especially within the realm of connection design. If connections become too complicated then there is an option of re-using the geometry to analyse the connection using a partner product.

Recent advancements in Autodesk Revit allows the realisation of designs to start to be transmitted back to the intent of those designs without the need to dumb down the information into generic solids.

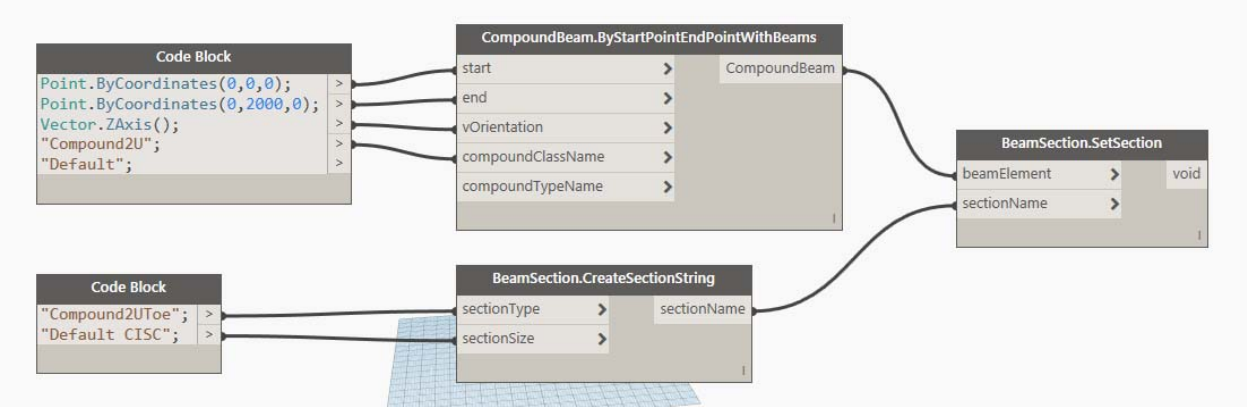
Addendum

Several new nodes for Dynamo are now available as part of an ongoing development plan and they are being revealed here for the first time. These new nodes form part of Dynamo Core 1.2. The new nodes have uses beyond that of the original release. These could include bridge design and pre-fabricated buildings.

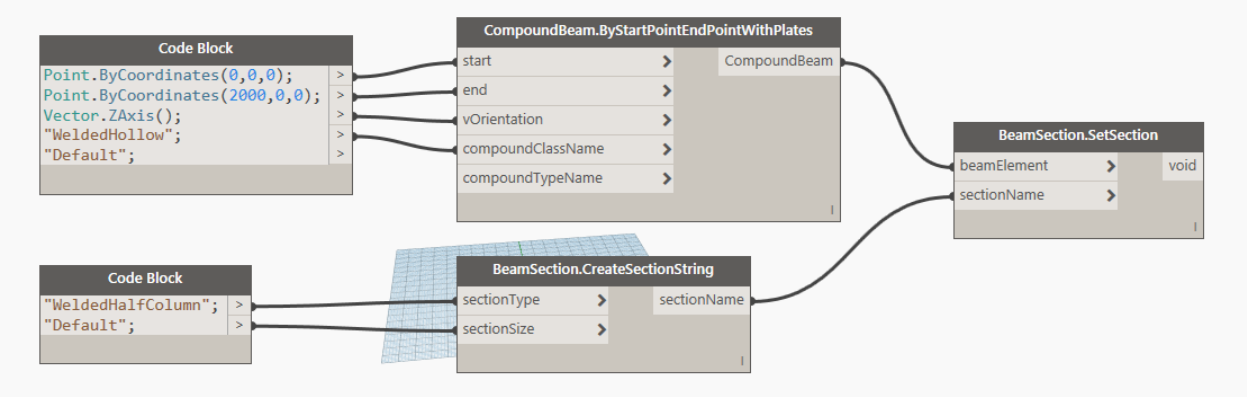
Node	Description
	This node takes two points one as a start point and one as an endpoint plus an orientation vector to set the angle of the member. The compound ClassName and the compound TypeName are used to define the Compound section using rolled beams. It creates a CompoundBeam with Beams object. *
	This node takes two points one as a start point and one as an endpoint plus an orientation vector to set the angle of the member. The compound ClassName and the compound TypeName are used to define the Compound section using welded plates. It creates a CompoundBeam with Plates object. *
	This node takes two points one as a start point and one as an endpoint plus an orientation vector to set the angle of the member. It creates a TaperedBeam object. *
	This node takes two strings as input and returns a string that defines the beam section. The first string is the SectionType and the second string is the SectionSize. This node replaces a series of constructs that were required for the initial release.

The following examples are taken from the installed samples.

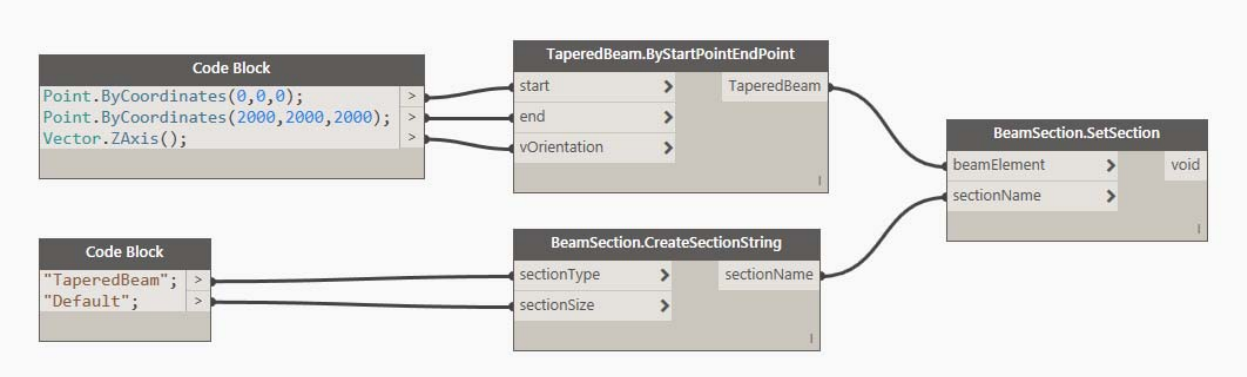
Compound Beam with Beams



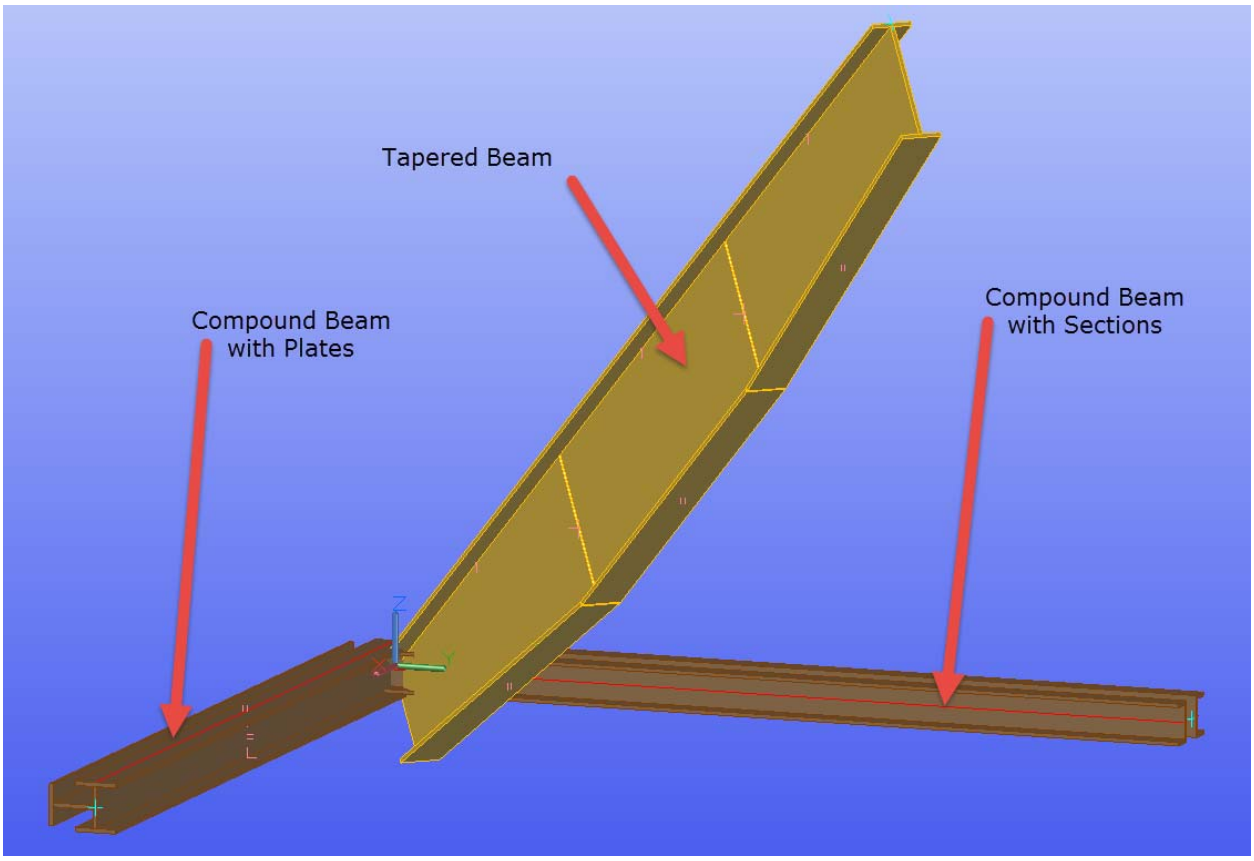
Compound Beam with Plates

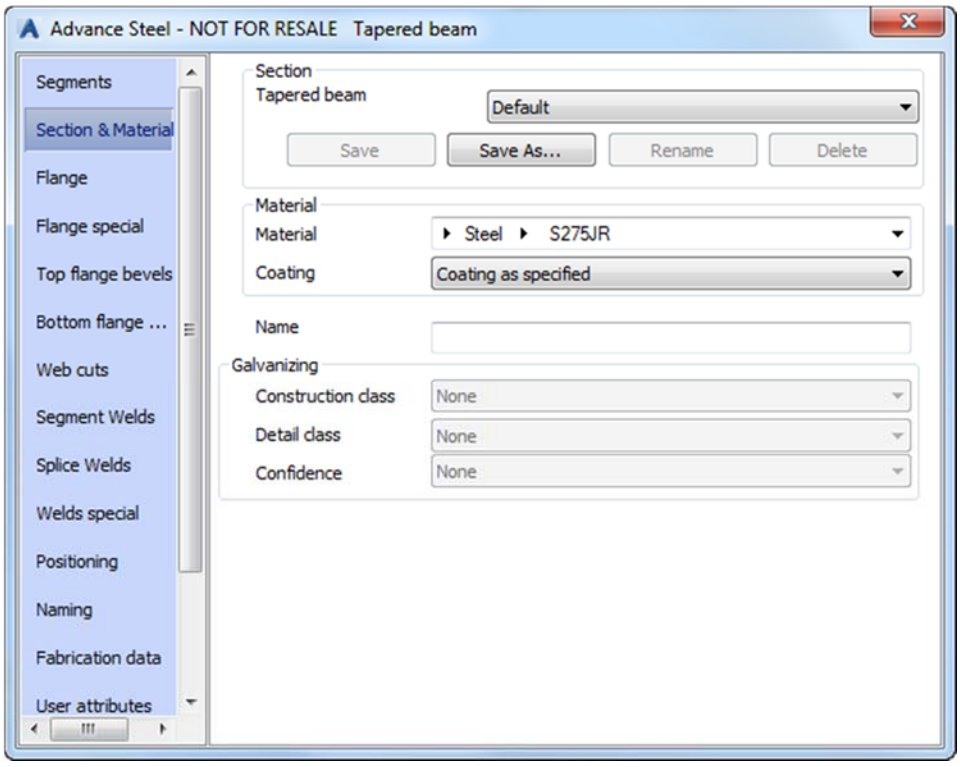


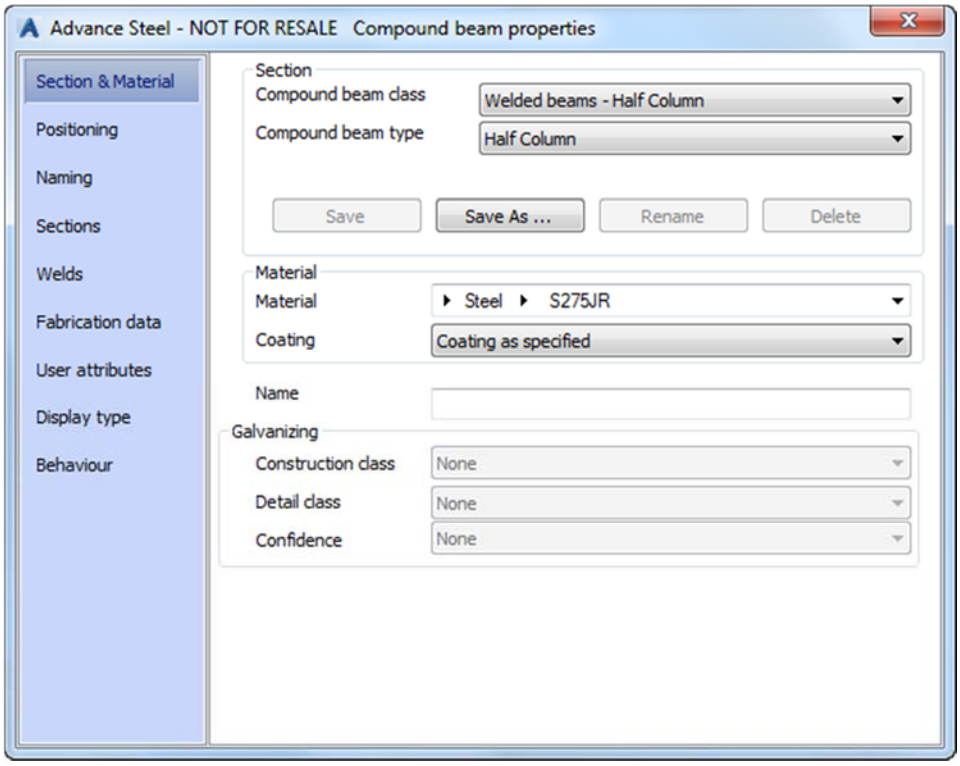
Tapered Beam

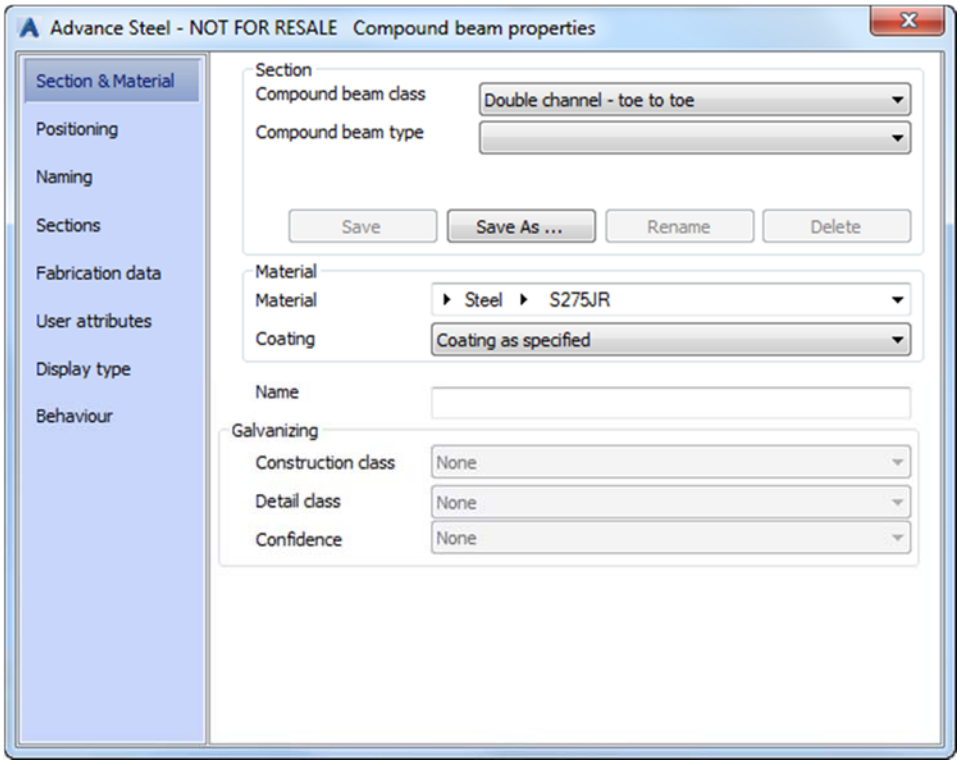


These nodes create a series of members as shown below.


Tapered Beam
Compound Beam
with Plates
Compound Beam
with Sections


Advance Steel - NOT FOR RESALE Tapered beam
Segments
Section & Material
Flange
Flange special
Top flange bevels
Bottom flange ...
Web cuts
Segment Welds
Splice Welds
Welds special
Positioning
Naming
Fabrication data
User attributes
Section
Tapered beam
Default
Save
Save As...
Rename
Delete
Material
Material
Steel
S275JR
Coating
Coating as specified
Name
Galvanizing
Construction class
None
Detail class
None
Confidence
None


Advance Steel - NOT FOR RESALE Compound beam properties
Section & Material
Positioning
Naming
Sections
Welds
Fabrication data
User attributes
Display type
Behaviour
Section
Compound beam class
Welded beams - Half Column
Compound beam type
Half Column
Save
Save As ...
Rename
Delete
Material
Material
Steel
S275JR
Coating
Coating as specified
Name
Galvanizing
Construction class
None
Detail class
None
Confidence
None


Advance Steel - NOT FOR RESALE Compound beam properties
Section & Material
Positioning
Naming
Sections
Fabrication data
User attributes
Display type
Behaviour
Section
Compound beam class
Double channel - toe to toe
Compound beam type
Save
Save As ...
Rename
Delete
Material
Material
Steel
S275JR
Coating
Coating as specified
Name
Galvanizing
Construction class
None
Detail class
None
Confidence
None