

BIM Tekla How-to Guides

May 2022

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1 Preface

It is recommended that users have gone through the documents in the resource kit, which provides an overview on the requirements and the importance of preparing an IFC model for submission to Corenet X;

- Step 0) How to Learn IFC-SG,
- Step 1) IFC 101,
- Step 2) Industry Mappings,
- Step 3) Configurations (respective BIM Authoring Tool)

Users may refer to Step 4) Exercise on IFC Key Data Structure to verify their understanding when they have completed all the steps listed above.

2 Introduction

IFC-SG aims to adopt the international Industry Foundation Classes (IFC) standard as the base for the common representation for BIM submission. IFC is a standardized, digital description of the built asset industry. It is an open, international standard (ISO 16739-1:2018) and promotes vendor-neutral, or agnostic, and usable capabilities across a wide range of hardware devices, software platforms, and interfaces for many different use cases.

This document is intended as a reference for the users in preparing BIM files for submission in IFC-SG. It contains software configuration setup, export settings, and IFC-SG-specific concepts used to map the native information for the applicable IFC-SG export.

2.1 UNDERSTANDING IFC-SG

With IFC being a semantically rich data structure, IFC Concepts are captured and used to map objects for IFC-SG. The building elements listed in the IFC-SG BIM Objects Dictionary are derived from various regulatory handbooks that are mapped in the early stage of IFC-SG. These objects are any physical elements referred to as BIM concepts such as walls, doors, and windows, and non-physical elements such as building containers, space, properties, and material information. IFC Concepts provide another level of identifying what an object is. IFC concepts are

- Standard IFC entities and types,
- predefined type enumeration, and
- IFC standard property set(s).

When no directly appropriate entity, predefined type, or property set is found, standard extension using USERDEFINED ObjectTypes and USERDEFINED PropertySets “SGPset_” is used.

2.2 IFC4 REFERENCE VIEW

IFC-SG is mapped using IFC4 Reference View, which is currently the broadest proliferation of IFC BIM data across many software application types supporting different communication and collaboration workflows.

IFC4 Reference View is particularly suitable for all BIM workflows that are based on reference models, where the exchange is mainly one-directional, similar to the workflow defined for the exchange in requirements in IFC-SG.

2.3 IFC-SG AS AN MVD

IFC-SG is like what an MVD does. It is only a subset of requirement definition from the overall IFC schema to describe data exchange for a specific use or workflow. Mainly, it narrows down the scope of the IFC schema to one that will be used as an exchange requirement for the local building plans submission using a neutral format.

3 Tekla Structures 2022

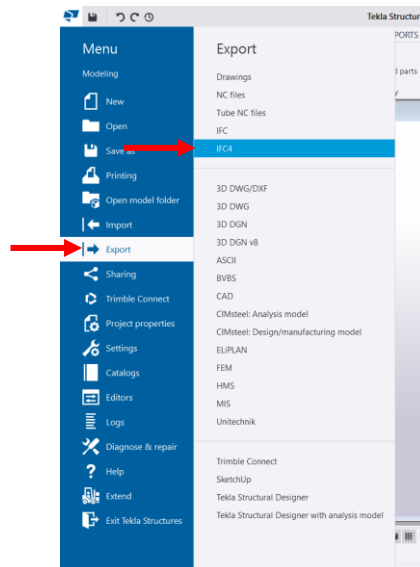
3.1 GENERAL BIM GUIDE

Note: It is preferable that users refer to the original guide from the authoring tool

<https://support.tekla.com/learn/first-steps-with-tekla-structures>

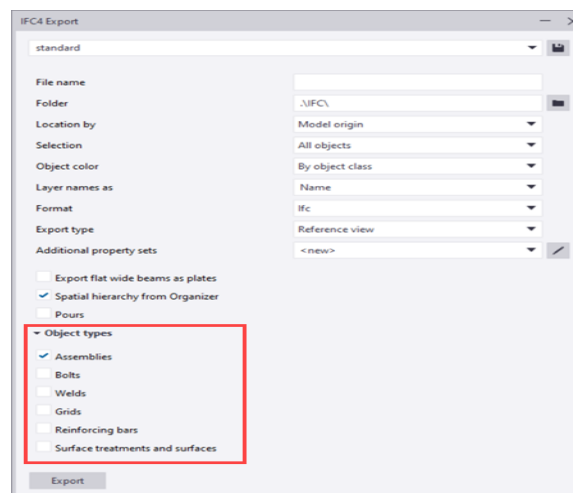
3.1.1 HOW TO ADD PROPERTIES

1. On the **File** menu, click **Export** and select **IFC4**.



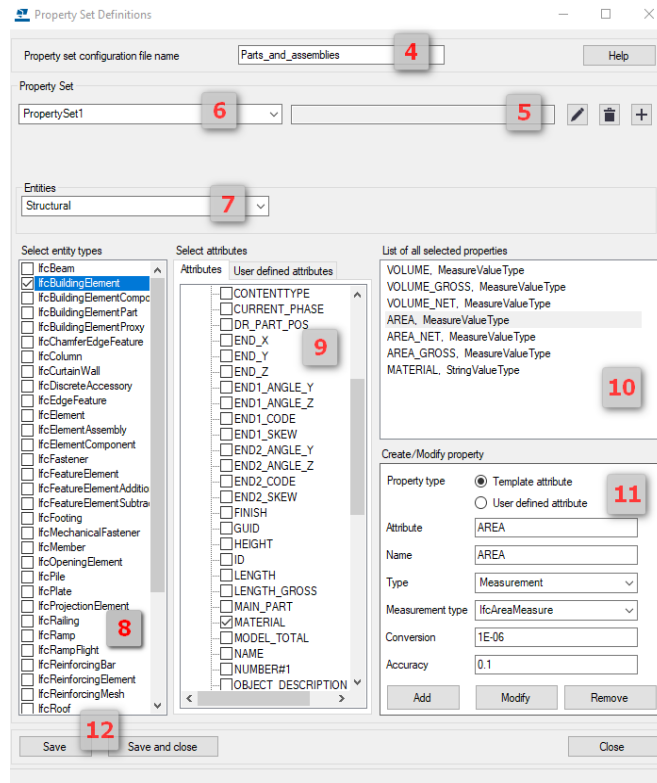
File Menu

2. Enter the **File Name**. Select **<new>** in the **Additional property sets** list and click the Edit button.




IFC Export Settings Dialog Box

3. In the **Property Set Definitions** dialog box will open.



Property Set Definitions Dialog Box

4. Enter a name for the Property set configuration file in the **Name** box.
5. Click the  button, enter the name of the property set.
6. For a new property set, enter description for the property set in the empty box, and click **Create**
7. Select the desired entity type category in the **Entities** list. **Structural** is the default category. When you select the category, the related IFC entities are displayed in the **Select entity types** list.
8. Select an entity type from the **Select entity types** list by selecting its check box. When you do this, the **Select attributes** list shows the attributes that are available for the selected entity type.
9. Add the desired attributes from the **Select attributes** list by selecting the check boxes next to the attribute names.
10. The attribute is added to the **List of all selected properties list** on the right. This list shows which attributes are exported and in which format:
 1. New attributes can be added by entering an attribute name in the Attribute box in the **Create/Modify property** area and clicking the **Add** button.
 2. The attributes can be modified and removed on the list by clicking **Modify** or **Remove**.

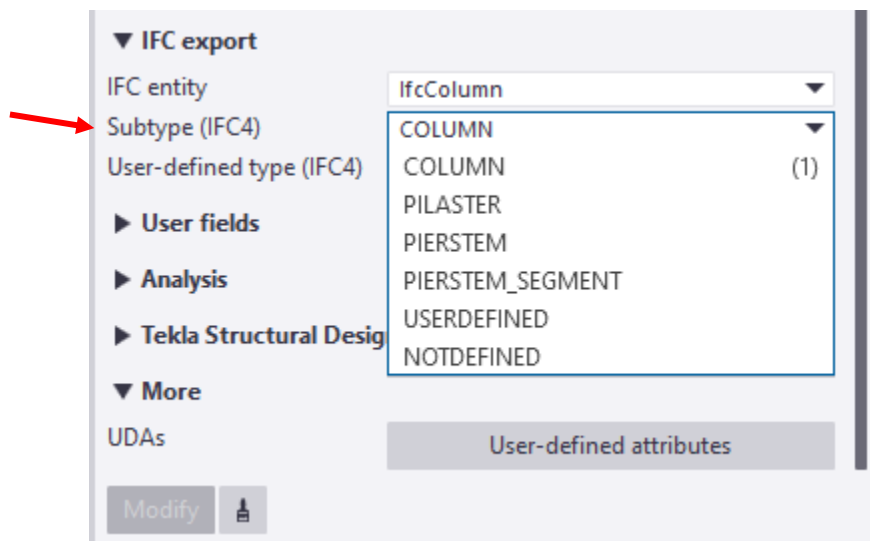
11. Under **Create/Modify property**, define the attribute properties:

1. Select **Property type** for the selected attribute.
2. Enter or modify the name of the selected attribute in the **Name** box.
3. Select the **Type** of the attribute can be one of the following: **String** (sequence of characters), **Boolean** (true or false), **Integer** (number without a fractional part), **Measurement**, **Real** (numbers that have decimal representations), or **Time stamp**.
4. For **Measurement** type: **Length**, **Area**, **Volume**, **Mass**, **Positive Length** or **Count**. The **Conversion** factor and **Accuracy** can also be selected.

12. Click **Save** to save the modifications.

3.2 HOW TO APPLY OBJECT TYPE

1. IFC entity moved to property pane. The IFC entity setting was earlier located in the user-defined attributes dialog box for model objects, now it is located in the **IFC export** section in the property pane for model objects and accessed more easily. Subtype (IFC4) is the list of all available Predefined Types of the entity.



IFC Predefined and Object Type on the IFC Export section in the property pane

2. You now have more control over the object types to support the workflow when you export information to the IFC4 format, and you can define the needed IFC entities more precisely by using the new predefined and user-defined subtypes.

3.3 GEO-REFERENCING

1. Open a Tekla Structures
2. Click **File > Project Properties > Base points >** to open the **Base point** dialog box.
3. Fill in the needed information

Base point dialog box showing the following fields and values:

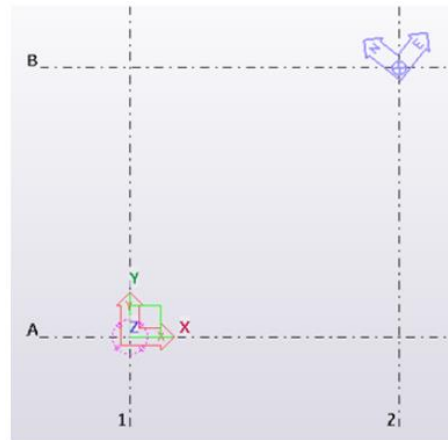
- Name: Trimble Building
- Description: Trimble Building in Espoo, Finland
- Coordinate system: ETRS-GK25
- East coordinate (E): 25489283613.00
- North coordinate (N): 6674830501.00
- Elevation: 3557.00
- Latitude: 60.186171
- Longitude: 24.806864
- Location in the model: X: 6000.00, Y: 6000.00, Z: 0.00, Angle to North: 26.408

Base Point Dialog Box

| | |
|-----------------------|---|
| Name, Description | Enter a name and a description for the base point. |
| Coordinate System | Enter the name of the coordinate system you are using. |
| East coordinate (E) | Enter the East coordinate (E) that represents the X coordinate related to the civil origin. |
| North coordinate (N) | Enter the North coordinate (N) that represents the Y coordinate related to the civil origin. |
| Elevation | Enter the Elevation that represents the Z coordinate related to the civil origin. |
| Latitude, Longitude | <p>Enter the Latitude and Longitude of the base point to be used in the IFC export.</p> <p>Latitude and Longitude is additional information, which some software can use. In the IFC file, this is written to IFC SITE information.</p> <p>If the total number of digits in Longitude is more than 15, the value is rounded up to the nearest if it is > 99.9999999999999999.</p> <p>To convert Latitude and Longitude information between decimal format and degree/minute/second (DMS) format, see Convert Latitude/Longitude to decimal.</p> |
| Location in the model | <p>Pick or enter a location for the base point in the Tekla Structures model. The distance is measured from the model origin.</p> <p>The base point location in the model can have a maximum value of +/- 10 km from the model origin. Modeling is meant to be done near the model origin, and the offset is to be given with East coordinate and North coordinate values.</p> |
| Angle to North | Pick or enter the Angle to North , which is the angle between Y and North directions. The maximum number of decimals for the angle is 13. |
| Project base point | If you want to set a coordinate system as the project base point, select a base point from the list at the top and then select the Project base point check box. |

Information Details

4. Click **Modify** to save the base point. After modifying, a blue symbol will be added to the model. If you make changes to the base point, the base point location in the model changes according to the location or rotation changes you make in the **Base point** dialog box when you press **Enter** or click another input field, and there is no need to click **Modify**.



Base Point on Model

3.3.1 SETTING A COORDINATE SYSTEM AS THE PROJECT BASE POINT

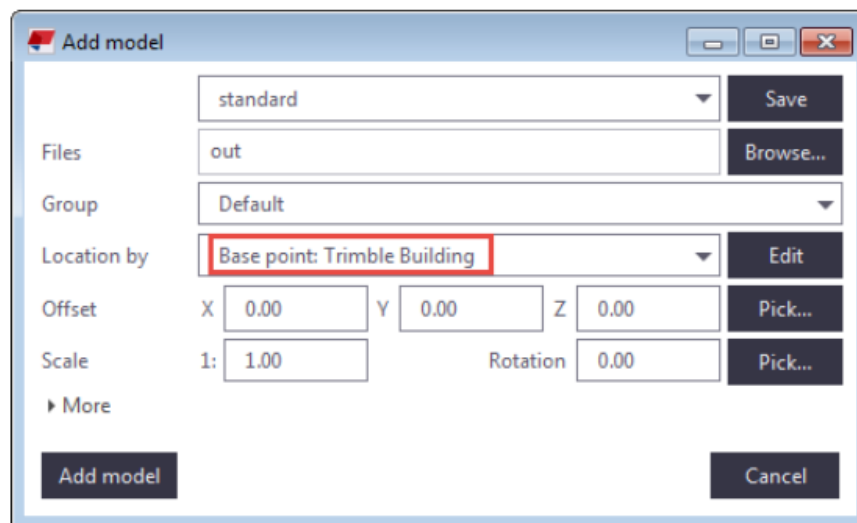
One base point can be set to be as the project base point. Model origin is the default project base point value if the model does not contain any base points, or if none of the existing base points has been set to the project base point. You can check and change the current project base point through **File > Project properties > Location by**

1. Click **File > Project Properties**. The current base point can be seen in the **Location by** box
2. To change the project base point, select a new project base point from the **Location by** list.
3. Click **Apply**

3.3.2 INSERT A REFERENCE MODEL USING A BASE POINTS

Before you can insert a reference at the base points, you need to create a base point in your model. To create the base point, you need to know the coordinates of the reference model that you are importing.

1. Open the **Reference Models** list by clicking the **Reference Models** button in the side pane.
2. In the **Reference Models** list, click the **Add model** button
3. In the **Add model** dialog box, load the desired file by selecting the file from the properties file list at the top.
4. Browse for the reference model by clicking **Browse...**
5. In **Group**, select a group for the reference model, or enter a name for a new group. If there's no name entered for the group, the reference model is inserted in the **Default** group.
6. In **Location by**, select the base point you want to use.

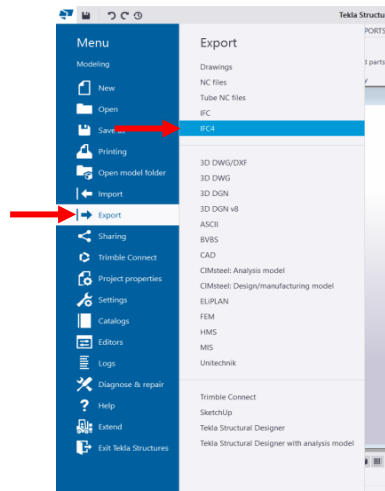


Add model Dialog Box

7. Click the **Add model** button. Tekla Structures inserts the reference model relative to the selected base point by using the coordinate system values, elevation and angle in the base point definition in the model **Project properties**.

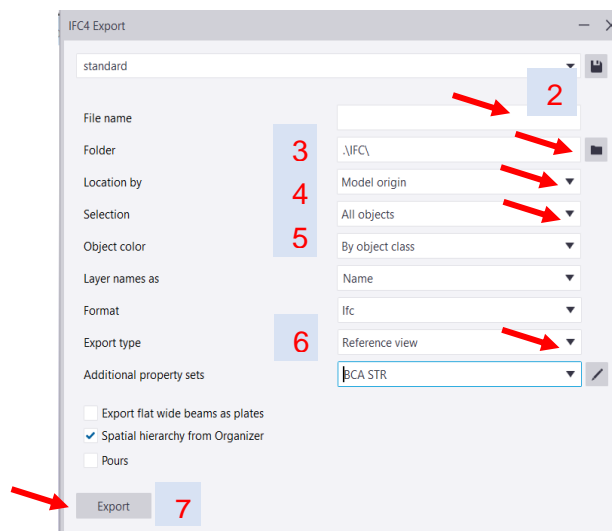
3.4 IFC EXPORT SETUP

1. On the **File** menu, click **Export** and select **IFC4**



File Menu

2. In the **File name** box, enter the file name without a file name extension.
3. Browse for the location to be saved in the **Folder**.
4. Select the Project Coordinated in the **Location by** drop down button.
5. In Selection, select whether you want to export **All objects** or **Selected objects**
6. Define other export settings, Select **Reference view** in **Export type**
7. Click **Export**



IFC4 Export

4 IFC-SG Specific

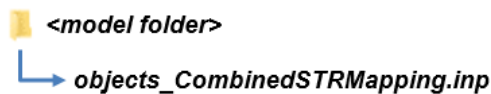
4.1 ADDING USERDEFINED PROPERTIES

All the user-defined attributes needed are loaded inside the Tekla Structures using the custom **object.inp** file.

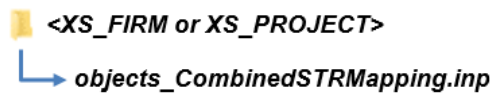
4.1.1 OBJECTS.INP FILE

The user-defined attributes are managed in the [objects.inp](#) file. To define new user-defined attributes, create your own objects.inp file in the model, project or firm folder. The creation of the objects.inp based on the IFC-SG Mapping is already done and it will only be needed to copy and paste the file in the model, project or firm folder.

Copy and paste objects.inp file based on the IFC-SG Resource Kit in the \<model> folder



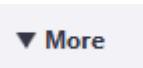

If applicable, save the file to XS_FIRM or XS_PROJECT location

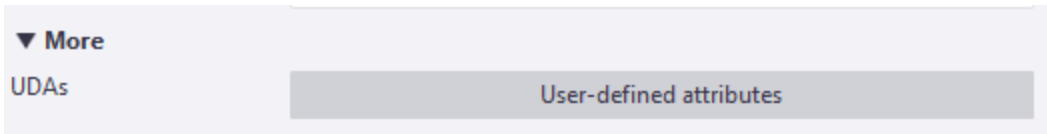


Objects.INP file based on the IFC-SG Mapping located in the model folder

4.1.2 USER-DEFINED ATTRIBUTES LOCATION

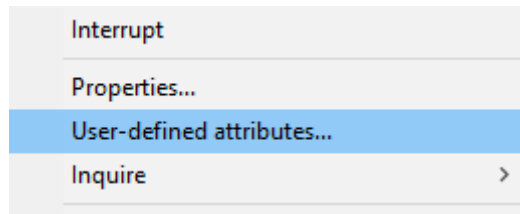
The property pane and many dialog boxes contain user-defined attributes (UDAs) for various objects, including beams, columns, bolts and drawings. Tekla Structures displays these fields when you click the

more button  in the property pane  or the User-defined attributes button in a dialog box.

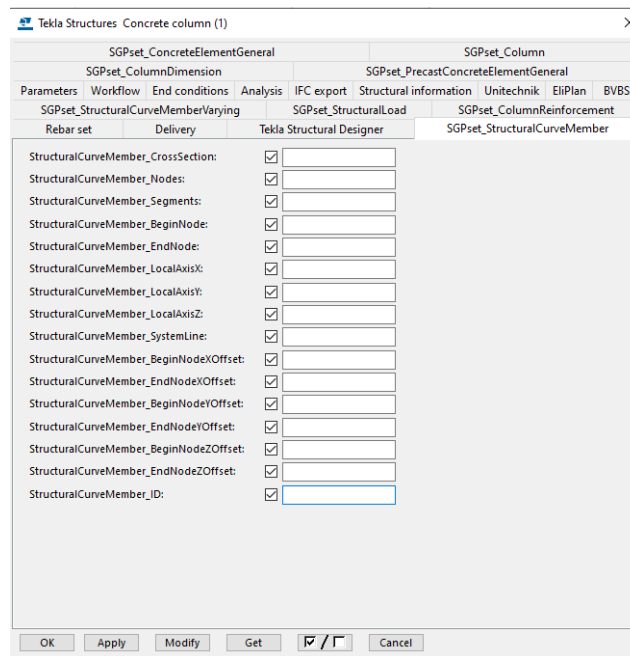


More button in the property pane (located Right side of the UI) where the UDAs can be accessed

Another way to access the UDA is by selecting the desired part and then right click, select the *User-Defined Attributes* option.


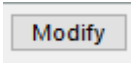


A new window will pop-out showing all the UDA the part contains.



Tekla Structures window showing all the UDAs defined in the native objects.inp file and the custom objects.inp file.

4.1.3 ADDING VALUES IN USER-DEFINED ATTRIBUTES

1. Select the necessary attributes and uncheck first all the attributes by clicking this button , after that key in the values needed, after you pressed enter it will automatically checked the tick box besides the attributes.
2. Click modify  after the necessary values are added.
3. If you have the UDA List Side pane extension the UDA will also going to automatically show up once the values are already added and the modify button is pressed.

4.2 ADDING USERDEFINED PROPERTIES USING UDA LIST SIDE PANE EXTENSION (OPTIONAL)

To use user-defined properties in Tekla Structures, the **UDA (User-defined Attributes) List** extension is needed to be installed. The extension is available in **Tekla Warehouse** website.

Link: <https://warehouse.tekla.com/#!/catalog/details/u272231ec-0fdf-4fa2-8036-3415b53d1916>

Tekla Warehouse

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TRIMBLE SOLUTIONS USA, INC.

US EXTENSIONS

UDA LIST

UDA List

| Name | Value | Type |
|--------------------|--------------|------|
| C_EXPOSED | Yes | int |
| RF11_RESP_DATE | 1/1/1970 | int |
| C_PLACEMENT_METHOD | Pump truck | int |
| RF15_RESP_DATE | 1/1/1970 | int |
| C_FINISH_TYPE | Broom finish | int |
| COLOR | Color&xbm | int |
| C_FORM_THICKNESS | 9 mm | int |
| C_BROOM_FINISH | Light | int |
| IFC_ENTITY | IfcWall | int |
| RF14_RESP_DATE | 1/1/1970 | int |

Log in to download

The UDA List is a testing, localization and development tool that shows all User Defined Attributes and values, including those written directly by the API, attributes within components and those written to mutli-level assemblies. It also allows purging of UDA's.

UDA List in Tekla Warehouse Website

4.2.1 PURPOSE AND DESCRIPTION

The UDA List is a testing, localization and development tool that shows all User-defined Attributes and values, including those written by the API, attributes within components and those written to multi-level assemblies. It also allows purging of UDA's as UDAs created by tools via the API are written directly to the model database and are not included in objects.inp.

4.2.2 INSTALLATION

To install the application:

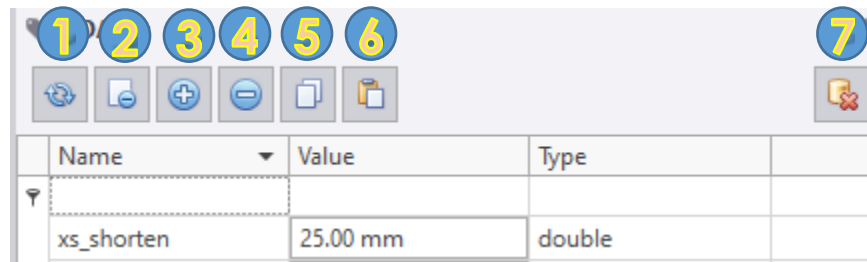
1. Make sure Tekla Structures is closed.
2. Run the installation package. Download from the Tekla Warehouse
3. Reopen Tekla Structures once installation is complete. The new UDA List icon will appear on the main user interface side pane.



UDA List Icon

To open the tool, click the new icon.

4.2.3 INTERFACE



UDA List Interface

4.2.3.1 MAIN INTERFACE

1. Use this button to refresh the UDA data for selected item. This is needed when you change the objects user-defined attributes through Tekla Structures property interface and need to see the updated changes in the UDa List. If you change the UDA values through this extension, this function is automatic.
2. Use this button to remove the selected UDA(s) only.

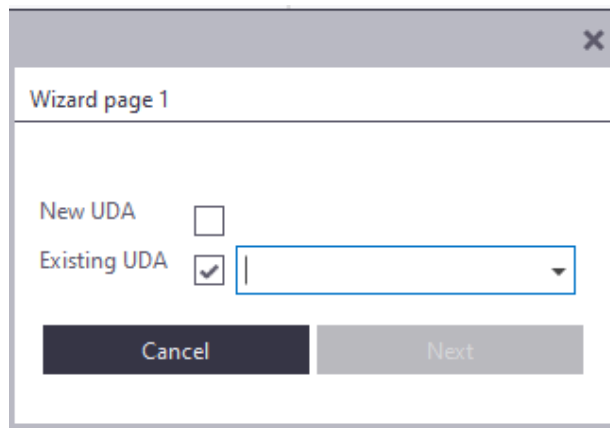
3. Use this button to add a new UDA.
4. Use this button to clear all UDAs stored to the currently selected object.
5. Copies selected UDA(s) to memory.
6. Pastes UDA(s) stored in memory to the selected object
7. Use this button to delete all UDAs from all selected objects.

4.2.3.2 COPYING UDA'S WORKFLOW

1. Select UDA row(s) from the table and select "Copy UDA" button to copy to memory
2. Select the part that will be copied to in the model
3. Click the "Paste UDA" button

4.2.3.3 WIZARD

1. Existing UDA
 - i. Wizard Page 1: Choose UDA Type



Wizard page 1

New UDA ☐

Existing UDA ☒

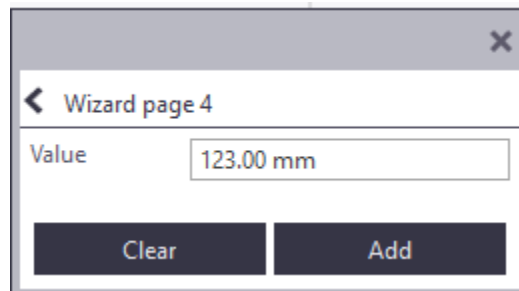
Cancel Next

Wizard Page 1

- ii. The values in the drop-down list are read from the model directly.
- iii. If you change the objects.inp and add UDA definitions you will have to re-open the model to get these to be available.
- iv. Select from the drop down list the UDA you want to add to the selected object.
- v. When choosing existing, you will skip to Wizard Page 4 next where you can define the value to store.

2. Wizard Page 4: Value Selection

- i. Pick the value you want to store in model to the selected object.
- ii. You can navigate back to the previous page if you need to change settings.
- iii. Click Add to end the wizard and store the value to the model.



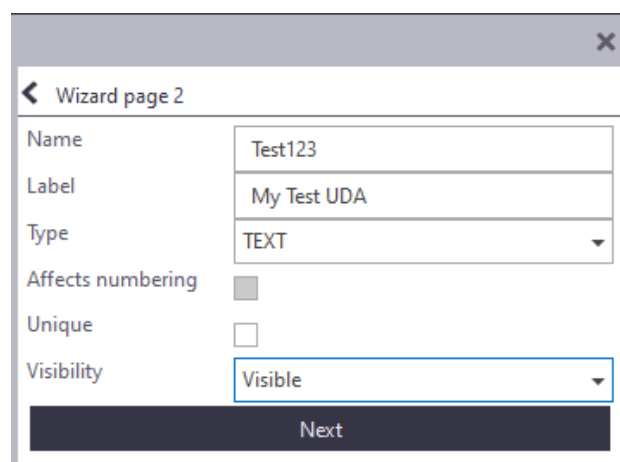
Wizard Page 4

4.2.4 NEW UDA DEFINITION

1. Wizard Page 1: Choose UDA Type

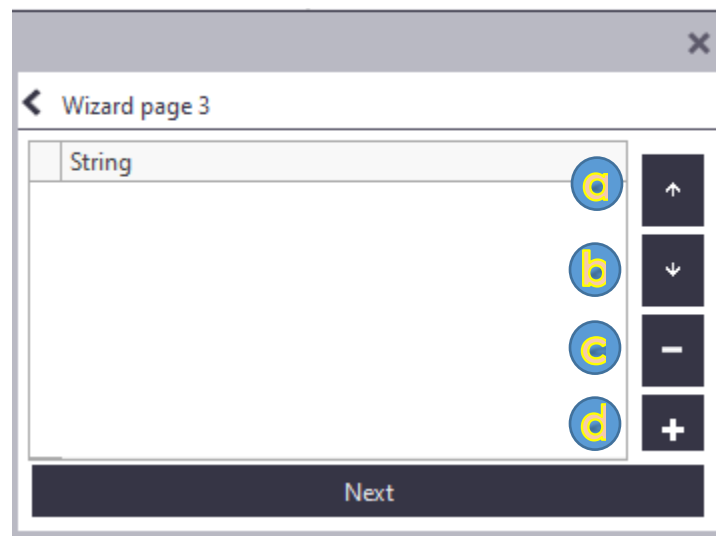
1. Adding a new UDA through this interface will add it directly to the model environment.
2. This does not create or modify any objects.inp files.
3. Only other extensions reading directly from the model environment to get the User Properties through will have access to these specific UDAs
4. Note: Choosing Number as Type will get an extra wizard page to define options for a drop-down list

2. Wizard Page 2: New UDA Definition



Wizard Page 2

1. Name: the actual name the data will be stored under
 2. Label: the label that will be seen in Tekla Structures interfaces
 3. Type: The specific kind of UDA to store. Use TEXT for strings, NUMBER for integer options, and DISTANCE for length type values.
 4. Affects Numbering: the UDA will affect the numbering process after checking the box
 5. Unique: Check the box to keep the value from being copied when copying objects in the model
 6. Visibility: Change this setting as desired for accessibility in Tekla Structures interfaces (Note: this setting will not affect this extension's ability to read/write the UDA values)
3. Wizard Page 3: Options Definition (Only for Number Type)
1. These items will define what the user will see in the drop-down list for this named UDA values
 2. All items are strings

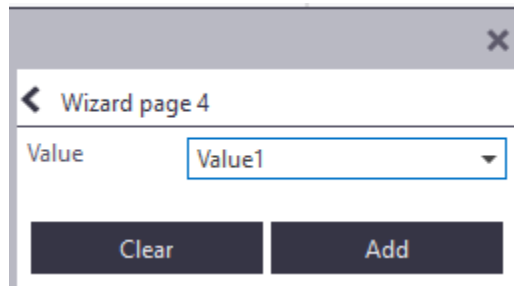


Wizard Page 3

- a. Move item up in list
- b. Move item down list
- c. Remove item from list
- d. Add new item to list

4. Wizard Page 4: Value Selection

1. Pick the value that will be stored in the model to the selected object.
2. The type of control used to select the value depends on the UDA type chosen on Wizard Page 2.
3. You can navigate back to the previous page if you to change the settings
4. Click Add to end the wizard and store the value to the model

A screenshot of a software dialog box titled "Wizard page 4". The dialog has a close button (X) in the top right corner. Below the title bar, there is a back arrow icon and the text "Wizard page 4". Underneath, the label "Value" is followed by a dropdown menu currently showing "Value1". At the bottom of the dialog, there are two buttons: "Clear" and "Add".

Wizard Page 4

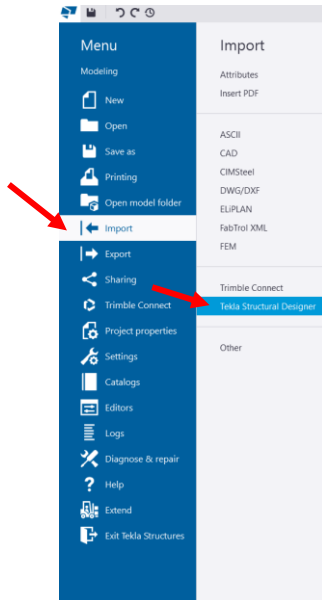
4.3 ADDING PROPERTIES FROM TSD (OPTIONAL)

1. On the **File** menu, click **Import > Tekla Structural Designer**.
2. Tekla Structural Designer import dialog box will open. Enter the path of the import .cxl file or the original .tsmd file. Once you have selected a valid file, the import settings and the **Import** button will be enabled.
3. If updating the positions of objects is not required, select the **Only consider profile and material changes** check box.
4. Select among the following grid options:
 1. Import grids from import file: The grid lines from the import file will be imported into the Tekla Structures model. A grid line pattern will be created, and all the imported grid lines will be attached as individual grid planes to this pattern.
 2. Delete existing Tekla Structures grids: Import will remove all grid lines/planes from the current Tekla Structures model.
5. If you want to remove slab and wall openings in the Tekla Structures model that were previously imported from Tekla Structural Designer, select the **Remove previously imported openings** check box.
6. Open the **Location** section and define to which location you want to import the model. Do one of the following:
 1. In the **X**, **Y**, and **Z** boxes, enter offsets for the imported model from the global origin of the Tekla Structures model.
 2. Click **Pick** and then pick a location for the import model datum point in the Tekla Structures model.

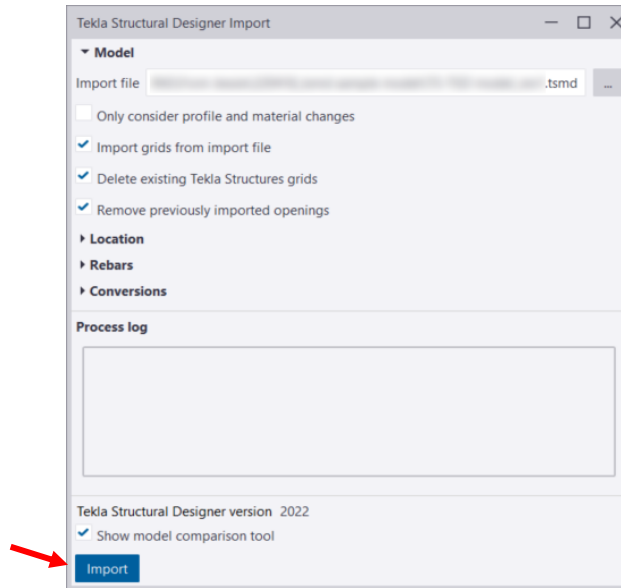
You can also define a rotation.

7. In the **Rebars** section, define whether the reinforcing bars are imported, and how they are imported. Note that the Rebars section will become available only when you have selected a .tsmd file as the import file.
8. To read the import file and display all the proposed profile, material grade, and rebar grade conversions to be used, open the **Conversions** section and click the preview buttons.

9. Click **Import**. Once the model is loaded, click **Close/Exit** dialog



File Menu



Tekla Structural Designer Import Dialog Box

10. Select object in the model and its properties from TSD will show in the UDA List.

Note: Value in the UDA List can be modified. Only Rebars and Links from Beam and Column can be imported from TSD Analysis as properties.

| Name | Value | Type |
|------------------|------------------------|--------|
| TSD_NOTES | Single Span, Torsion I | string |
| TSD_RC_COVER | T 30.0mm;B 30.0mm; | string |
| TSD_END_CONN | Fixed | string |
| TSD_RC_SIDE | 10H25-61 | string |
| MBR_TYPE | GENERAL_BEAM | string |
| TSD_PROFILE_NAME | \$1050x1250 | string |
| TSD_STATUS | New | string |
| FABRICATION | CAST_IN_PLACE | string |
| TSD_GUID | D269ADC5-CD9A-47 | string |
| TSD_RC_LINKS | C 4H8-125 (5 legs, 10 | string |
| TSD_DETAIL_GRP | CRB27-D3 | string |
| TSD_PART_MARK | 2B48 | string |
| TSD_RC_BOTTOM | C 8H25-31, 2H20-32 | string |
| TSD_START_CONN | Fixed | string |
| TSD_RC_TOP | L 17H25-16 (25.00%); | string |
| TSD_DESIGN_GRP | CRB27 | string |

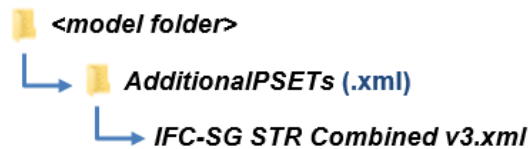
UDA List Properties

4.4 PROPERTY SET (PSET & SGPSET)

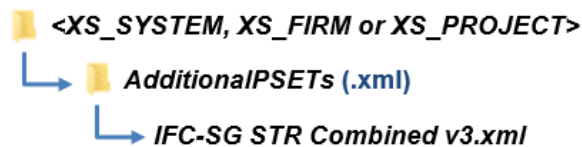
4.4.1 IFC-SG PROPERTY SET CONFIGURATION FILE

The creation of the property set configuration files based on the IFC-SG Mapping is already done and it will only be needed to copy and paste to the **\AdditionalPSETs folder** under the model folder by default. You can also read property sets under the system, project or firm folder.

Copy and paste property set configuration file based on the IFC-SG Resource Kit in the
\\<model>\AdditionalPSETs subfolder

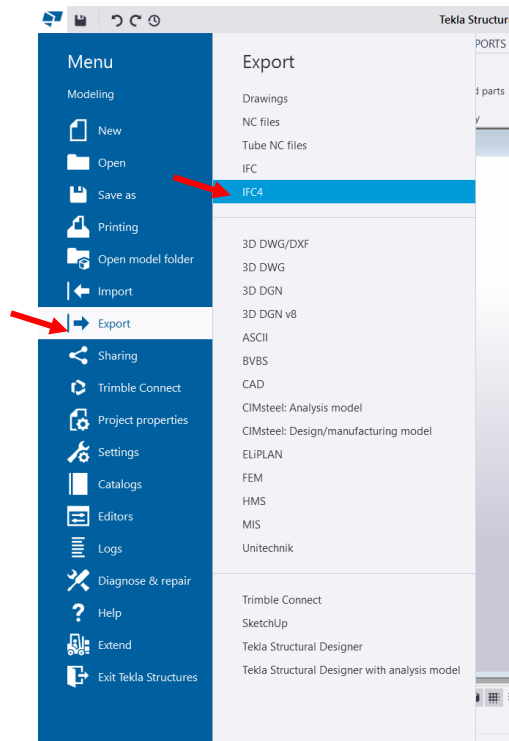


If applicable, save the file in a folder called \AdditionalPSETS under the XS_SYSTEM, XS_FIRM or XS_PROJECT location



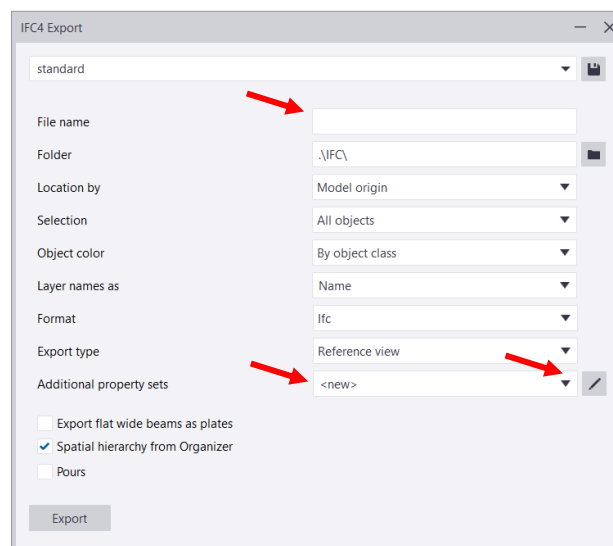
4.4.2 ADDING ADDITIONALPROPERTY SET INFORMATION (OPTIONAL)

1. On the **File** menu, click **Export** and select IFC4



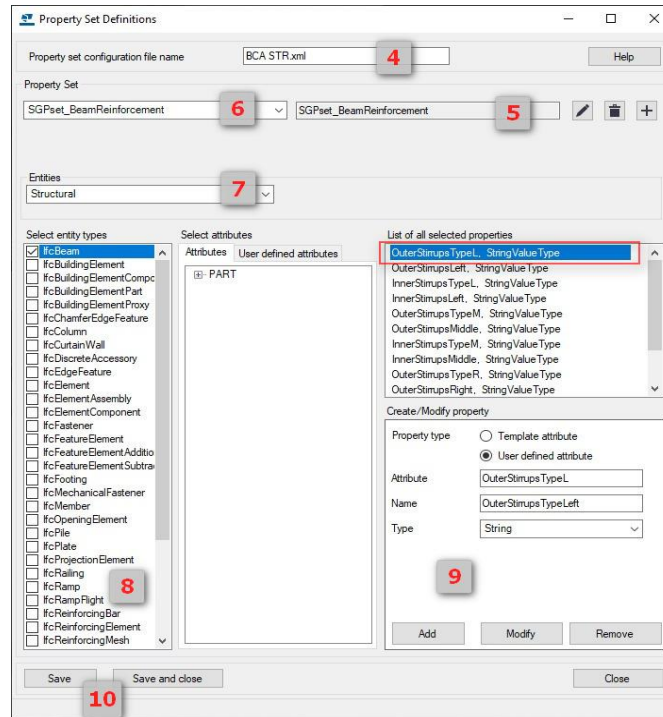
File Menu

2. Enter the File name. Select <new> in the Additional property sets list and click Edit.




IFC4 Export Dialog Box

3. In the **Property Set Definition** dialog box will open.



Property Set Definitions Dialog Box

4. Enter a name for the Property set configuration file in the **Name** box.
5. Click the  button, enter the name of the property set.
6. For a new property set, enter description for the property set in the empty box, and click **Create**
7. Select the desired entity type category in the **Entities** list. **Structural** is the default category. When you select the category, the related IFC entities are displayed in the **Select entity types** list.
8. Select an entity type from the **Select entity types** list by selecting its check box.
9. Go to **Create/Modify property** and select **User defined attribute**. Type the Attribute name based on **UDA List** (e.g., OuterStirrupsTypeL) For the **Name**, type the name that will be exported in IFC4 (e.g. OuterStirrupsTypeLeft). For the **Type**, open the drop-down list and choose the appropriate property type (e.g. String) and Click **Add**.

UDA list

| Name | Value | Type |
|---------------------|-----------|--------|
| BotEndSpanM | 3H25+3H25 | string |
| OuterStirrupsTypeR | U Type | string |
| TopEndSpanL | 3H32+3H25 | string |
| TopEndSpanM | 3H25 | string |
| TopEndSpanR | 3H32+3H25 | string |
| TopInteriorL | 3H25+3H25 | string |
| BotEndSpanR | 3H25 | string |
| OuterStirrupsTypeL | U Type | string |
| OuterStirrupsLeft | 1H16-250 | string |
| InnerStirrupsTypeM | C/L Type | string |
| OuterStirrupsTypeM | U Type | string |
| OuterStirrupsMiddle | 1H16-250 | string |
| InnerStirrupsLeft | 2H10-250 | string |
| OuterStirrupsRight | 1H16-250 | string |
| InnerStirrupsTypeR | C/L Type | string |
| InnerStirrupsRight | 2H10-250 | string |
| InnerStirrupsTypeL | C/L Type | string |
| InnerStirrupsMiddle | 2H10-250 | string |
| ReinfSteelGrade | 500 N/mm2 | string |
| BotEndSpanL | 3H25 | string |
| OuterStirTypeRight | U Type | int |
| OuterStirTypeMiddle | U Type | int |
| InnerStirTypeLeft | C/L Type | int |
| InnerStirTypeRight | C/L Type | int |
| OuterStirTypeLeft | U Type | int |
| InnerStirTypeMiddle | C/L Type | int |
| AsReqStirRight | 532 | double |
| AsReqStirMid | 323 | double |
| AsReqStirLeft | 213 | double |
| AsReqTopMid | 232 | double |
| AsReqBotRight | 432 | double |
| Deflection | 16 | double |

UDA List Dialog Box

10. Click **Save**.

5 Advanced Users

5.1 MODIFYING CONFIGURATION FILES (OPTIONAL)

5.1.1 CREATE/MODIFY PROPERTY SETS USING XML

Saving Tekla Structures model creates a folder with the same file name. Inside the folder, there is another folder named **Additional Psets** that contains all created psets in the model. The psets are saved as an XML file.

To modify or edit the Psets, open the XML file in Notepad. Search for the property that will be edited. The Property Set Name and Property Name that will be reflected in the IFC file is under <Name></Name>. The property value type can also be modified. (e.g., String, Real or Boolean). See examples below for reference.



```
BCA STR - Notepad
File Edit Format View Help
</PropertySet>
<PropertySet referenceId="sgpset_beamreinforcement">
  <Description>SGPset_BeamReinforcement</Description>
  <Name>SGPset_BeamReinforcement</Name>
  <Properties>
    <Property xsi:type="PropertySingleValueType" optional="true">
      <Name>OuterStirrupsLeft</Name>
      <PropertyValue xsi:type="StringValueType" stringType="IfcLabel">
        <GetValue xsi:type="UdaVariableType">
          <UdaName>OuterStirrupsLeft</UdaName>
        </GetValue>
      </PropertyValue>
    </Property>
    <Property xsi:type="PropertySingleValueType" optional="true">
      <Name>OuterStirrupsTypeLeft</Name>
      <PropertyValue xsi:type="StringValueType" stringType="IfcLabel">
        <GetValue xsi:type="UdaVariableType">
          <UdaName>OuterStirrupsTypeL</UdaName>
        </GetValue>
      </PropertyValue>
    </Property>
    <Property xsi:type="PropertySingleValueType" optional="true">
      <Name>InnerStirrupsLeft</Name>
      <PropertyValue xsi:type="StringValueType" stringType="IfcLabel">
        <GetValue xsi:type="UdaVariableType">
          <UdaName>InnerStirrupsLeft</UdaName>
        </GetValue>
      </PropertyValue>
    </Property>
    <Property xsi:type="PropertySingleValueType" optional="true">
      <Name>InnerStirrupsTypeLeft</Name>
      <PropertyValue xsi:type="StringValueType" stringType="IfcLabel">
        <GetValue xsi:type="UdaVariableType">
          <UdaName>InnerStirrupsTypeL</UdaName>
        </GetValue>
      </PropertyValue>
    </Property>
    <Property xsi:type="PropertySingleValueType" optional="true">
      <Name>OuterStirrupsMiddle</Name>
      <PropertyValue xsi:type="StringValueType" stringType="IfcLabel">
        <GetValue xsi:type="UdaVariableType">
          <UdaName>OuterStirrupsMiddle</UdaName>
        </GetValue>
      </PropertyValue>
    </Property>
  </Properties>
</PropertySet>
```

Example of Property Sets and String/Label Type Property

```

<PropertySet referenceId="sgpset_beam">
  <Description>SGPset_Beam</Description>
  <Name>SGPset_Beam</Name>
  <Properties>
    <Property xsi:type="PropertySingleValueType" optional="true">
      <Name>PrestressForce(kN)</Name>
      <PropertyValue xsi:type="RealValueType">
        <GetValue xsi:type="UdaVariableType">
          <UdaName>PrestressForce</UdaName>
        </GetValue>
      </PropertyValue>
    </Property>
  </Properties>

```

Example of Real Type Property

```

<PropertySet referenceId="pset_beamcommon">
  <Description>Pset_BeamCommon</Description>
  <Name>Pset_BeamCommon</Name>
  <Properties>
    <Property xsi:type="PropertySingleValueType" optional="true">
      <Name>IsExternal</Name>
      <PropertyValue xsi:type="BooleanValueType">
        <Default>true</Default>
        <ValueConversion xsi:type="BooleanTypeFromStringVariable">
          <GetValue xsi:type="UdaVariableType">
            <UdaName>IsExternal</UdaName>
          </GetValue>
        </ValueConversion>
        <KeyValuePair>
          <Key>0</Key>
          <Value>>false</Value>
        </KeyValuePair>
      </PropertyValue>
    </Property>
  </Properties>
</PropertySet>

```

Example of Boolean Type Property

6 Change Log

| Date | Description |
|----------|---|
| Feb 2023 | Added preface section and updated screenshots |