

# Going into details - Property Sets with RailCOMPLETE

## Defining a Custom Property Set

A **Property Set** has a recognizable **Property Set Name** and an associated collection of **Properties**. Each property has a **Property Name** and a **Property Value** field that will hold a value consistent with a specified **Data Type**. Let us explore this example from the railway realm in detail:

### SignalPlacement

Signal name	37113(L)	Text (String)
Orientation	Outbound	Enumeration (Outbound   Inbound)
Line	Mountain Railway	Text (String)
Station	Hillside St. (No.37)	Text (String)
Track	1	Text (String)
Km	462,031	Number (Double)
Side of track	Left	Enumeration (Left   Right   Unknown)
LateralOffset	3,850	Number (Double)

Use the **RailCOMPLETE Property Set Definition Manager** to enter the property set's definition and possible default values. Press the '+' button to start a new property set definition:

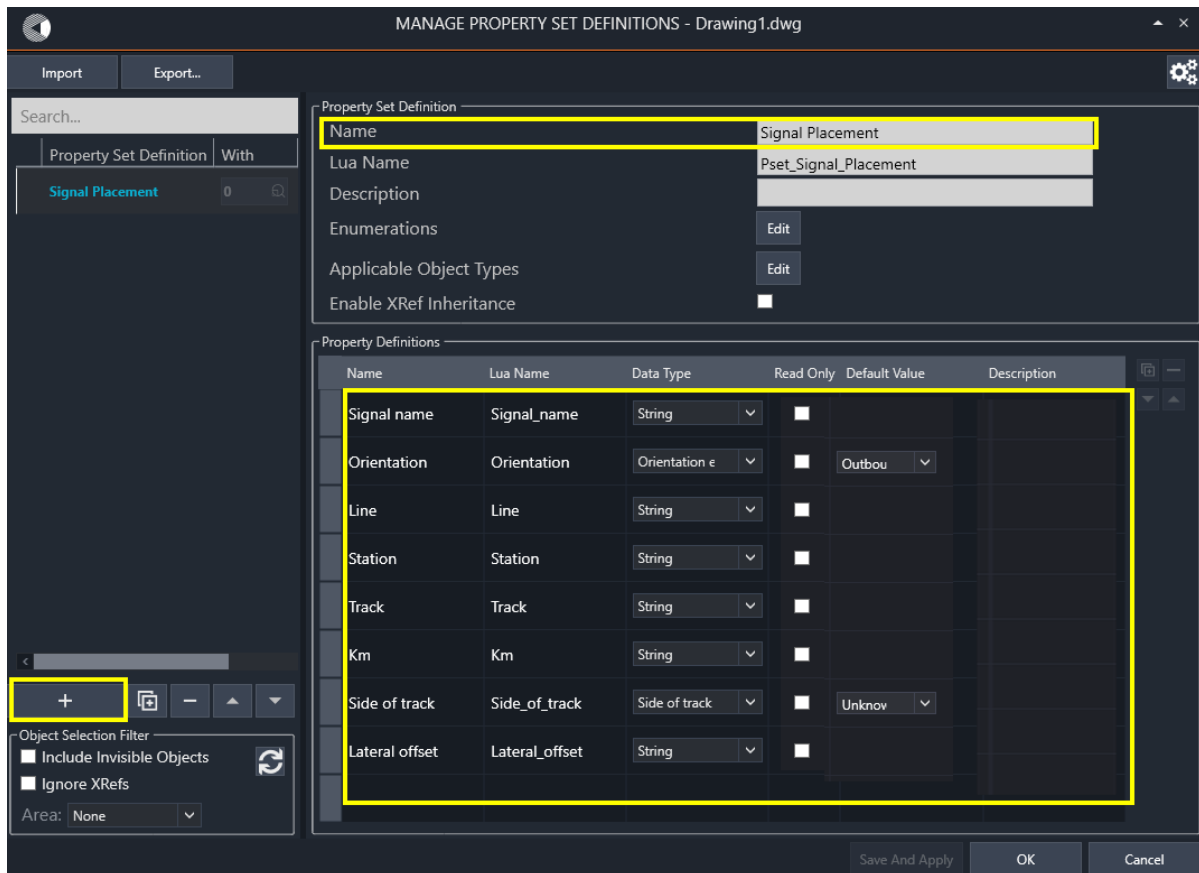
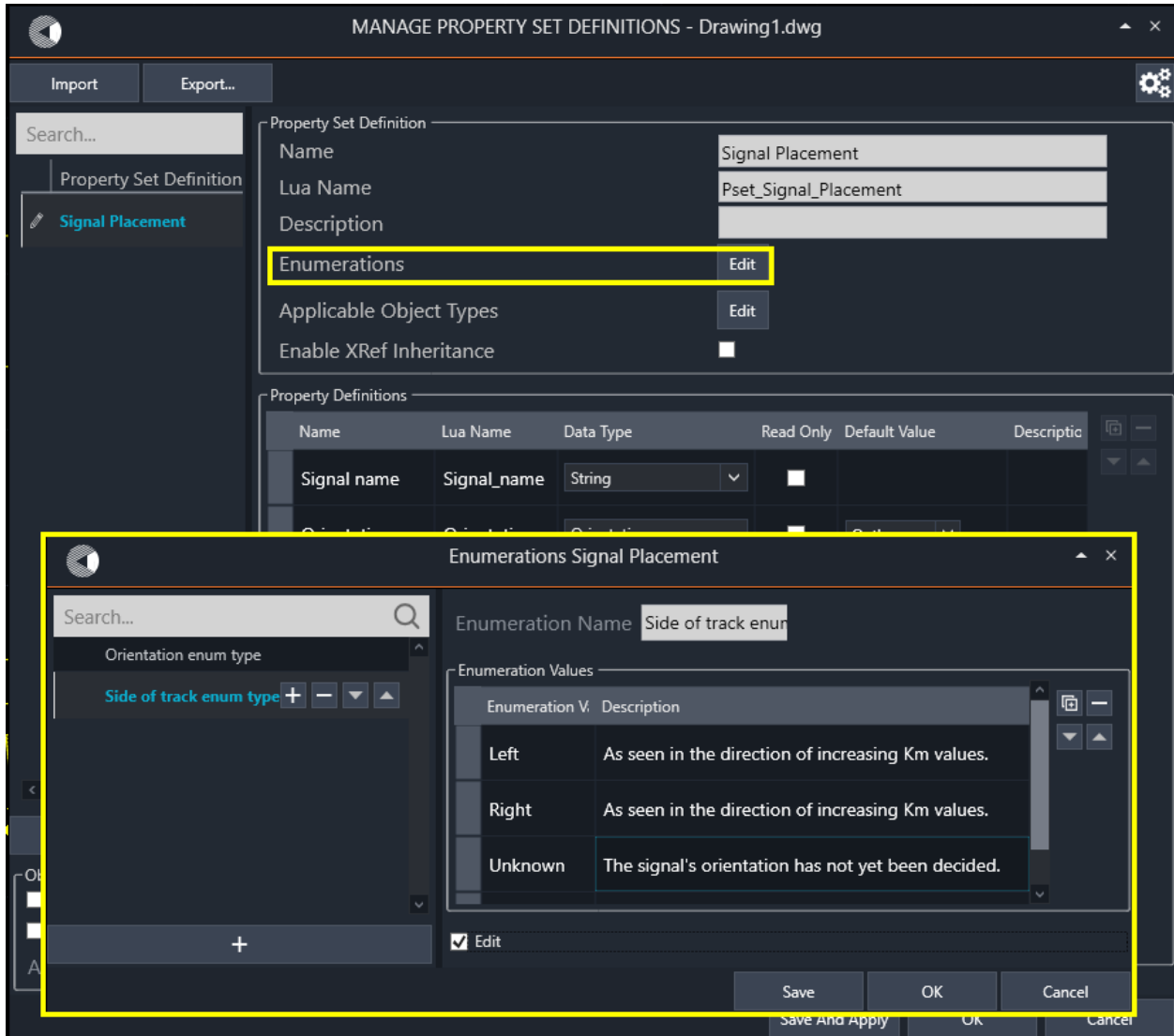


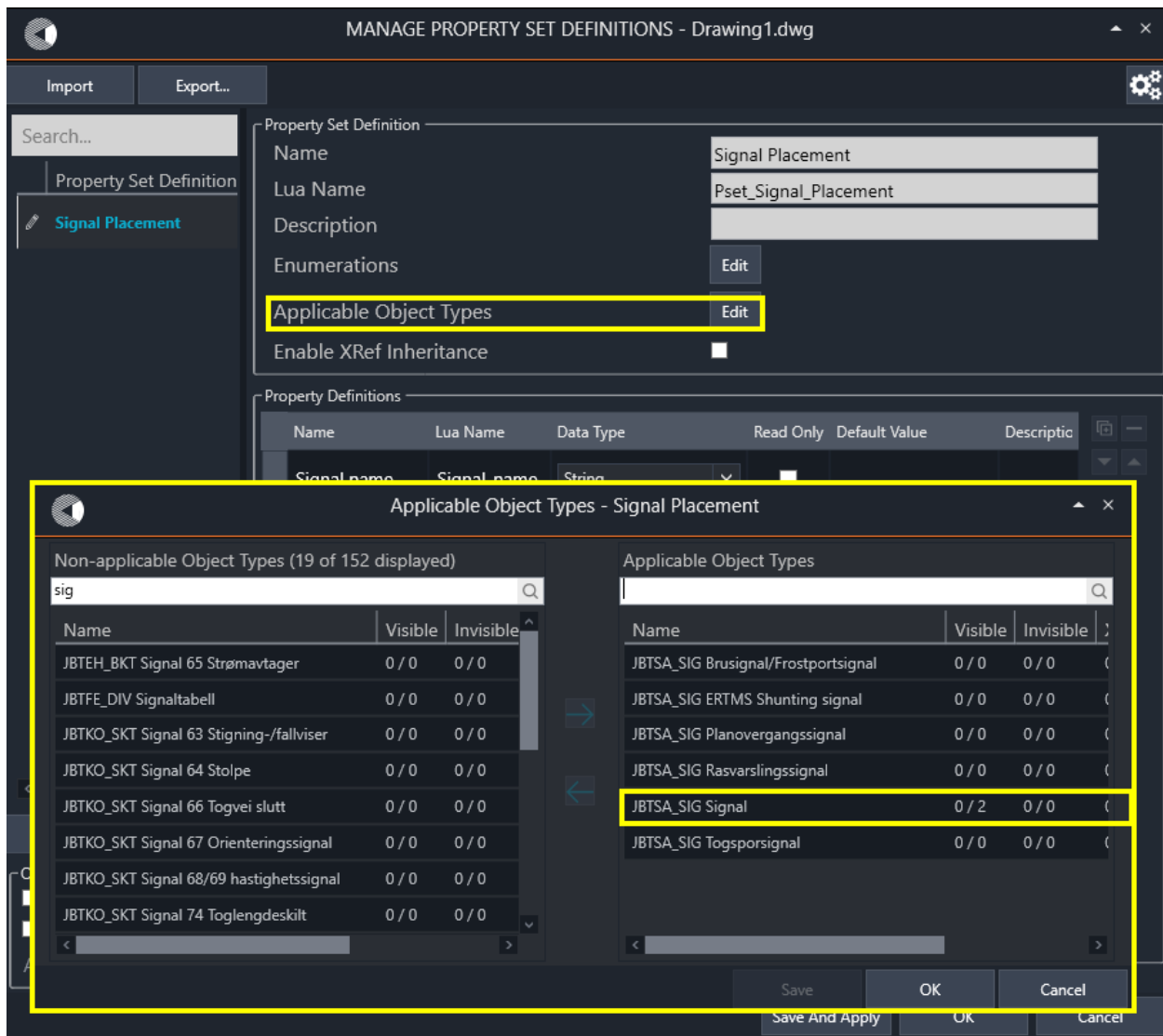
Figure 1 Example Pset 'Signal Placement'

An enumeration type acts as an extra, custom defined, data type. To modify an enumeration, use the **Property Set Enumerations Editor**:



**Figure 2 Enumerations editor**

RailCOMPLETE keeps track for you about which RC object types are the intended users of a given property set. This information is handled in the **Property Set Applicability Editor**:

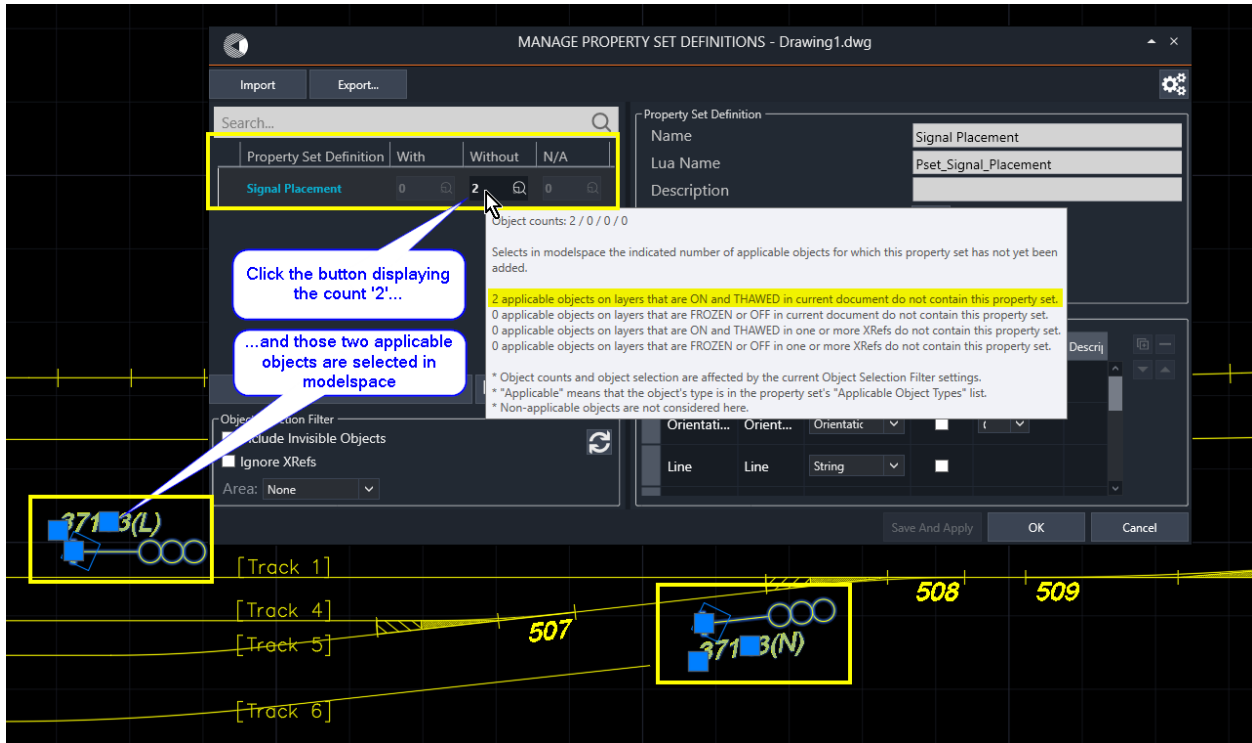


**Figure 3** Applicability editor

To provide oversight, the numbers 'a / b' denote the current count of objects (of a given RC object type) that have been assigned the property set, versus the total number of objects of that type in the drawing. Similar counts are provided for objects in XRef'ed drawings. There are two "JBTSA\_SIG Signal" objects that have not yet been assigned the "Signal Placement" property set in the above example.

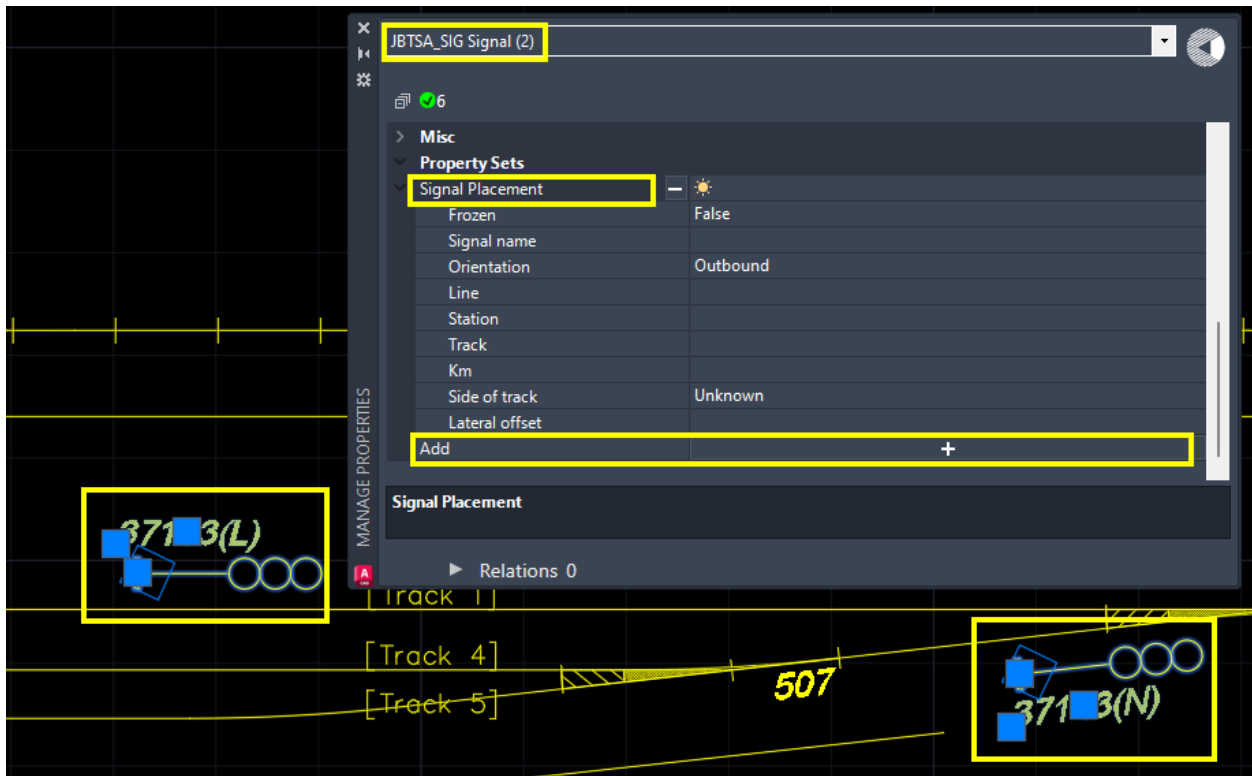
## Assigning Custom Property Sets to RC objects

Once the property set definition has been saved and applied to the drawing, you may conveniently use the Property Set Definition Manager's browser pane to select objects that shall be assigned a property set. See below - click the the button displaying the count '2' in the browser's column "Without":



**Figure 4 Select applicable objects**

Next, use the familiar RC Property Manager to add one or more property sets to the selected objects – Click the ‘Add’ (+) button and select a property set from the dropdown list that appears:



**Figure 5 Assign a Pset to RC objects**

## Property Set Automation using Lua

Entering literally thousands of values into your object's property set properties takes a lot of time and can be prone to errors. But RailCOMPLETE's unrivalled Lua automation system allows you to easily enter Lua formulas instead of plain default values for each property in the property set definition. In our 'Signal Placement' example, let's add this formula to property 'Signal name':

```
name .. " (" .. RcType .. ") "
```

and this formula to the 'Orientation' property:

```
dir == "up" and "Outbound" or "Inbound"
```

To distribute these automation formulas to the objects already featuring the property set, check the 'Read Only' box for the automated properties before you save and apply changes.

In the example below, we have entered automation formulas for all the properties (except the "Line" property, to which we have assigned a fixed value, since our example drawing is all about that one railway line). The user can now move RC objects around, change their names etc, and the property set values adapt automatically.

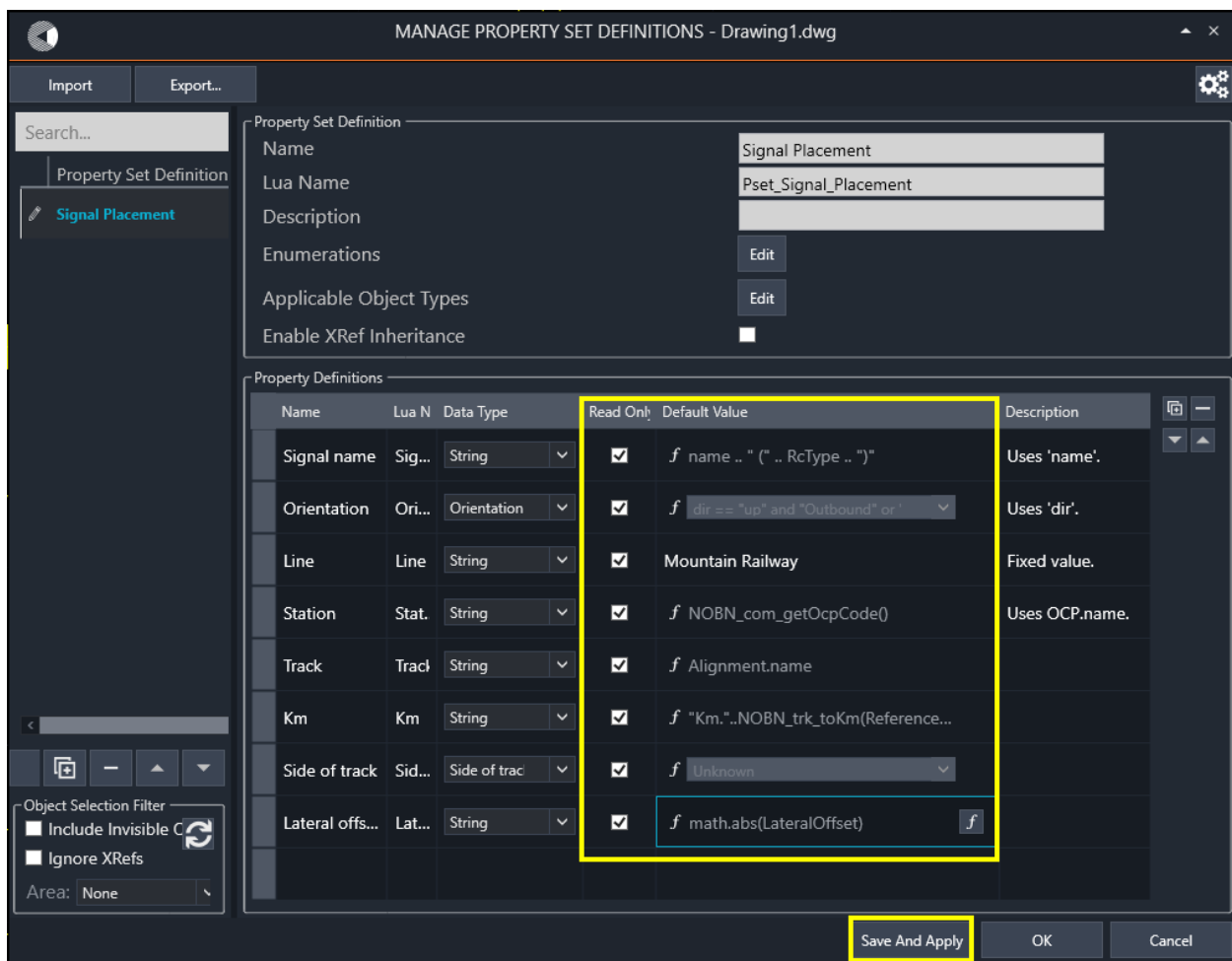


Figure 6 Automation of property values with Lua code

Here is what an updated object's properties now look like:

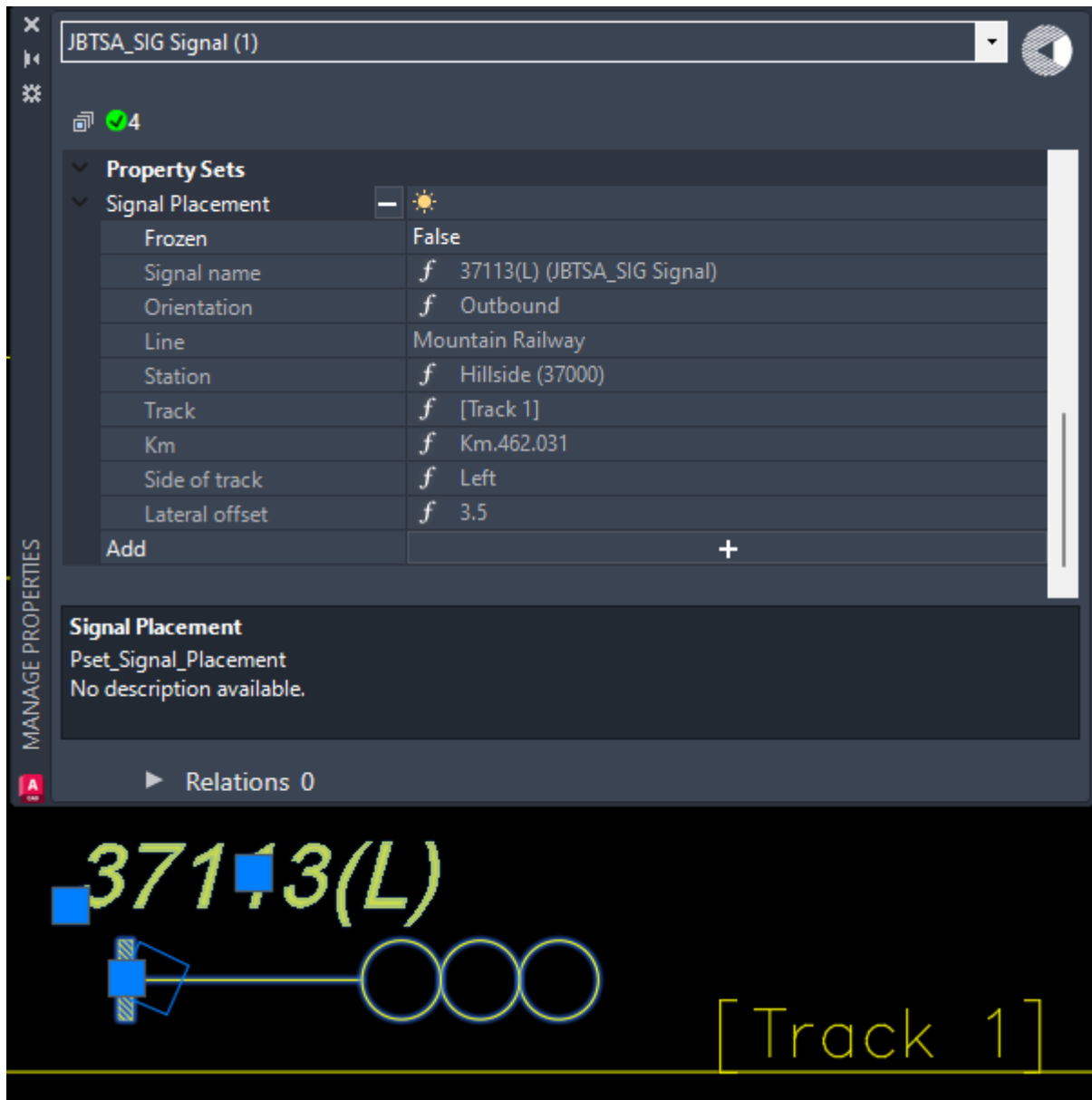


Figure 7 Signal 37113(L) with automated values

## Exporting property set values to DWG or to IFC

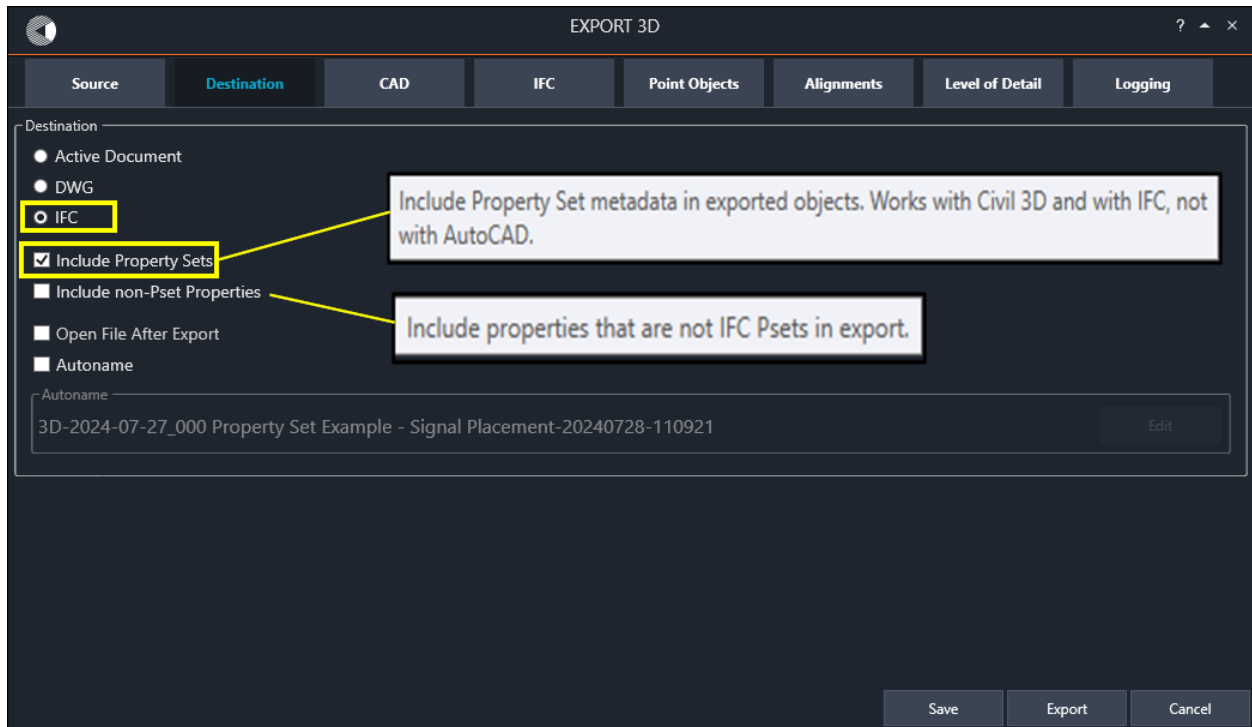
### Exporting to IFC

RailCOMPLETE includes an IFC export engine which means that exports to IFC can be done while running RailCOMPLETE as a plugin to AutoCAD™, instead of having to run it under its 'big brother' Civil 3D™, which would be more expensive.

Check the option 'IFC' in the 'Destination' tab in the RC-Export3D command's window and make sure that

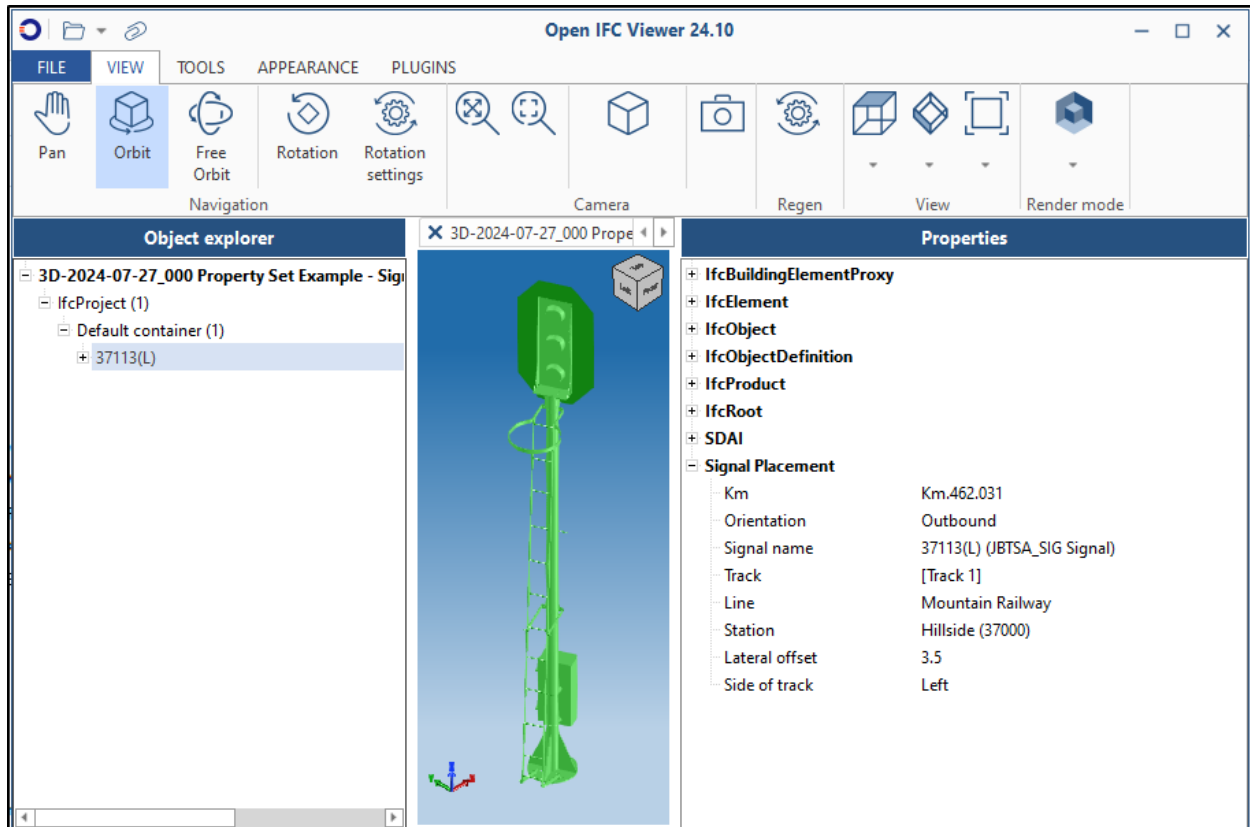
You can choose between the following:

- No properties being exported
- Property sets (with their properties' current values)
- RC objects' regular intrinsic and custom properties (there are lots of them!)
- Both Property Set properties and regular properties



**Figure 8** Exporting RC objects' property set instances to IFC or to DWG along with their 3D geometry

This is what it might look like in IFC, here using the Open Design Alliance's free viewer:



**Figure 9** Exported properties to IFC

## Exporting to DWG

AutoCAD™ cannot attach property sets to CAD entities, but Civil 3D™ does. If you run RC as a plugin to Civil 3D, then an export of 3D geometry with properties to the DWG format will make them appear in DWG files loaded into Civil 3D or in the NavisWorks™ viewer.

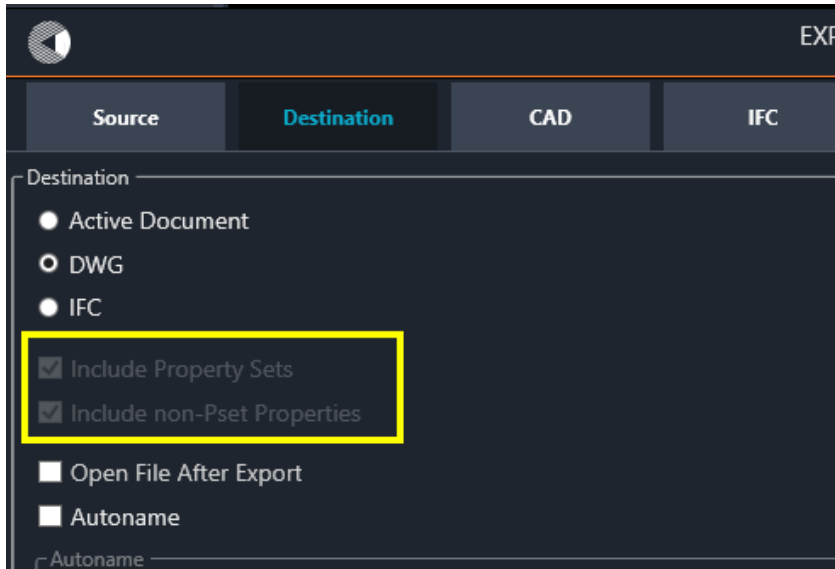
Check the option 'DWG' in the 'Destination' tab in the RC-Export3D command's window.

You can choose between the following:

- No properties being exported
- Property sets (with their properties' current values)
- RC objects' regular intrinsic and custom properties (there are lots of them!)
- Both Property Set properties and regular properties

Note that if you are running RailCOMPLETE under AutoCAD, then the two options 'Include Property Sets' and 'Include non-Pset Properties' are grayed down since they would not have any effect, anyway.



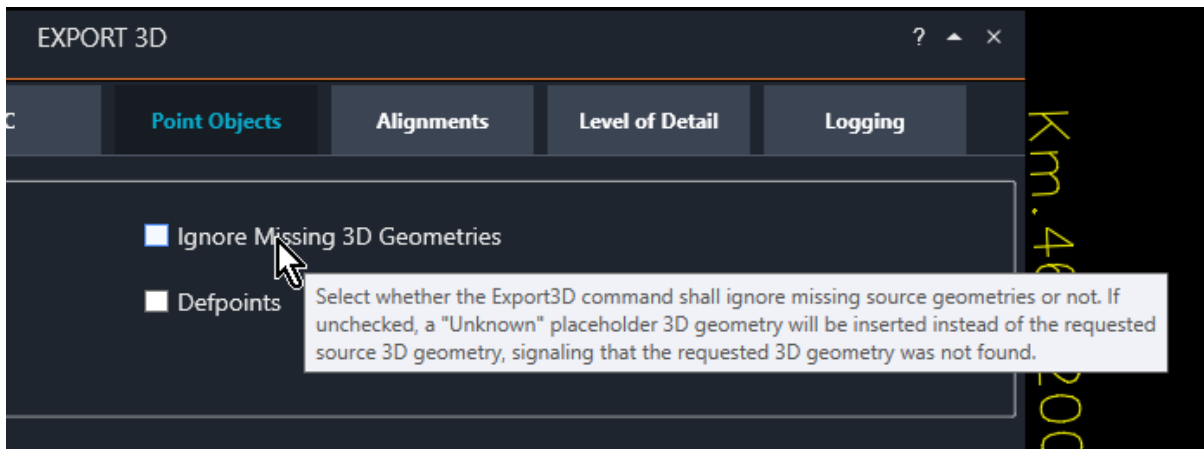


**Figure 10** No properties will be exported to DWG when running RailCOMPLETE under AutoCAD

## Exporting properties to DWG or IFC from objects that do not have 3D geometry

There might be RC objects in your drawing that do not have an associated 3D geometry. Remember, 3D geometries can be added dynamically to any object, also to “abstract” object types.

To enable IFC or DWG viewers to display something in 3D that you can click on to represent such objects, you can either add representative graphics in RailCOMPLETE to those objects, or you can ensure that you have unchecked the “Ignore Missing 3D Geometries” in the RC-Export3D command window’s ‘Point Objects’ tab. This has the effect of inserting a default 3D geometry in the resulting DWG or IFC file for each such object, along with the properties that you have chosen to include.



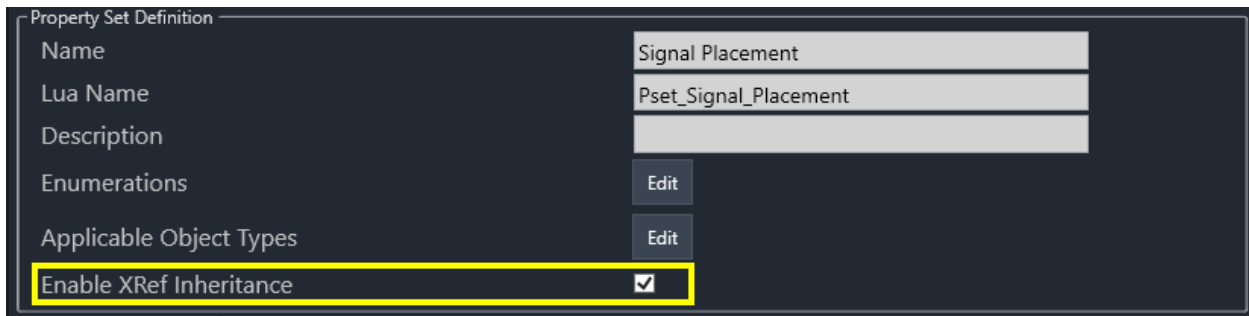
**Figure 11** Exporting properties to DWG or IFC for objects that do not have 3D geometry

Most DNAs use a 3D question mark ‘?’ symbol to represent an object without its own 3D geometry. Your DNA might not feature such a default 3D geometry file name, in which case you must explicitly add some dynamic 3D graphics to your abstract objects.

## Advanced features with RailCOMPLETE property sets

### XRef

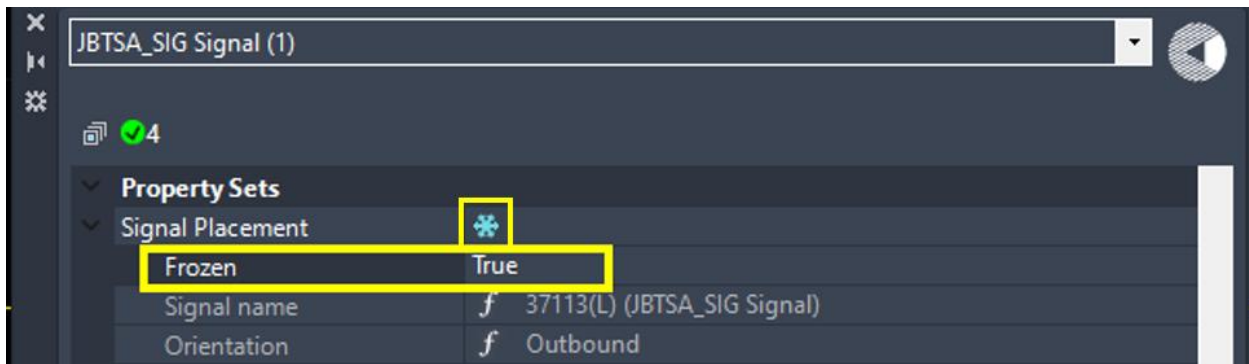
Working with property set definitions being defined in an XRef’ed file is easy: Just check the “Enable XRef inheritance” box, save, and the property set definition becomes available to applicable objects in any DWG file that XRefs the file with the property set definition in it. Automation formulas apply as well.



**Figure 12** Use XRef inheritance

### Frozen property set instance in RC object

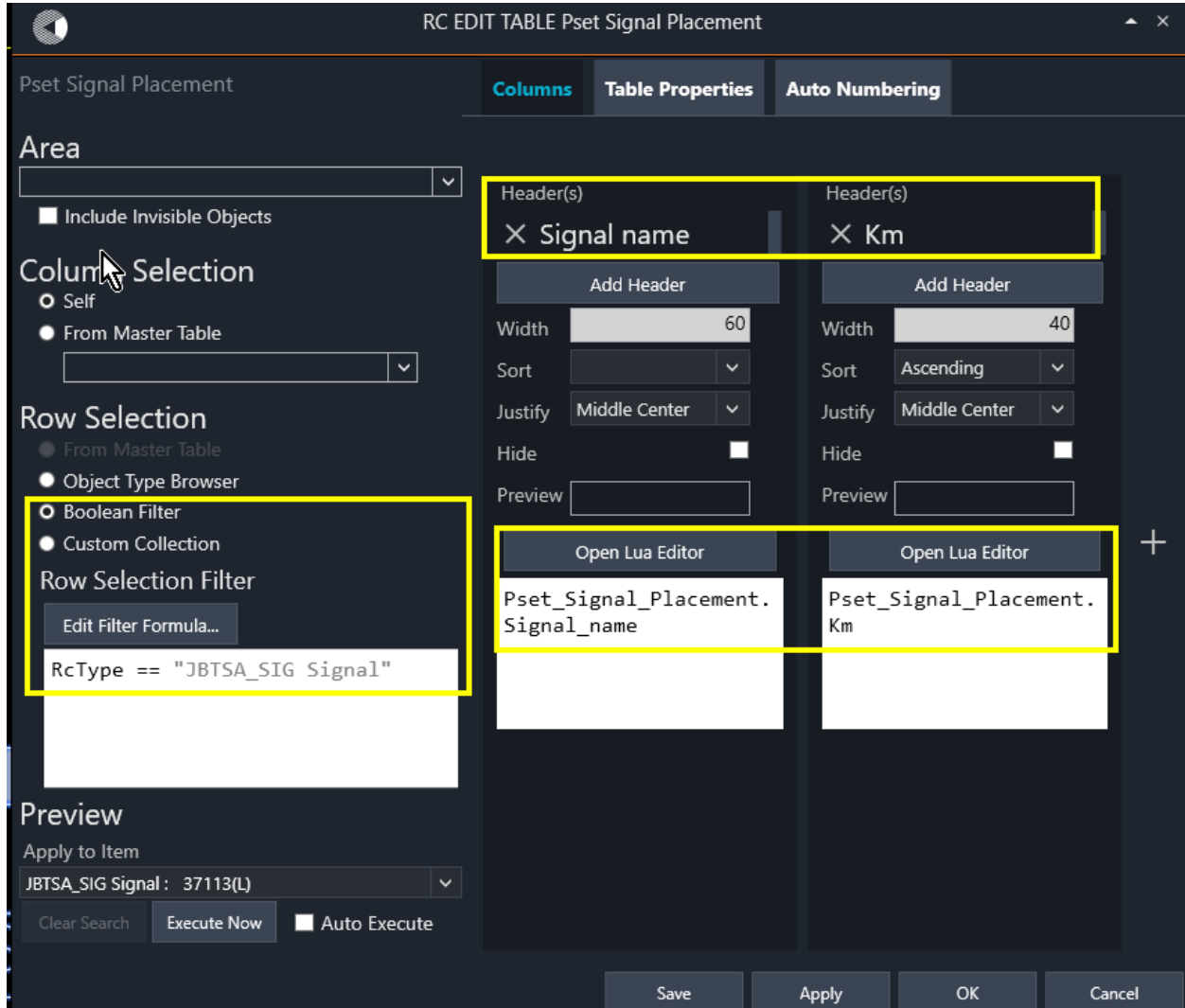
In case you do not want to export every property set instance from your drawing to IFC, you may suppress all of them globally (in RC-Export3D), or you can set the “Frozen” attribute to True for the affected RC objects’ property sets before exporting objects to IFC:



**Figure 13** Frozen property set - suppress output from RC object

## Tables using Property Set values

Every property set and every property inside that property set must be given a unique Lua name. Scripts and tables in RailCOMPLETE can then access the drawing's database with a Lua program using those unique Lua identifiers. Here is an example from the RC table tool:



**Figure 14** Table tool editor using Pset values

The resulting table is:

Pset Signal Placement	
Signal name	Km
37113(L) (JB TSA_SIG Signal)	Km.462.031
37143(N) (JB TSA_SIG Signal)	Km.462.117

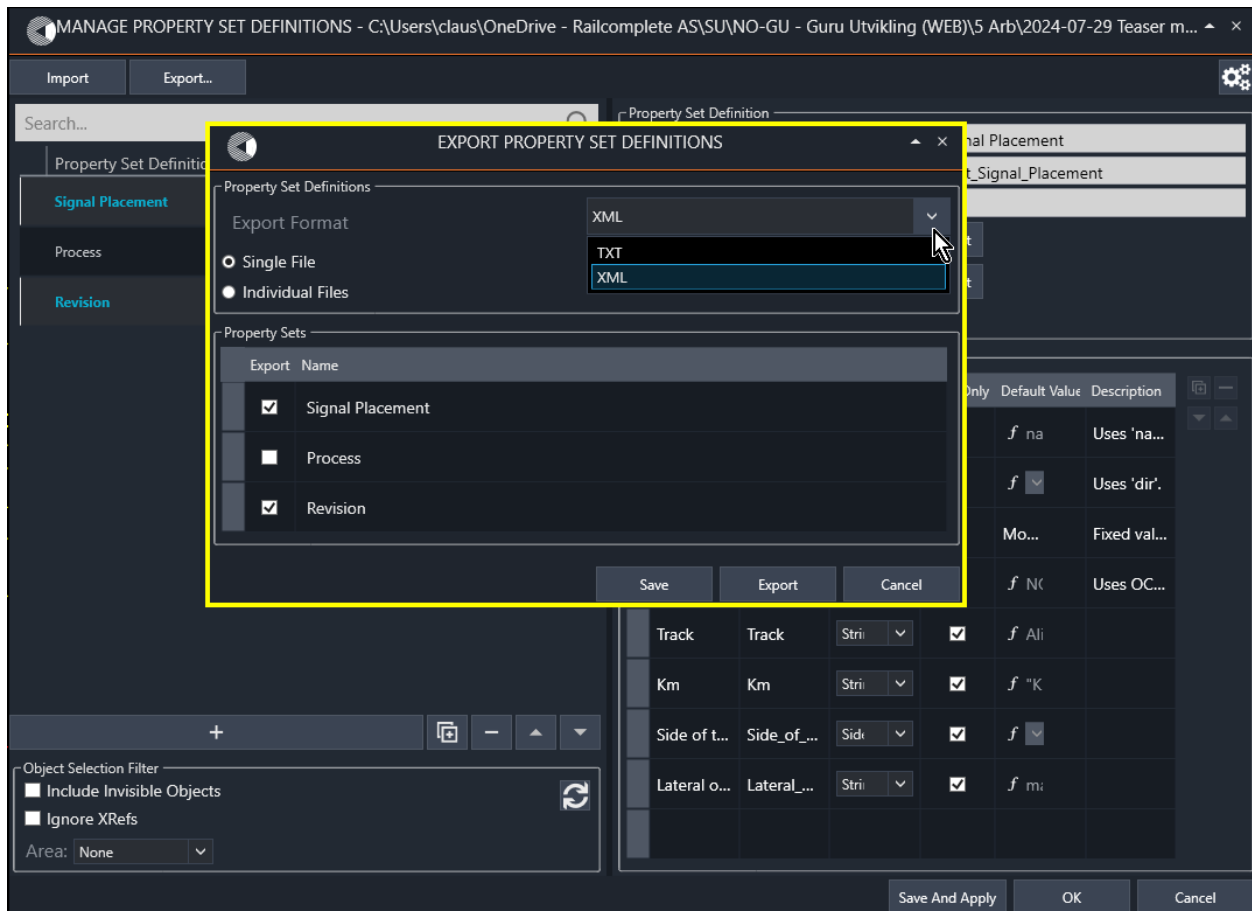
**Figure 15** Table example displaying Pset values

## Exporting and Importing RailCOMPLETE property set definitions

### XML format

Property sets may be exported, one by one or several together, to a loss-less XML file format, proprietary to RailCOMPLETE. The lists of applicable RC object types are also stored, so you do not have to re-think the applicability lists after importing those property set.

Upon export, pick from the list of available property set definitions which ones you want to export. Select either 'Single file' to bundle your selection into one XML file or select 'Individual files' to produce one XML file per property set definition. In the latter case, the file names are the same as the property set's names.



**Figure 16** Exporting Pset definitions to the lossless XML format

Upon import from an XML file, you can pick which property sets to import, in case you do not need them all.

Need to share your property set definitions with your colleagues? Either store the property set definitions as a DWG file (remember to check "Enable Xref Inheritance"), or store as XML – then distribute that file, or its location, to everyone concerned.

## TXT format

Property set definitions may be exported to a simple TXT file format, one file per property set definition. The property set's name is the same as the file name upon export/import. This simple format is also in use by other software products than RailCOMPLETE.

The properties' names, their data types (text or enumeration) and their default values are exported. Each property can be tagged as Read Only or not.

However, Lua automation code, descriptions and the list of applicable RC objects will not be exported to TXT files.

```
# Text file (.TXT) format and examples for Pset property definitions.
# =====
# Empty lines and comments starting with the sharp '#' character are ignored.
# Keywords are case sensitive. Non-printable characters (spaces, tabs etc) are allowed.
#
# Text property:           Text[_RO];<Property name>[;<Value>]
# Enumeration property:   Dropdown[_RO];<Property name>;<Value>[;<Value>]*
#
#   Add '_RO' to the data type to make it readonly.
#   <Property name> is a text string.
#   <Value> is a text string. The empty string is allowed. The first value is default.
#   [X] denotes an optional item X. [X]* denotes zero or more occurrences of item X.
#
# =====

# Text property with no default value (i.e., an empty string):
Text;Customer address 1

# Readonly text property with non-empty default value:
Text_RO;Issue date;2024-07-22

# Enumeration property (dropdown list) with an empty string as default value:
Dropdown;Discipline;;Track;Electrification;Signalling;Telecomms;Low power

# =====
```

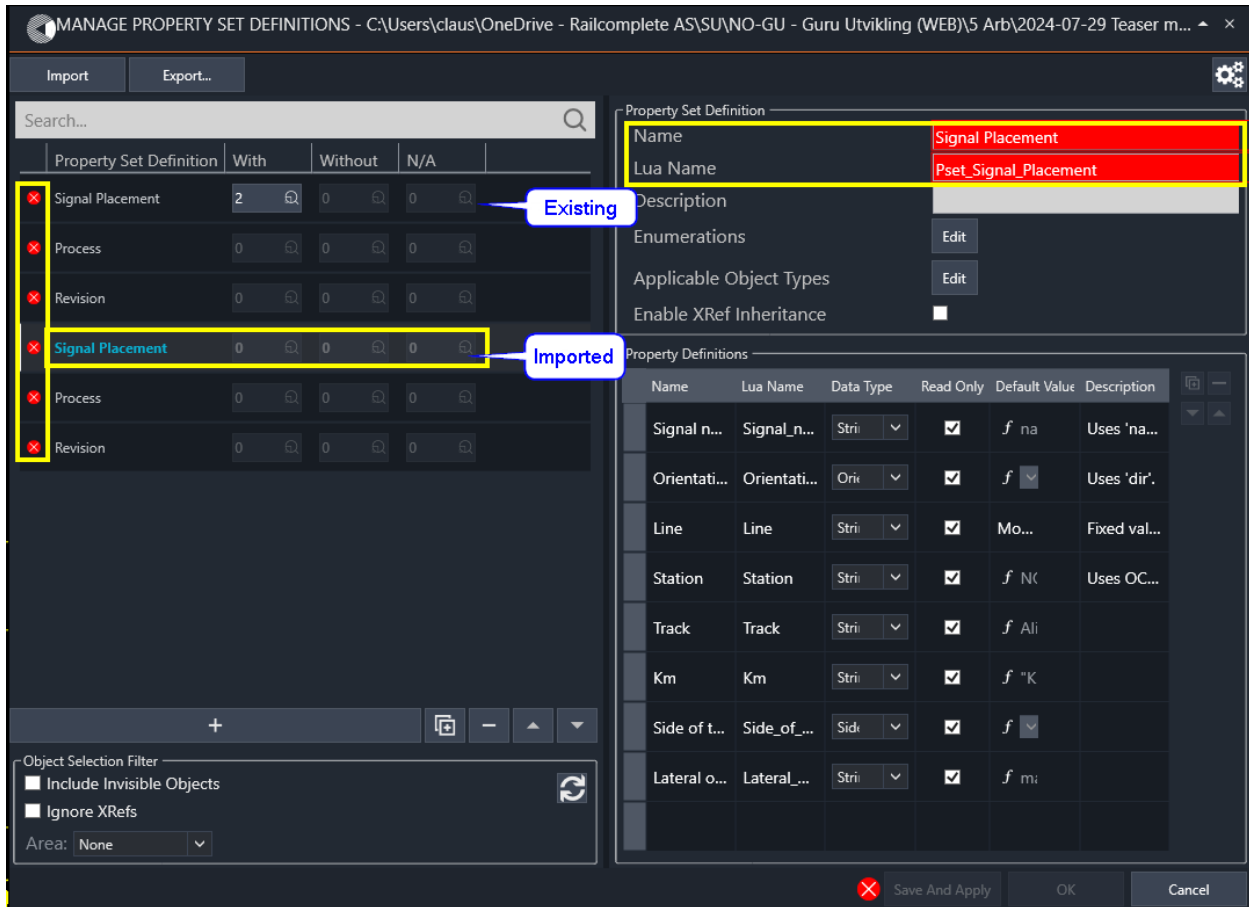
**Figure 17**      **TXT format for Pset defintions**

## Updating existing property set definitions and their affected objects

Updating an existing property set definition is a functionality that may become available in future RailCOMPLETE versions.

Meanwhile, a little manual work is needed.

If you import a property set definition when there is already an existing definition occupying the same name, then both will be flagged in red as erroneous. The values that are already assigned to the existing property set instances in your RC objects will not be affected.



**Figure 18 Reimporting already existing Pset definitions**

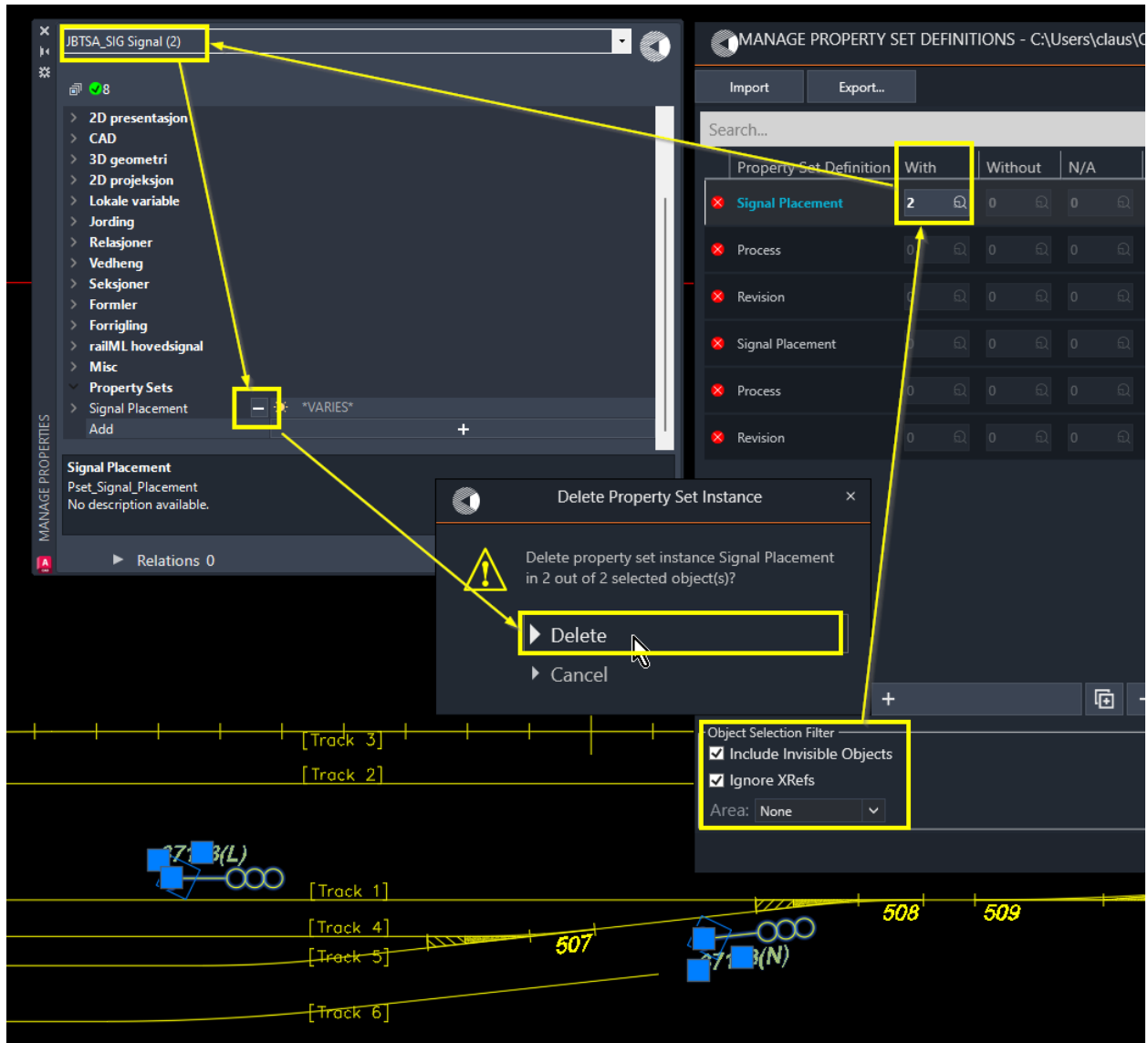
To proceed from here, you would need to inspect the two clashing property set definitions and carefully copy the new property names, enumerations, default values and automation formulas to update the old definition. After copying the contents, delete the newly imported definition. By checking the “Read Only” checkboxes and clicking “Save and Apply”, your existing RC objects’ properties will be updated according to their revised automation formulas. Properties that are not tagged as Read Only will not lead to changes in the RC objects’ corresponding existing property values.

Note that all flagged errors must be resolved before you can save and apply the revised property set definitions to your drawing. Delete the unused property set definitions that you do not need any longer, or change their property set names.

Once you have resolved all errors and clicked the Save and Apply button, the revised property set definitions will be applied to all existing RC objects referencing the property set definition, provided that the concerned properties have been tagged as Read Only in the property set definition.

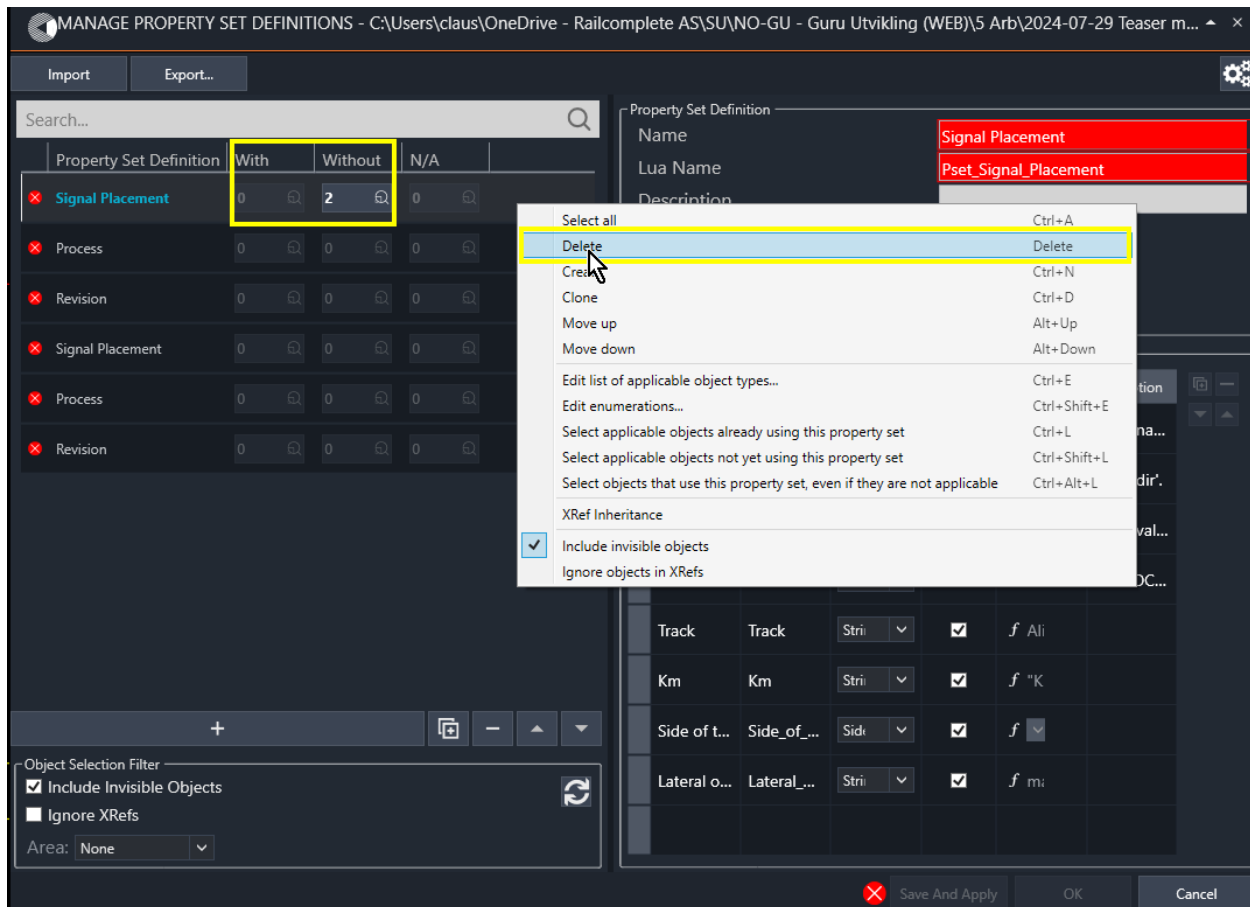
## Alternative solution for updating RC objects' property sets

Alternatively, you may entirely scrap the data in your existing RC objects' property set instances. Use the Property Set Definition Manager's browser to select all visible and invisible objects in your current document, then use RC's Property Manager to delete the property set instances – press the minus '-' symbol next to the property set's name in the "Property Set" category.



**Figure 19** Deleting instances of a property set from RC objects

After successfully removing all existing instances of the old property set, you may proceed to delete its definition.



**Figure 20 Deleting an unused property set definition**

After having deleted the old property set definition, the newly imported ‘Signal Placement’ property set definition from our example is no longer tagged as erroneous, and you can assign it to the applicable objects that used to have that property set. See further up in this article on how to add property sets to RC objects.

## Lua Name prefix

Lua names are the identifiers used in Lua programming to access the content of a property set. Lua identifiers are not allowed to contain special characters such as commas and periods and they are not allowed to start with a digit. Nevertheless, your customer might require your property set to have a certain name such as “10.23: Installation”. The Property Set Definitions Manager will automatically convert the Name “10.23: Installation” into the suggested Lua Name “10\_23\_\_Installation”, where illegal characters have been replaced by the underscore ‘\_’ character. However, that name will be flashed in red because it starts with a digit. You may then manually add an underscore or any other legal character as a prefix, to produce a valid Lua name: “\_10\_23\_\_Installation”.

To ease this process, and to standardize across multiple users, your company might decide to require everyone to use a prefix such as “Pset\_”. Such a prefix makes your property sets and their properties very recognizable in RailCOMPLETE’s Object Manager as well as in Lua formulas and scripts.



Click the Settings icon in the top right corner of the Property Set Definitions Manager window, or use the RC-Settings command and go to the tab for settings stored in your drawing (the current document). Enter a valid Lua identifier as the Property Set Default Lua Name Prefix.

The effect is that newly imported property set definitions, or the property set names that you enter manually, will be translated into Lua Names starting with the given prefix.

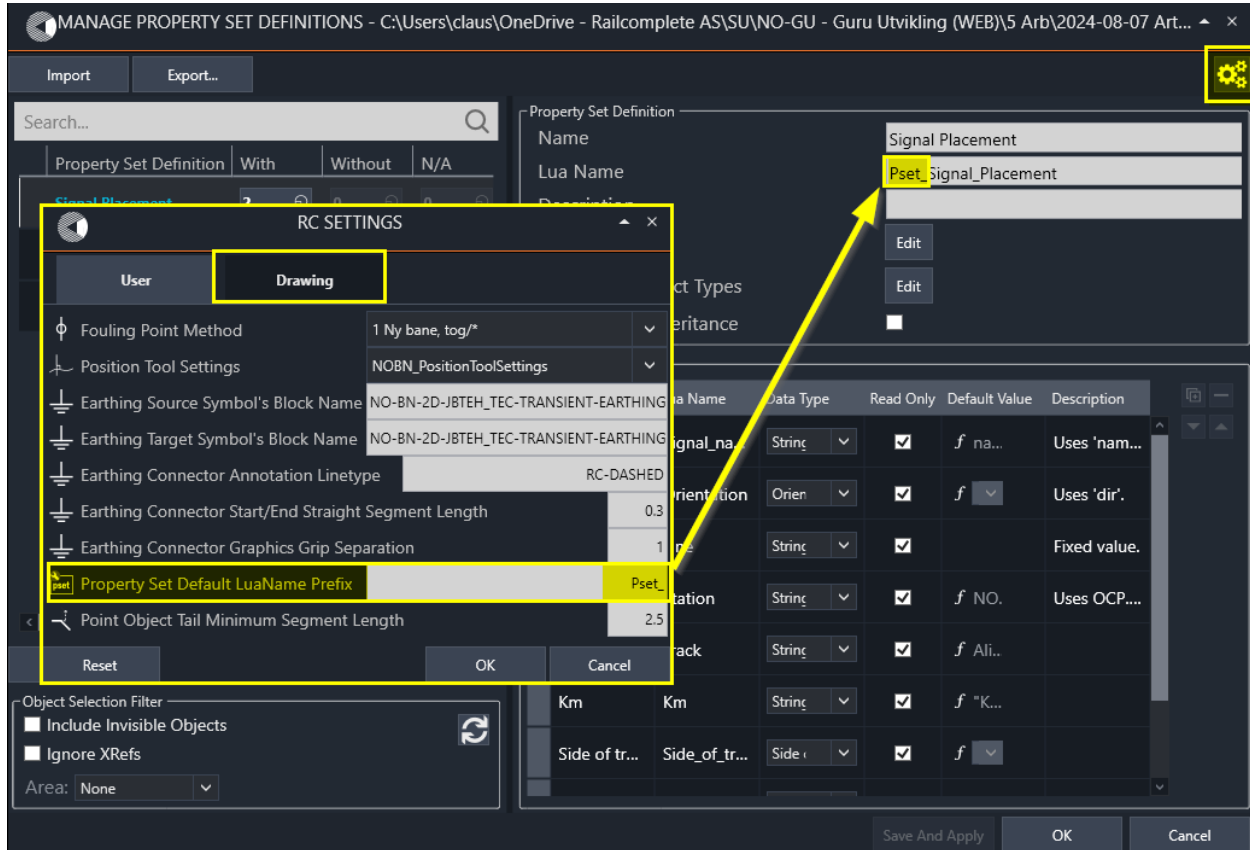


Figure 21 Using RC-Settings to define a standard Lua Name prefix