

DigiPara® Liftdesigner
Creating a steel shaft

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Glossary

 - paragraph with instructions for operations or data that needs to be entered

 - paragraph containing important information and warnings

1. Introduction

This document explains how to create a steel shaft in DigiPara Liftdesigner by using **Additional Child Objects (ACO)**.

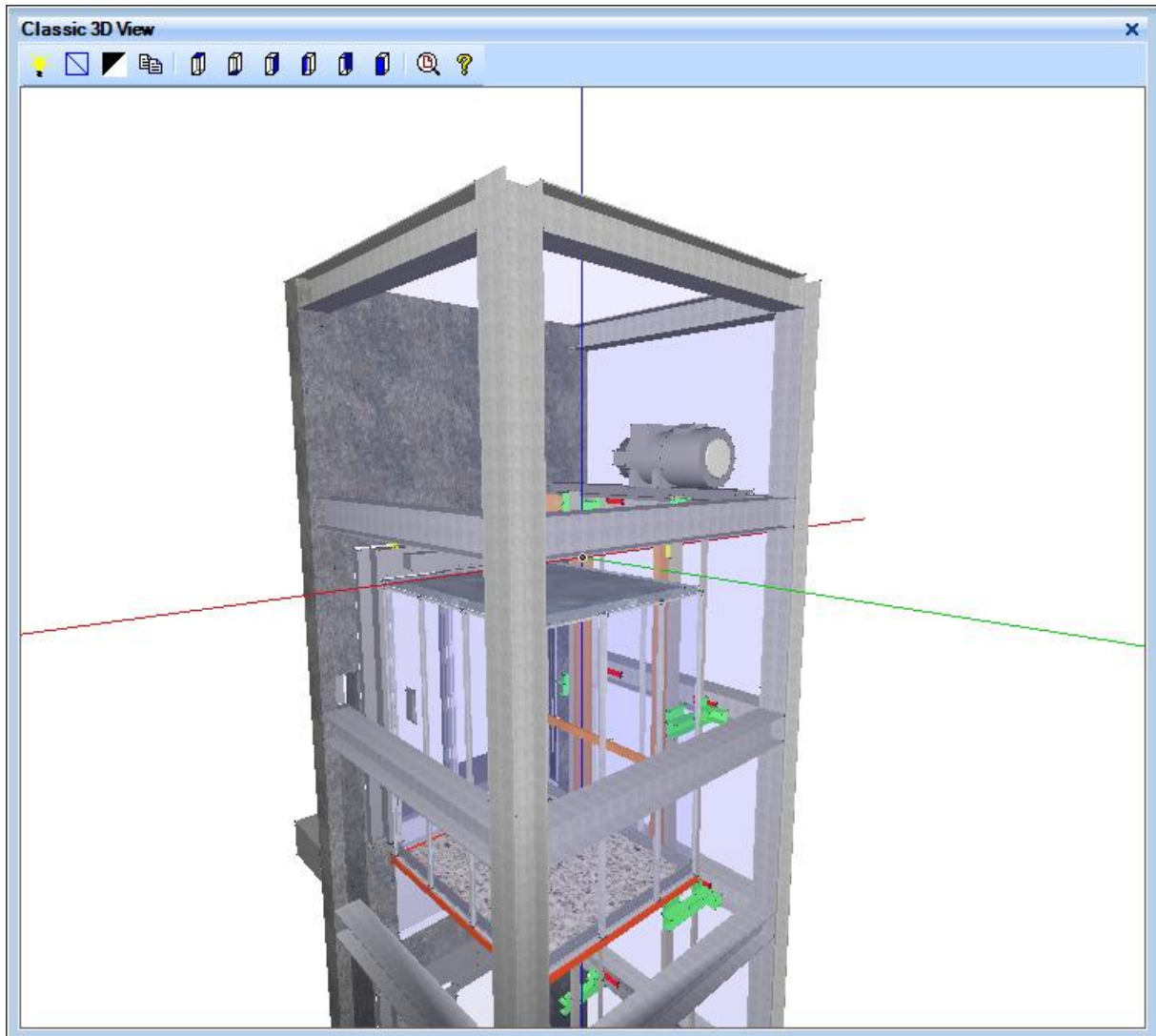
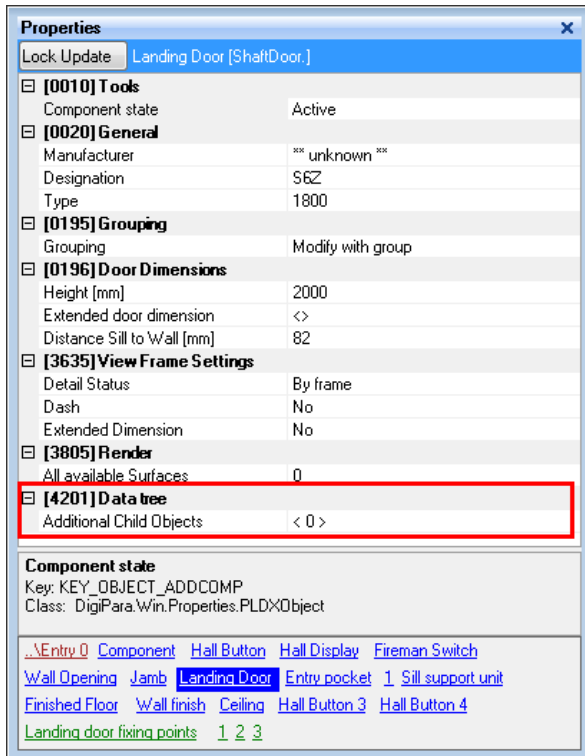


Image: Simple Steel Shaft Example

2. Additional Child Objects (ACO)

Additional Child Objects (ACO) can be added to every shaft component via the corresponding **Additional Child Objects** property. The image below shows the ACO property for a landing door component.

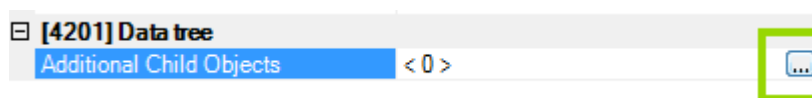


In the following document the term **ACO** will be used as a shortcut for the **Additional Child Objects** expression.

- ☞ ACO's are always inserted at the basis point of the parent component. ACO's can also be combined, since the corresponding **Additional Child Object** property is also available for ACO's.
- ☞ Additional Child Objects are always created on a Liftdesigner project basis. They cannot be stored separately.

2.1 Adding a new ACO

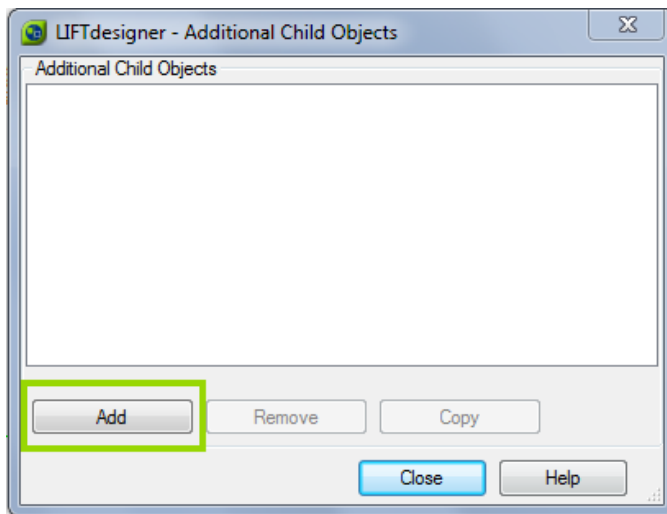
To add an ACO click on the  Button in the Additional Child Objects property.



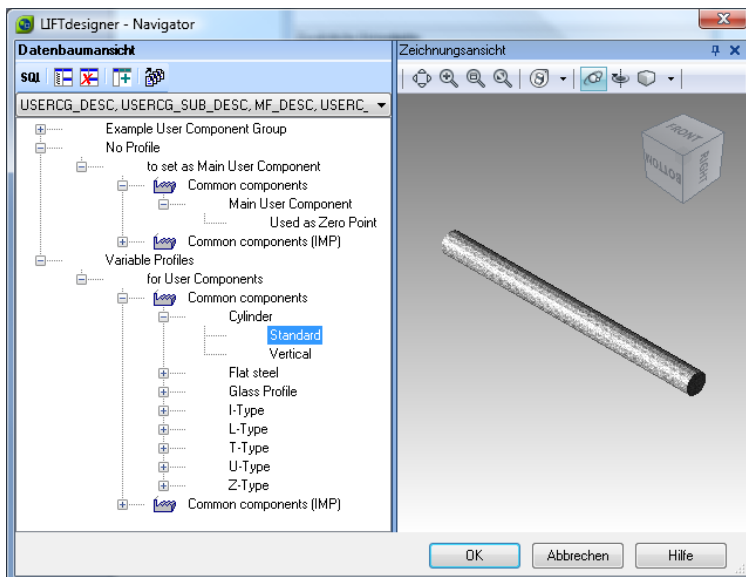
A new dialog window appears with the following dialog options:

- Adding ACO's
- Removing existing ACO's
- Copying existing ACO's

Click "Add".



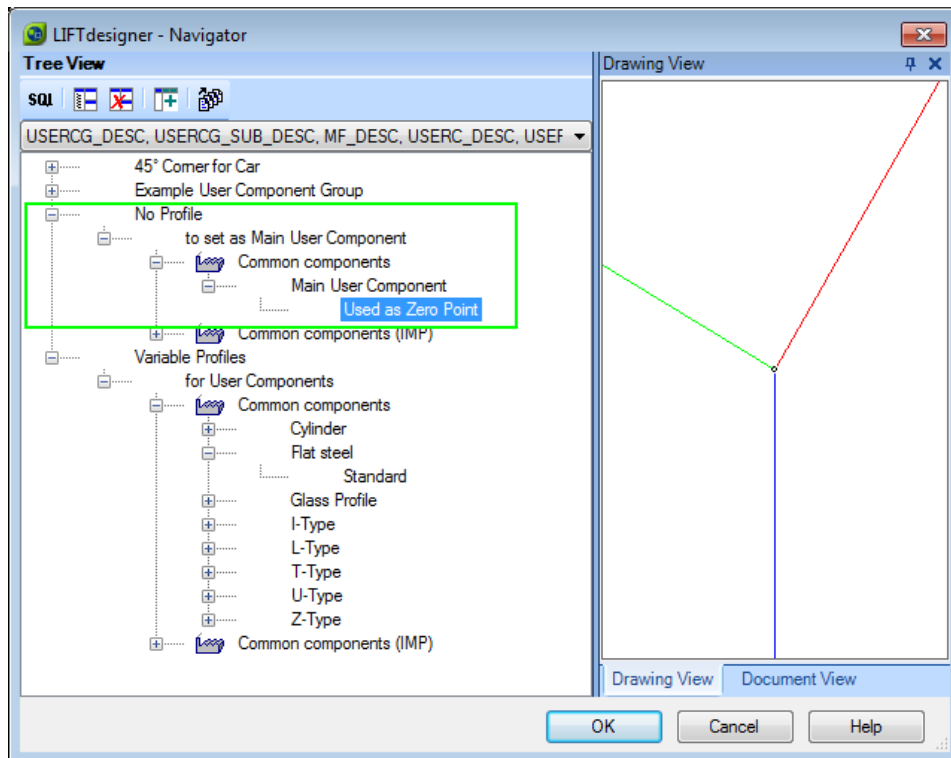
A new ACO can now be selected via the **Navigator** dialog window.



There are two ACO types available:

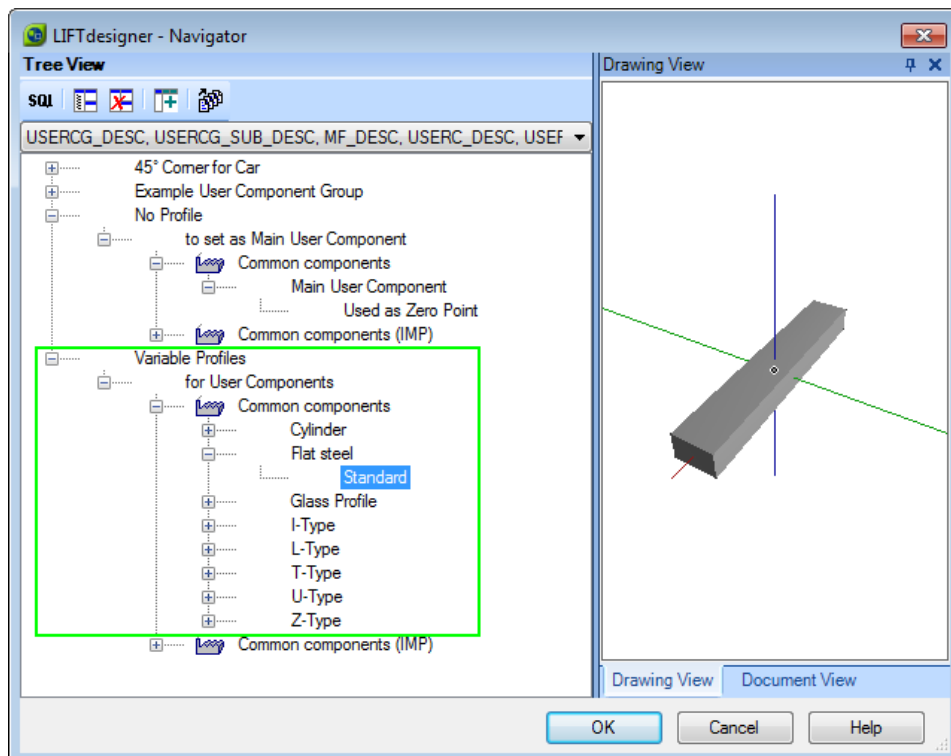
1. No Profile - Main User Component

Creates a basis point without any additional geometry.



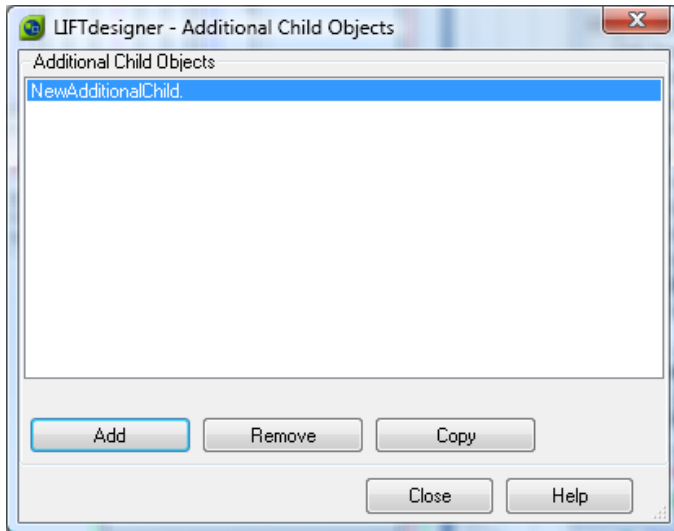
2. Variable Profiles

Creates any of the available profile types.

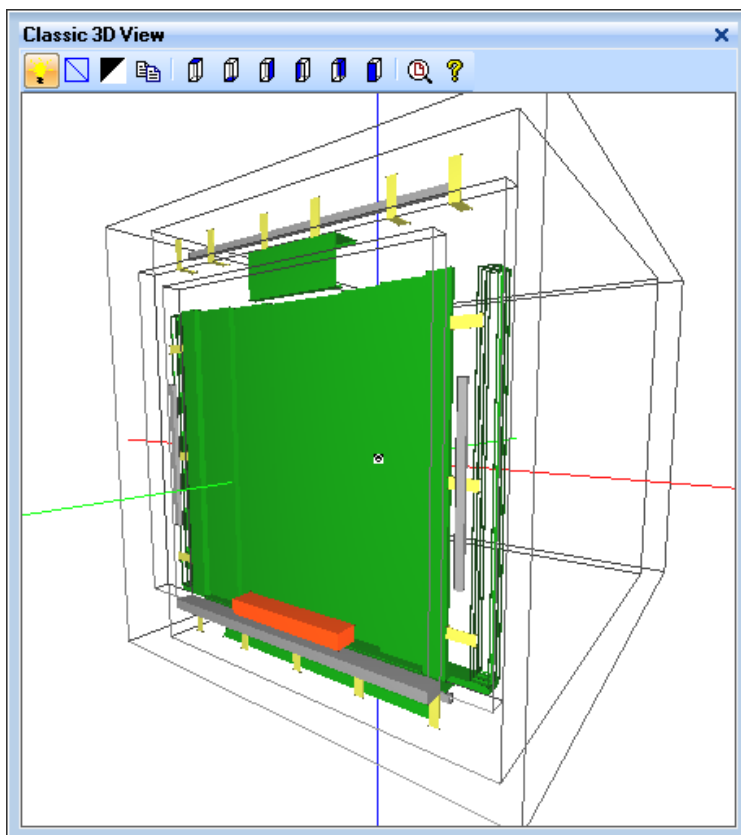


 The two ACO types are explained more into detail in chapter 4.

After a profile has been selected via the **Navigator** dialog, a corresponding item will be shown in the **Additional Child Objects** dialog. The dialog can be closed via the **Close** button.



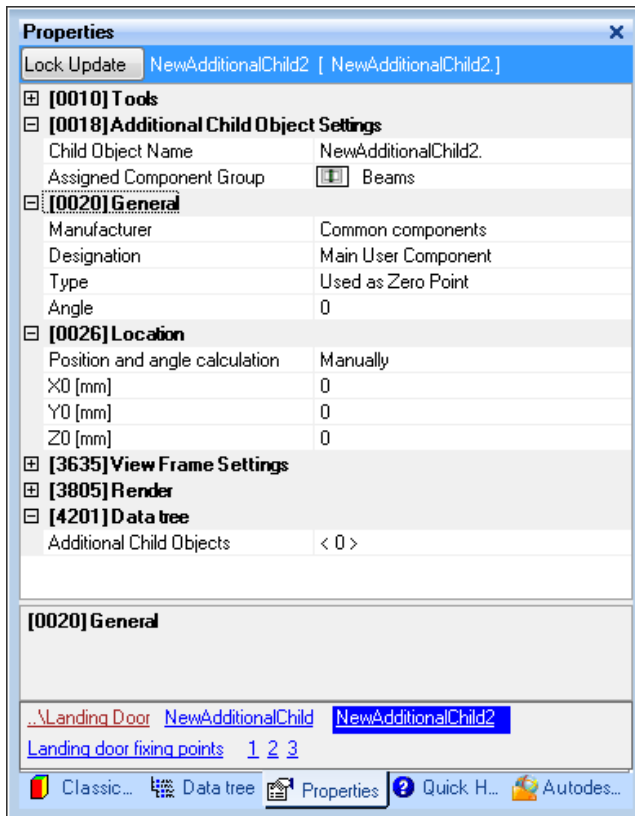
The image below shows a landing door with an added ACO profile (in red) for example:



2.2 ACO Properties

The properties for the new created ACO will be shown in the **Properties** docking window after the **Additional Child Objects** dialog has been closed.

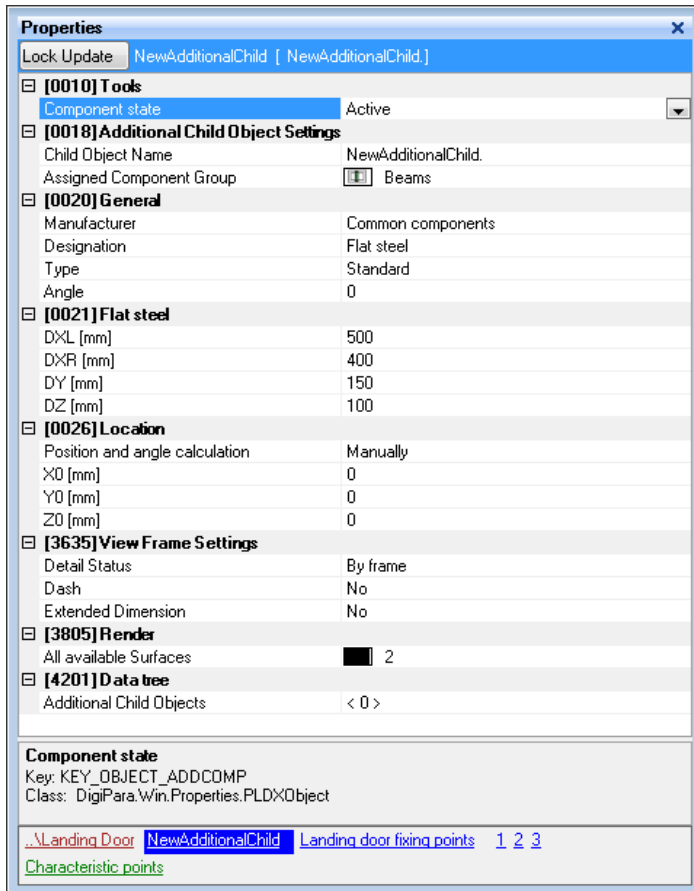
2.2.1 No Profile - Main User Component



Properties:

Child Object Name	Specifies the name of the ACO in the Data-Structure. The value of this property can be changed.
Assigned Component Group	Provides the option to assign the ACO to a specific elevator component group. The ACO can also be switched on & off via the corresponding Components toolbar item.
Angle	Specifies the ACO angle. The value of this property can be changed.
Location X0, Y0, Z0	Specifies the location of the ACO Main User Component in relation to the basis point of the parent component. The values of these properties can be changed.

2.2.2 Variable Profiles



Properties:

Child Object Name	Specifies the name of the ACO in the Data-Structure. The value of this property can be changed
Assigned Component Group	Provides the option to assign the ACO to a specific elevator component group. The ACO can also be switched on & off via the corresponding Components toolbar item.
Angle	Specifies the ACO angle. The value of this property can be changed.
Location X0, Y0, Z0	Specifies the location of the ACO Variable Profile in relation to the basis point of the parent component. The values of these properties can be changed.
Profile Type Properties (Flat Steel) DXL, DXR, DY, DZ, ...	Specifies the size of the ACO Variable Profile. The displayed properties vary depending on the selected ACO profile type. The values of these properties can be changed.

3. Steel shaft preparation: removing the shaft walls

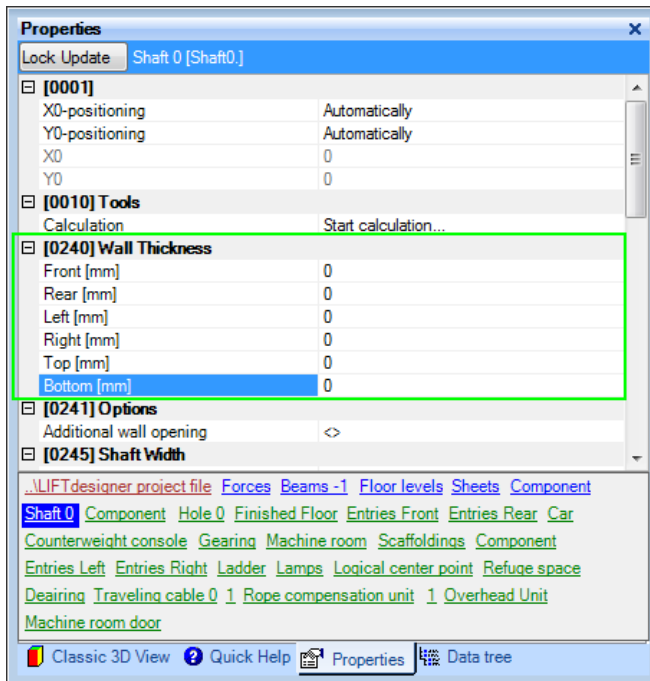
Before setting up the steel shaft using ACO's, the existing concrete shaft walls need to be removed from the project first. There are two different ways to remove the shaft walls:

- via the "Wall Thickness" properties
- via an "Additional Wall Opening"

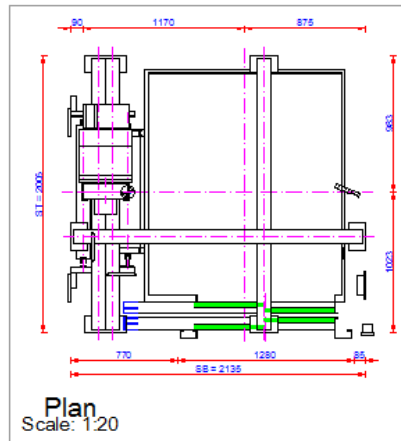
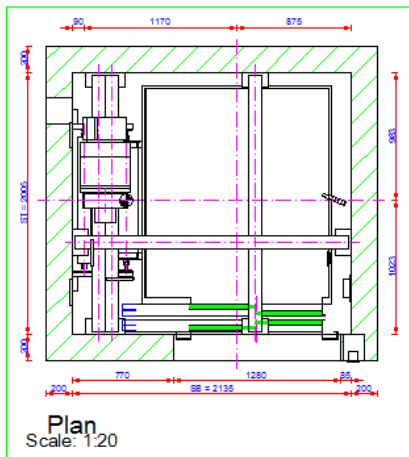
3.1 Removing the shaft walls via the "Wall Thickness" properties

If the complete concrete shaft shall be replaced with a steel shaft, the easiest way to remove the shaft walls is to set the corresponding **Wall Thickness** shaft properties to 0.

Adapting the shaft **Wall Thickness** properties:



Elevator model before and after adapting the shaft wall thicknesses:



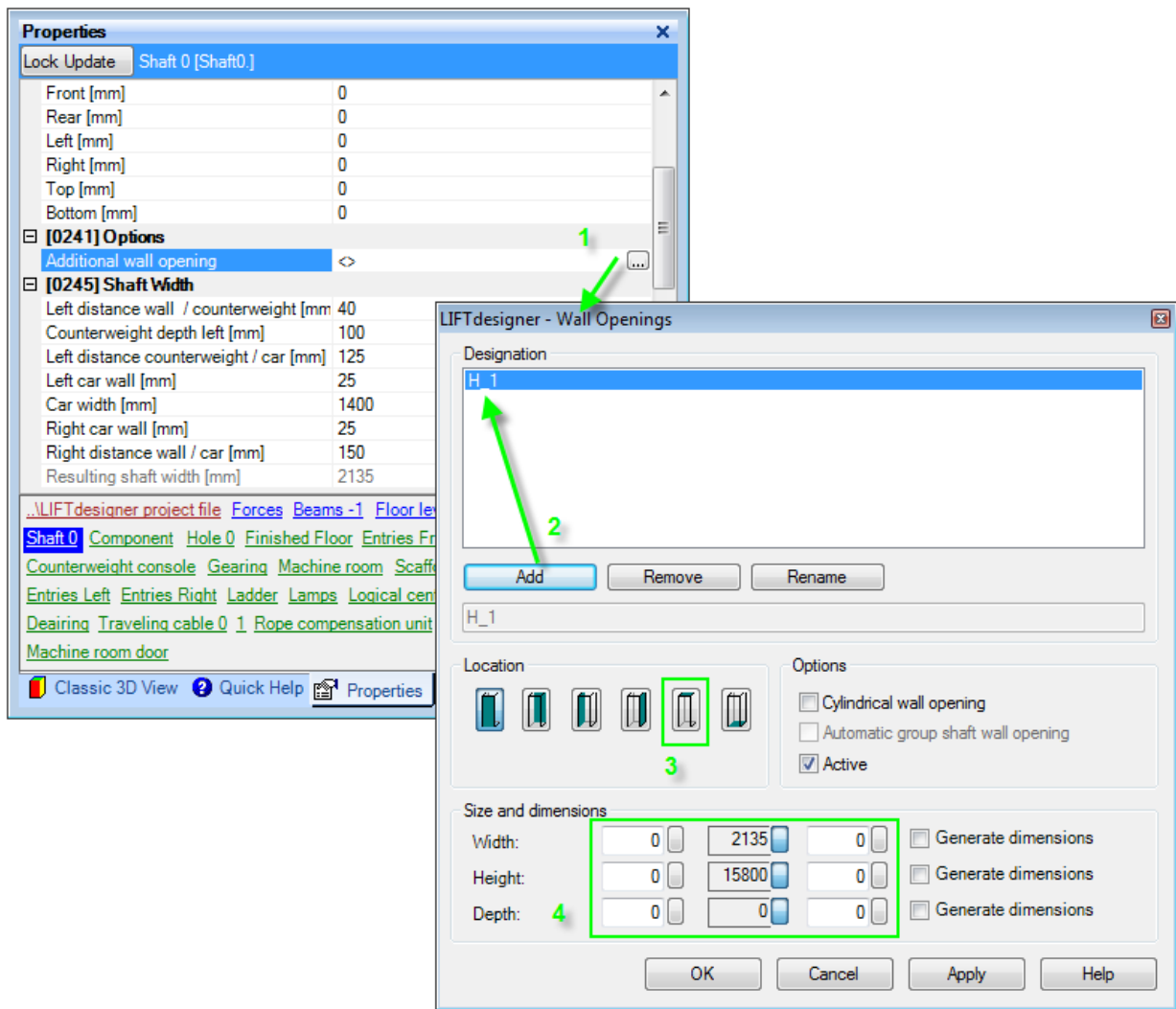
3.2 Removing the shaft walls via an “Additional Wall Opening”

If you need to keep a part of the shaft like the pit for example, removing the walls via the shaft **Wall Thickness** properties doesn't make sense.

For this reason, the shaft concrete area needs to be cut using an **Additional Wall Opening**, which can be created via the shaft properties.


Creating an **Additional Wall Opening** via the corresponding shaft property:


Steel shaft preparation: removing the shaft walls

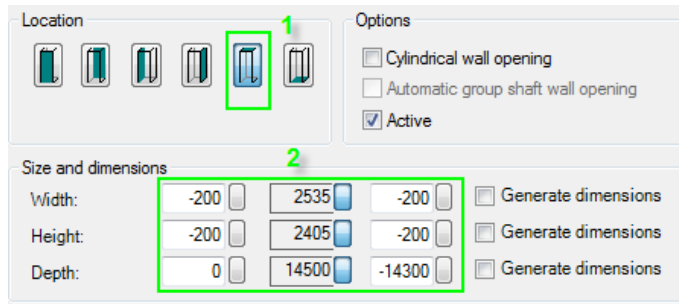


Additional main shaft wall opening creation steps:

1. Opening the **Additional Wall Opening** dialog via the corresponding shaft property
2. Creating a new wall opening
3. Specifying the wall opening location (shaft wall)
4. Specifying the wall opening size

 In this steel shaft example we will apply a shaft wall opening to the shaft (**Project: Zetatop_mrl_1_1_top_traction.Id3**) which will only keep the shaft pit.

 Start DigiPara LIFTdesigner and open the **Zetatop_mrl_1_1_top_traction.Id3** example project and add an **Additional Wall Opening** with the following characteristics to the shaft:

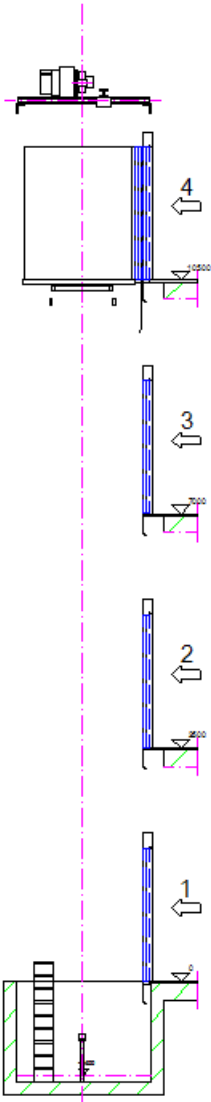



Main dialog items description:

Location	In this example, the wall opening will be created from the shaft ceiling.
Size and Dimensions	<p>Width: locked value in the center column is the resulting wall opening width</p> <p>Height: locked value in the center column is the resulting wall opening depth</p> <p>Depth: locked value in the center column is the resulting wall opening height</p>

Steel shaft preparation: removing the shaft walls

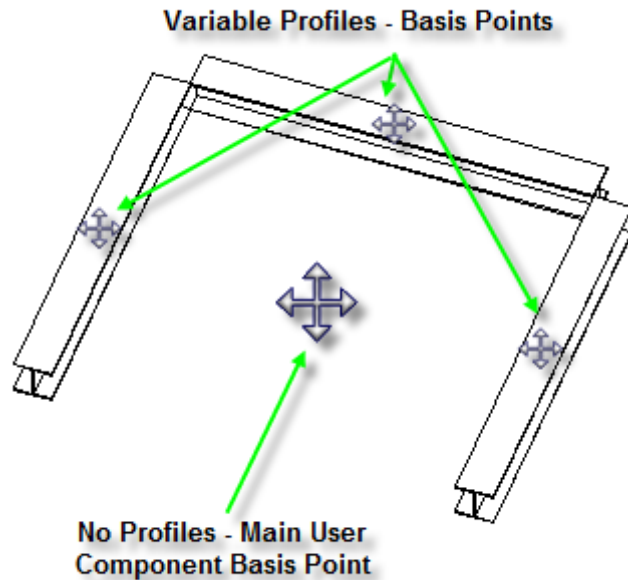
Shaft cut via an additional wall opening:



 When the wall opening looks like the example above, please save the project under a new name e.g. **Zetatop_mrl_1_1_top_traction_SteelShaft.Id3**

4. Steel Shaft Preparation: specifying the steel shaft component structure

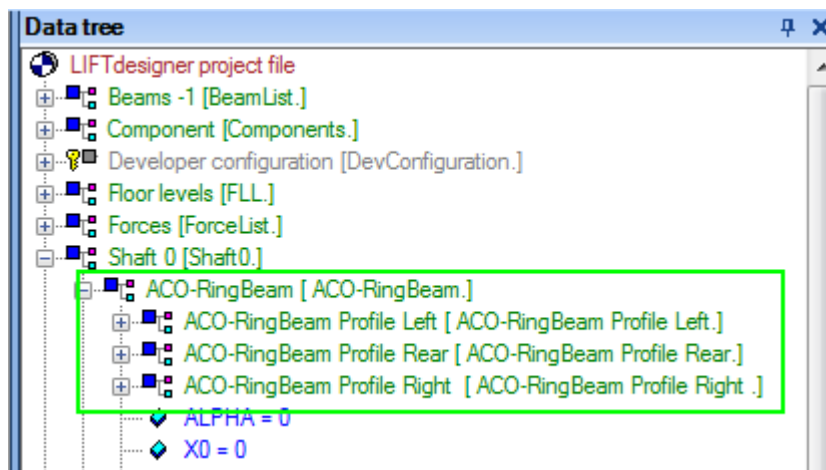
Before specifying the steel shaft structure, we will take a closer look at the two different ACO types showing a simple example of a user defined beam assembly.



ACO structure for the example above :

ACO Item	Parent Liftdesigner Object	ACO Type
ACO-RingBeam	Shaft	No Profile - Main User Component
ACO-RingBeam Profile Left	ACO-RingBeam	Variable Profile - I-Type Horizontal
ACO-RingBeam Profile Right	ACO-RingBeam	Variable Profile - I-Type Horizontal
ACO-RingBeam Profile Rear	ACO-RingBeam	Variable Profile - I-Type Horizontal

The structure for the above ACO-Assembly in the Liftdesigner **Data tree** could look as follows:



The complete assembly, consists of the 3 single beam profiles, can be moved via the Location properties of the **No Profile- Main User Component** (ACO-RingBeam).

4.1 No Profile - Main User Component

A No Profile - Main User Component doesn't show any geometry, it only provides a basis point. It is recommended to use this kind of ACO's as a parent item for user defined assemblies, which consist of multiple, geometrical interdependent ACO Variable Profiles.

The assembly, including all ACO profiles, can e.g. be moved via the Main User Component basis point.

 Without using a parent Main User Component, all ACO profiles belonging to an assembly would need to be moved separately, via the single profile basis points, if needed.

4.2 Variable Profiles

A variable profile can be any of the predefined profile types (L-Type, I-Type, Flat Steel, glass profile, etc.) provided in the **Navigator** dialog.

Similar to the **No Profile** ACO's, the Variable Profile ACO's do have a basis point as well, which is always in the center of the geometry.

4.3 Steel Shaft Structure

The structure of the user defined steel shaft will look as shown below:

ACO Item	Parent Liftdesigner Object	ACO Type
ACO-SteelShaft1	Shaft	No Profile - Main User Component

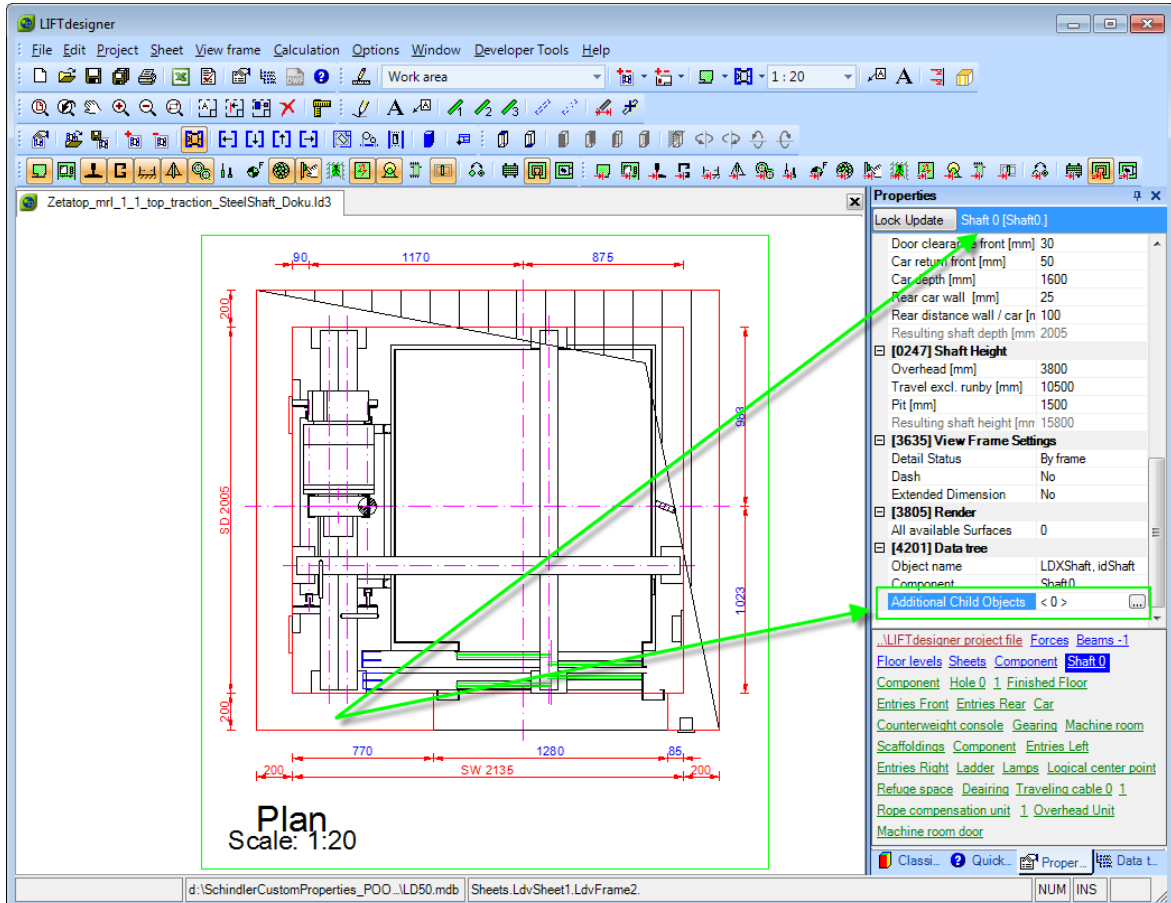
ACO_VerticalBeam_FrontLeft	ACO_SteelShaft1	Variable Profile - I-Type Vertical
ACO_VerticalBeam_FrontRight	ACO_SteelShaft1	Variable Profile - I-Type Vertical
ACO_VerticalBeam_RearLeft	ACO_SteelShaft1	Variable Profile - I-Type Vertical
ACO_VerticalBeam_RearRight	ACO_SteelShaft1	Variable Profile - I-Type Vertical
ACO_RingBeam1 – n	ACO_SteelShaft1	No Profile - Main User Component
ACO_RingBeamProfile_Left	ACO_RingBeam1	Variable Profile - I-Type Vertical
ACO_RingBeamProfile_Right	ACO_RingBeam1	Variable Profile - I-Type Vertical
ACO_RingBeamProfile_Front	ACO_RingBeam1	Variable Profile - I-Type Vertical
ACO_RingBeamProfile_Rear	ACO_RingBeam1	Variable Profile - I-Type Vertical
ACO_RingBeam2	ACO_SteelShaft1	No Profile - Main User Component
ACO_RingBeamProfile_Left	ACO_RingBeam2	Variable Profile - I-Type Vertical
ACO_RingBeamProfile_Right	ACO_RingBeam2	Variable Profile - I-Type Vertical
ACO_RingBeamProfile_Front	ACO_RingBeam2	Variable Profile - I-Type Vertical
ACO_RingBeamProfile_Rear	ACO_RingBeam2	Variable Profile - I-Type Vertical
ACO_RingBeam3	ACO_SteelShaft1	No Profile - Main User Component
...

ACO_RingBeam Information:

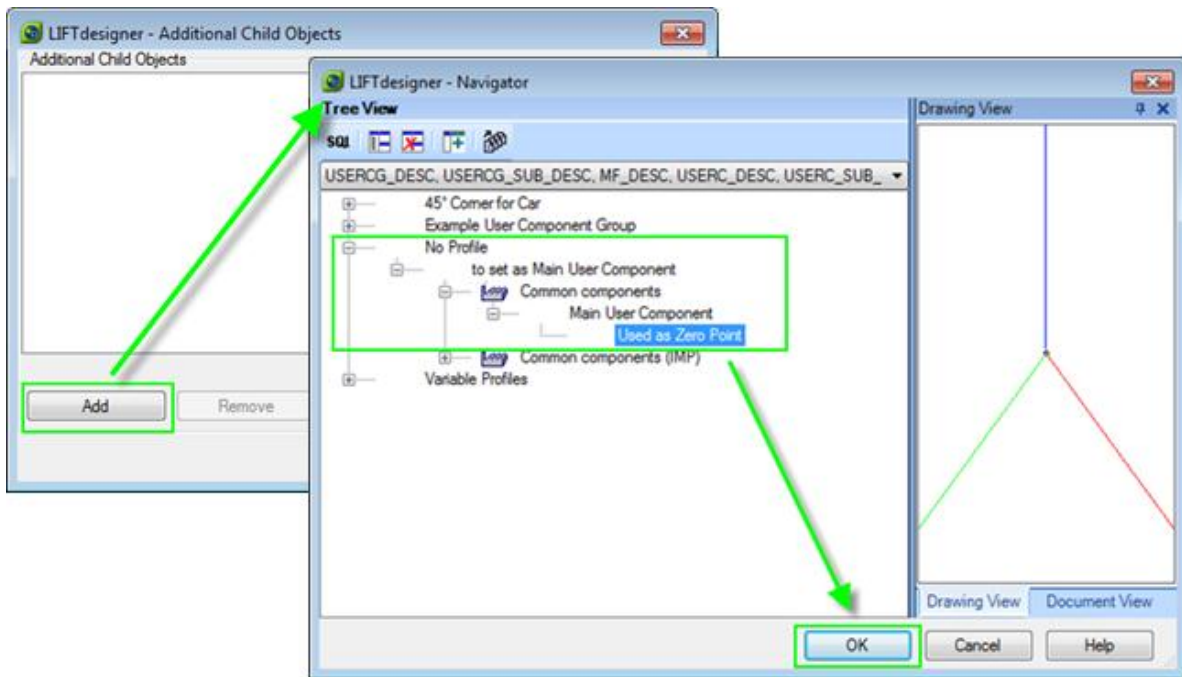
The **ACO_RingBeam No Profile - Main User Component**, inclusive the corresponding child profiles only needs to manually be created once, as it will be copied as often as it is needed afterwards.

5. Creating a steel shaft via ACO's

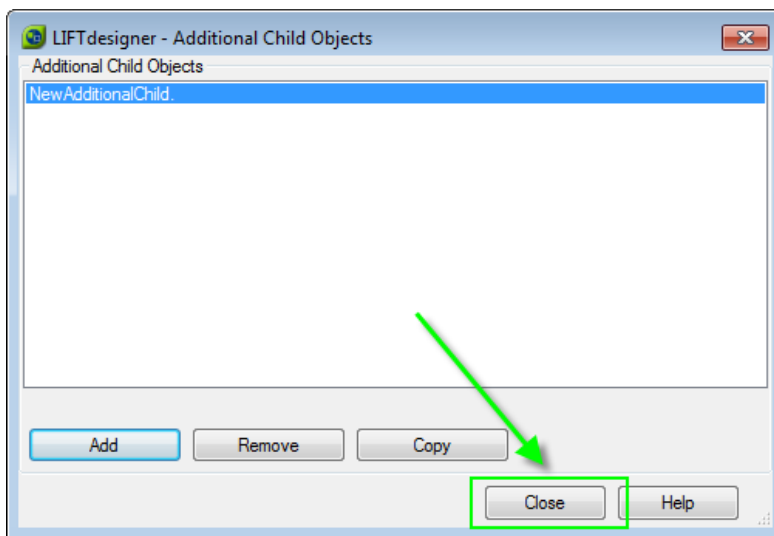
Start DigiPara Liftdesigner and open the previously modified and saved **Zetatop_mrl_1_1_top_traction_SteelShaft.Id3** project. Select the shaft in one of the DigiPara Liftdesigner views and add a new **Additional Child Object** via the corresponding property to it.



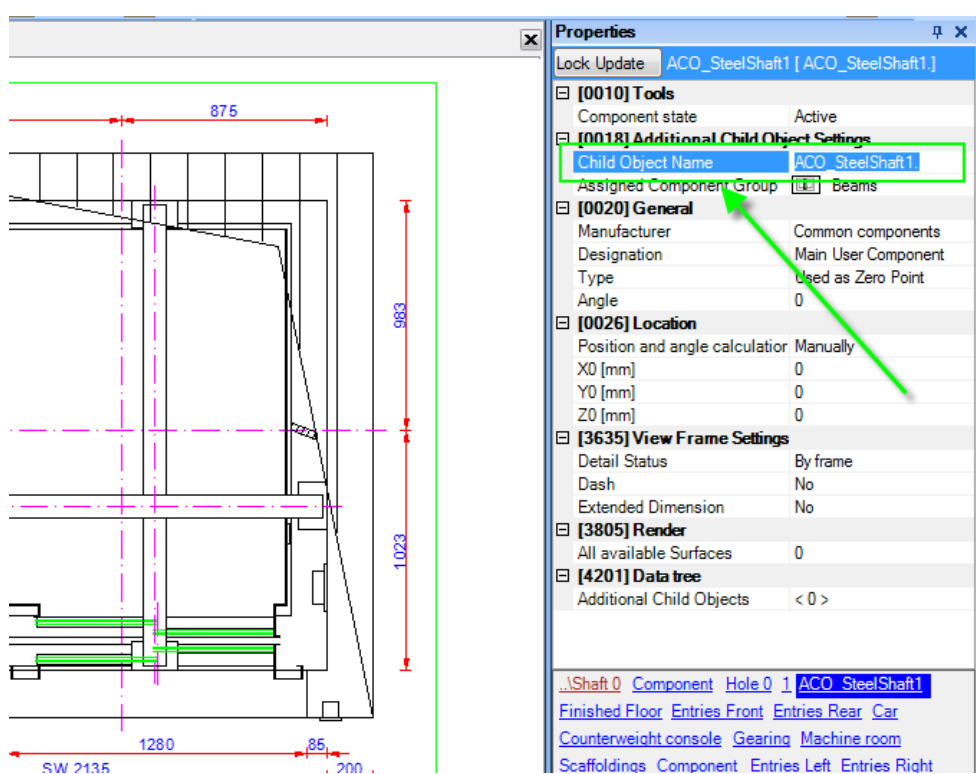
In the appearing **Additional Childs Objects** dialog, click on the **Add** button to show the **Navigator** dialog. Select the **No Profile - Main User Component** object. Click on the **OK** button to confirm your selection and to close the **Navigator** dialog.



Confirm the settings in the ACO dialog by clicking on the **Close** button.



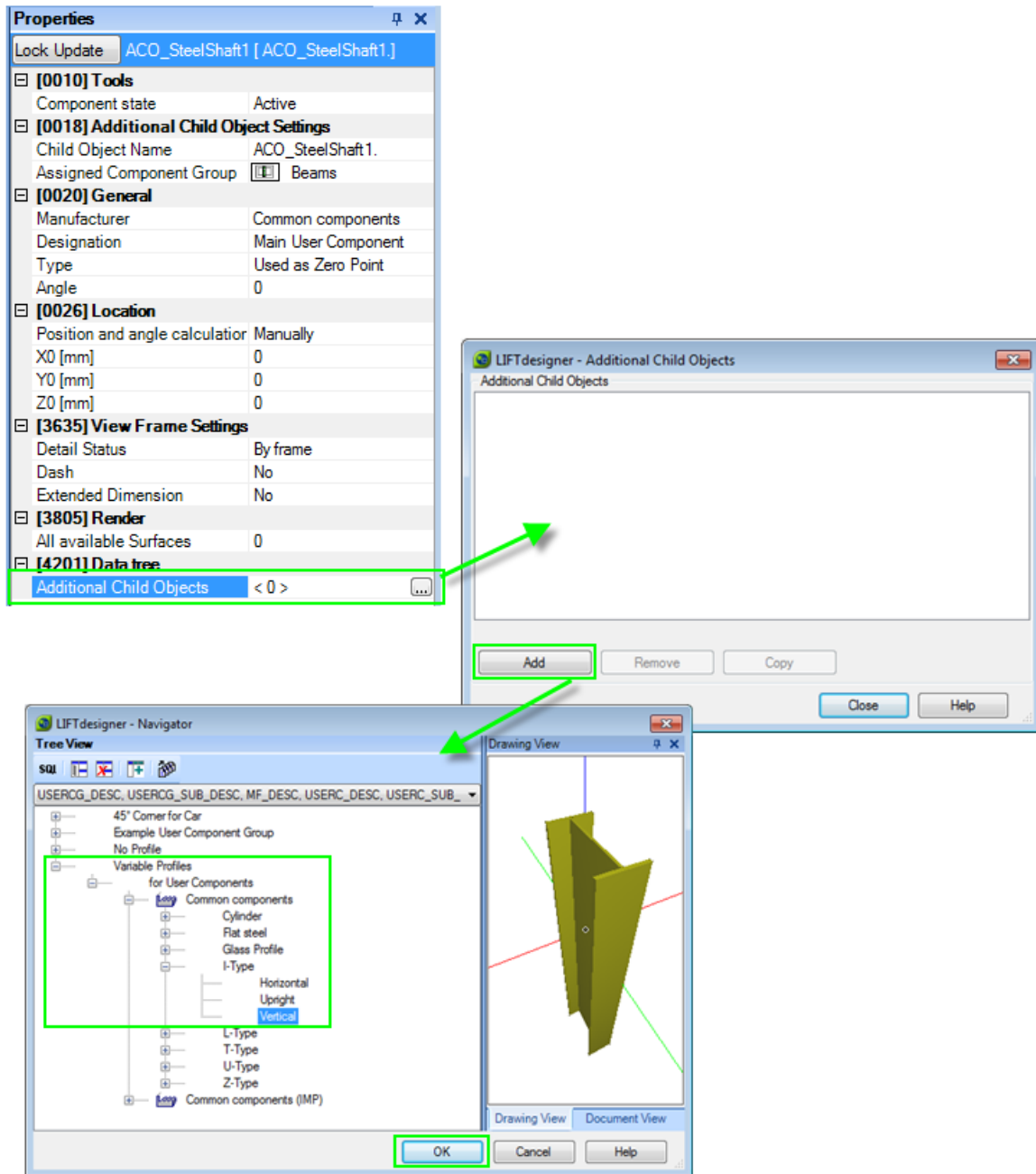
Now change the name of the new added ACO to **ACO_SteelShaft1** via the **Properties** docking window.



5.1 Steel Shaft ACO_ VerticalBeams

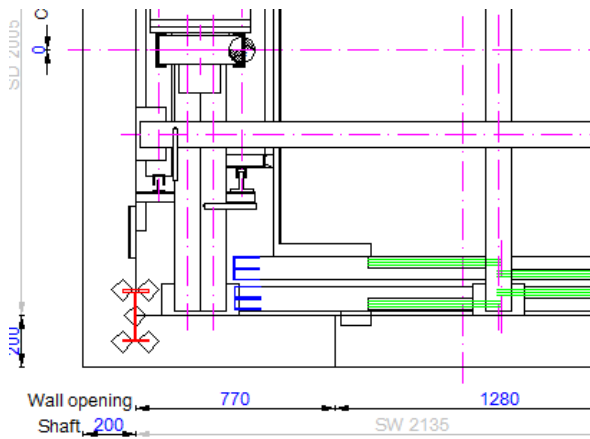
In this step, we will add the first one of the 4 vertical steel shaft beams to the new **ACO_SteelShaft1**.

Please make sure that the **ACO_SteelShaft1** object has been selected and create a new ACO via the corresponding **Additional Child Objects** property.



After the ACO variable profile has been added you can see it in the drawing e.g. in the plan view. It will be located in the lower left shaft corner, since this is the basis point of the parent **ACO_SteelShaft1** object.

Creating a steel shaft via ACO's



- 📄 Rename the ACO profile and change the location and size according to the settings shown below.

Properties

Lock Update ACO_VericalBeam_FrontLeft [ACO_VericalBea...

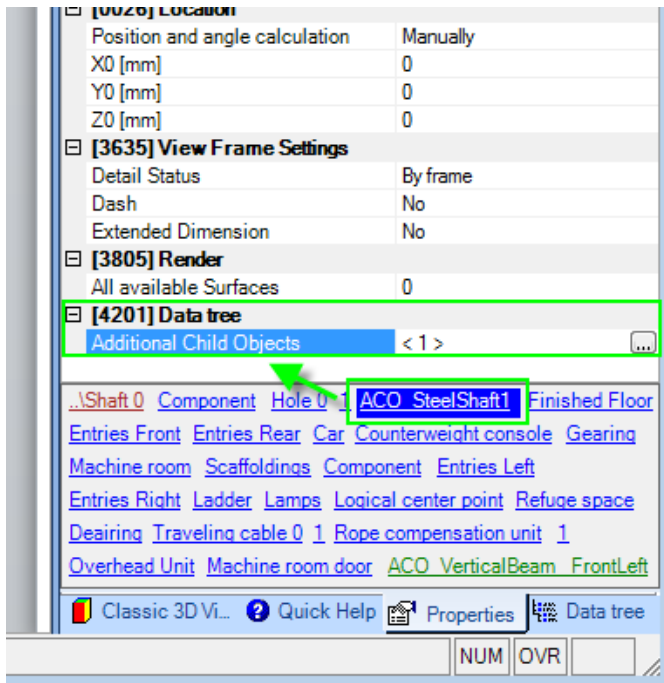
- [0010] Tools**
 - Component state Active
- [0018] Additional Child Object Settings**
 - Child Object Name ACO_VericalBeam_FrontLeft
 - Assigned Component Group Beams
- [0020] General**
 - Manufacturer Common components
 - Designation I-Type
 - Type Vertical
 - Angle 0
- [0021] I-Type**
 - Length [mm] 14500
 - DY [mm] 200
 - DZ [mm] 200
- [0026] Location**
 - Position and angle calculation Manually
 - X0 [mm] -100
 - Y0 [mm] -100
 - Z0 [mm] 1500
- [3635] View Frame Settings**
 - Detail Status By frame
 - Dash No
 - Extended Dimension No
- [3805] Render**
 - All available Surfaces 2
- [4201] Data tree**
 - Additional Child Objects < 0 >

..ACO_SteelShaft1 ACO_VericalBeam_FrontLeft
Characteristic points

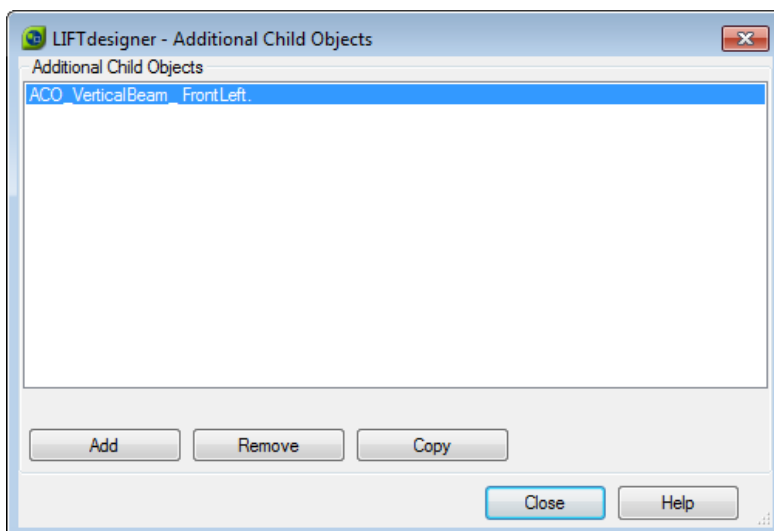
- 👉 The profile location and size must be calculated manually. There is no option to use any parameter logic.

Next, switch back to the **ACO_SteelShaft1** object by selecting it via the QuickComponent Link Box at the bottom of the **Properties** docking window.

You can now see that the **Additional Child Objects** properties counter has changed wfrom <0> to <1>.

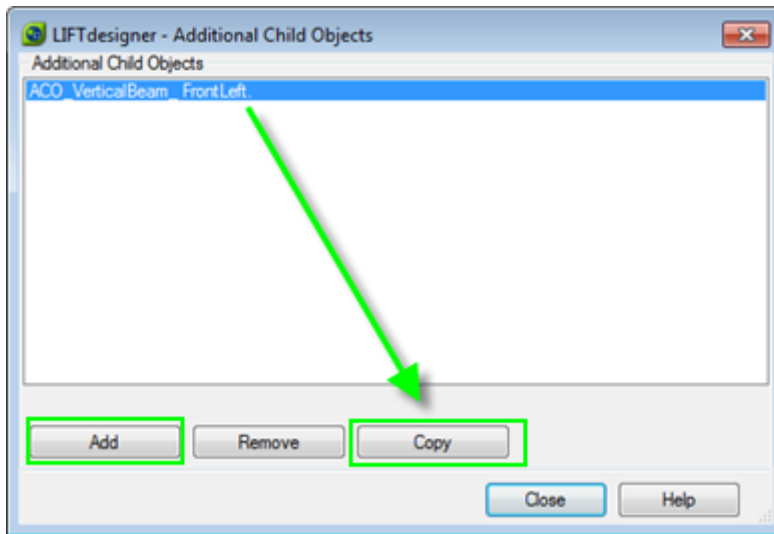


Open the ACO dialog via the corresponding property again. The dialog window now shows one item in the list, which is the first ACO_VericalBeam profile we added.



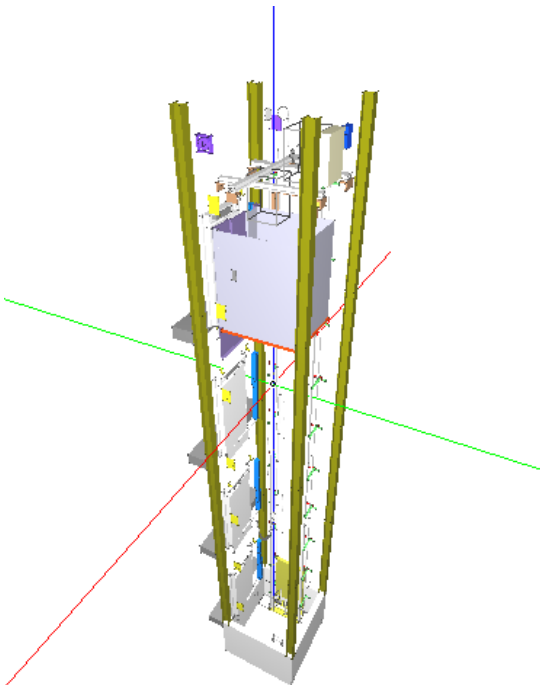
Creating a steel shaft via ACO's

Please add the remaining 3 vertical beams as we did, either by adding a new profile via the **Add** button or by just copying the existing **ACO_VerticalBeam** profile via the **Copy** button in the ACO dialog.

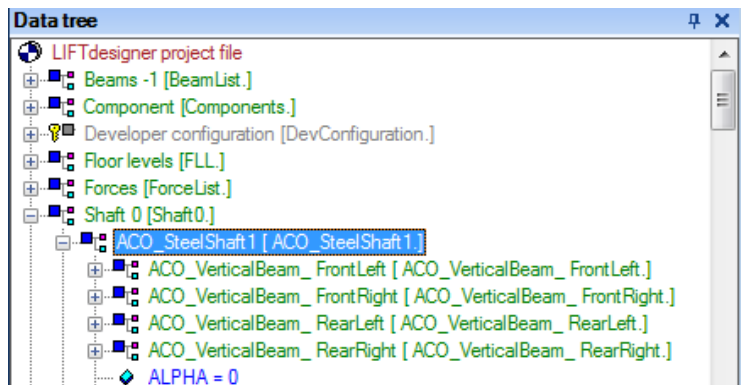


☞ Do not copy the ACO_VerticalBeam profile via the keyboard short cut Strg + C/Strg +V as the item loses the profile logic and the profile isn't copied properly.

After the three additional vertical beams have been added, renamed, resized and moved to the correct location, the elevator model should now look as follows:



The ACO steel shaft structure in the Liftdesigner **Data tree** should now look like shown below:



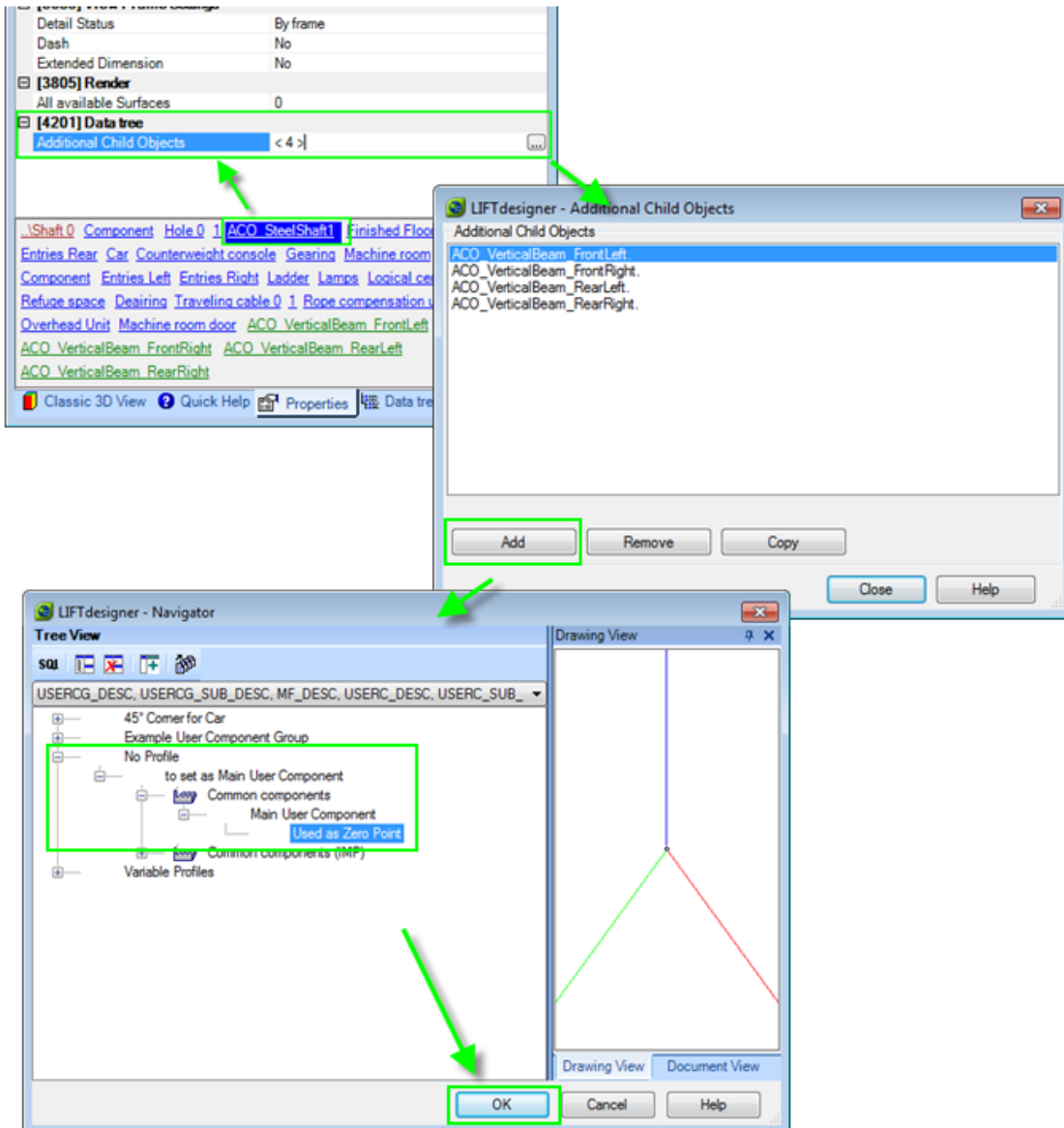
5.2 Steel Shaft ACO_RingBeams


In the next step we will add the first **ACO_RingBeam** assembly, which consists of 4 single horizontal I -Beams, to the steel shaft.

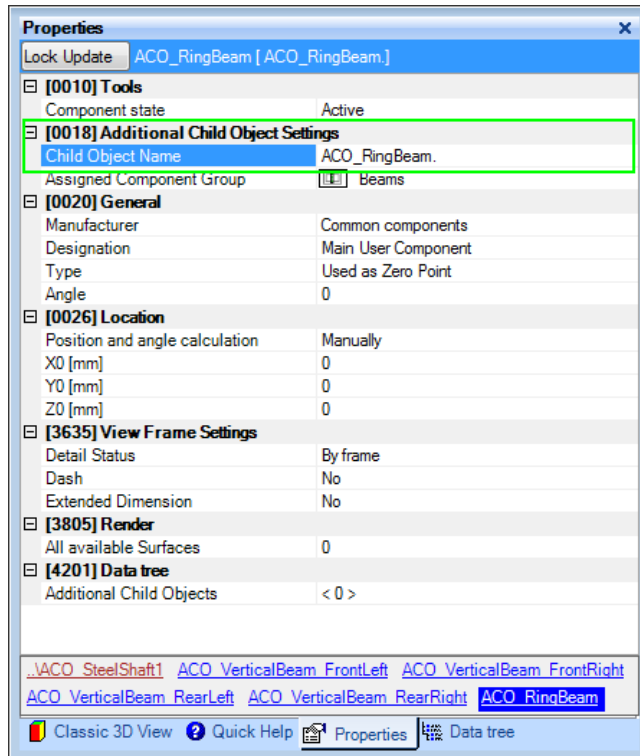
Switch to the **ACO_SteelShaft1** object by selecting it via the Quick Component Link Box at the bottom of the **Properties** docking window and open the ACO dialog via the corresponding property.

Click on **Add** in the ACO dialog and select a **No Profile - Main User Component** object in the **Navigator** and close the dialog via the **OK** button.

Creating a steel shaft via ACO's



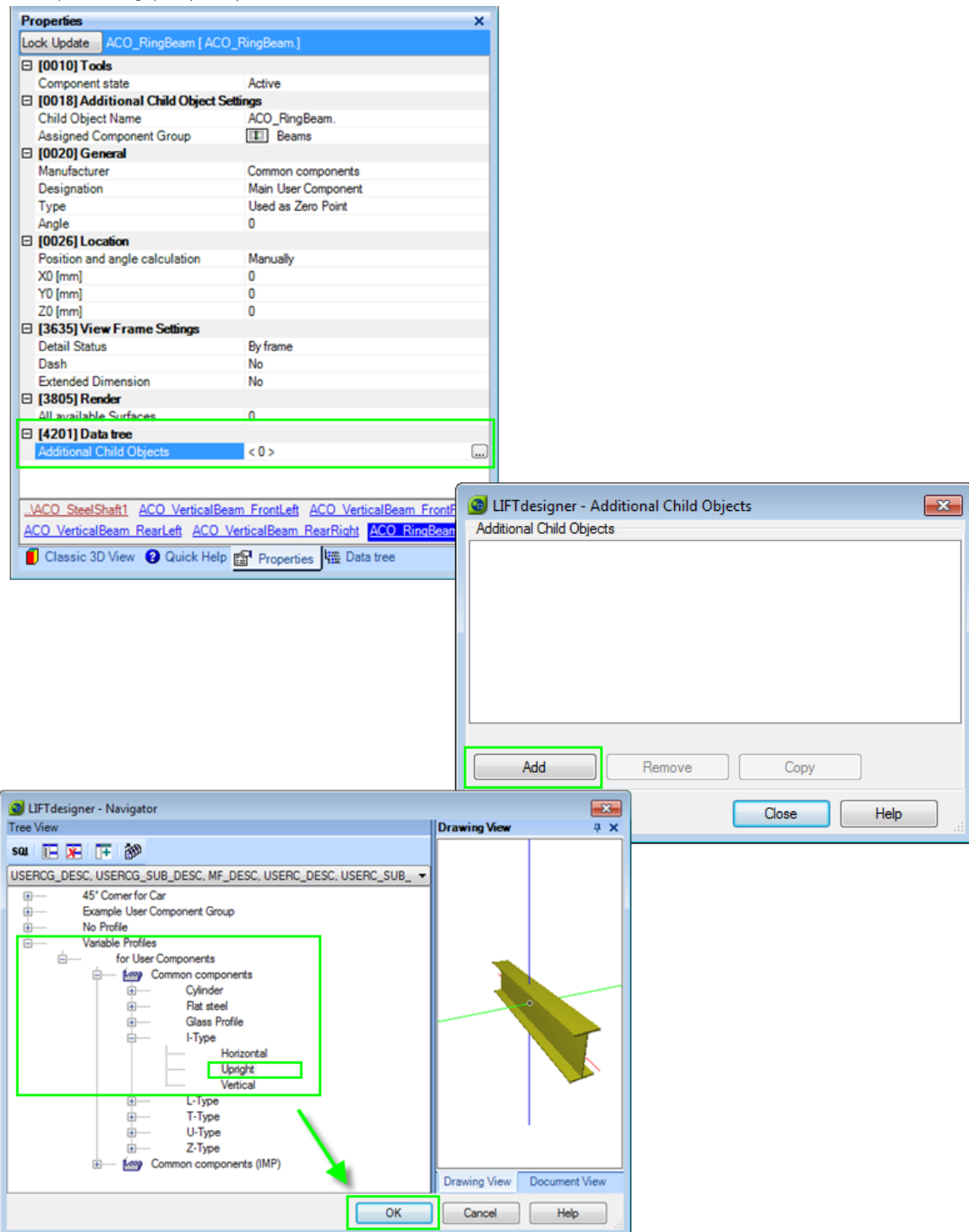
 Rename the new created ACO Object to **ACO_RingBeam** via the corresponding property.



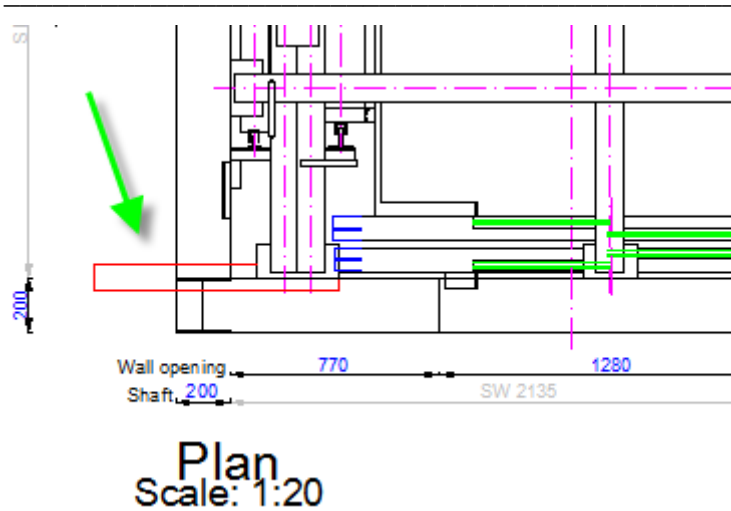
Keep all other properties as is.

Creating a steel shaft via ACO's

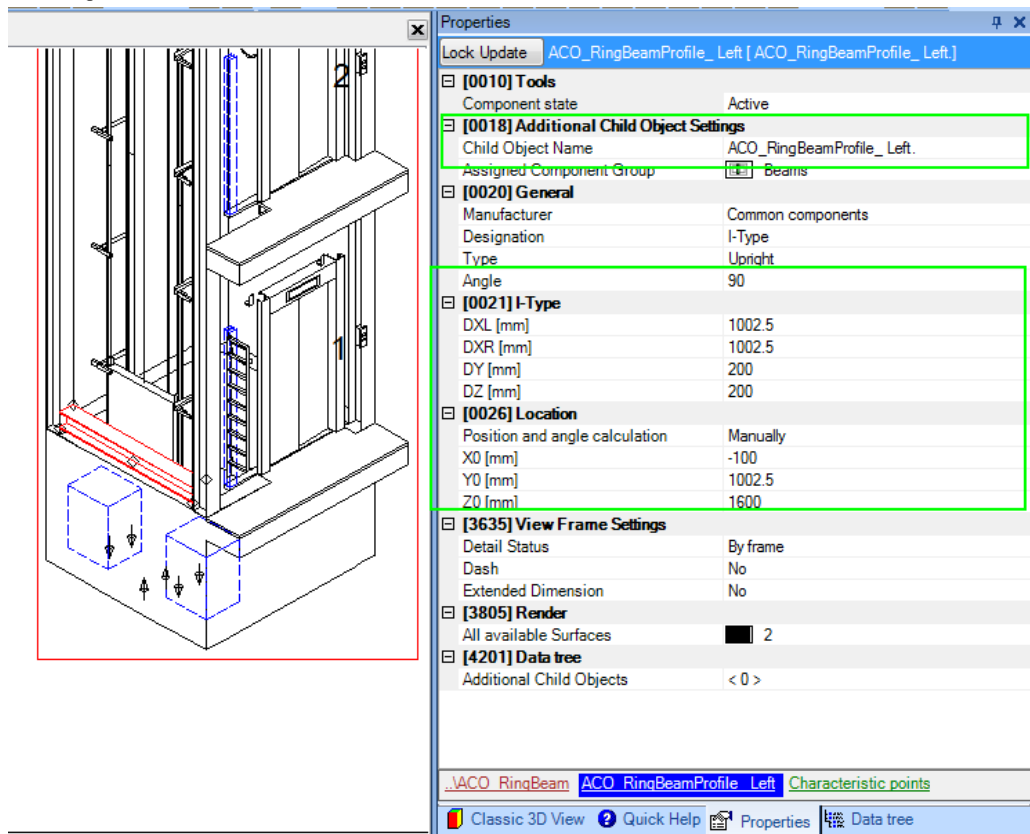
Make sure that the **ACO_RingBeam** object has been selected and create a new ACO via the corresponding property.



After the ACO variable profile has been added, you can see it in the drawing e.g. in the plan view. It will be located in the lower left shaft corner, since this is the basis point of the parent **ACO_RingBeam** object.



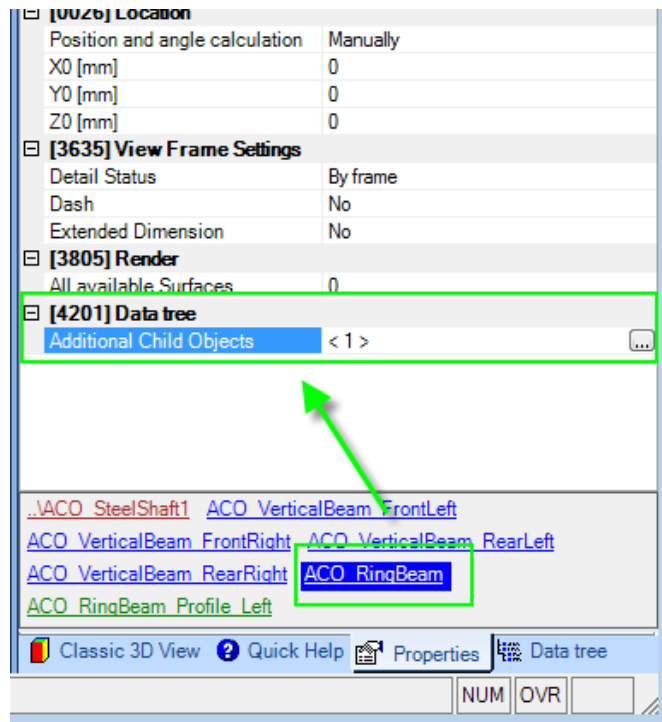
Now rename the ACO profile and change the location and size according to the settings shown below:



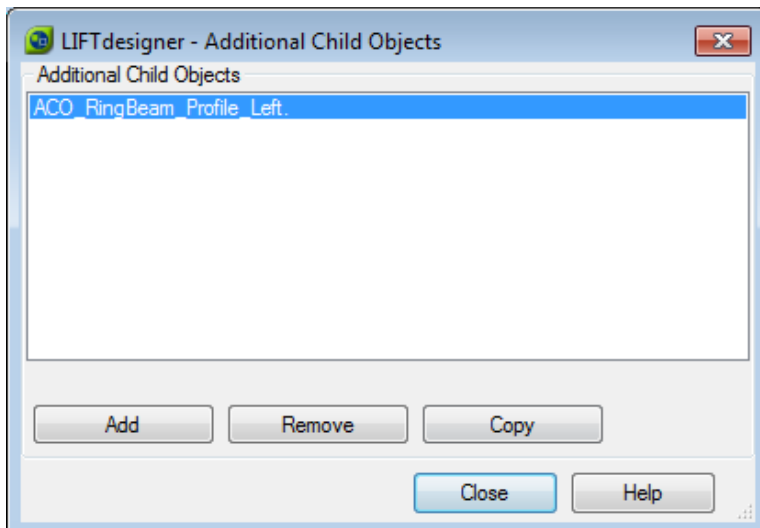
Next switch back to the **ACO_RingBeam** object by selecting it via the Quick Component Link Box at the bottom of the **Properties** docking window.

You can now see that the the **Additional Child Objects** properties counter has changed from <0> to <1>.

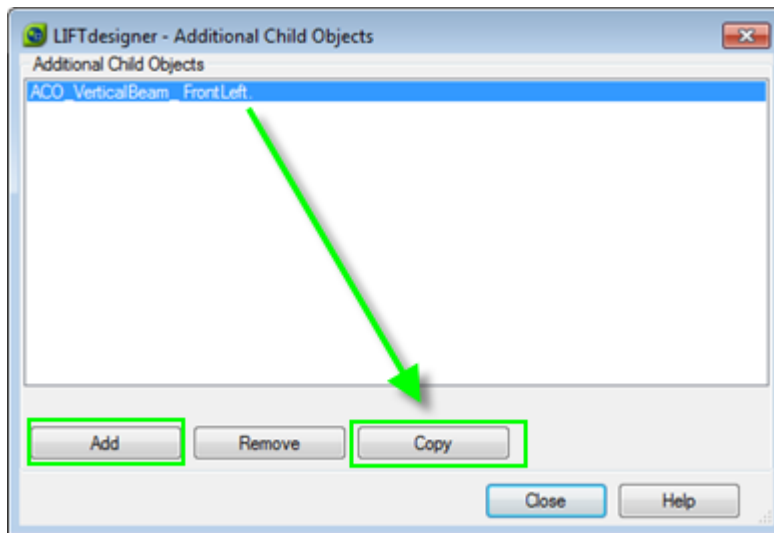
Creating a steel shaft via ACO's



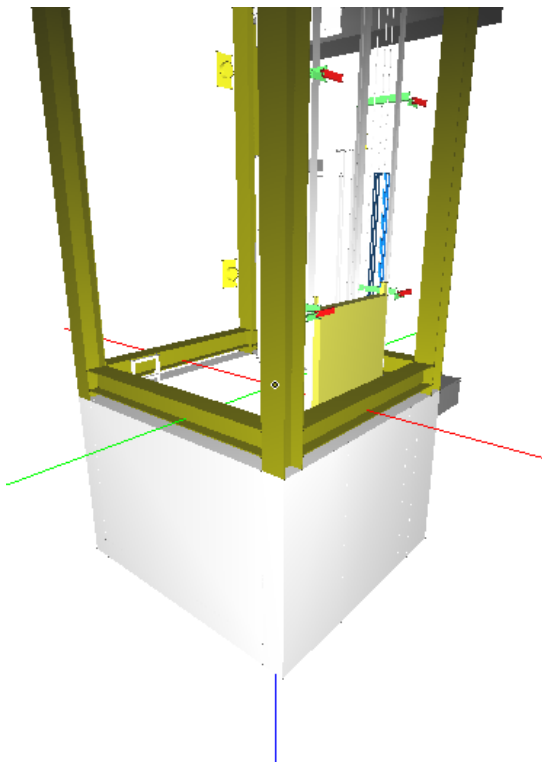
Open the ACO dialog via the corresponding property again. The dialog now shows one item in the list, which is the first **ACO_RingBeam_Profile_left** profile we added to the **ACO_RingBeam** object.



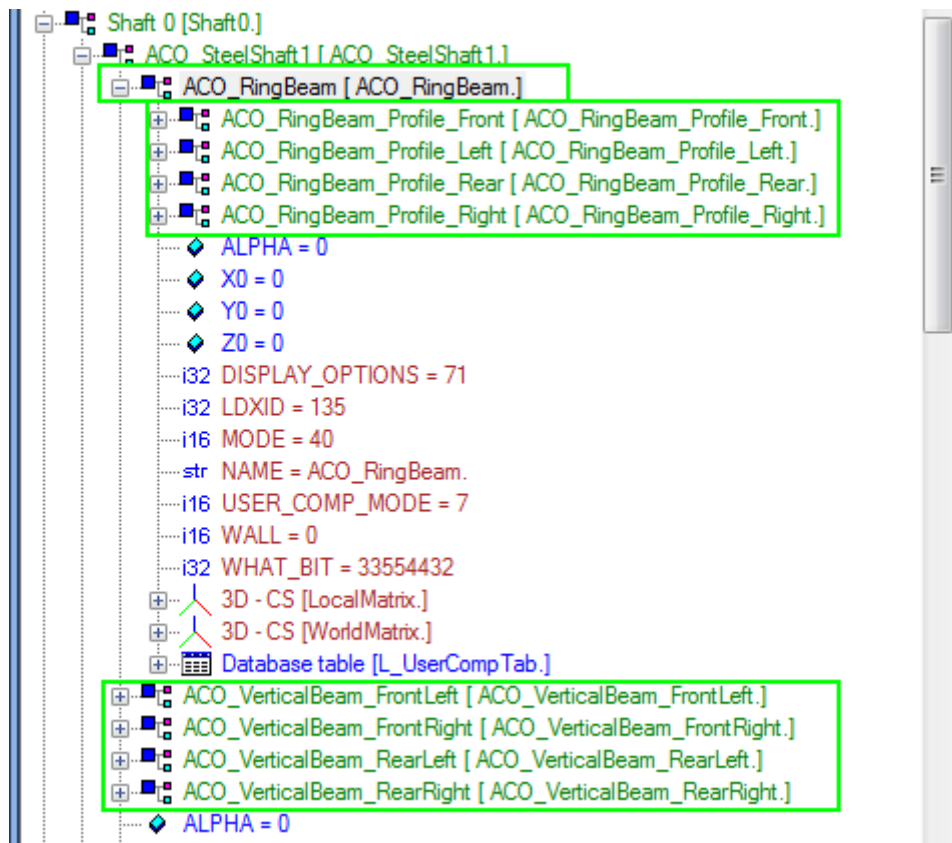
Please add the remaining 3 horizontal beams as we did before, either by adding new profiles via the **Add** button or by just copying the existing **ACO_RingBeam_Profile_left** profile via the **Copy** button in the ACO dialog.



After the 3 additional horizontal beams have been added, renamed, resized and moved to the correct location, the elevator model should now look as follows:



The ACO steel shaft structure in the LIFTdesigner **Data tree** should now look like shown below:

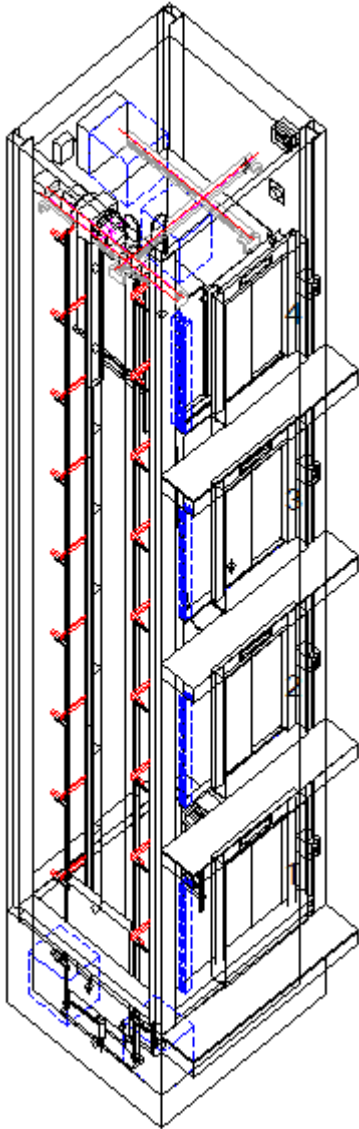


The new **ACO_RingBeam** Main User Component is a child of the **ACO_SteelShaft1** object and contains 4 additional ACO profiles

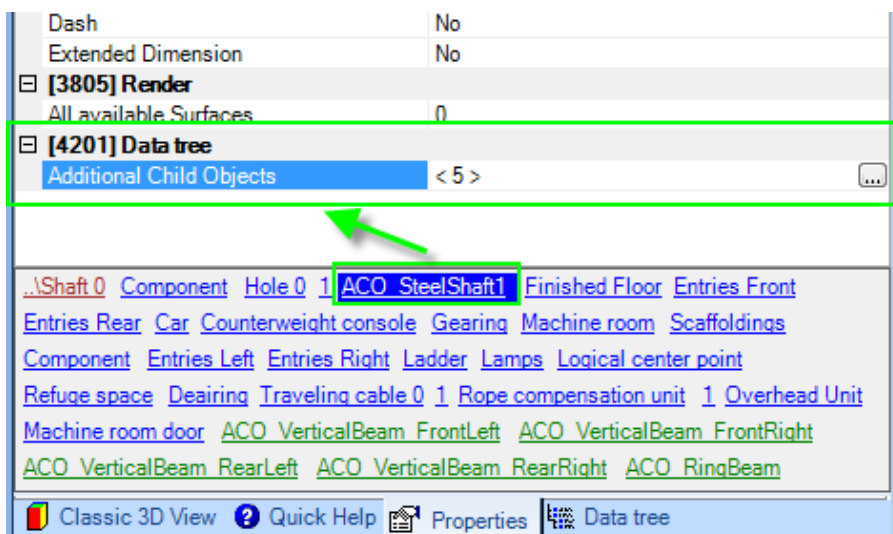
 Save the changes in the project

5.3 Copying the ACO Ring Beams

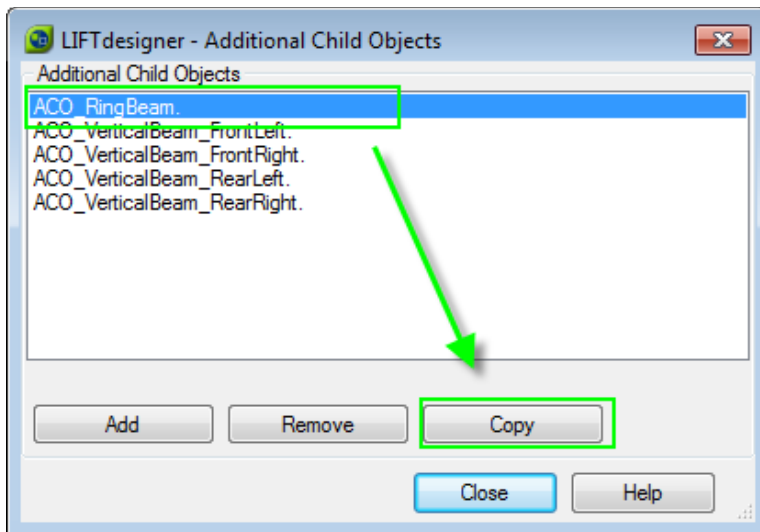
In the last step we will complete the steel shaft structure by copying the **ACO_RingBeam** object. According to the number of rail brackets + the machine beam in the shaft head, we will need a total of 10 **ACO_RingBeam** objects.



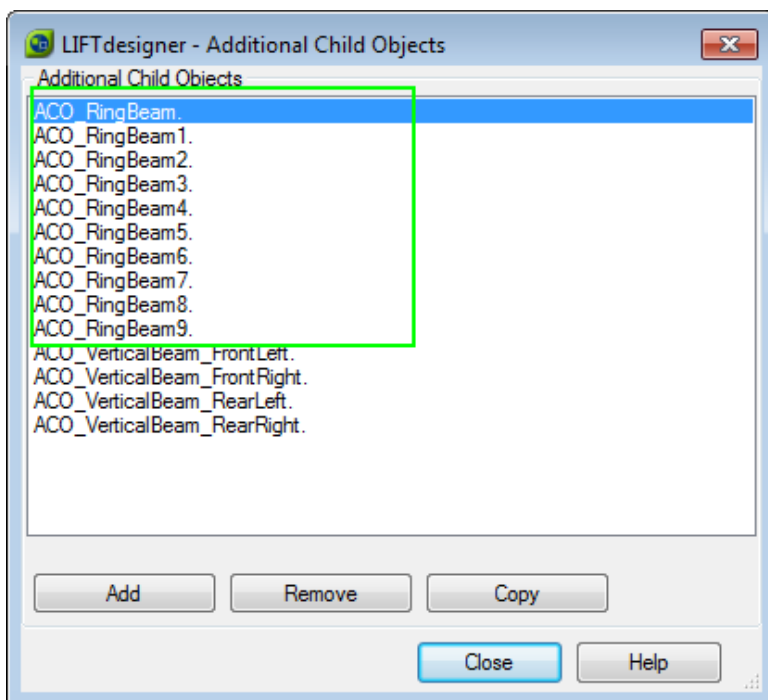
Select the **ACO_SteelShaft1** object e.g. via the **Quick Component Link** box at the bottom of the Properties dialog.



Open the **ACO_SteelShaft1** ACO dialog by clicking on the corresponding property.

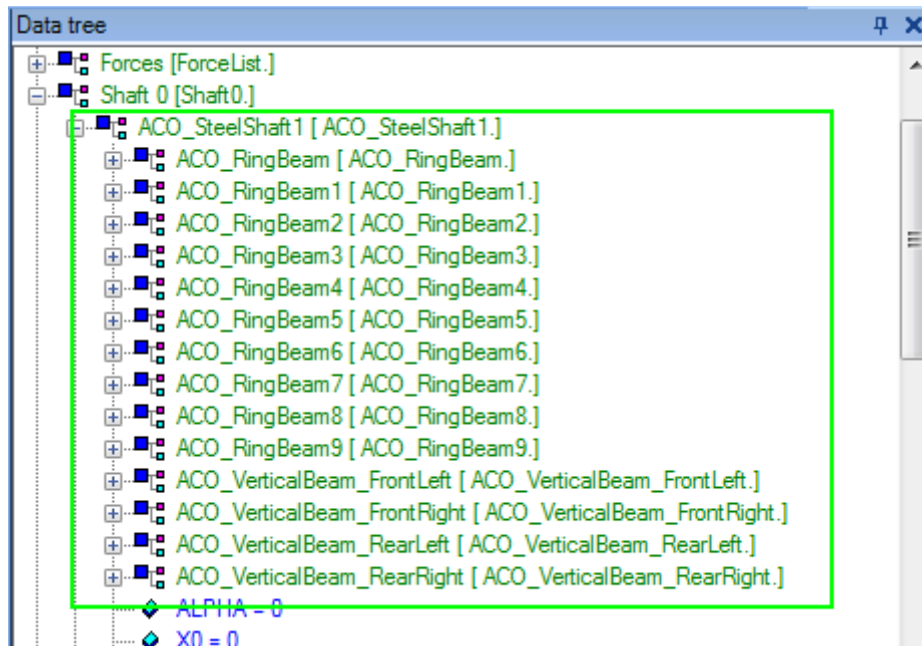


Now select the displayed **ACO_RingBeam** object in the list and copy it 9 times via the corresponding button (the indexes will be added automatically).



Close the **ACO** dialog.

The ACO steel shaft structure in the Liftdesigner **Data tree** should now look like shown below:



Now we will need to adapt the location of the copied **ACO_RingBeam** objects, since they now overlap each other. Adapt the location according to the rail brackets and the machine beam position.

- ☞ Each copied **ACO_RingBeam** object also contains the 4 ring beam profiles, which means that these profiles will be moved automatically when changing the Z-location of an **ACO_RingBeam** object.

Select each single **ACO_RingBeam** object via the Quick Component Link Box and adapt the Z-location via the corresponding property.

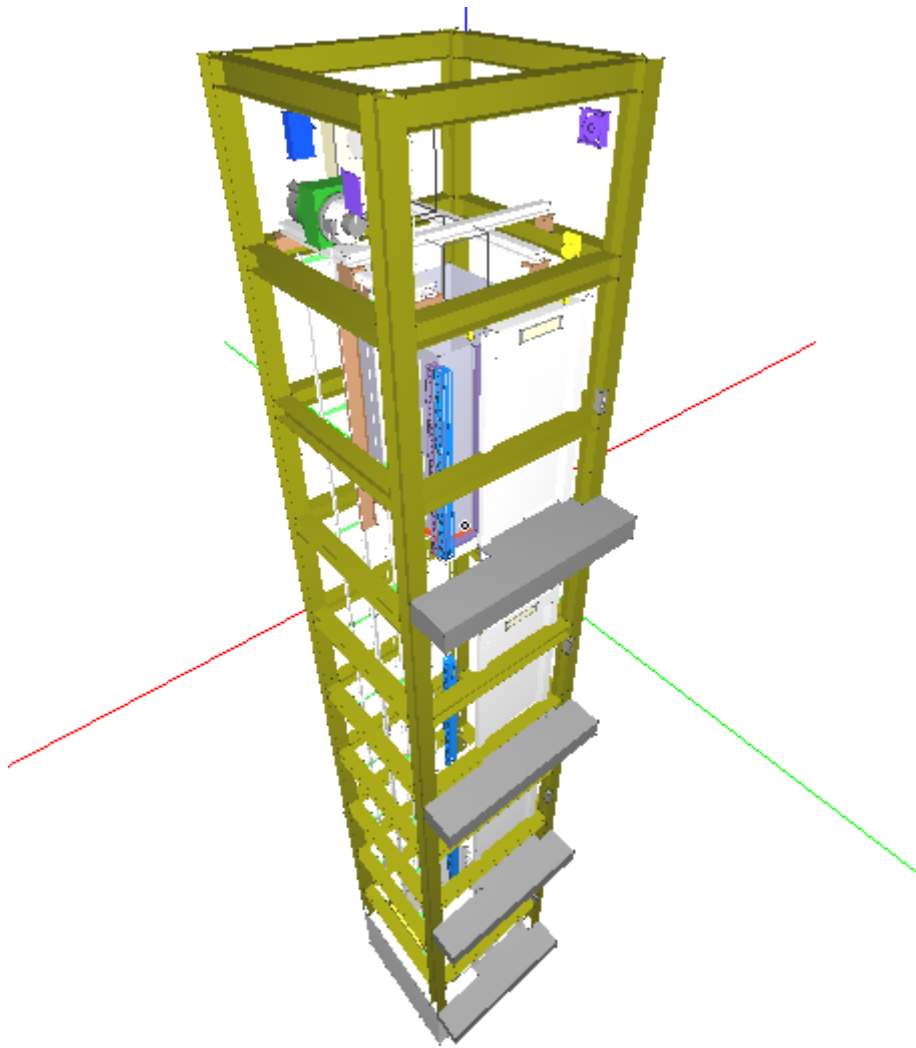
Creating a steel shaft via ACO's


Angle	0
[0026] Location	
Position and angle calculation	Manually
X0 [mm]	0
Y0 [mm]	0
Z0 [mm]	800
[3635] View Frame Settings	
Detail Status	By name
Dash	No
Extended Dimension	No
[3805] Render	
All available Surfaces	0
[4201] Data tree	
Additional Child Objects	< 4 >

..ACO_SteelShaft1	ACO_VerticalBeam_FrontLeft	ACO_VerticalBeam_FrontRight	
ACO_VerticalBeam_RearLeft	ACO_VerticalBeam_RearRight	ACO_RingBeam	
ACO_RingBeam1	ACO_RingBeam2	ACO_RingBeam3	ACO_RingBeam4
ACO_RingBeam5	ACO_RingBeam6	ACO_RingBeam7	ACO_RingBeam8
ACO_RingBeam9	ACO_RingBeam_Profile_Left	ACO_RingBeam_Profile_Right	
ACO_RingBeam_Profile_Rear	ACO_RingBeam_Profile_Front		

Classic 3D View Quick Help Properties Data tree

The final result should now look as follows:



 Save the project

5.4 Further ACO_SteelShaft1 adaption

You will need to do further modifications to your steel shaft, like adapting the single **ACO_RingBeam** front profiles as they do collide with the doors, adding some glass profiles to the steel structure, and so on.