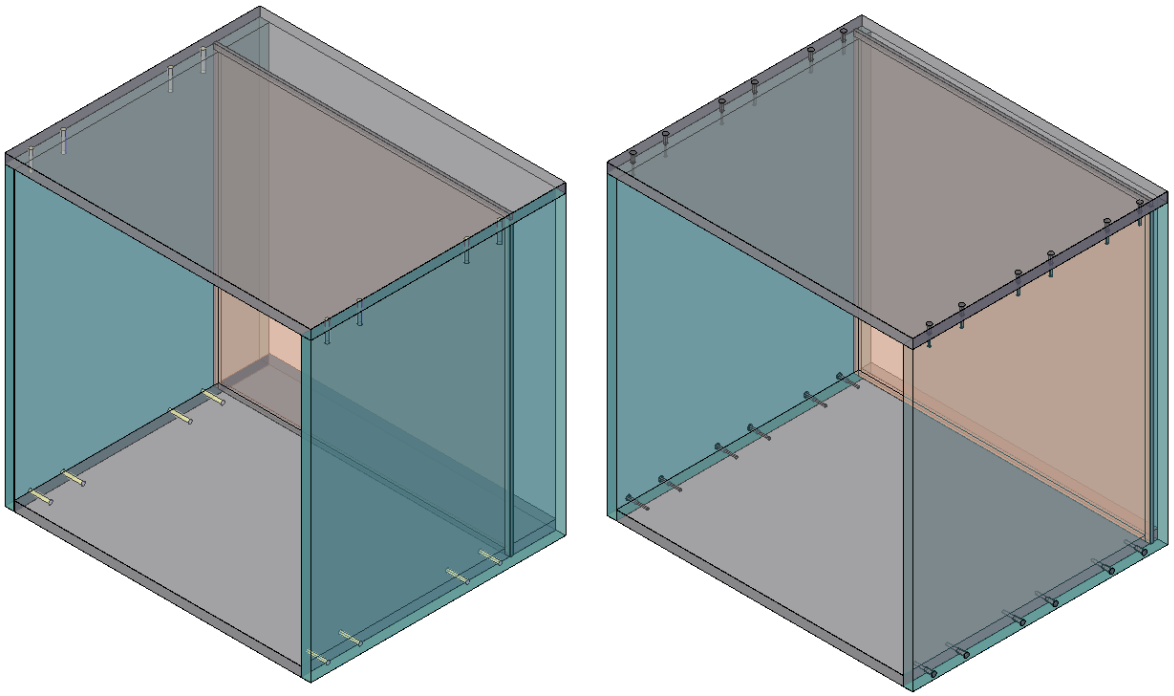
Training Creating Data / Variable:

Number Variables, Connection Situation and Descriptors



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Contents

1. Introduction

Objectives of this exercise

- Create and use material variables and profile variables
- Recognize the flexibility that using variables makes possible
- Create and use value sets
- Modify linear divisions in descriptors
- Create profiles

The abbreviations used

- **CP** Construction Principle
- **PD** Part Definition
- **_C_** Set in the name of data objects instead of "_C_" e.g. "M_" for "Miller" to mark the data object as your own.
- **_Customer** This abbreviation is applied for naming folders in the data system. Replace this term with your firm's name in your own system, e.g. "_Miller".

Preparation

Prior to this exercise, please **turn off** the **Article Mode**. You can find the button in the AutoCAD status bar.

Article Mode **active**:

Article Mode **inactive**:

Prerequisites

- Construction rules "Type_A" have been created.
- All CPs, of the construction rule "Type_A" are created as customer-specific ("_C_*).
- All PDs of the CPs used in the construction rule "Type_A" are created as customer-specific (_C_*)

2. Thoughts before beginning to create data

2.1 How flexible should I set up my product data?

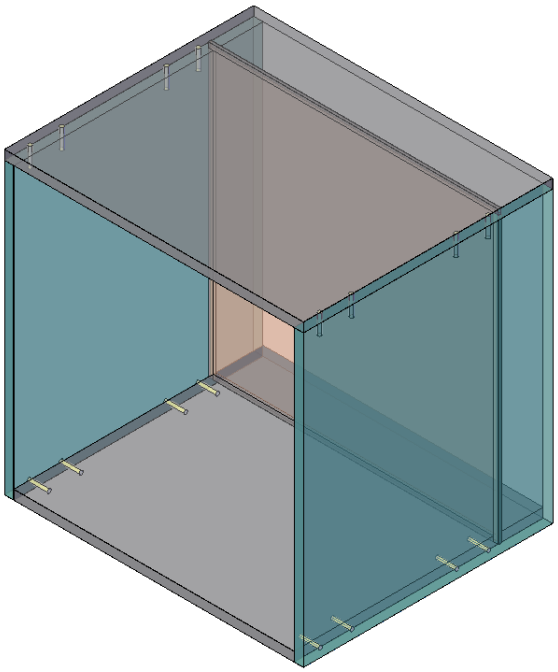
Before you begin to create data, first determine how flexible you want your product data to be. Too little or too much flexibility can lead to unnecessary costs for your company.

- The flexibility that you fail to implement at the outset of creating data either leads to costs during subsequent implementation and/or during daily order processing.
- Unnecessary high levels of flexibility lead to permanently high costs for data maintenance. Extremely complex data structures can lead to dependency on individual members of staff.

Consequently, please try to analyze and ascertain your job order spectrum; determine at which points you require flexibility of your data (or the flexibility you wish to offer your customers).

3. The Task

The depicted cabinet will serve as an example of making use of the functionalities the **variables** offer.



The following features of the cabinet are to be created using variables:

- Back panel inset.
- Types of carcass connectors.

In addition, the following features are to be designed using variables in another exercise:

- Core material for top shelf, bottom shelf, exteriors and back panel.
- Surface of the top shelf, bottom shelf, exteriors and back panel.
- Edging for top shelf, bottom shelf, exteriors.
- Open panel edge surfaces are to be sealed with paper edges.

4. Composing the structure of the variables

Before you create variables, you should think about the structure of the variable families and variables as well as the names of the variables.

The structure of variable families and variables:

- If you do not have any experience or have not developed your own ideas, you should first make use of the structure of variables presented under “Getting Started”.
- Begin the names of your variable families and, in particular, the names of the variables with “_”. That will ensure “your” variables will always be displayed at the top of lists of variables.
- Keep the names of number variables as short as possible, because those variables are also used in formulas.
- Develop descriptive naming conventions for your variables.
- Ensure the naming convention of the variables within a family supports an alphabetic order.
- Avoid making typing errors in the variable names, because these can only be corrected later with a lot of effort.

For this exercise and the following one, you will create the following variables structure:

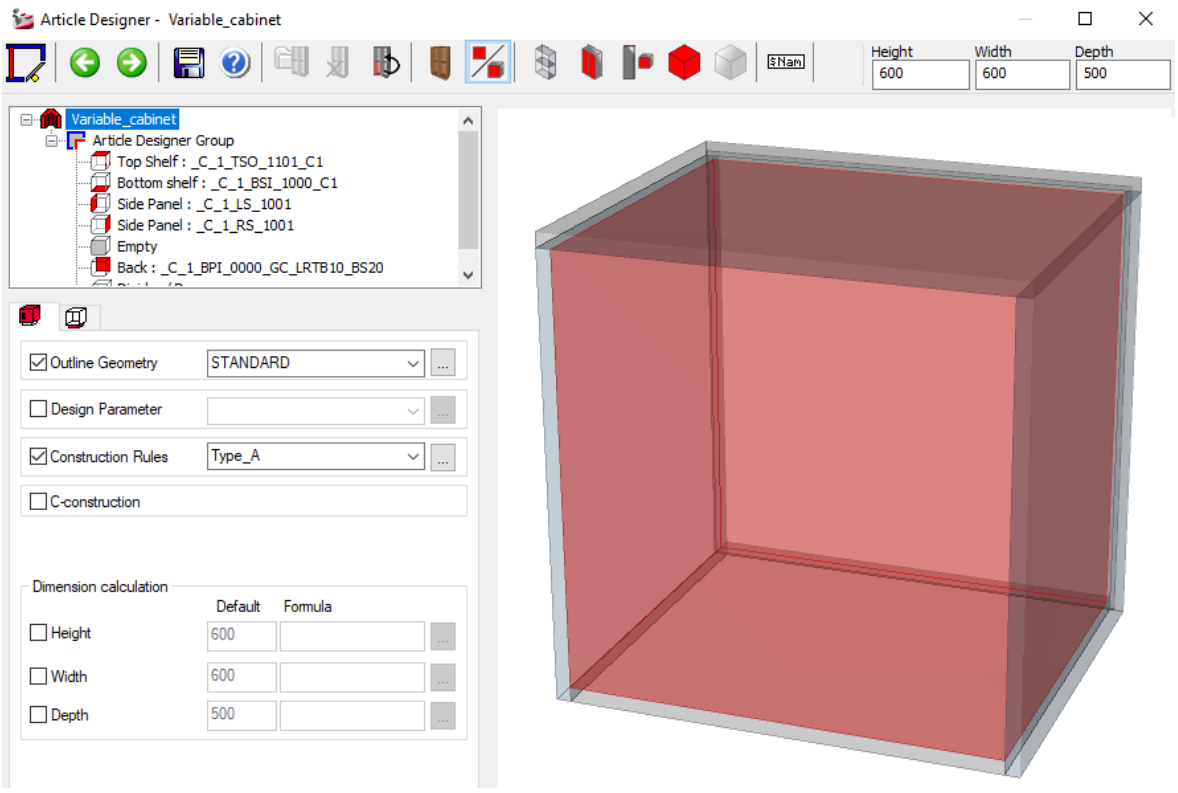
Variable Family

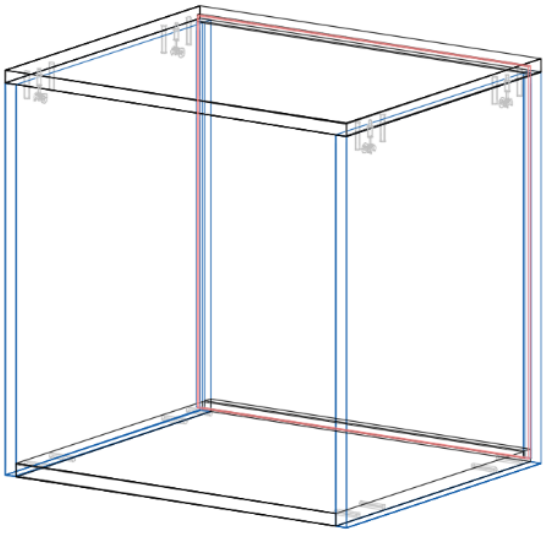
Variable

Category; Notes

					Category	Notes
_Customer						
	_Construction					
		_Carcass_construction				
			_Dimensions			
				_BPI	_Carcass	Dimension of the back panel inset
			_Connectors			
				_C1L	_Carcass	Connection situation left
				_C1R	_Carcass	Connection situation right
	_Material					
		_Case_1			_case	Variable family 1 for carcass
			_MAT_1_TS		_case	Core material 1 top shelf
			_MAT_1_BS		_case	Core material 1 bottom shelf
			_MAT_1_SP		_case	Core material 1 side panel
			_MAT_1_BP		_case	Core material 1 back panel
			_SURF_1_TS_top		_case	Surface 1 top shelf top
			_SURF_1_TS_bottom		_case	Surface 1 top shelf bottom
			_SURF_1_BS_top		_case	Surface 1 bottom shelf top
			_SURF_1_BS_bottom		_case	Surface 1 bottom shelf bottom
			_SURF_1_LS_top		_case	Surface 1 side panel left top
			_SURF_1_LS_bottom		_case	Surface 1 side panel left bottom
			_SURF_1_RS_top		_case	Surface 1 side panel right top
			_SURF_1_RS_bottom		_case	Surface 1 side panel right bottom
			_SURF_1_BP_top		_case	Surface 1 back panel top
			_SURF_1_BP_bottom		_case	Surface 1 back panel bottom
			_PRF_1_TS		_case	Edging 1 top shelf
			_PRF_1_BS		_case	Edging 1 bottom shelf
			_PRF_1_SP		_case	Edging 1 side panel
		_Front_1			_Front	Variable family 1 for front
			_MAT_1_D		_Front	Core material 1 door
			_MAT_1_DR		_Front	Core material 1 drawer
			_SURF_1_D_top		_Front	Surface 1 door top
			_SURF_1_D_bottom		_Front	Surface 1 door bottom
			_SURF_1_DR_top		_Front	Surface 1 drawer top
			_SURF_1_DR_bottom		_Front	Surface 1 drawer bottom
			_PRF_D		_Front	Edging 1 door
			_PRF_DR		_Front	Edging 1 drawer
			_PRF_1_Front_SP		_Front	Edging Side panel front in front color

5. Creating a test cabinet





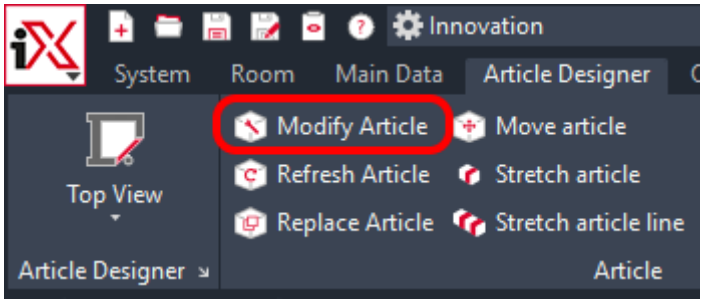
Please create the article “**Variable_cabinet**”.

- Height / Width / Depth:
  600mm/ 600mm/ 500mm
- Construction Rules: **Type_A**
- CPs as shown above in the screenshot

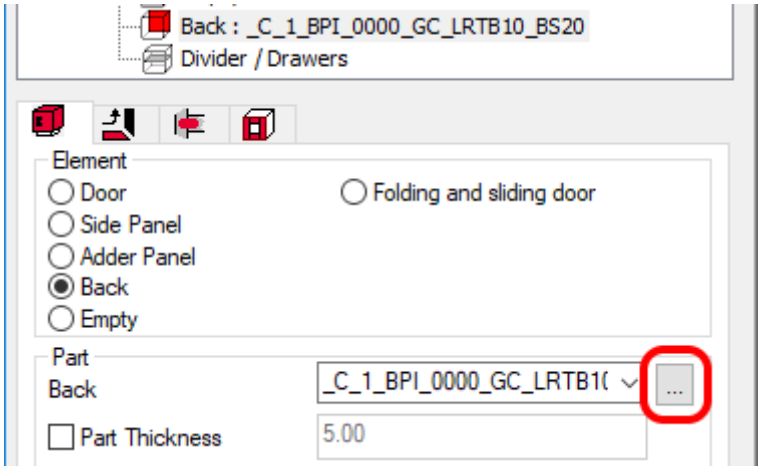
Position the cabinet upright in the graphic.

6. Variable – back panel inset

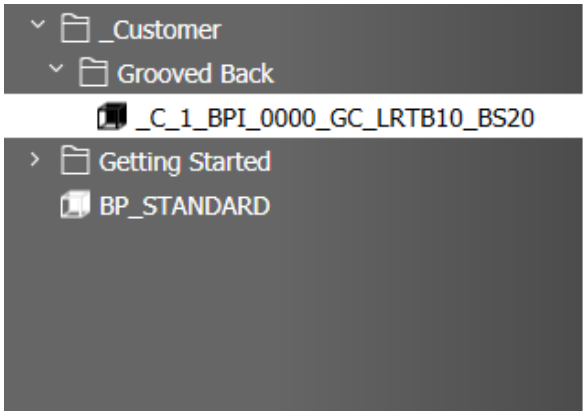
According to the task described above, the first step is to set the variable for the back panel inset.

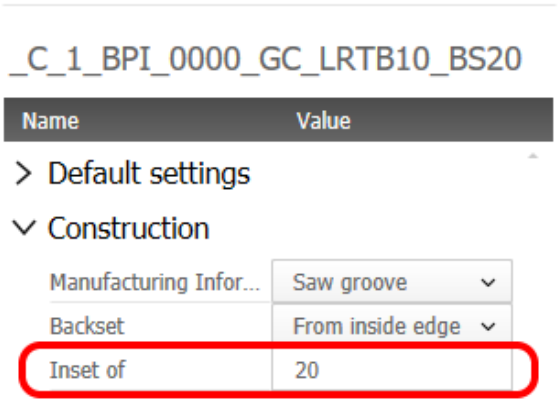


To determine the value of the currently used inset, open the back panel CP.



Then replace the value “20” with a variable.





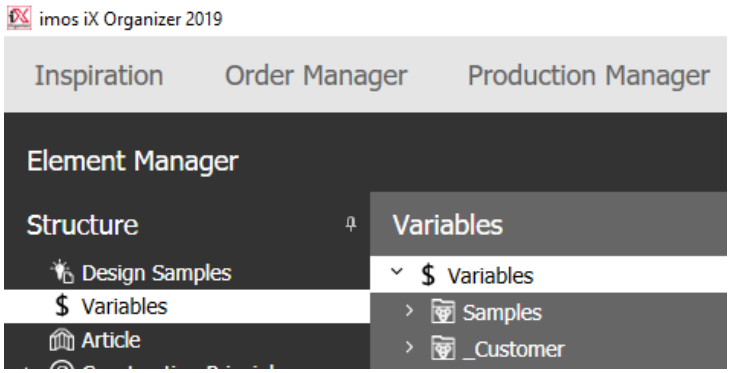
Close the Element Manager and the Article Designer.

6.1 Variable for back panel inset

Hint

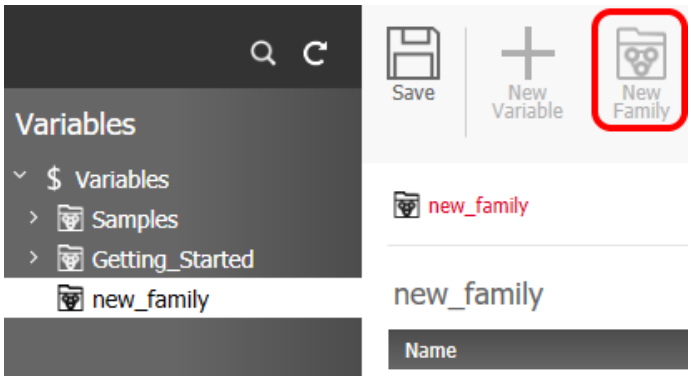
In this exercise you will carry out data maintenance in the Element Manager of the Organizer; you will then test this data in the graphic.

In addition to the graphic, please launch the Organizer and then the Element Manager. Select the node “Variables”.

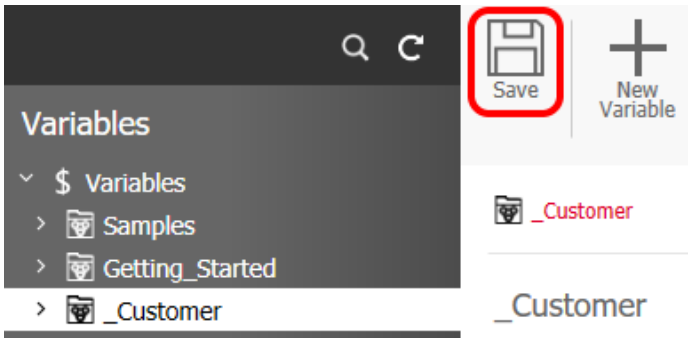


6.1.1 Creating variable families

In line with the list depicted in section 4 we will now create the first variable families and the variable to control the back panel inset. Click on “**New Family**”



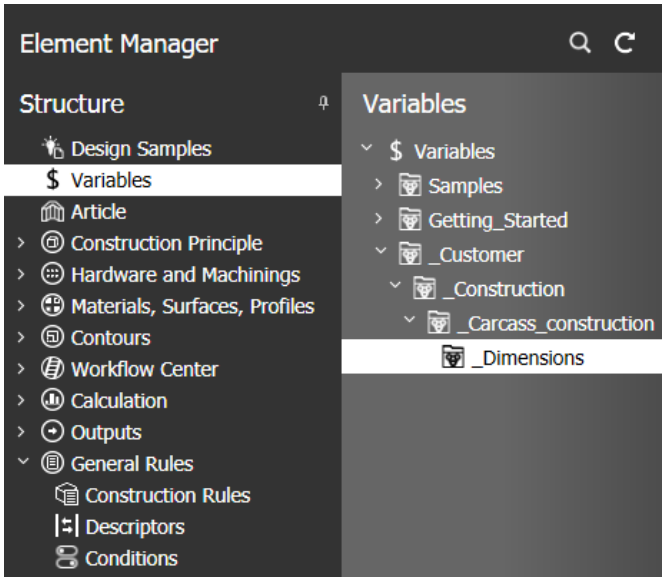
overwrite “new_family” with “_Customer” and then click on “**Save**”.



You have just created your first variable family.

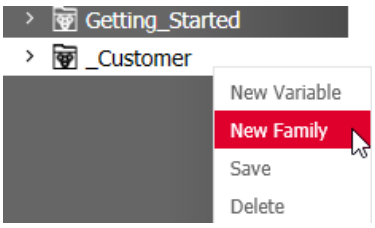
Now build the further structure of the variable families in the family "**_Customer**" by yourself.

_Customer			
	_Construction		
		_Carcass_construction	
			_Dimensions



Hint

To create new variable families or variables, you can also make use of the shortcut menu (right-click the respective higher-level variable family).

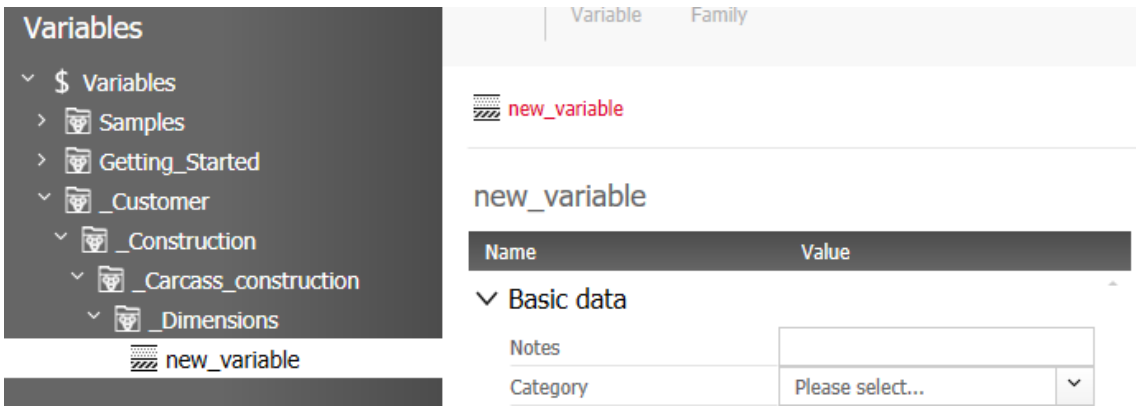


6.1.2 Creating variables for a back panel inset

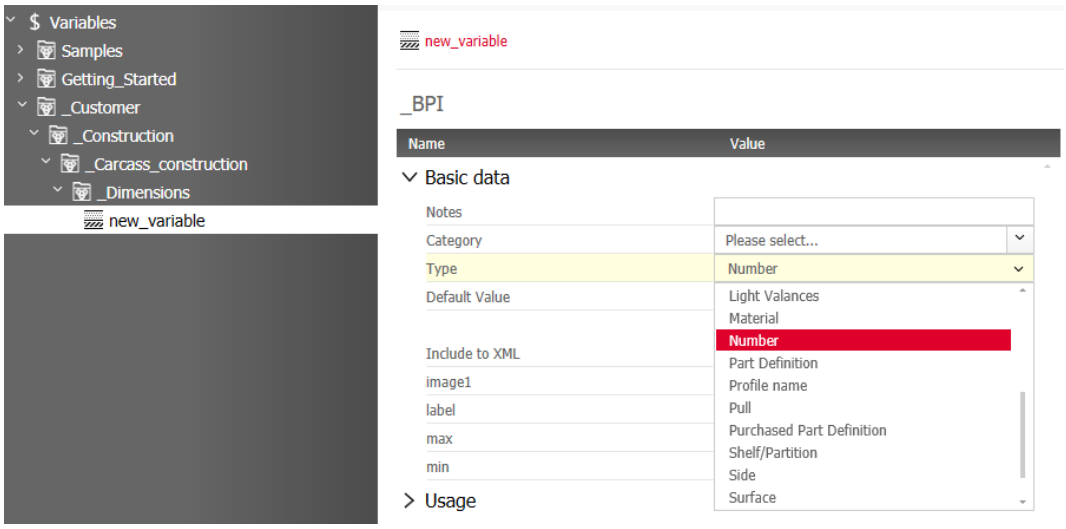
_Dimensions			
	_BPI	_Carcass	Dimension of the back panel inset

Select the variable family "_Dimensions" and then click 

(or alternatively, use the shortcut menu)



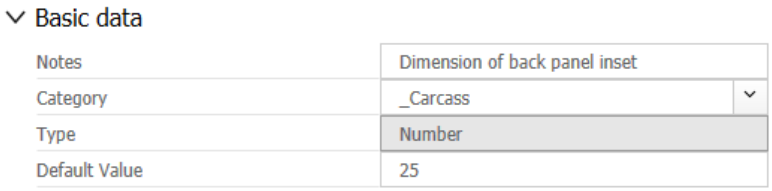
… overwrite “new_variable” with “**_BPI**”. Before saving you must first set the “**Type**” of variable.



Now click on 

.

Complete the **Category** and **Notes** as well as a **Default Value** “**25**”. Save the variable again!



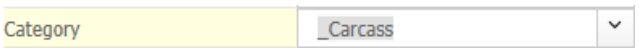
You have now created the variable for the back panel inset.

Hint 1

It is not possible to alter the type of variable once it has been saved! If you have saved a variable set with a wrong “Type”, delete the variable; create a new variable and set the right type.

Hint 2

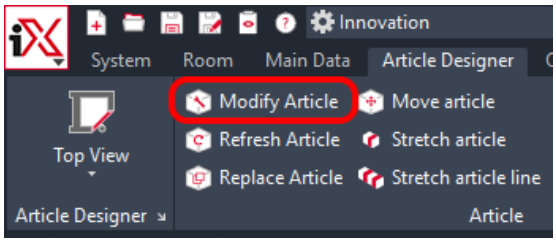
You can use the category later to search for variables. Create your own categories simply by writing category names in the selection field.



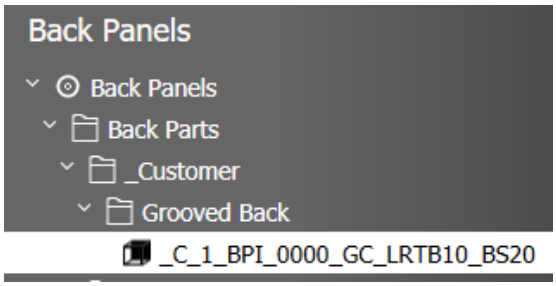
Once saved, you can call up your own categories from the pull-down menu. Create your own categories with a prefixed “_”, so they appear at the top of the list.

6.1.3 Using the variables to inset the back panel

Now return to the graphic. Select “**Modify Article**”

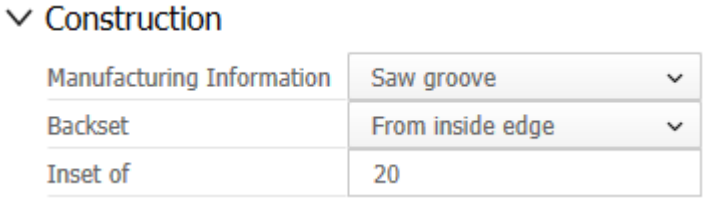


… then select the article “**Variable_cabinet**” at the back panel and open the back panel in the Element Manager.

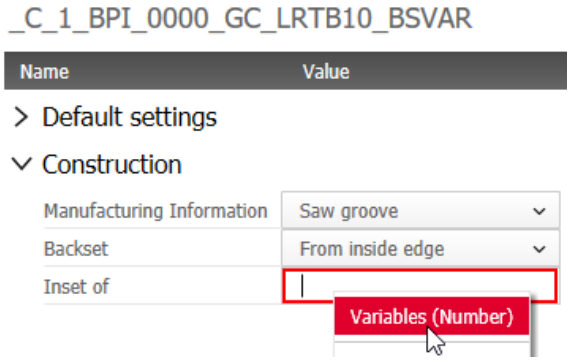


As you can now variably set the inset, you need a new CP whose name also depicts this property. Consequently, save the back panel CP under
“**_C_1_BPI_0000_GC_LRTB10_BSVAR**”.

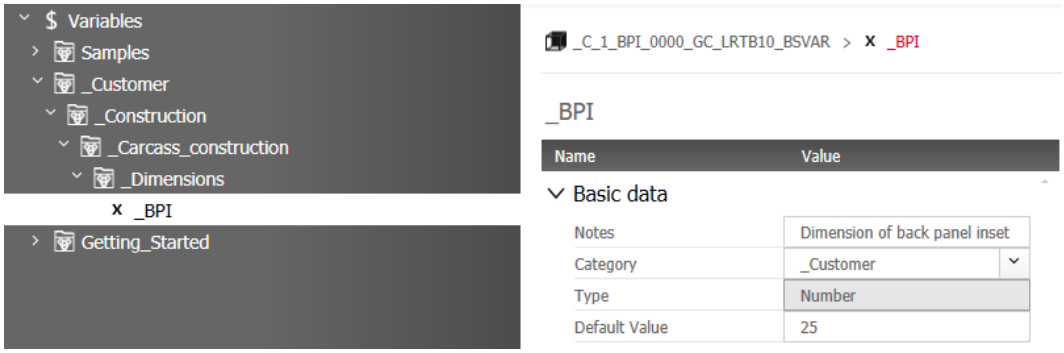
Open the node **Construction**.



Now enter the newly created variable for the back panel inset instead of the value “20”. Click to select the value field and delete the value “20”. Then right-click the value field to call up the shortcut menu where you can select a number variable. Click “Variables (Number)” to open the Element Manager.



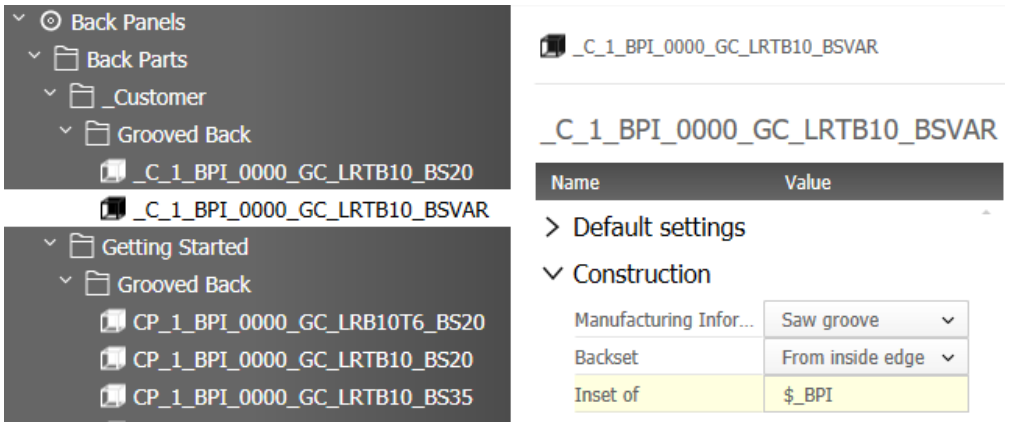
In the Element Manager, select the variable “**_BPI**”



……and then click on 

.

The variable is now entered as value for the back panel inset.

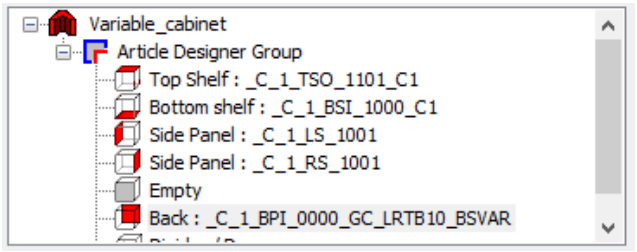


Save the back panel CP.

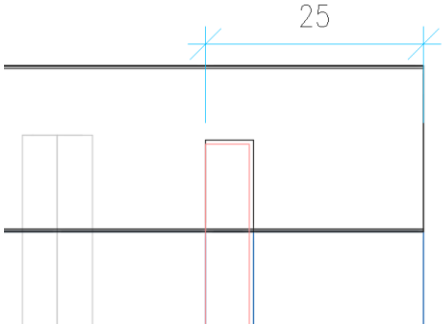
It is possible to recognize if a variable has been used as the value of an attribute by the leading “$” symbol.

Click on 

to include the CP in the Article Designer. Save the article and exit the Article Designer.

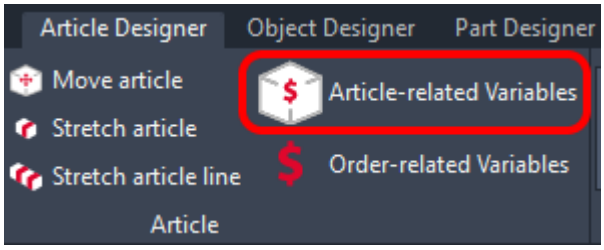


Observe the changed position of the back panel when you return to the graphic. In accordance with the set default value the back panel has now been moved in by 25mm.



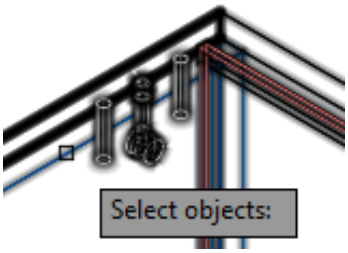
6.1.4 Changing the back panel inset

Now change the value of the article-related variable of the back panel inset to 35mm. To do so, click "**Article-related Variables**" in the ribbon menu.



Then select the article in the graphic; terminate the selection function with a right-click. The dialog box "Article-related Variables" opens. Expand the variable structure below "_Customer" through to variable "_BPI".

You will see that the order value of the variable "_BPI" has automatically been set the same as the default value.

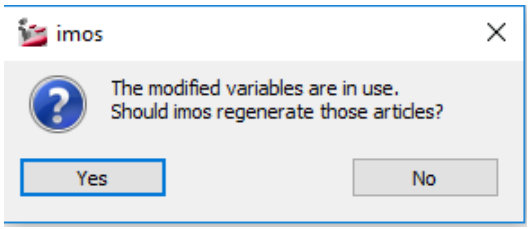


Name	Type	Default Value	Order Value	Article value
_Customer	Family			←
_Construction	Family			←
_Carcass_construction	Family			←
_Dimensions	Family			←
X _BPI	Number	25	25	←
Getting_Started	Family			←

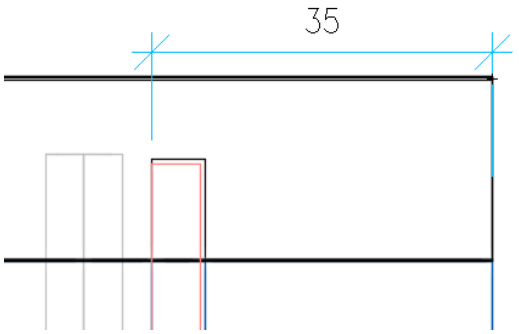
Now set the "**Article value**" to "**35**". To do so, simply click the field "Article value" of the variable "_BPI", type in the value 35 and press ENTER to complete the entry.

X _BPI	Number	25	25	35

When you click on  the prompt box depicted on the right will be displayed. Please click "**Yes**". The article will then be generated anew.



Check the back panel inset! We will discuss the positioning of the dowel in the next chapter when we set the connection situation variable.

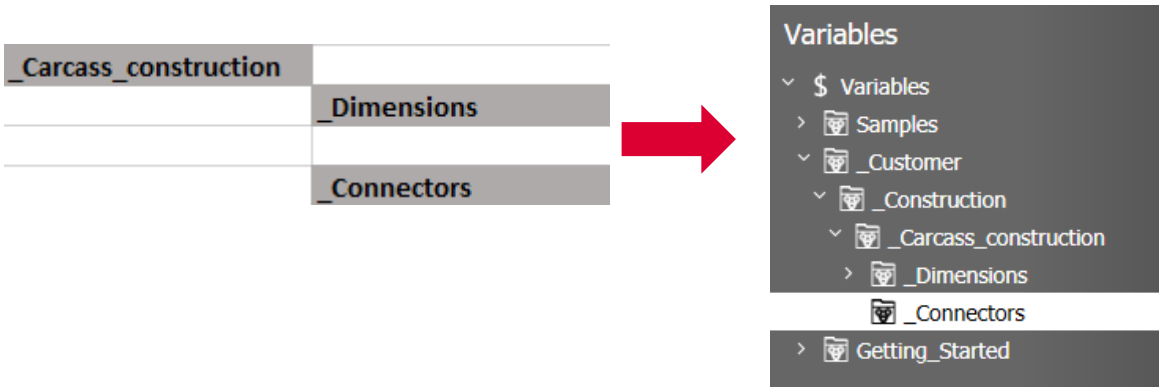


7. Variable connection situation for top and bottom shelves

The objective of the variable connection situation for top and bottom shelves is to connect the sides and shelves with either dowels or screws. It should be possible to set a different connection situation on the left and right.

7.1 Creating a variable family

In the Organizer, create a variable family "_Connector" on the same level as "_Dimensions" by yourself.

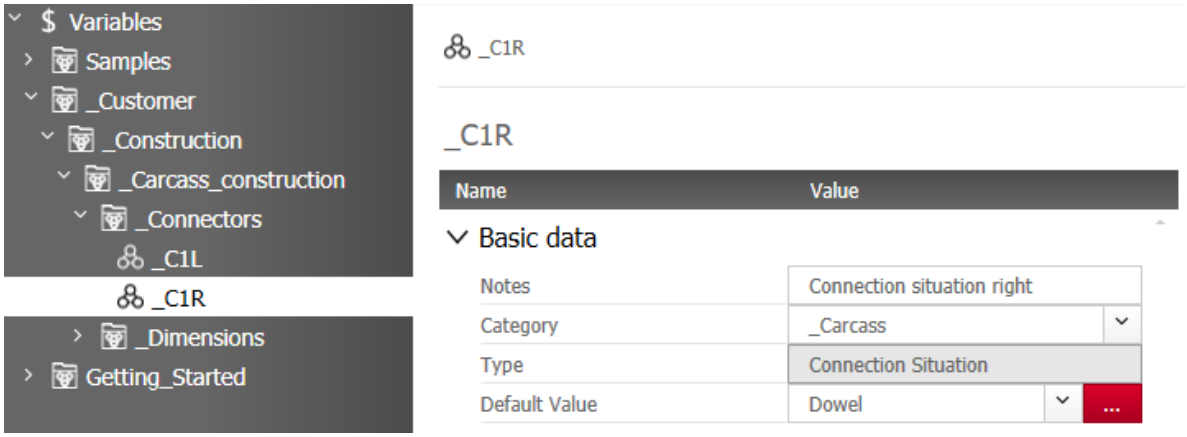


7.2 Creating variables

Now create the two variables of the type "**Connection Situation**" in the variable family "**_Connector**".

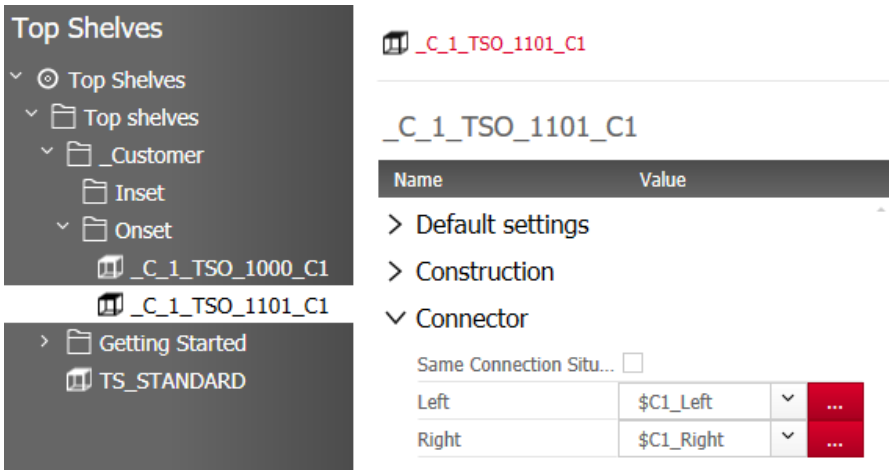
_Connectors			
	_C1L	_Carcass	Connection situation left
	_C1R	_Carcass	Connection situation right

Please enter (initially) **Dowel** as the **Default Value**. You can simply type the value in the Default Value input field or click the red ellipsis button and then select and apply the default value in the next level in the hierarchy of the connection situation.

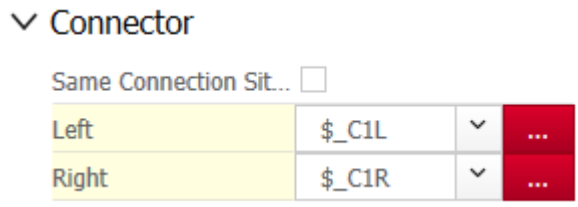


7.2.1 Using the variables for the connection situation

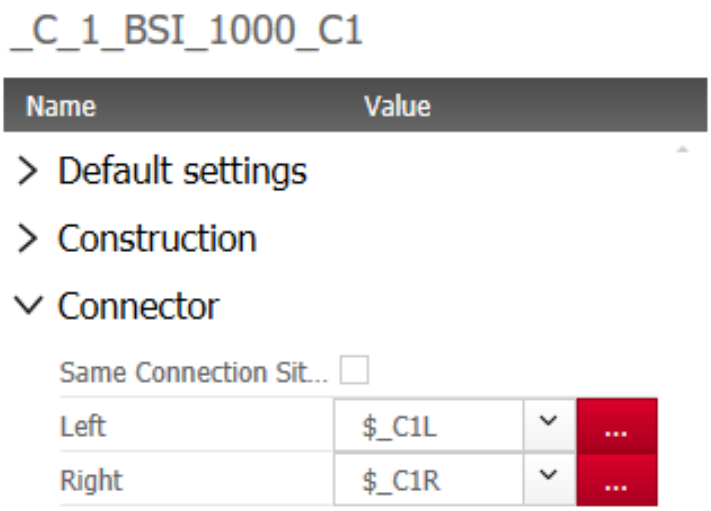
The CPs of top and bottom shelves have connection situations entered. Now return to the graphic and open the top shelf in the Element Manager (Modify Article -> Select article at top shelf -> Right-click-> open the Element Manager in the Article Designer at the top shelf via the 3-Point-Button).



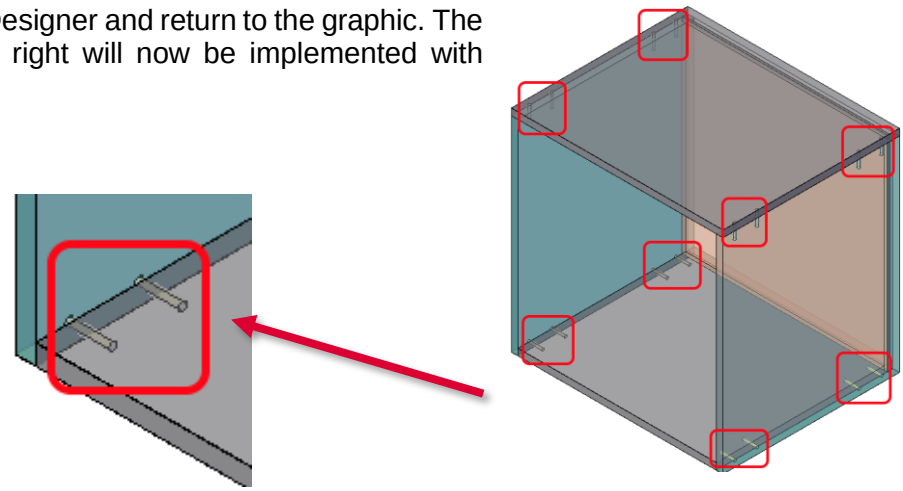
Now enter the newly created variables “$_C1L” and “$_C1R”, save the top shelf CP and apply the newly defined CP in the Article Designer.



Repeat the procedure for the bottom shelf CP “_C_1_BSI_1000_C1”.

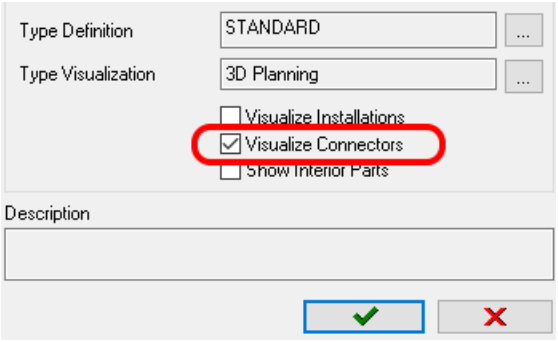


Now exit the Article Designer and return to the graphic. The connections left and right will now be implemented with dowels.

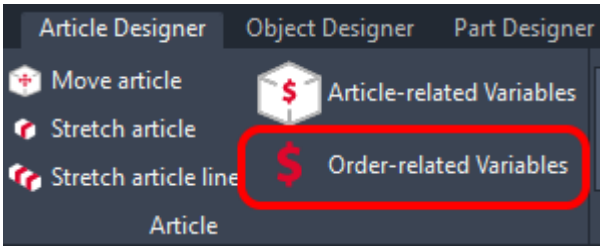


Hint

In the event no dowels are displayed, first check the setting in the Visu Manager.



If no dowels are visible despite the fact that the check box “Visualize Connectors” has been selected, open the dialog box “Order-related Variables”.



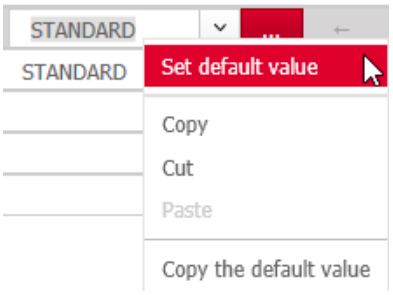
Name	In order	Type	Default Value	Order Value
_Customer	No	Family		
_Construction	No	Family		
_Carcass_construction	No	Family		
_Connectors	No	Family		
_C1L	Yes	Connection Situation	Dowel	STANDARD
_C1R	Yes	Connection Situation	Dowel	STANDARD

Change the order value “STANDARD” to “Dowel”, …

_Connectors	No	Family		
_C1L	Yes	Connection Situation	Dowel	Dowel
_C1R	Yes	Connection Situation	Dowel	Dowel

… by simply…

- Typing in “Dowel”
- Assigning the connection situation “Dowel” via the 3-Point-Button
- Selecting “Set default value” or “Copy the default value” on the shortcut menu



… putting the article together again with the new settings.

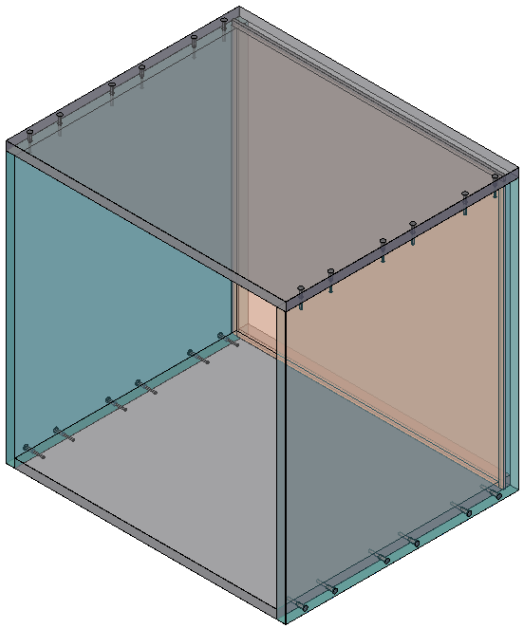
7.2.2 Article-related changes to the connection situation

Now change the connection situation to “Confirmat” (screwing).

Open the dialog box “Article-related Variables” and enter “Confirmat” as connection situation left and right.

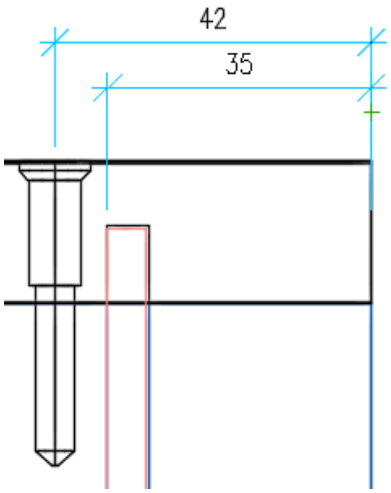
Name	Type	Default Value	Order Value	Article value	Category	Comment
_Customer	Family			←		
_Construction	Family			←		
_Carcass_construction	Family			←		
_Connectors	Family			←		
_C1L	Connection Situation	Dowel	Dowel	Confirmat	_Carcass	Connection situation left
_C1R	Connection Situation	Dowel	Dowel	Confirmat	_Carcass	Connection situation right

The carcass connections are now implemented by screwing.



8. Back panel vs. dowels and screws

The variable back panel inset means there is now a possibility of some overlap between dowels and screws in conjunction with the back panel position. To avoid this, the value of the variables “$_BPI” must be considered when distributing dowels and screws.



Dowels and screws are distributed by means of linear divisions. To be able to react flexibly to different carcass depths, the linear divisions are created in so-called descriptors. Different linear divisions representing the different lengths of the components to be connected together are stored in descriptors.

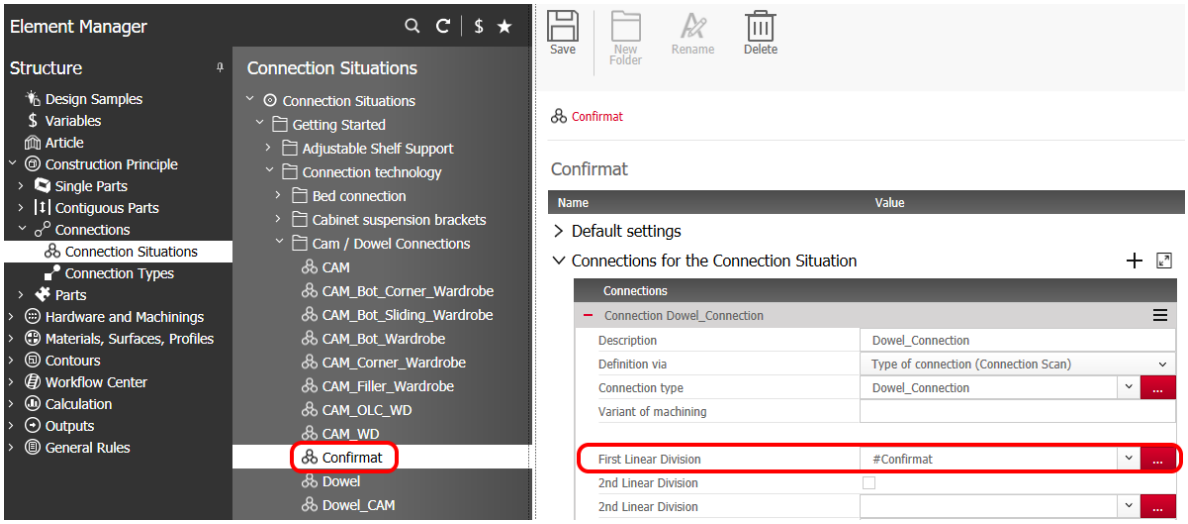
8.1 Descriptor for screwing

8.1.1 Descriptor basics

First of all, we will look at the descriptor of screwing. In the Organizer, open the connection situation “Confirmat”. In the opened connection you will find “#Confirmat” entered as the attribute for “First Linear Division”.

Hint

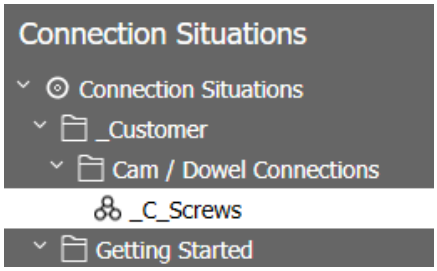
You can always recognize **descriptors** in value fields by the prefixed “#”.



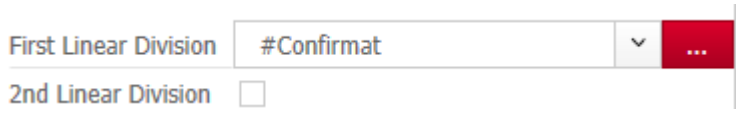
8.1.2 Adapt descriptors

As you will now be creating a new descriptor and assigning the connection situation in the following exercise, you should first create your own connection situation. You do that in precisely the same manner as you are familiar with when creating a CP and PD.

- Allocate a new name for the connection situation: "_C_Screws"
- Save
- Create your own folder "_Customer"
- Move the connection situation "_C_Screws" into your own folder

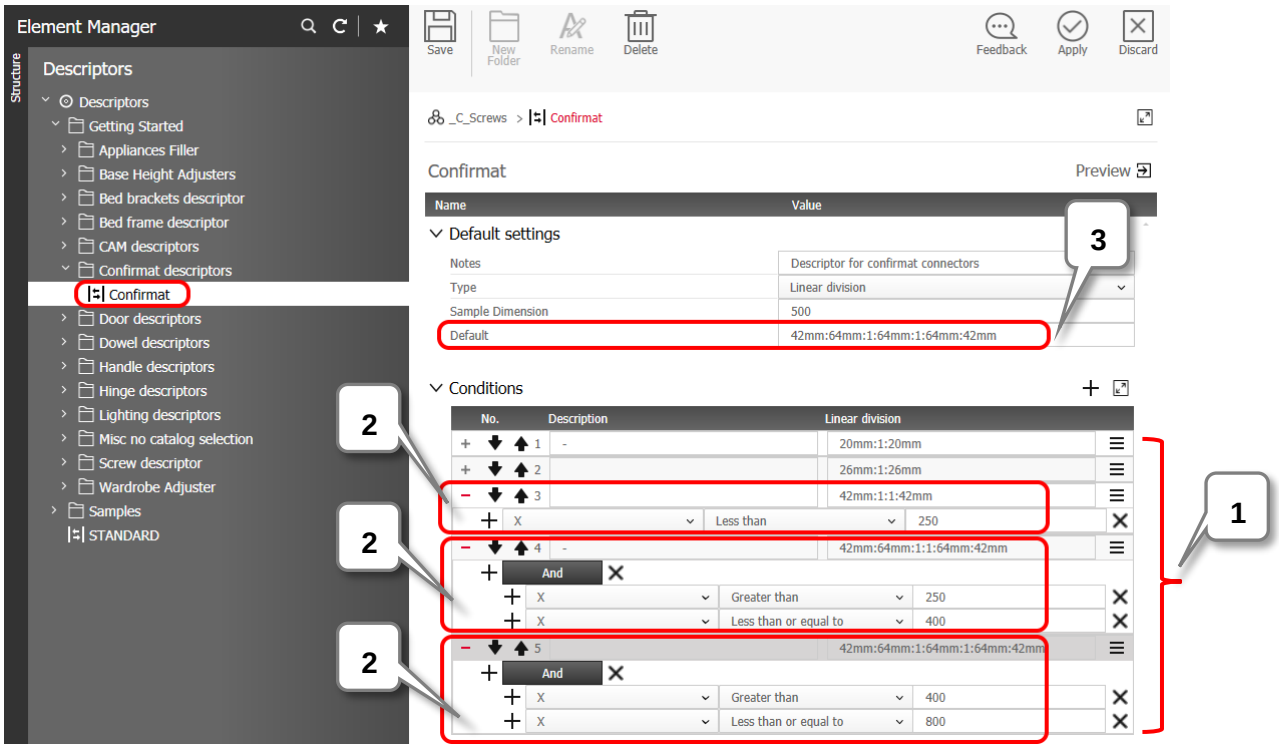


Now click the red 3-Point-button and open the descriptor "#Confirmat".



Hint

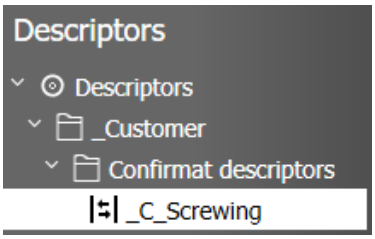
Open the descriptor so that you have the same view of the descriptor as displayed below.



The descriptor "#Confirmat" contains 5 different linear divisions (1), which are executed according to defined, stored conditions (2). A 6th linear division (3) is used as default, when none of the predefined conditions applies.

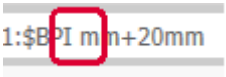
Of interest for the following adaptations are the conditions in which the last screw is placed at a distance of 42mm from the rear. They are the linear divisions circled in red. You will now ensure that the variable for the back panel inset “$_BPI” affects the distance of the last screw from the rear. Instead of a distance of 42mm, the last screw is to receive a distance of “**Back panel inset + 20mm**”.

Before you make any changes to the descriptor, save it under “_C_Screwing” and move the descriptor to your own folder “_Customer”.



Now change the entry “**42mm**” to “**$_BPI mm+20mm**” in the 4 highlighted linear divisions.

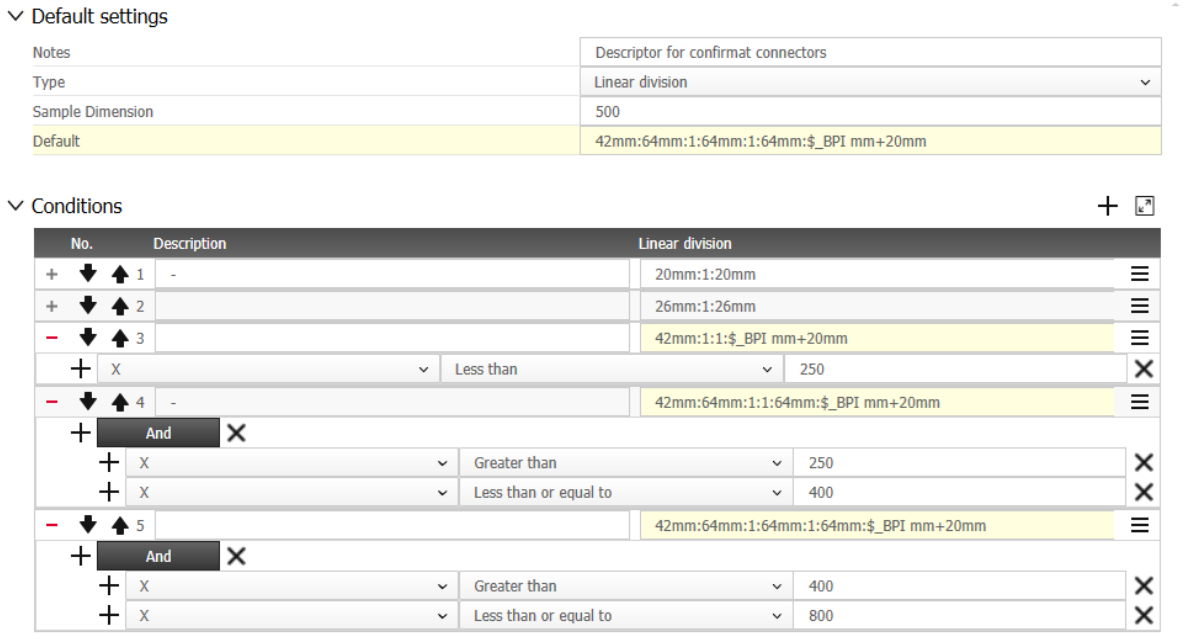
Hint



Make sure you insert a space between the variable name “$_BPI” and the unit “mm”.

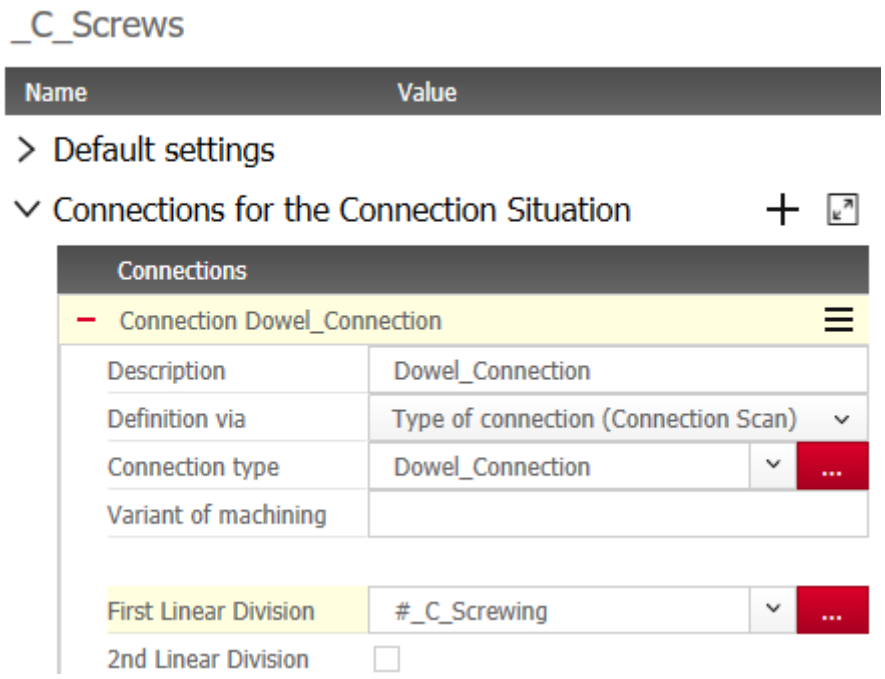
“$” ensures that imos recognizes that “a variable follows”. imos understands the space to mean the end of the variable name. There must be no space between a number and a unit. If a linear division does not deliver the desired result, the reason often turns out to be a space between the number and the unit.

Change the linear divisions as depicted below; save the new descriptor …



… and apply it to the new connection situation “_C_Screws” that you have just created. Save the changed connection situation as well.

The descriptor for the screwed carcass or rather the back panel inset has been adapted and can now be tested.

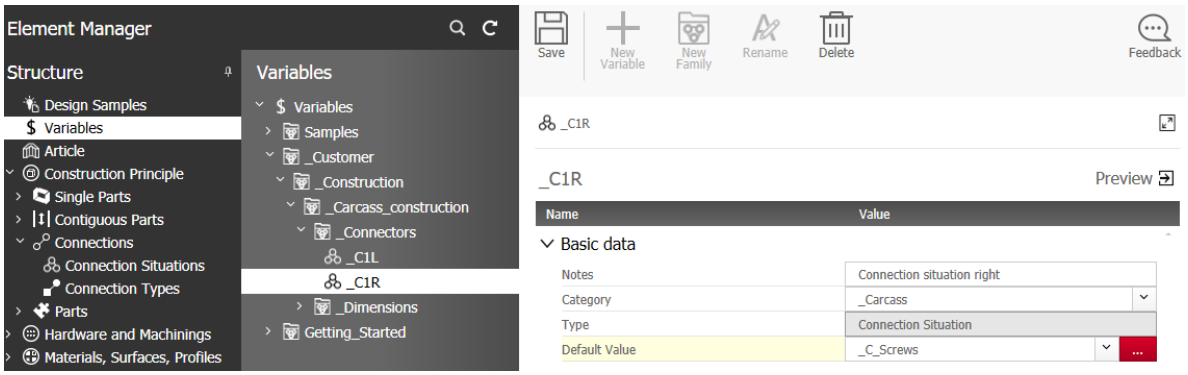


8.1.3 Using the adapted descriptor

The new descriptor “_C_Screwing” will now be used in a connection of the equally new connection situation “_C_Screws”. To use the new descriptor, you will now assign the connection situation “_C_Screws” to the variables “$_C1L” and “$_C1R”.

8.1.4 Default value for the variable connection situations “$_C1L” and “$_C1R”

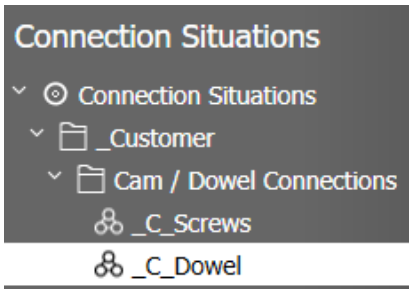
Now assign the new connection situation “_C_Screws” as the default value to your variable connection situations “$_C1L” and “$_C1R”.



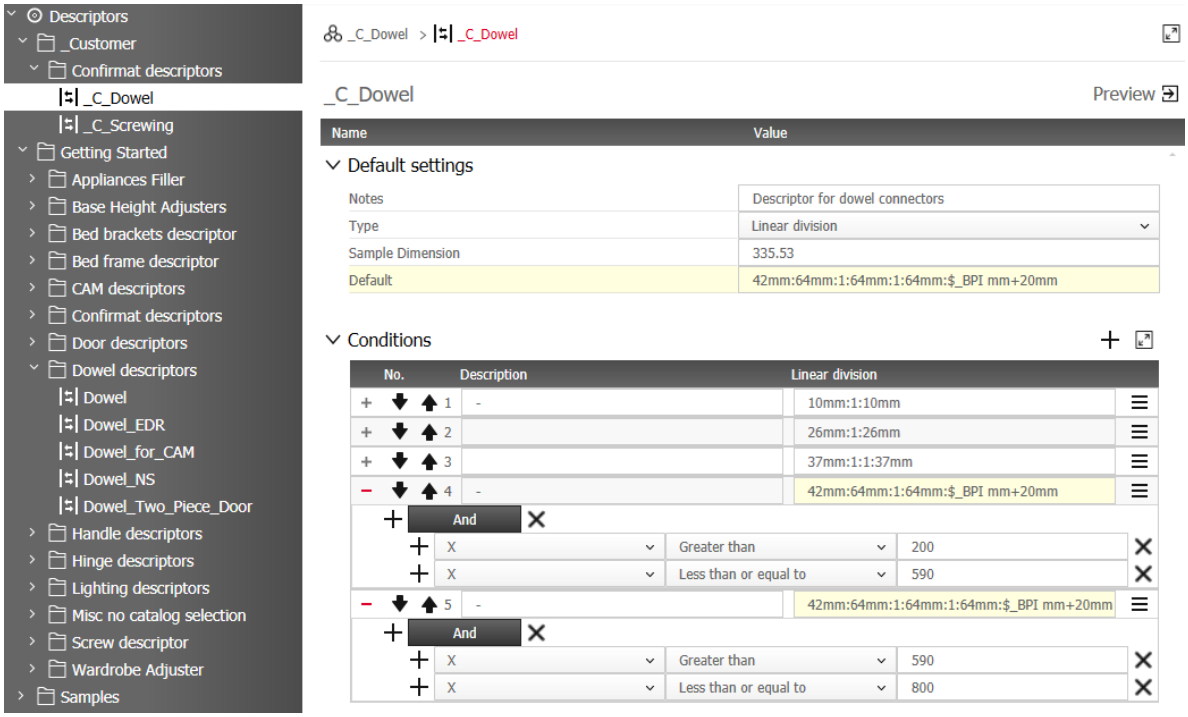
8.2 Descriptor for the dowel connection

Repeat the steps shown in 8.1 by yourself to adapt the descriptor for the dowel connection as well, to ensure the variable back panel inset is also taken into account.

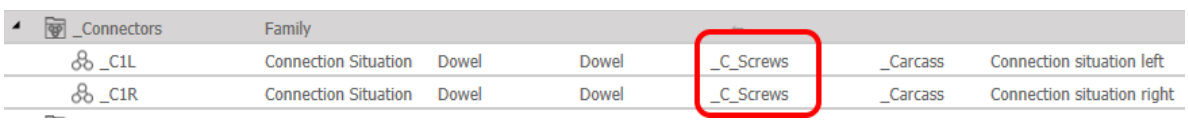
Connection Situations:



Descriptor:

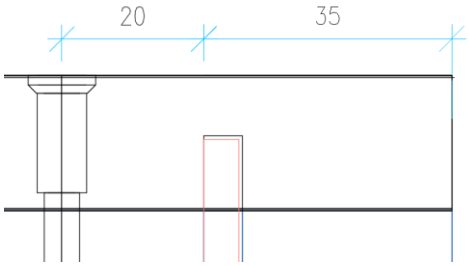


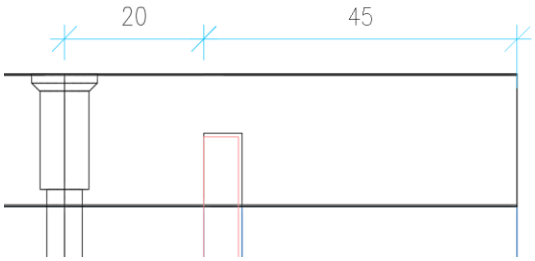
To do so, open the **Article-related Variables** in the graphic for the article “Variables_cabinet” and assign the connection situation as shown below.



Click on 

and allow the article to be put together with the new values. Check the distance of the rear screw connection to the back panel and to the rear edge of the carcass. Test your descriptor with different back panel insets.





Hint

Working with variables for material, surface and profiles will be implemented in the next exercise using this article as well.