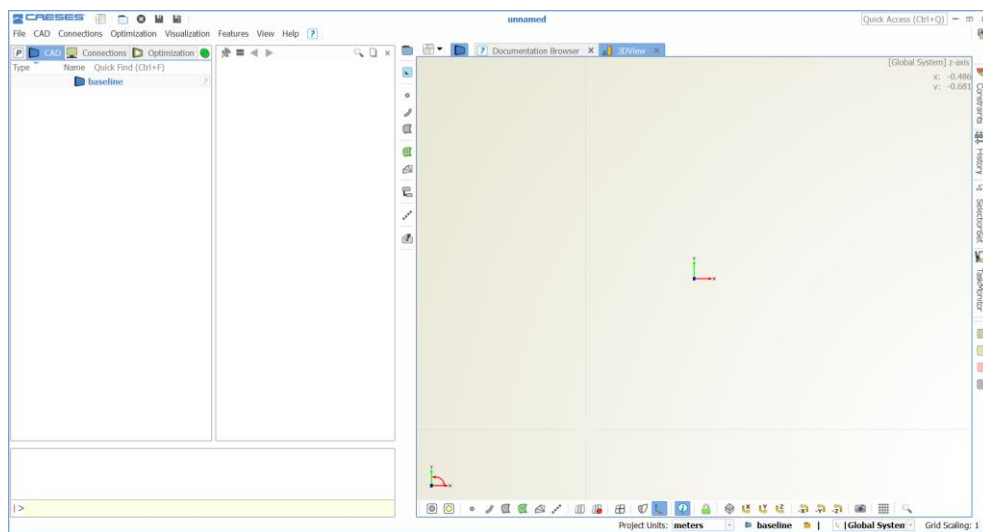


Overview



Graphical User Interface (GUI)

This tutorial will give you an overview over the CAESES GUI and teach you the basics on how to use the program. You will learn about the implemented functionality's, which will make the usage more comfortable and enable you to do the other tutorials we offer to get your first projects started.



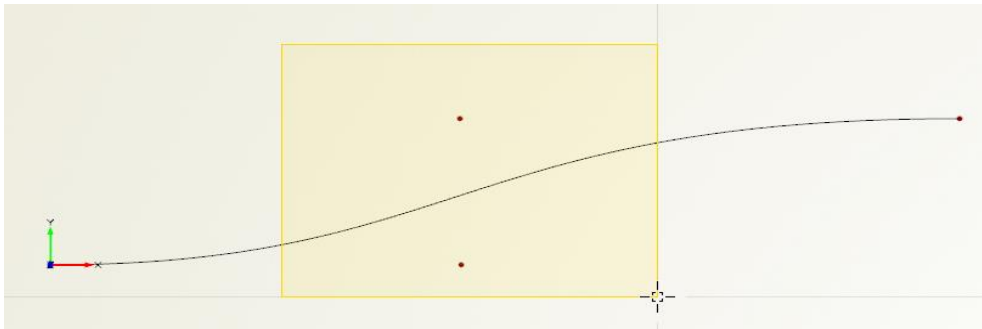
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1

3D Navigation and Selection


The following keyboard shortcuts and mouse actions are provided for navigation and selection in the 3D view (LMB: left mouse button · MMB: middle mouse button · RMB: right mouse button):



Zoom Options

- ▶ Zoom directly by scrolling with the mouse wheel.
- ▶ Pull a rectangle with SHIFT + LMB from upper left to lower right (zoom in).
- ▶ Pull a rectangle with SHIFT + LMB from lower right to upper left (zoom out).

Rotation Options

- ▶ Rotate by moving the mouse while holding the RMB.
- ▶ Use the arrow keys to rotate the view around the central coordinate system.
- ▶ Use the x-, y- and z-buttons at the bottom of the 3D window to select a plane view.
- ▶ Change the x-, y- and z-buttons into isometric perspectives by clicking the isometric view button  .

Selection Options

- ▶ Click onto an object with LMB to select.
- ▶ LMB + CTRL to select multiple objects.
- ▶ Pull a rectangle with LMB from upper left to lower right (selects enclosed objects) .
- ▶ Pull a rectangle with LMB from lower right to upper left (selects “touched” objects).

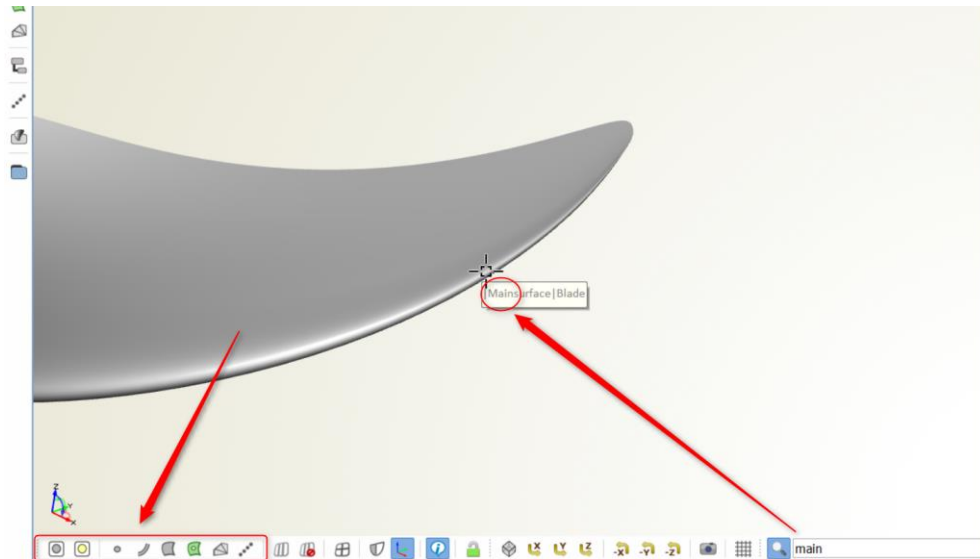
Moving Options

- ▶ Move the mouse while holding the MMB to move the scene.

2

3D View

Objects can be filtered and focused in the 3D view. In particular, type and name filters are very helpful to get a quick view of relevant items.



- Zooms into the entire model or into the selected object(s) only. This is helpful if you need to get back to a global view again.



- Filters for specific types e.g. points (*FPoint*), curves (*FCurve*) and surfaces (*FSurface*). Take care if you mix this filter functionality with individual visibilities of the created objects which will be explained in “Visibility of Objects” on page 17.



- Filter for objects with specific names or whose names consist of parts of the given string. Separate multiple strings by commas. Write “!” in front of the name or string as “not”.



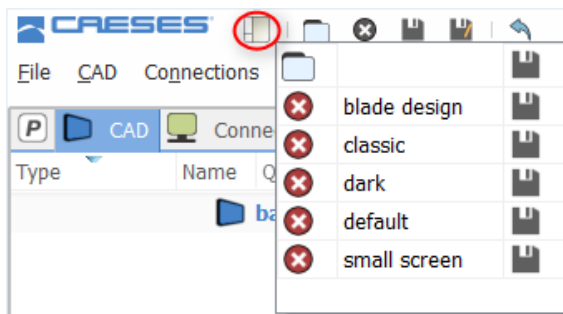
- The camera symbol in the top right corner allows you to save the camera position you have currently adjusted. Name the position and save in order to find it available next to the camera symbol.

3

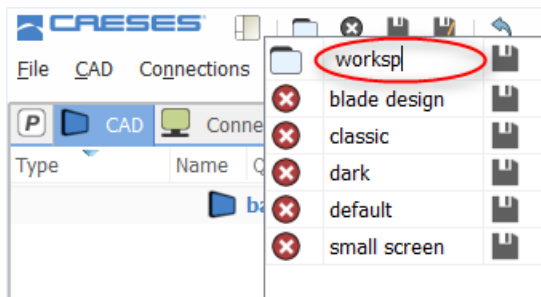
Workspace

When working on certain projects it can be useful to have different window alignments. CAESES offers different alignments and designs to choose from, as well as the possibility to shape your own workspace and save it.

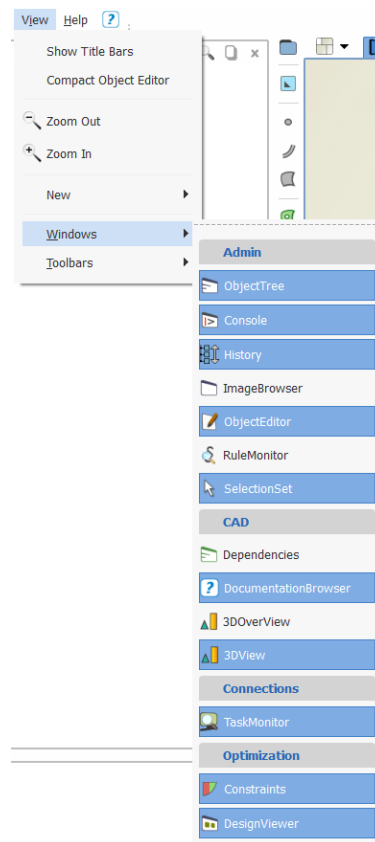
- To select a workspace click on the workspace button in the upper right corner.



- Windows can be added via *View > Windows*.
- If you want to save the current workspace write into the textbox next to the folder symbol and press enter.



- The new workspace will now be part of the list and can easily be loaded independently from the project.

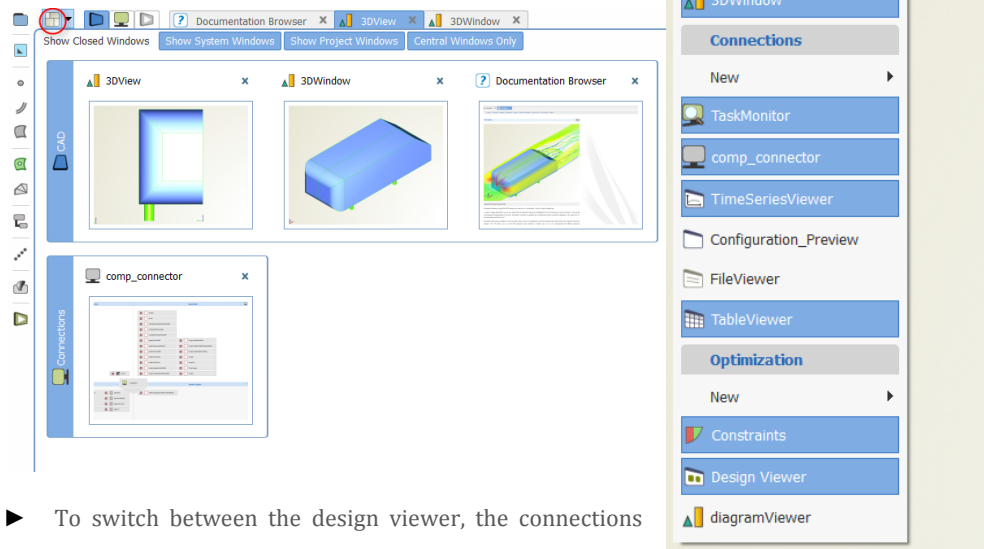





4

Widgets

The interface allows using multiple windows, for example several 3D viewer's and the documentation browser. These windows are related to the design view. In order to keep a clean and simple workspace CAESES offers multiple widgets for the design view, software connection and optimization, as well as an overview window.

- Click the arrow as shown in the picture, to see which windows you can add and which objects you can create.
- If you click the symbol next to the arrow you will see an overview of all windows that are currently in the project. This will allow you to navigate through your project more easily.



- To switch between the design viewer, the connections and the optimization working spaces select the corresponding symbol.  for CAD,  for connections and  for the optimization.

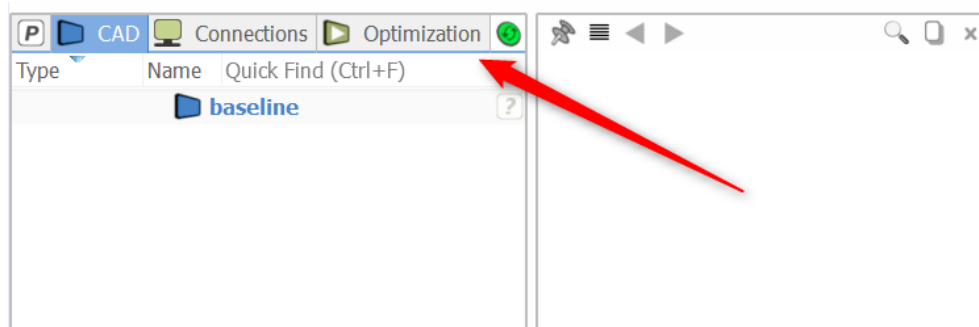


The connection and optimization symbol will only be visible if you have created a connection or an optimization.

5

Object Tree

The object tree has four tabs which are related to the menu structure of CAESES. Here is a brief overview:



P General Settings

- ▶ Project item for adding user documentation.
- ▶ Administration of global objects that are project-independent (in addition, see also *menu > file > settings* for more global options).

CAD

- ▶ Model geometry.

Connections

- ▶ Configurations for external software (e.g. CFD).
- ▶ Computations of external software (application setup, links to executables, SSH setup, etc).
- ▶ Results of external computations e.g. for result post-processing.
- ▶ Visualization toolbox for access to post-processing settings.

Optimization

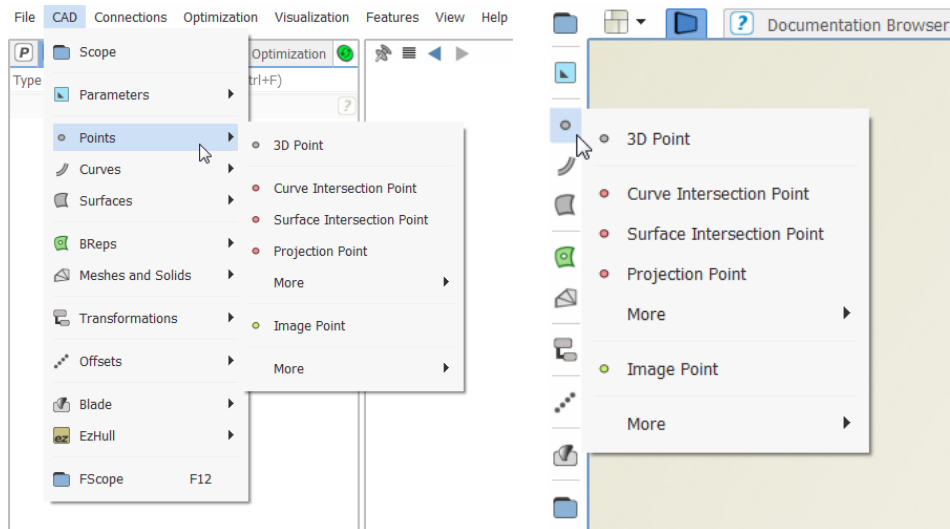
- ▶ Design engines i.e. variation and optimization strategies.
- ▶ Design tree which shows generated variants.
- ▶ Equality and inequality constraints.

6

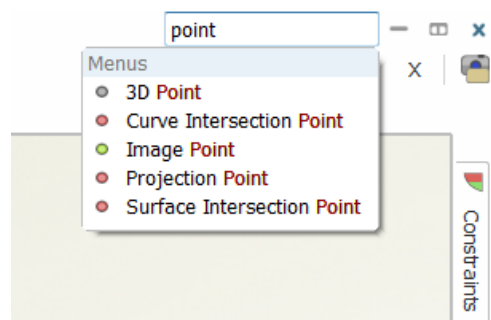
Creating Objects

In CAESES there are numerous objects that allow you to form a 3D model. There are a few possibilities to create these.

- Expand the CAD tab and select the object you want to create as shown in the picture on the left.
- Alternatively you can use the toolbar between the object tree and the 3D viewer.



- Another way is to use the quick access search bar that can be found in the top right corner. Type the name of the object you want to create and click it from the list. The quick access will also show object's that are within the project and contain the text you entered in their name.



If there are no symbols shown in the object tree check our forum by clicking the link below:

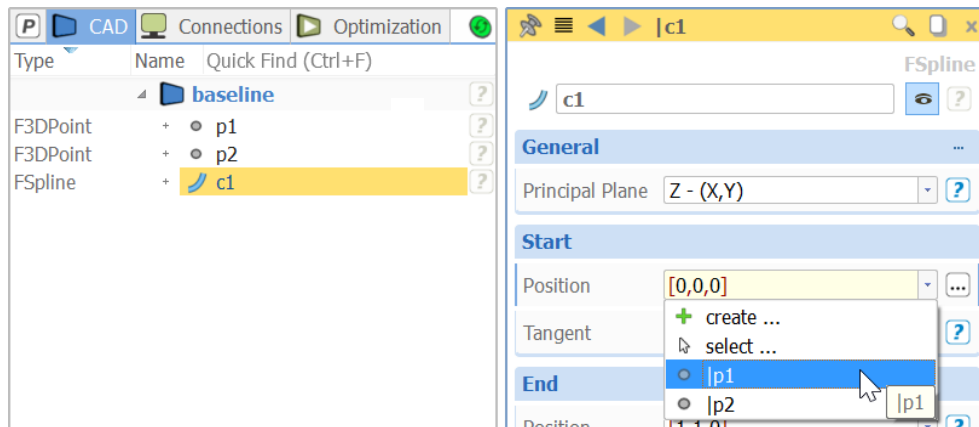
[Missing Object Symbols Forum](#)

7

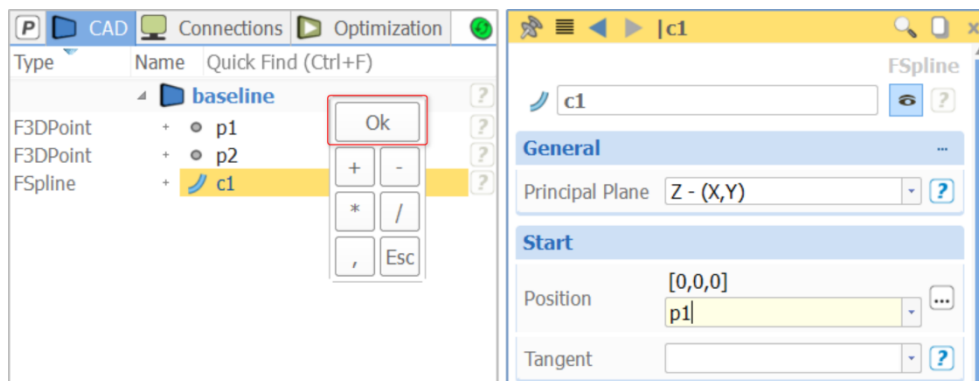
Connect Objects

Normally objects are created as shown in the previous step. In addition, objects can be created directly from a parent object. This will result in a connection between parent and child.

- From the pull down menu of an editor, choose either project objects (e.g. “p1” in the screenshot) or create new objects via “create ...”.



- There is also the possibility to use the “select” mode, which allows you to select the object either from the object tree or the 3D view. To finish the selection either click into free space or press “OK” in the small dialog shown in the picture below.



- For list input (e.g. adding points to a curve), use the keys “ESC” or “ENTER” to leave the select mode.

8

Scopes

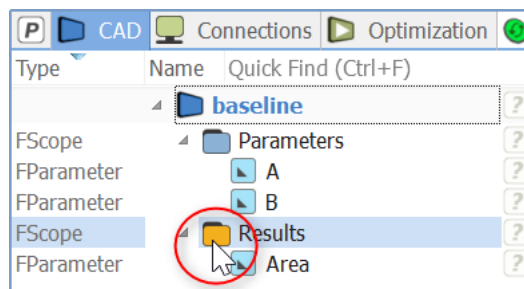
Scopes help to structure and organize objects in the *object tree*. This can be helpful in large projects.

When a scope is created, the current selection will automatically be checked and all selected objects will be transferred into the new scope:

- Select the target objects and create a scope via *menu > CAD > scope*.

Scopes can also be activated so that all newly created objects are automatically put into the scope.

- Click on a scope with the MMB for activation. All objects created now will be moved into that scope automatically.
- Click on the baseline with the MMB if you want to return to the initial state.



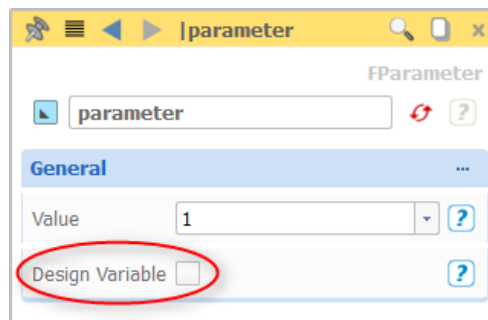
- ✓ You can assign a global color to a scope. All objects in this scope will then have this color, unless the objects themselves have a specific color assignment.

9

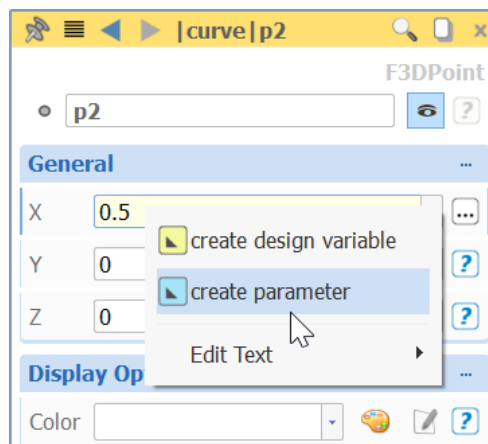
Inserting Parameters and Design Variables

Typically key numbers are stored as *parameters*. This allows us to re-use them in different objects while changing them in only once. *Parameters* can also contain discrete values or expressions (e.g. “sqrt(a+b)”).

Design variables can are similar to *parameters*, but can only hold discrete values. *Design variables* are used in *design engines* to create variations automatically. To switch between *parameters* and *design variables* there is a check box.



- *Parameters* can be created via *CAD > parameters* and *design variables* via *optimization > design variables*.
- A *parameter* or *design variable* can be connected directly to any selected floating-point number in the object editor. Right click the selected number and choose which one you want to create.



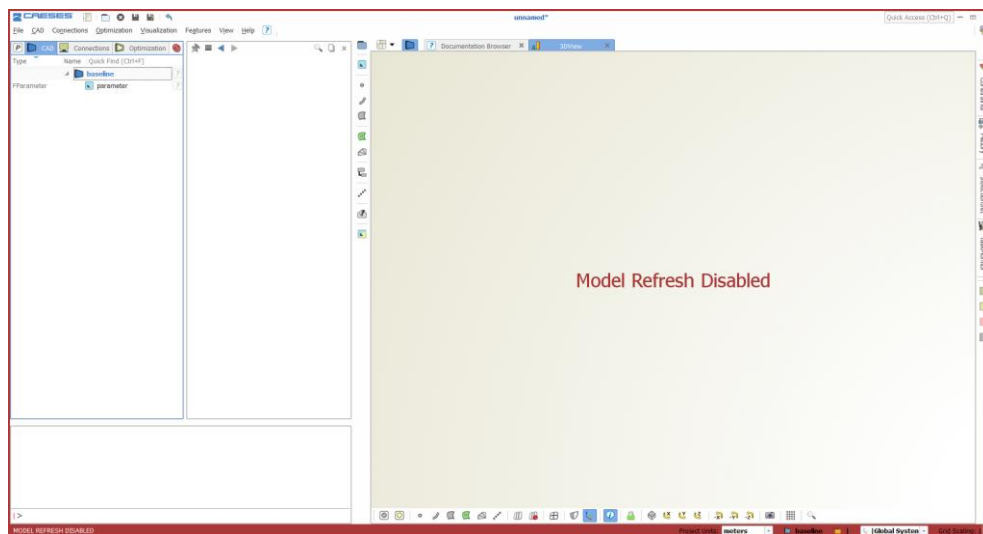
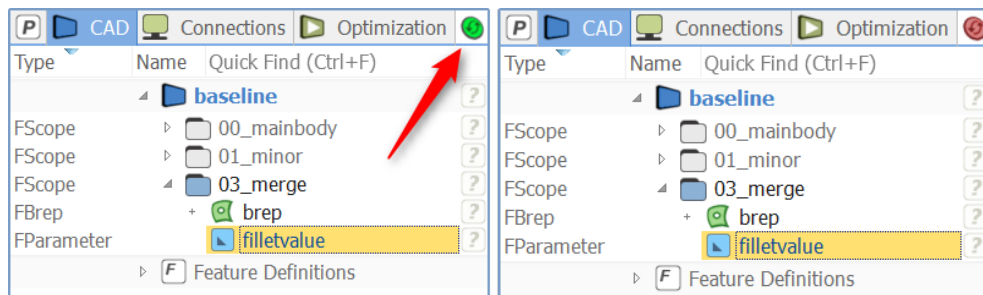
10

Disable Model Refresh

In complex models, the update i.e. refresh process can be time-expensive.

In the object tree you can temporarily switch off the update process. This allows you to change a set of parameters, and update the model only once.

- ▶ Click on the green update icon at the upper right corner of the object tree widget.
- ▶ Change the model via *parameters* and *design variables* etc.
- ▶ Click on the (now) red update icon again in order to refresh the model.

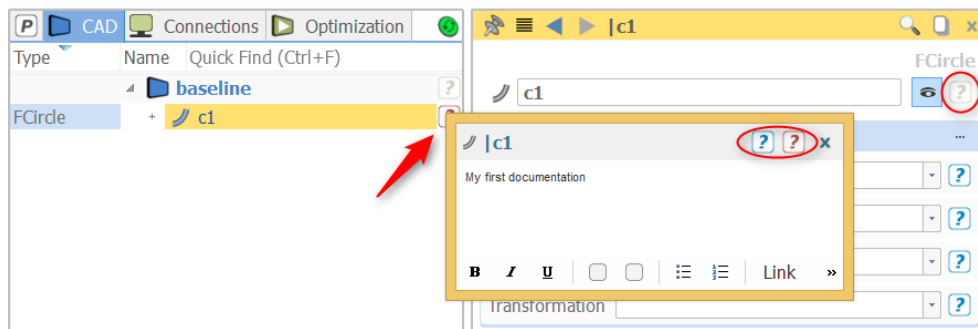


11

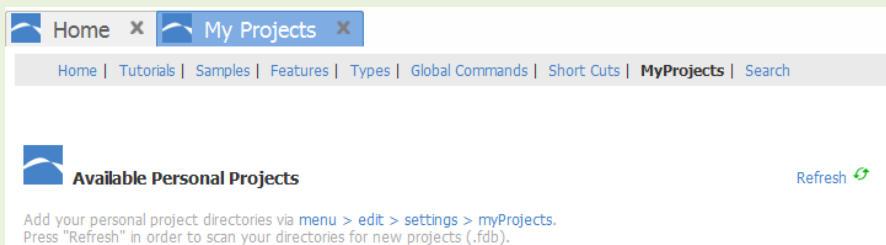
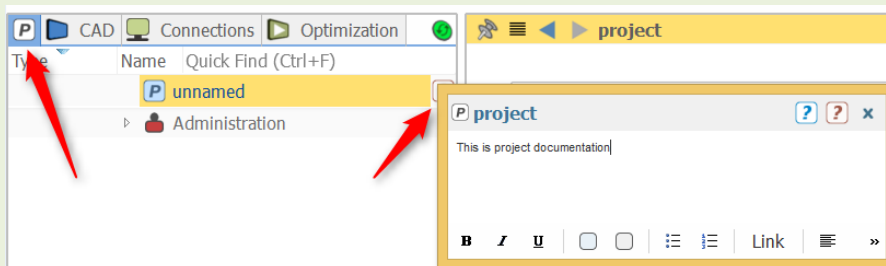
Documentation of Objects

Documentations can be created for each object in the project. These documentations can include description and screenshots, etc.

- In order to read or add documentation, click on the “?” icon either in the object tree next to the object or, when the object is selected, on the right to the name.



- ✓ The project item can also be seen as an object for which user documentation can be added in the same manner as described above (see the first screenshot below). This documentation can then be displayed on start-up of the project and it can be shown as a preview in the project list of the documentation browser (see second screenshot).

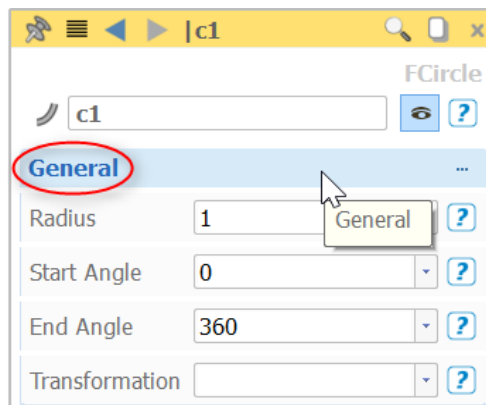


12

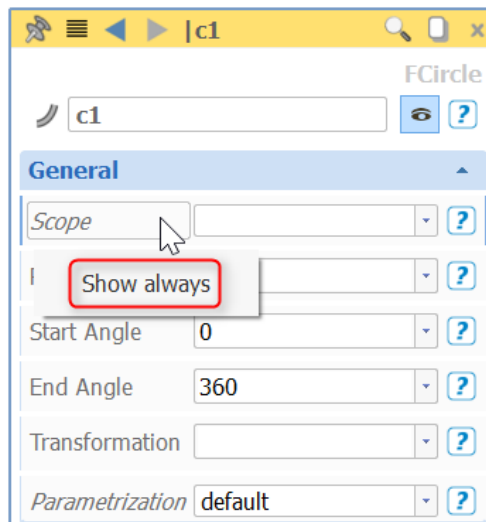
Categories

Category tabs group the different properties of an object. There are primarily and secondary properties. Primal properties are always shown in a category tab. Second properties are hidden and can be accessed by the following action:

- Click onto the header of the category to show more options (e.g. "General").



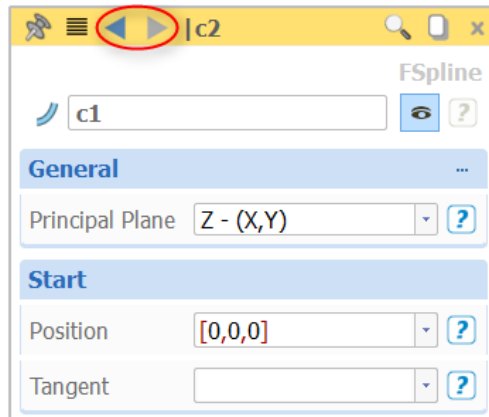
- User Customization: Left or right click onto a property label in order to permanently show / hide the option.



13

Navigating through selected Objects

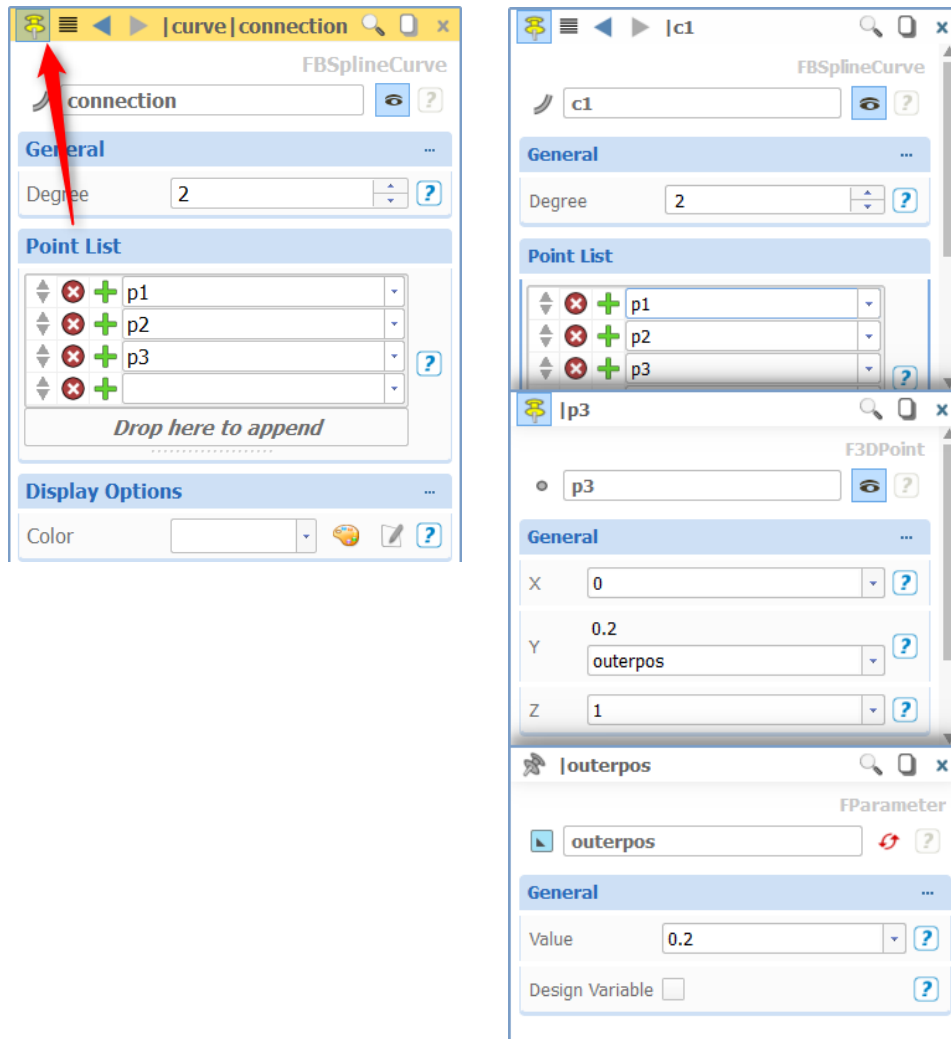
Use the two arrow buttons at the top of the object editor in order to go back and forth between the previous selections. This is helpful in projects with a lot of objects where it can be unclear where to find the previous selection again.



14

Pin Object Editor

Pin an object in the object editor so that it's not lost with the next selection. This is helpful if you for example want to fill up the properties of an object with multiple drag & drop actions. You can also pin multiple objects.

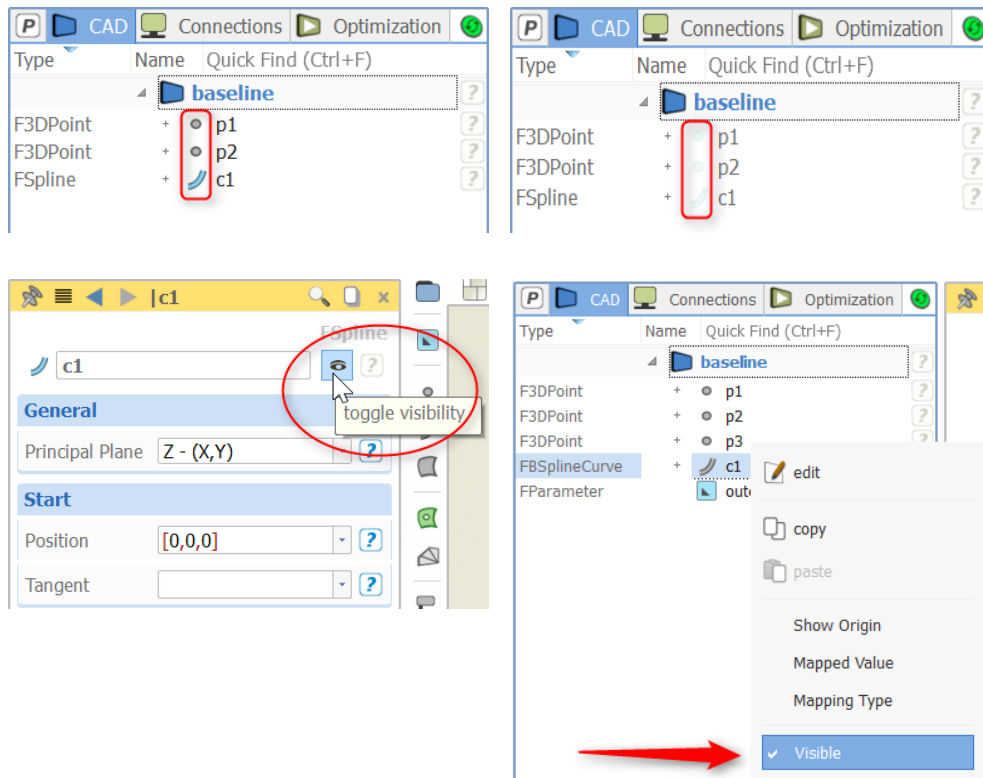


15

Visibility of Objects

All created objects can be set invisible or visible by using one of the following options:

- ▶ Click on the type icon in the object tree in order to set the object invisible/visible.
- ▶ Alternatively, use the icon in the object editor.
- ▶ Or RMB click the object and uncheck or check the visibility.




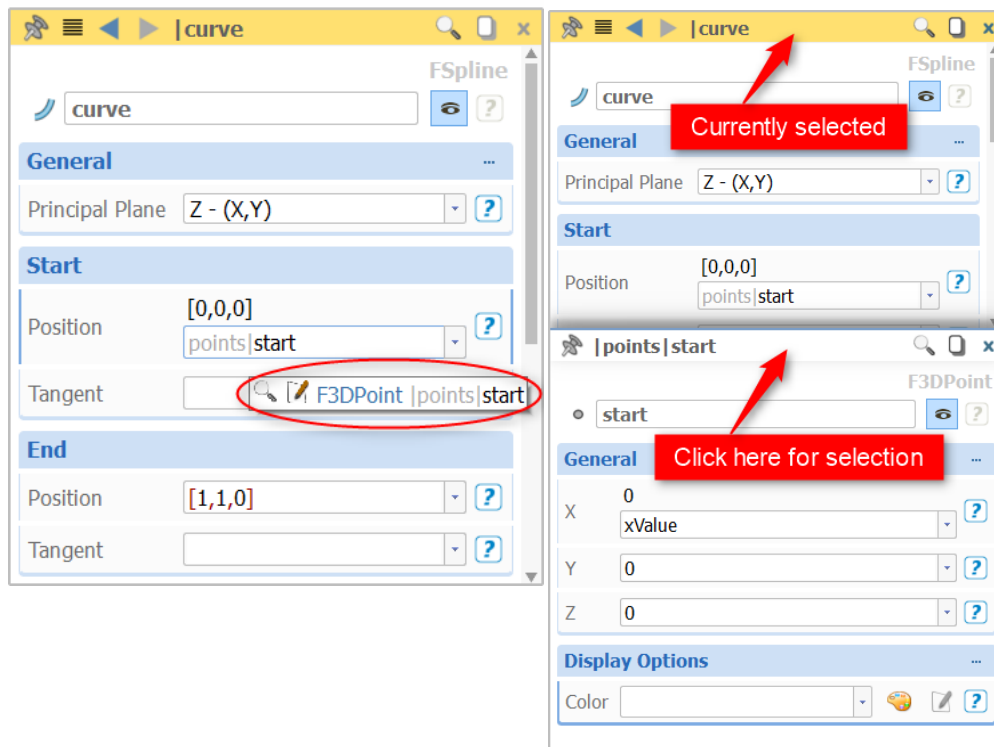
✓ Invisibility of objects sometimes leads to irritation when you accidentally click on the icon in the object tree without noticing.

16

Quick Edit of Objects

Objects can be edited by simply selecting them. In addition, a short cut is available:

- ▶ Click on the edit icon  that appears when moving the mouse over objects in editors.
- ▶ The editor window that shows up is not selected by default (e.g. the lower “start” window in the second figure). Click on the header of “start” in order to select it (the color changes into a pale yellow; e.g. “[curve” is currently selected).
- ▶ Keep the left mouse button pressed in the header section (of “start”) in order to move it.

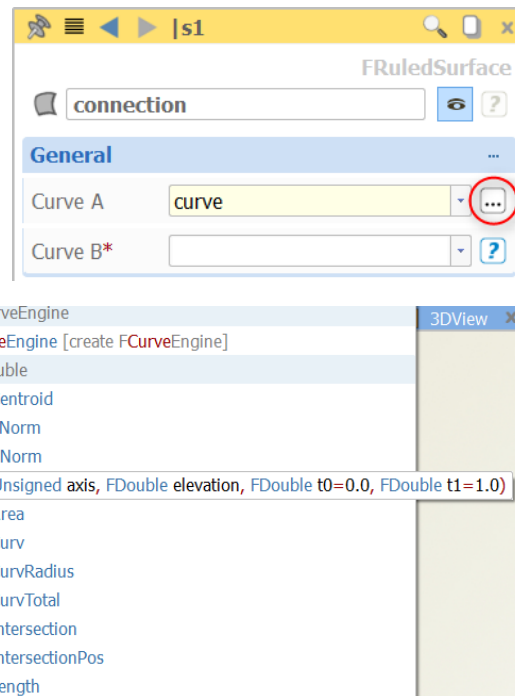


17

Auto-Completion

As mentioned above, each created object is based on a specific type. The commands are available and depend on the object type (e.g. for receiving object related values, such as the radius of a circle, etc.). The auto-completion function lets the software complete expression:

- In editors, use the “...” button for auto-completion support.
- Also when typing into an editor, the console or within feature definitions, choose CTRL + SPACE for auto-completion.



- ✓ Use the auto-completion in order to complete expressions (e.g. the name of an object which can be very long in complex projects), or to receive a list of possible commands and options as well as function arguments etc. For instance, typing “myCurve.get” and then CTRL + SPACE will list all of the available commands of the myCurve object that start with “get”.

This is especially helpful when writing feature definitions in CAESES.

- ✓ If the combination of CTRL + SPACE doesn't work check our forum by clicking the link below:

[Auto-Completion Forum](#)

18

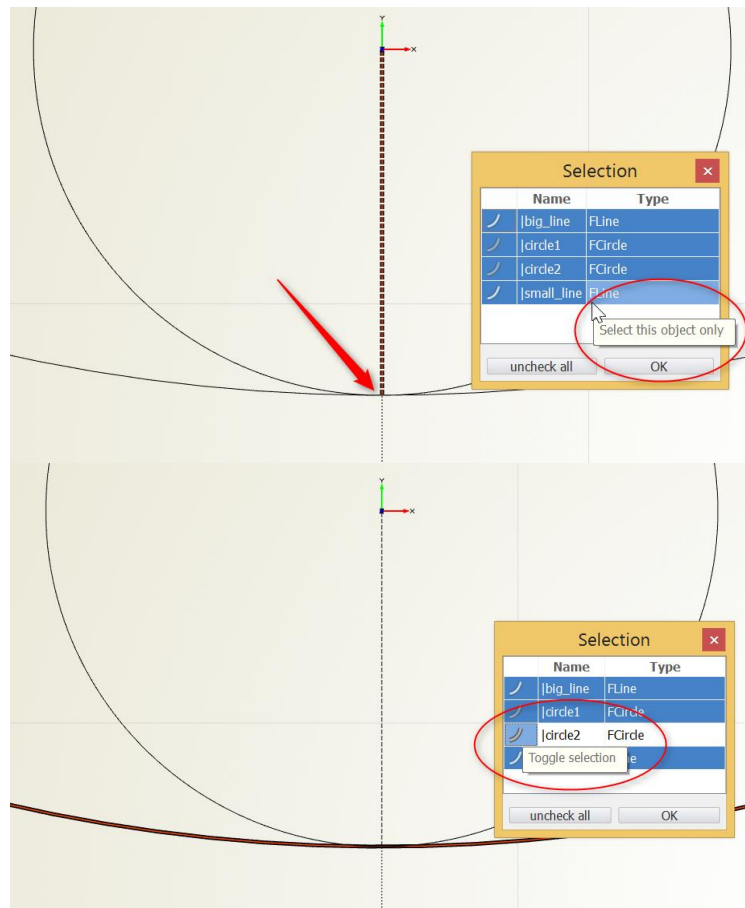
Drag & Drop

Connect your objects via drag & drop actions. Objects can be dragged into editors either from the object tree or from the 3D view.

- Keep the left mouse button pressed while selecting an object for dragging.

In the 3D view it might happen that you select more than just one object e.g. when they are coincident. In this case, a menu lets you choose which one(s) will be dragged:

- Click on the item in the selection list and keep the left mouse pressed for drag & drop.



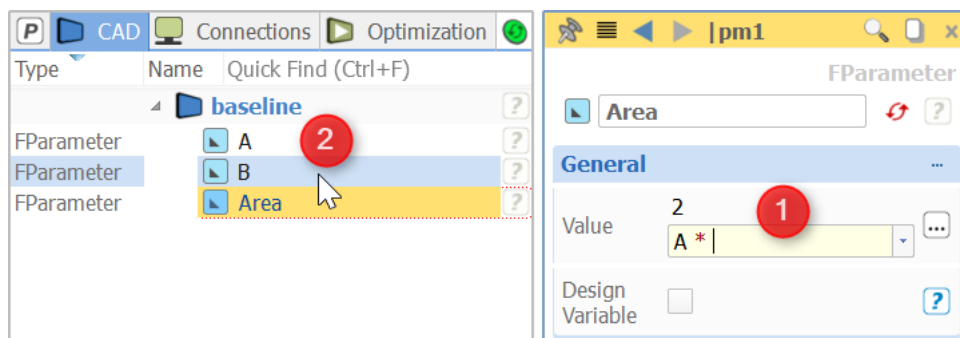
✓ Note that drag & drop of objects e.g. from one scope into another does not have an effect on the relationships between objects.

19

ALT-Key

In addition to drag & drop, the ALT-key can also be used to quickly paste an object name into an editor. In some situations this operation is faster and more convenient than drag & drop.

- First put the cursor on the target location in the editor (step 1, below).
- Then, press the ALT-key and click on an object in the tree or 3D view to paste the name to the cursor position (step 2, below).



If the combination ALT + left click doesn't work check our forum by clicking the link below:

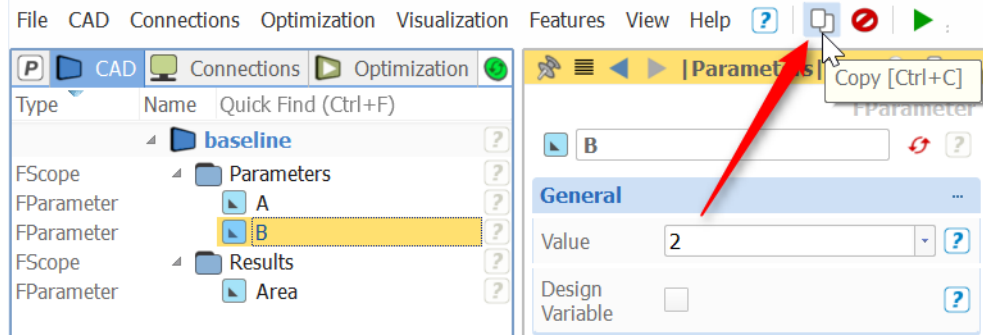
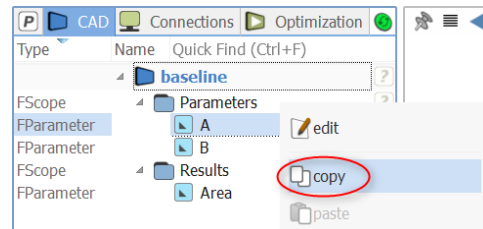
[Alt-Key Forum](#)

20

Copy & Paste

Copy & paste can be used for objects and scopes.

- By using the shortcuts CTRL-C and CTRL-V.
- By using RMB choose *copy* or *paste*
- By using the icons on the top toolbar.

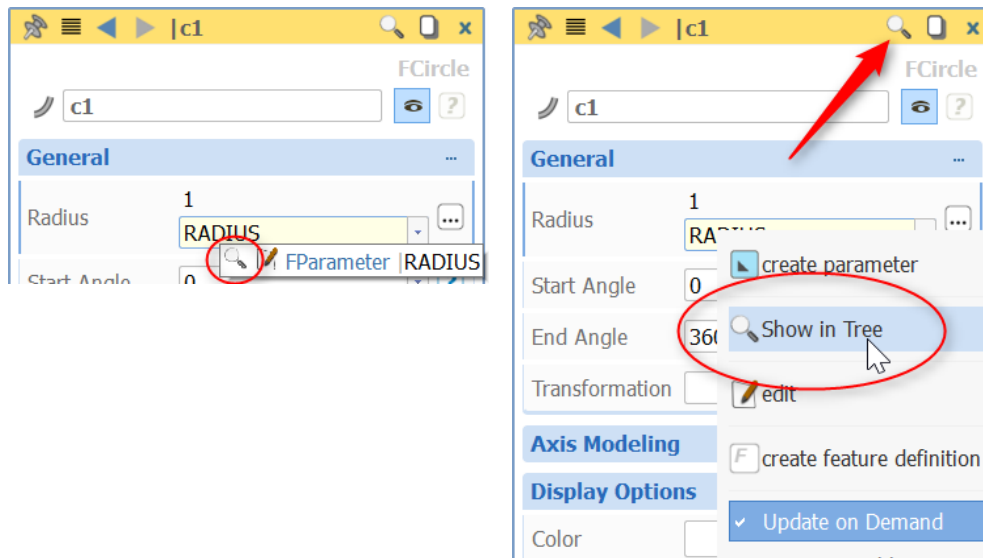


21

Show in Tree

This allows you to quickly locate an object in the object tree.

In large projects it can sometimes be difficult to locate an object in the tree. This functionality is available in the context menu in the 3D view, in the object editor when applied to any object in an editor field and in the tooltip simply move the mouse cursor over the object.

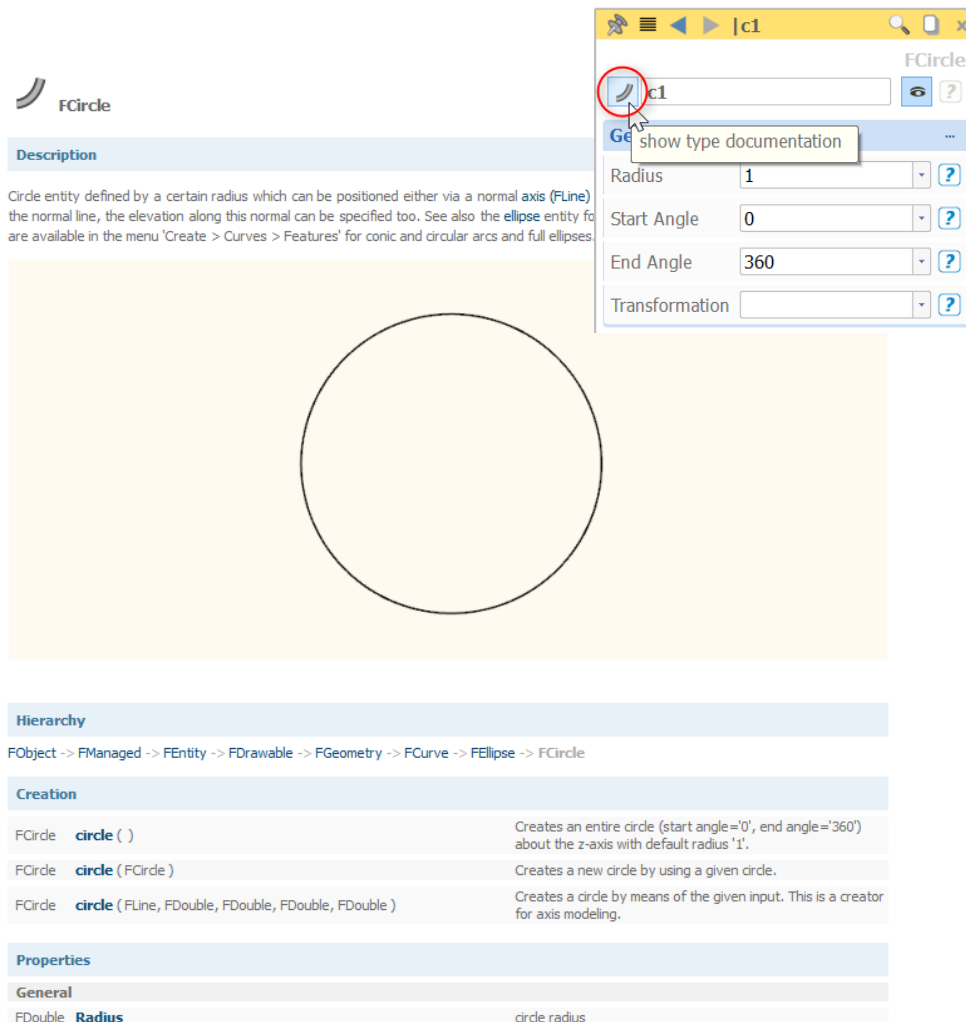


22

Documentation of Types and Properties

Each object within CAESES is based on a certain type for which documentation is available. Type documentation is shown in the documentation browser and lists all of the available commands for a certain type (types always start with "F" e.g. *FCircle*). This includes creation and property commands but also function commands that can be used for objects (i.e. instances) of this type. These commands can be used for receiving information from the objects as well as for setting values etc.

- Click on the type icon (upper left corner) of a selected object to show the type documentation or press "F1" on your keyboard.



FCircle

Description

Circle entity defined by a certain radius which can be positioned either via a normal **axis (FLine)** the normal line, the elevation along this normal can be specified too. See also the **ellipse** entity for are available in the menu 'Create > Curves > Features' for conic and circular arcs and full ellipses.

Hierarchy

FObject -> FManaged -> FEntity -> FDrawable -> FGeometry -> FCurve -> FEllipse -> FCircle

Creation

FCircle	circle ()	Creates an entire circle (start angle='0', end angle='360') about the z-axis with default radius '1'.
FCircle	circle (FCircle)	Creates a new circle by using a given circle.
FCircle	circle (FLine, FDouble, FDouble, FDouble, FDouble)	Creates a circle by means of the given input. This is a creator for axis modeling.

Properties

General

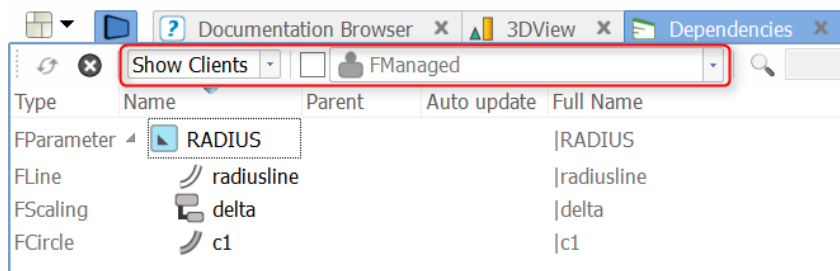
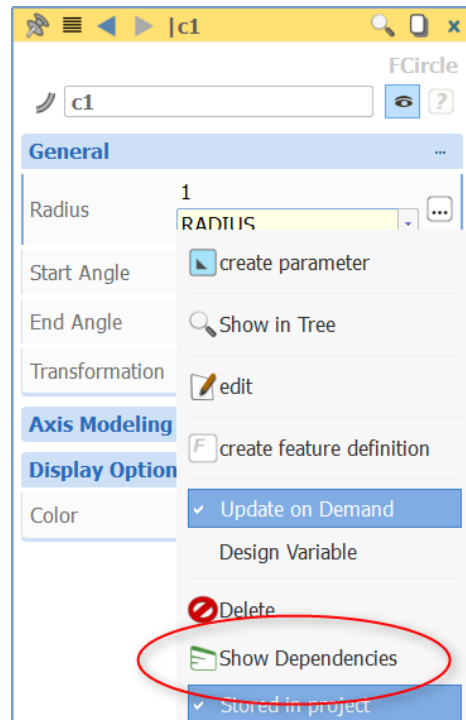
FDouble	Radius	circle radius
---------	---------------	---------------

23

Show Dependencies

This allows you to quickly track dependencies between objects. Clients and suppliers of an object can be shown.

- Use the context menu for an object and choose “Show Dependencies” so that the dependency viewer comes up. In this viewer, objects can also be selected for editing similar to the object tree.
- Alternatively, drag & drop objects into this viewer.
- Suppliers and clients of an object can be listed.
- In addition, this list can be filtered by certain types (activate the pull-down menu at the top of the viewer and choose a type filter).

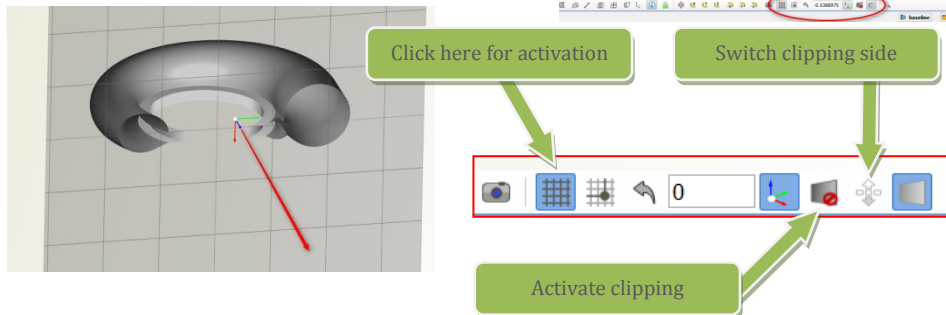


24

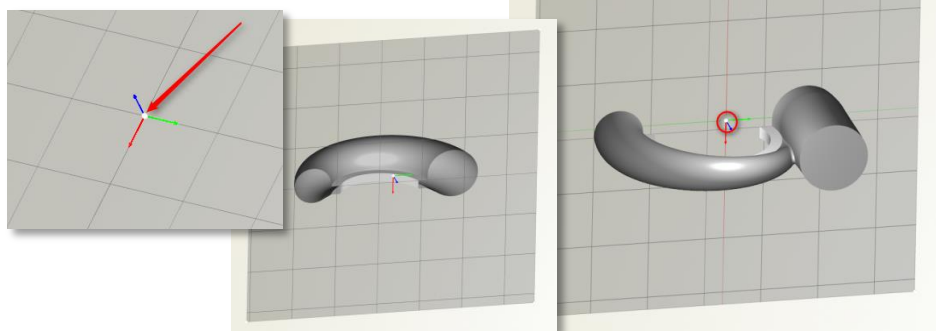
Display Plane and Clipping Plane

Plane view and clipping are available in the 3D view: A simple plane can be switched on and additionally used for clipping the 3D scene.

- ▶ Activate the plane via the corresponding button in the 3D view (or press F6).
- ▶ Click on an axis (x, y, z) of the plane handle in order to activate a specific plane axis (or press F7).
- ▶ Drag an axis of the handle to move the plane, alternatively add the amount you want to move in the field between the arrow and the coordinate symbol or use SHIFT + Mouse wheel.
- ▶ Activate clipping by selecting the plane symbol with the red mark.



- ▶ Click on the white center point of the handle to reverse the clipping direction (or press F8).



- ▶ Drag the corner points of the plane in order to resize it. Note that this does not affect the clipping functionality.

