

Flexible PCB Automation (FP9)

BPA Delivery 6 for V5R19 (V5.6)

User Guide

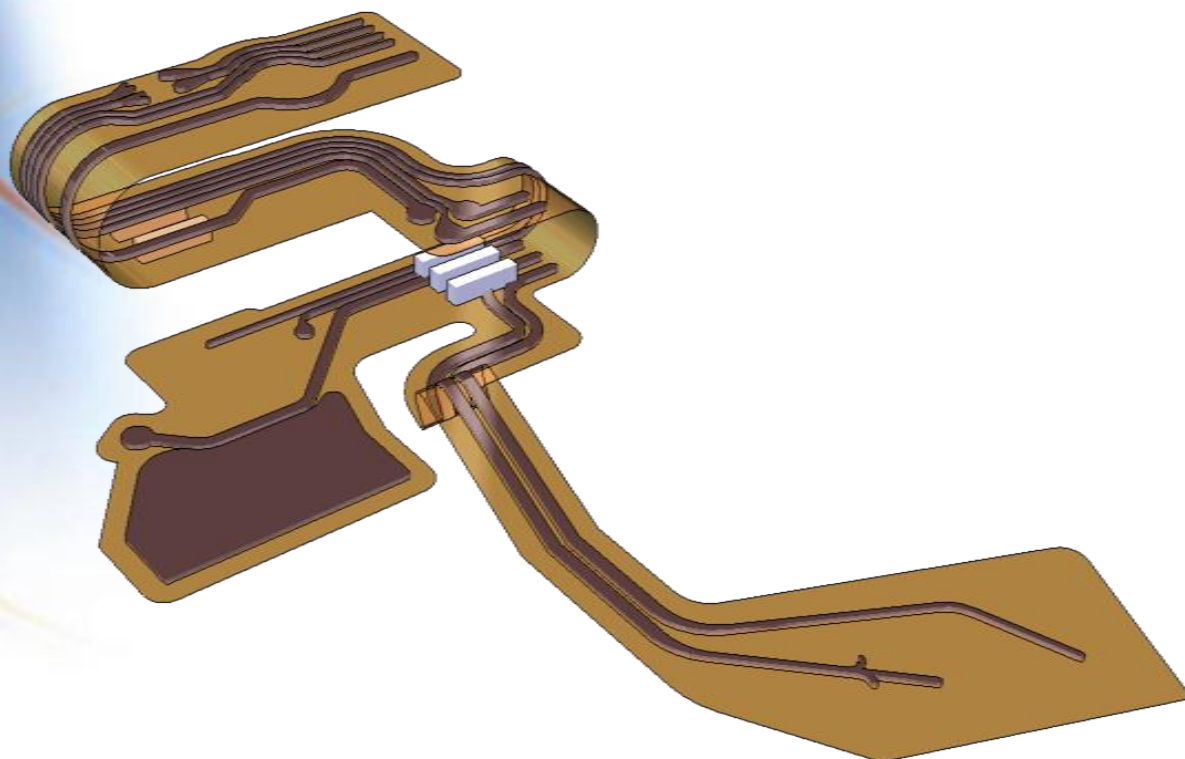


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Flexible PCB deliverables


The Flexible PCB deliverables are provided as an executable package including the following functions:


1. Constraint Area 


Creation of 3D zones to help the electronics engineer for the FPCB Layout: Where are the zones for components? Where are the zones forbidden to components? Where the bend (flex) areas are?
2. Fold/Unfold Board 


It flattens and folds a master sheet metal part, attached components and constraint areas
3. Component Placement 

Attach and place a mechanical component onto a flexible PCB. With this function, the attached components will move along with the sheet metal model's flattening and folding.
4. Generate CBD Part 

Formatting of the Sheet Metal model into a ready for export flattened board. The specification tree structure allows an easy drafting generation.
5. Update CBD Part 

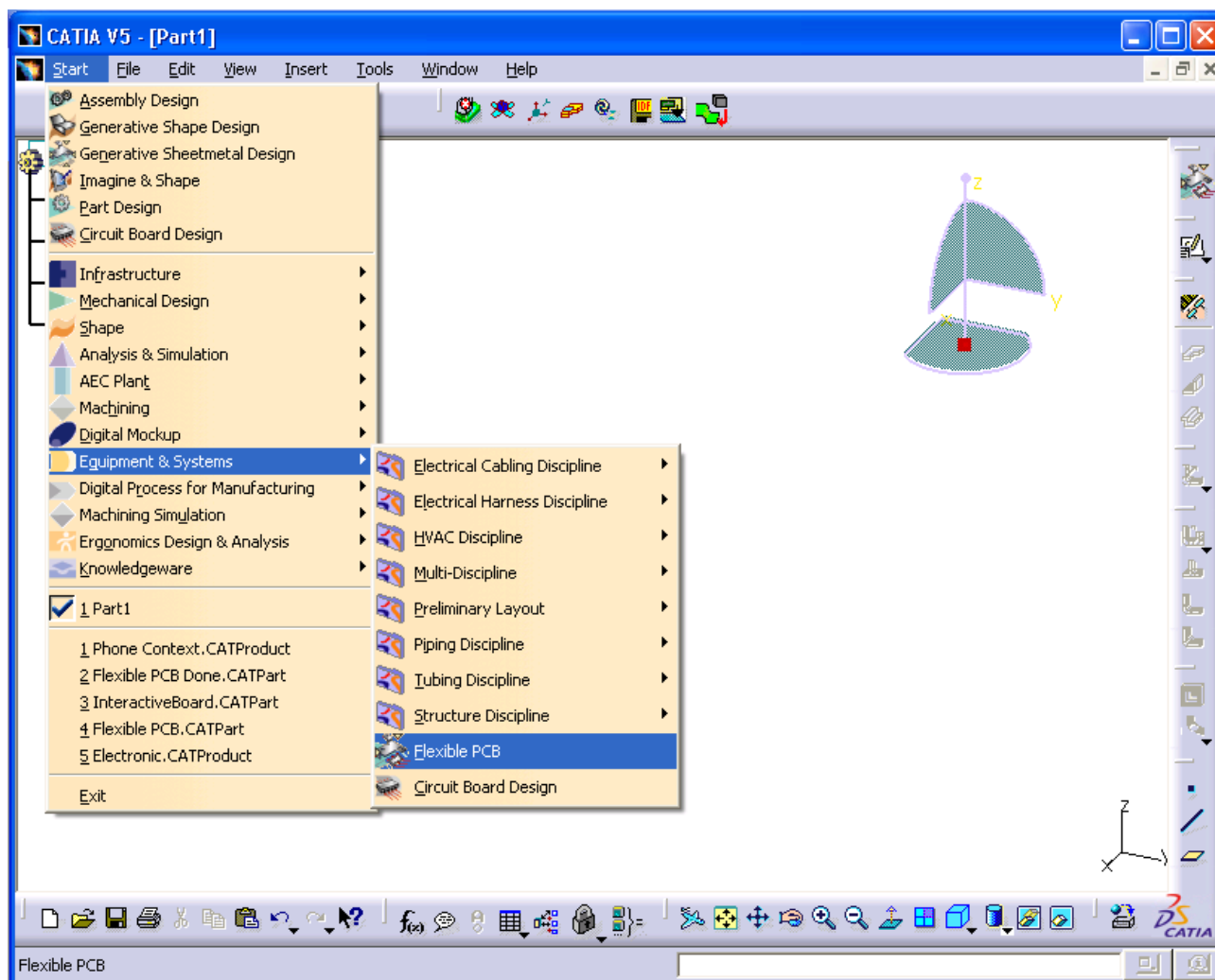
The master sheet metal model and the formatted model are fully associative through the use of this function
6. Export As IDF File 

It generates an IDF files that can be read by any EDA tool.
7. Import In Context 

It imports an IDF files and places it at the same location as its flexible PCB master model.
8. Refold Flexible Board 

It folds the constraint area and components of the imported IDF file according to the master flexible PCB part

These capabilities can be accessed through the use of a CATIA V5 workbench, available and accessible from menu Start/“Equipment and Systems”:



Generation of Constraint Area

There are several types of default constraint areas (please refer to the implementation guide for more details):

- Component Area
- Keep out Area
- Stiffener
- Cover Layer Opening

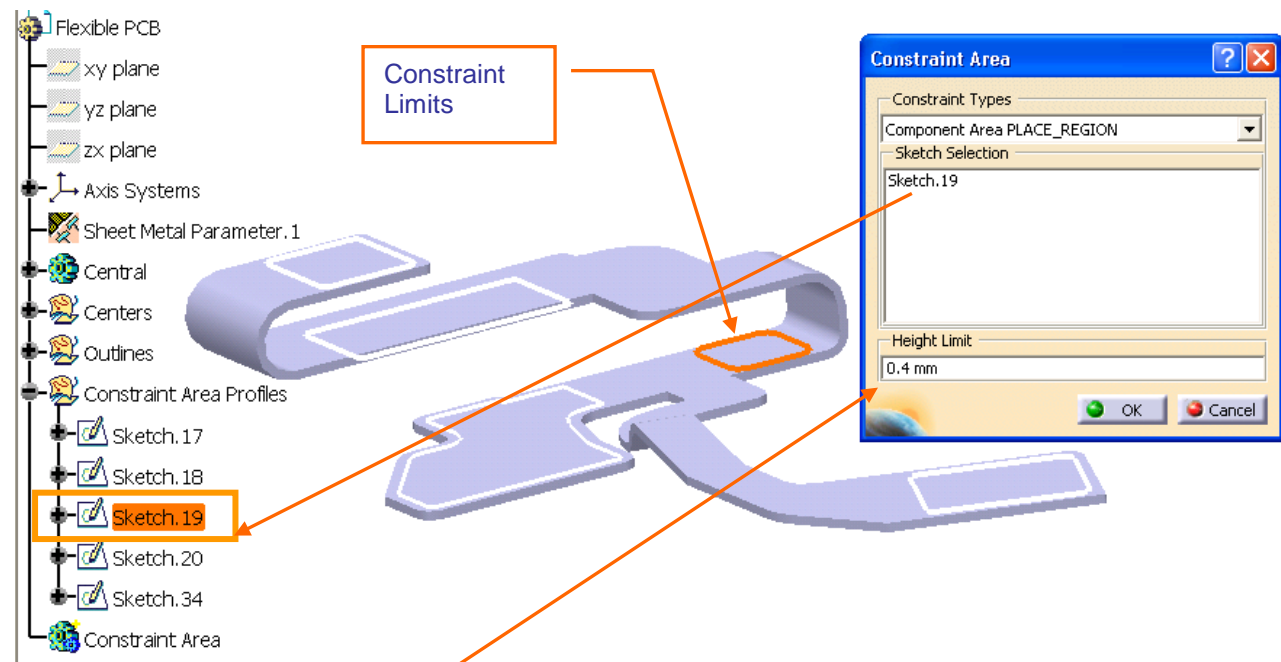
The creation of any type of constraint area follows the same procedure.

Here is an explanation for Component Area.



1. Select Function "Constraint Area"

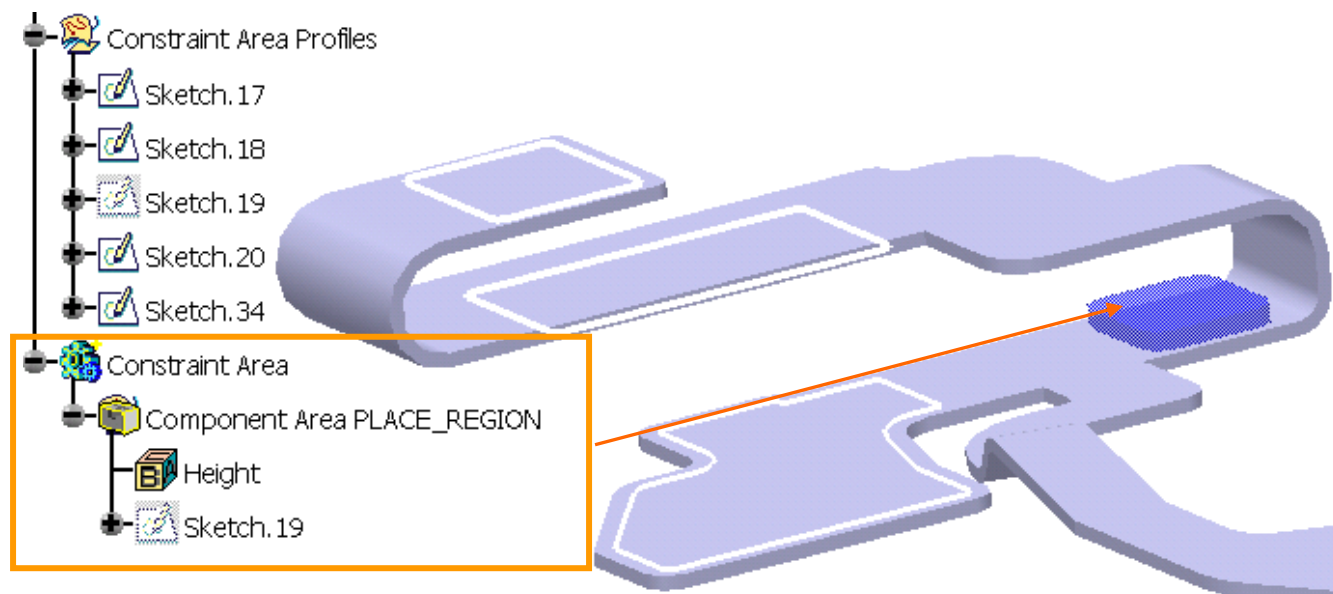
2. Select inputs required to create this area (e.g. the area profile and the last sheet metal feature in the 3D shape's body)



3. If necessary, set area's height

4. Press OK

A Pad for the Constraint Area's 3D shape in the folded view and a geometrical set group in the unfolded configuration are created.



A New solid body named "Constraint Area" with specific attribute is created. The specific solid body is name independent and unique. It can be created only one time. All the newly created Power Copy is aggregated under this body.

Multiple selections of sketches are allowed. Selection of Multi profile sketches is forbidden because It does not comply with the IDF standard.

Generating Flexible Main Circuit Board

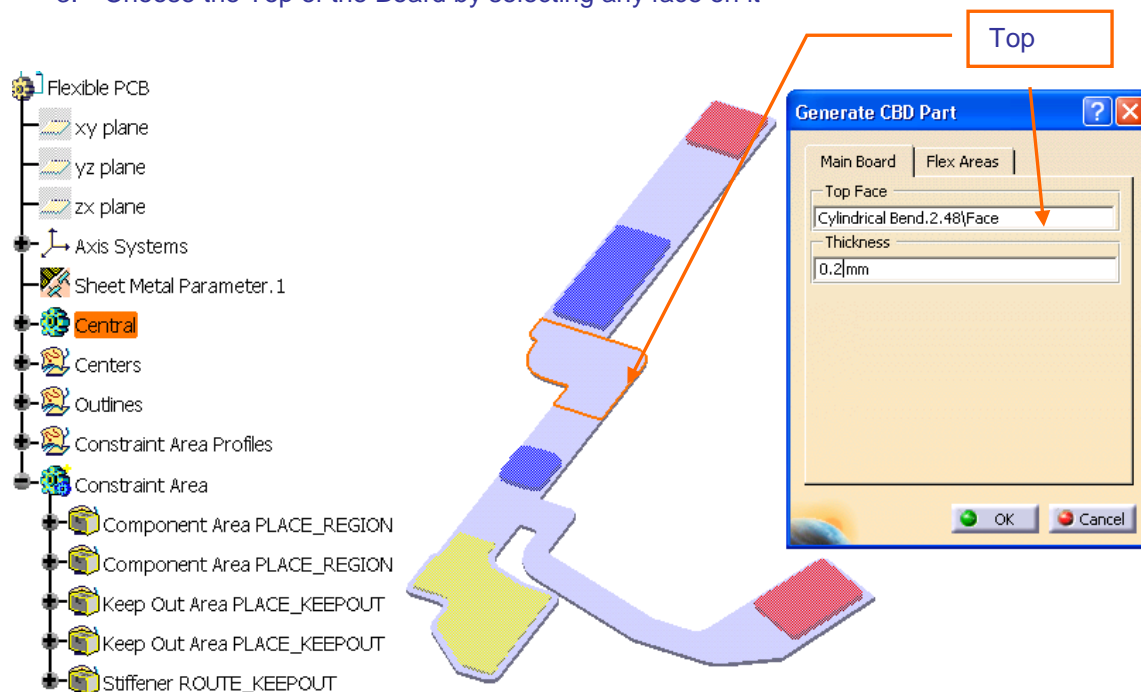
1. Switch into Unfolded view using function “Fold/Unfold Board”



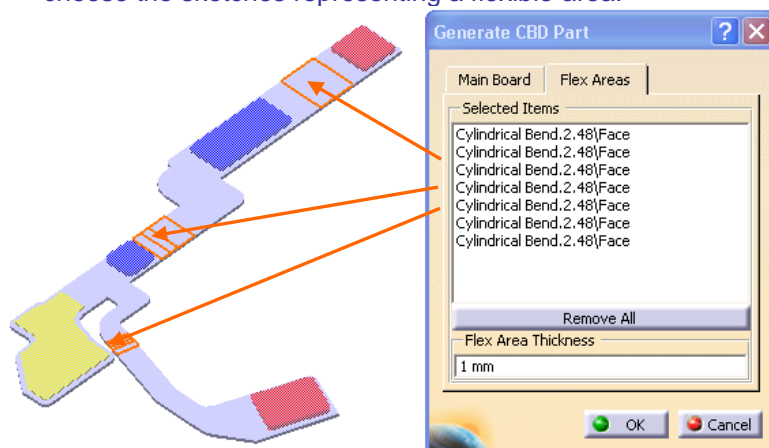
2. Select “Generate CBD Part” function



3. Choose the Top of the Board by selecting any face on it



4. In the index “Flex Areas”, multi Select the faces of the area that are bended in the unfolded view or choose the sketches representing a flexible area.

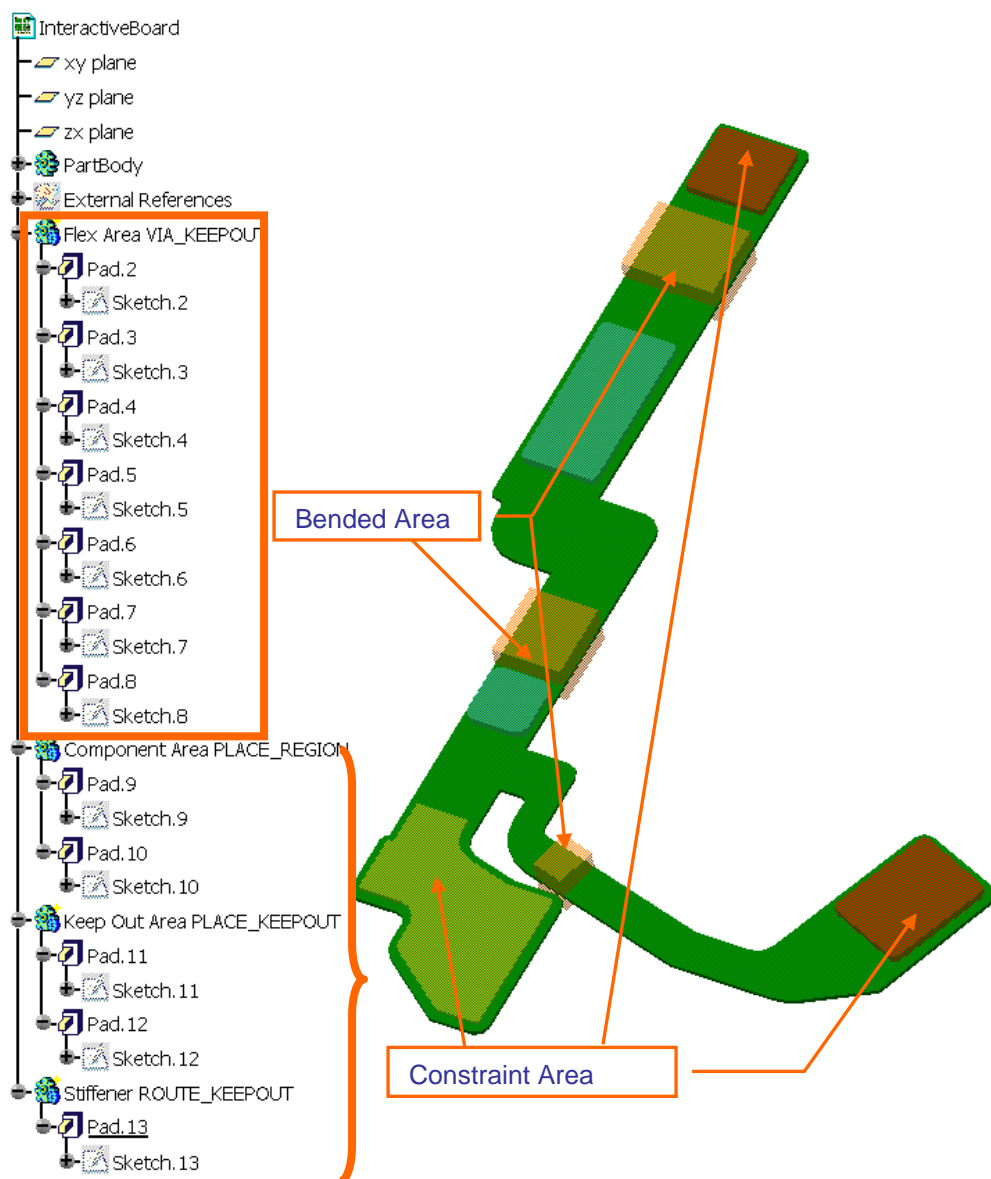


5. Select OK

A new part is generated. It contains a Geometrical set called “support” with the planes corresponding to the flexible PCB’s top and bottom faces of the flexible PCB. This part is linked to the master CATPart through the function “Update CBD Board”. The feature links areas are stored in the body “External References”.

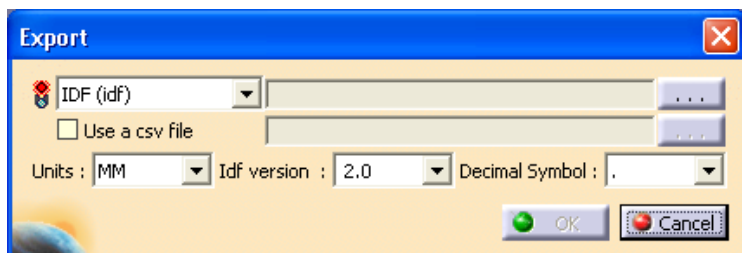
Bended areas are created in InteractiveBoard.CATPart as VIA_KEEPOUT in a body called “Flexible Area VIA_KEEPOUT”.

Constraint area created via the function “Create CBD Board”. They area stored in a body with the same name as defined in the constraint area function’s pull down list.



Exporting Flexible Main Circuit Board

1. select function "Export as IDF File"



2. Enter Export for example in the File name field.

You can choose between three extensions for the IDF type:

- .idf: the general format
- .brd: the MG specific format
- .bdf: the Allegro specific format

You can choose between two unit systems:

- MM: millimeters
- THOU: 1/1000 of inch

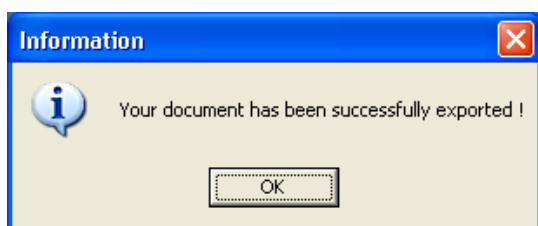
Two IDF versions:

- IDF 2.0
- IDF 3.0

And two decimal symbols:

- Point (.)
- Comma (,)

3. Click OK to perform the export.
An Information message is displayed:

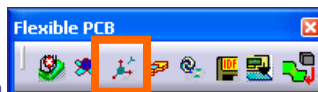


Component Placement on a Flex Board

1. Insert the Standard Component into Assembly. This Component must contain an axis system named "Positioning Axis"
2. Activate Flexible PCB Sheet Metal Part



3. Switch into Folded view using function "Fold/Unfold Board"

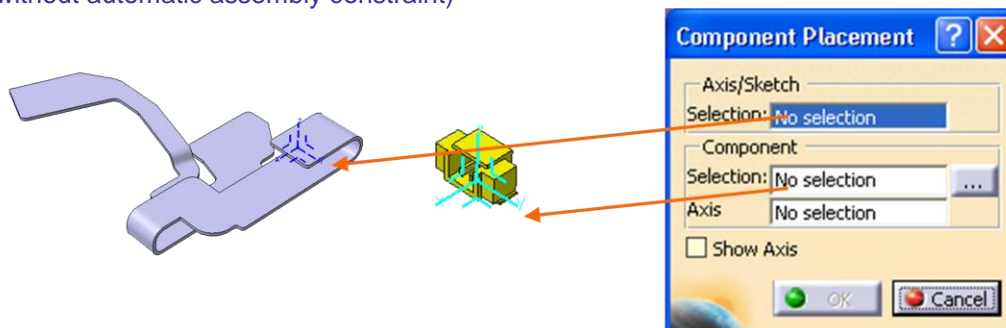


4. Select "Component Placement" function

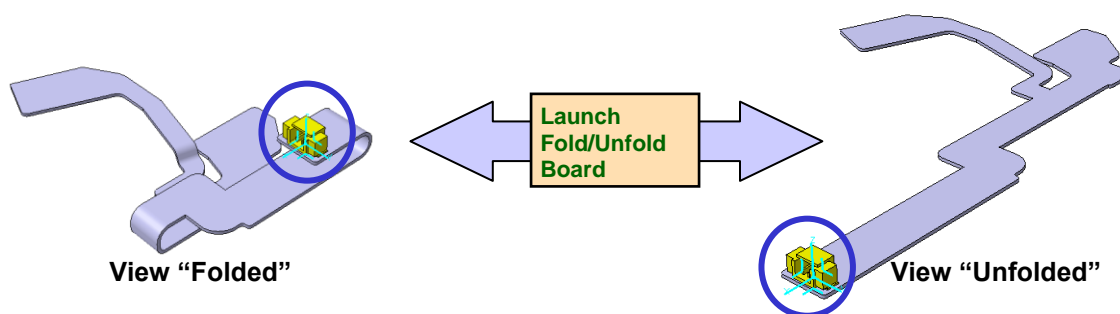
5. Choose an Axis system or a sketch created in the Sheet Metal Part. This Axis system is the location of the Standard Component in the flexible PCB part (folded view). And XY plane of Flex PCB axis system must lie within a SMD face.

Instead of an axis system as location input, a sketch can be used. In this case, the standard component's local axis system will be positioned on the center of gravity of the input sketch and the Z axis will be orthogonal to the sheet metal face

6. Select the standard Component. (If no component is selected, then creation of the moving axis without automatic assembly constraint)



The component is positioned according to an "axis to axis coincidence" constraint with the Flex PCB part. The component can be then unfolded along with the Flex PCB part.



If no standard par is selected, only a moving axis group is created.

If the axis system of the standard part is not published or not named "positioning axis", the user has to select it manually in the standard part

Import IDF in Context of Master Flexible CBD Part

1. Open Assembly containing original master Flexible CBD Part
2. Activate master Flexible CBD Part

3. Switch into Folded view using function “Fold/Unfold Board”



4. Select “Import in Context” function



5. Select IDF files, lib files and if necessary standard component detailed catalog

The .IDF file contains the location of the components in the circuit board assembly. You can also use a library and/or a catalog to get a better geometry of the components:




- The .lib file contains the 2D footprint geometry of the components
- The .catalog contains the 3D (exact) geometry of the components.

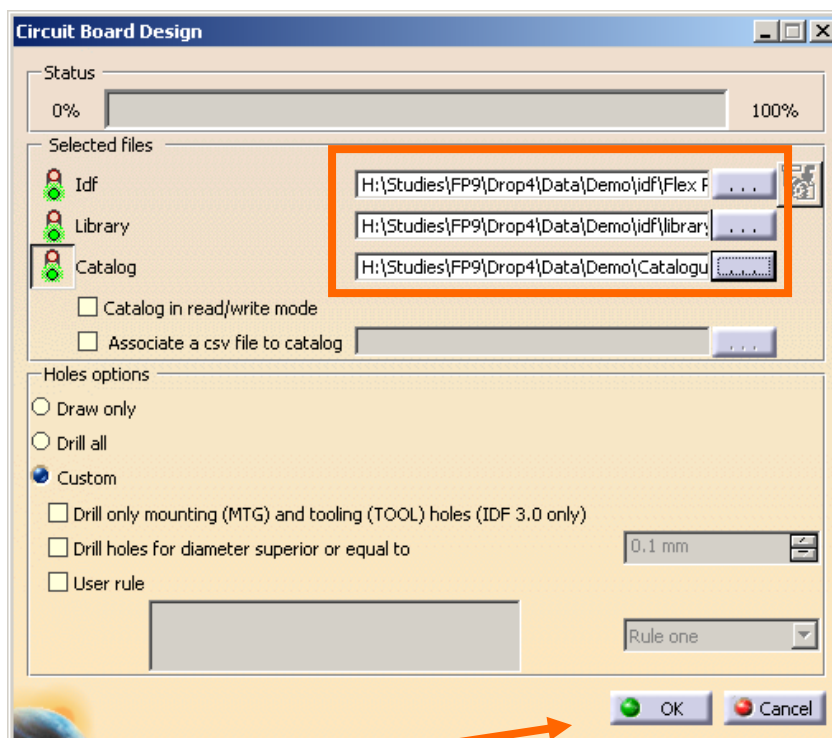
However, none of these two files are mandatory.

You can choose between several alternatives:

- Open a library only: the 3D geometry is extruded from the 2D geometry
- Open a library and use a catalog.
- Open no library and no catalog, the component has no associated geometry.

The light shows, according to a color code:

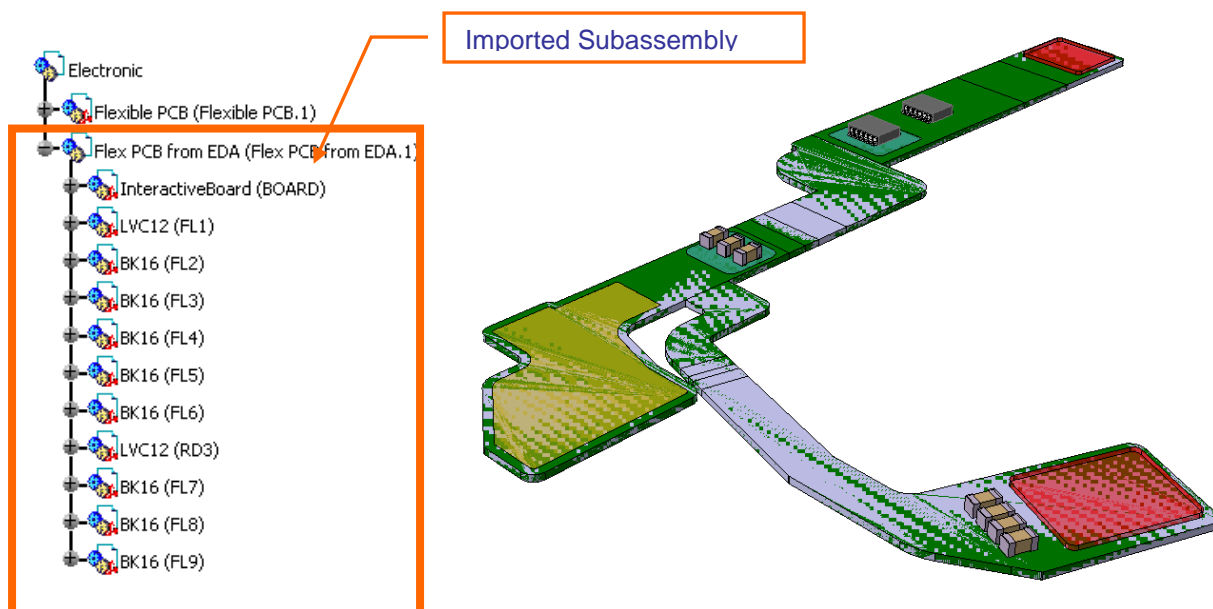
- If the file is mandatory, the light is red 
- If the file is optional, the light is yellow 
- If your selection is valid, the light turns green. 



6. Launch the import

7. Close the imported assembly view, the imported structure is a subassembly of the flexible CBD Part's root product and located at the same position in flat view.

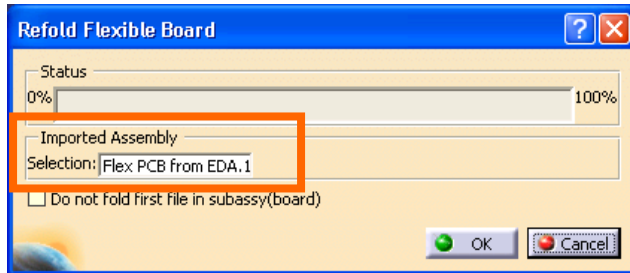
A new subassembly is created in the master flexible part assembly, representing the IDF file import. It is located at the same place as the master flexible part.



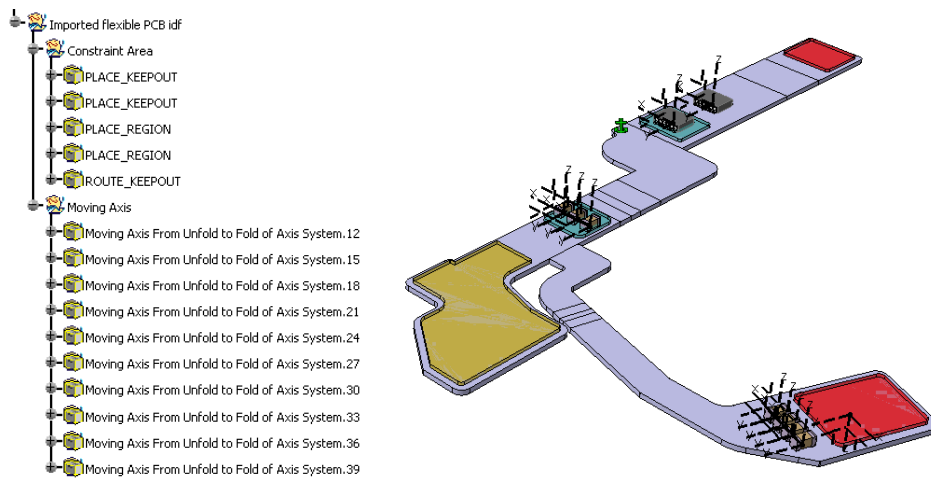
8. Select “Refold” function



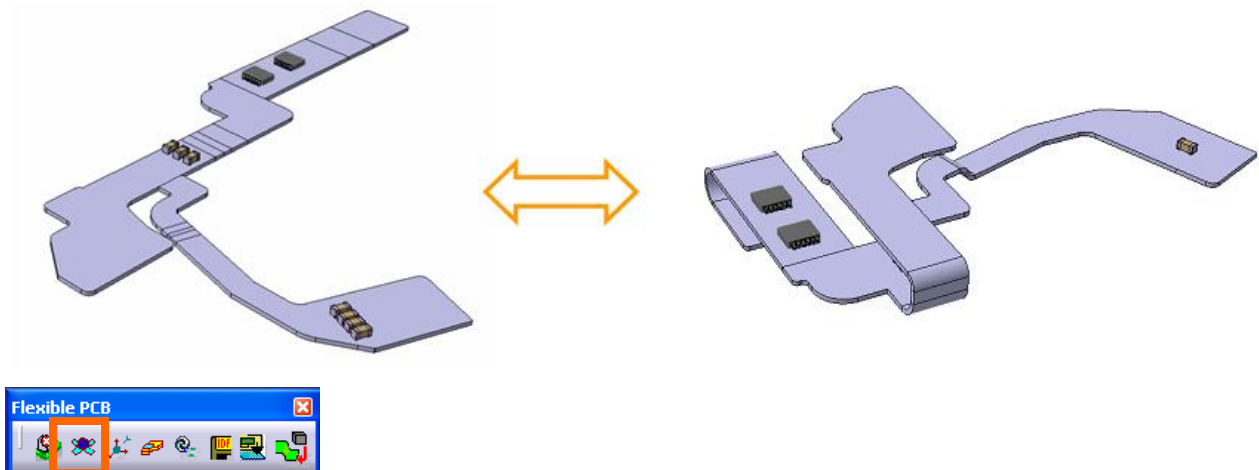
9. Select the imported subassembly and click OK



A special geometrical set is created with two subsets containing the moving axis for the components and the constraints area.



At the end of the procedure all the imported components and constraint area are attached to the master flexible PCB. The function “Fold/Unfold Board” impacts the position of the imported components and constraint area.



New in CATIA Flexible PCB Automation (FP9) – v5.6

- **Constraint area**
 - Support a closed profile with holes not only for OTHER_OUTLINE, but also for the other standard constraint
- **Generate CBD Part**
 - Support Flex Area with not only VIA_KEEPOUT type but other types
- **Component Placement**
 - Add an option to hide axes created by the command
 - Import component from external part file
 - Place component under sub product
- **Refold Flexible board**
 - Refold only Component

Please refer to the Implementation for further details on these enhancements