taglio
software house

TUTORIAL

TEMPLATE RECOGNITION

TAGLIO S.r.l. - Via Roma, 12/A 12040 Piobesi d'Alba (CN) - Tel. ++39-0173-619877
Fax ++39-0173-619879 - e-mail: taglio@taglio.it - www.taglio.it

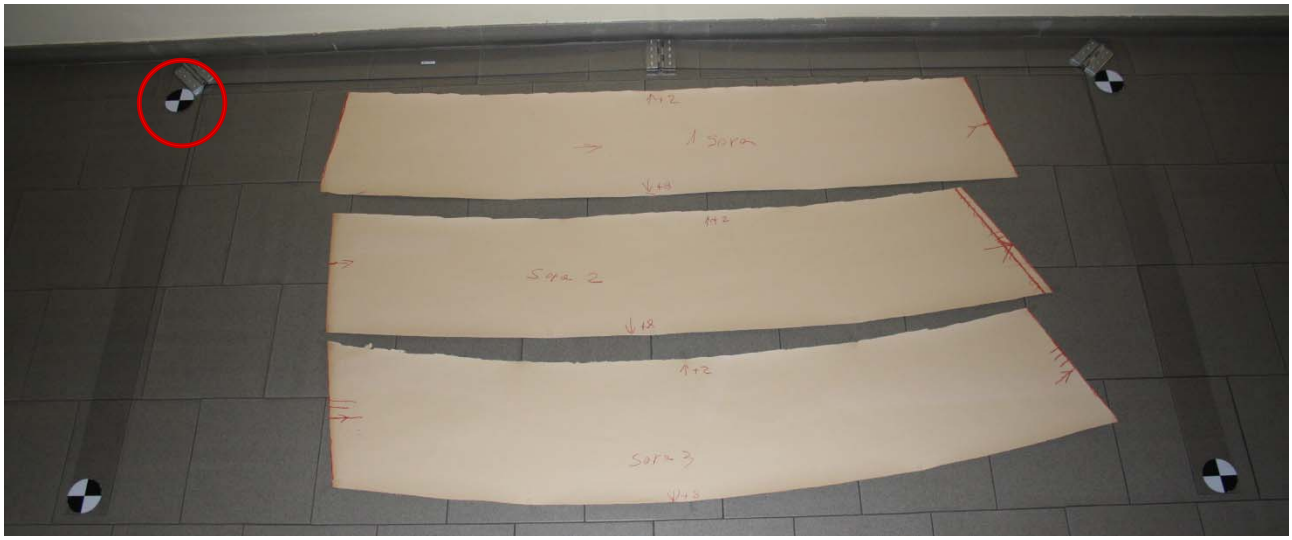
TEMPLATE RECOGNITION TUTORIAL

“TEMPLATE” toolbar

This toolbar includes all the functions for template automatic recognition.

It is an optional component of **Logotag** to be purchased separately.

The commands for automatic recognition of the camera position with respect to the plane of the templates to be recognized are based on the detection of 4 dots (called glyphs), mandatorily in black and white, which shall be located on the same plane as the templates.



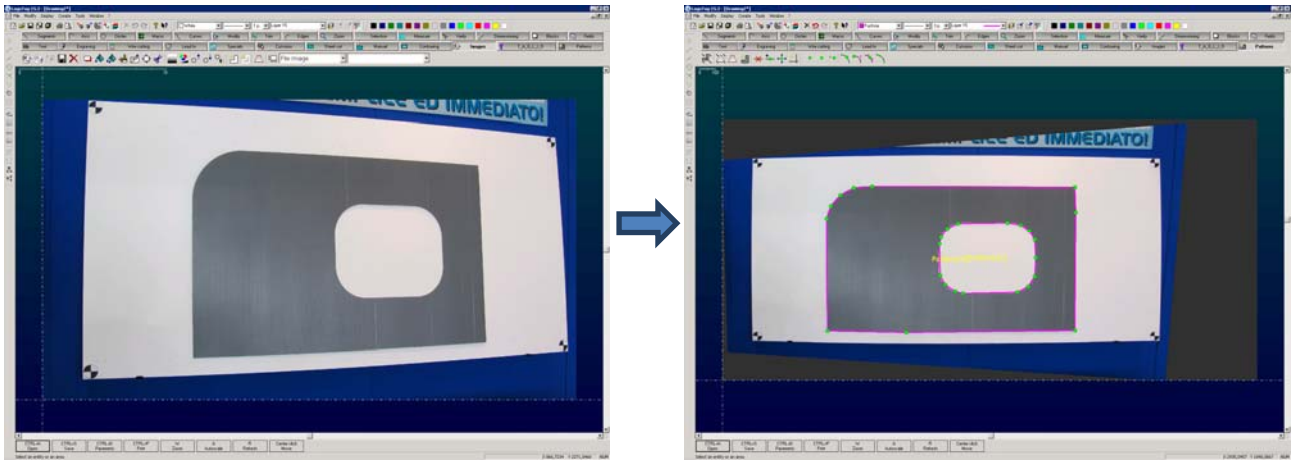
These 4 glyphs shall be orthogonal one with respect to the other and at a known distance, if you want to automatically obtain as well the dimensions of the templates to be recognized.

Even if the system is able to operate regardless of the position of the camera with respect to the 4 glyphs, we strongly recommend to try to position the camera perpendicular to the area to be recognized to get the best image resolution and ensuing precision.

CAUTION:
it is very important to apply lens aberration correction to images taken by cameras, otherwise the recognized dimensions are not correct. Contact TAGLIO to obtain further information about this procedure.

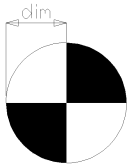
Recognition 

Tries to recognize the glyphs to straighten the image and traces the profiles. The two operations (perspective and profile search) are carried out at the same time, yet they can be as well performed manually, one at a time. The parameters used by this feature are those set in each command.



Perspective (automatic) 

Tries to recognize the glyphs to automatically straighten the image and, if required, to obtain its scale. When this command is pressed, a window to confirm the parameters to be used is displayed.

Glyph dimensions	It is the minimum size (in points) of a portion of the glyph.  For a good recognition of the glyphs, they should be clearly visible in the picture, thus their dimensions should not be less than 10 points.
B/W tolerance	It is the tolerance (0÷100) to recognize the two opposite portions of the glyph as having the same colour. The recommended value is 20 and if the glyphs are correctly printed with black and white tonality, it is not usually necessary to change this value.
B/W limit	It is the tolerance (0÷100) to recognize the two contiguous portions of the glyph as having complementary colour. The recommended value is 80. The tolerance value shall be set proportionally to the contrast.
Dimension X	(optional) actual distance between two horizontal glyphs
Dimension Y	(optional) actual distance between two vertical glyphs

If the system succeeds in automatically recognizing all 4 glyphs, points will be added in correspondence with recognized glyphs. The operator can try to modify the parameters or proceed with the manual command.

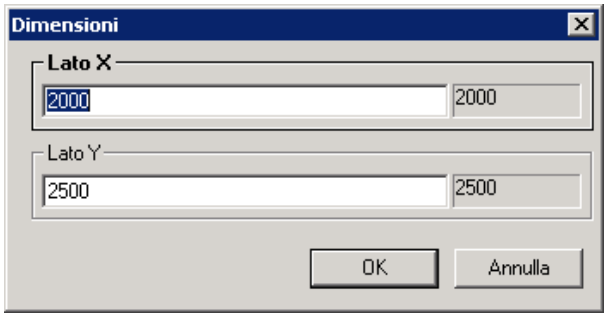
Perspective (manual) 

If the automatic system is not able to recognize the glyphs, or if it was not physically possible to add the glyphs, it is possible to proceed manually with image straightening, indicating the position of 4 reference points which represent the plane which has to be straightened. The sequence of the 4 points shall start from the bottom left one and then proceeding anticlockwise, as in the drawing:

During manual selection of the 4 reference points, some buttons may be useful:

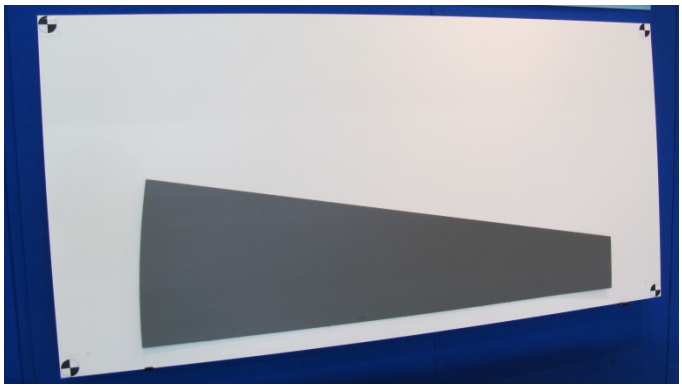
Button D : performs a 5x zoom in correspondence with the mouse position. This way, it is possible to approach the point with the mouse, then press button D as much as required to enlarge the images and to be able to precisely select the point.
Button A : after selecting the point, returns to autoscale display for a better localization of the next point.
Button K : enables/disables the “extended” display of the selection cursor for a better framing of the point which is being selected.

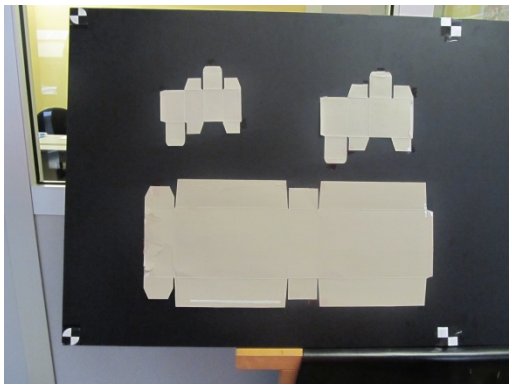
At the end of the 4 points, a window is displayed where it is possible to enter the actual dimensions of the selected rectangle to automatically obtain the resulting image in scale.



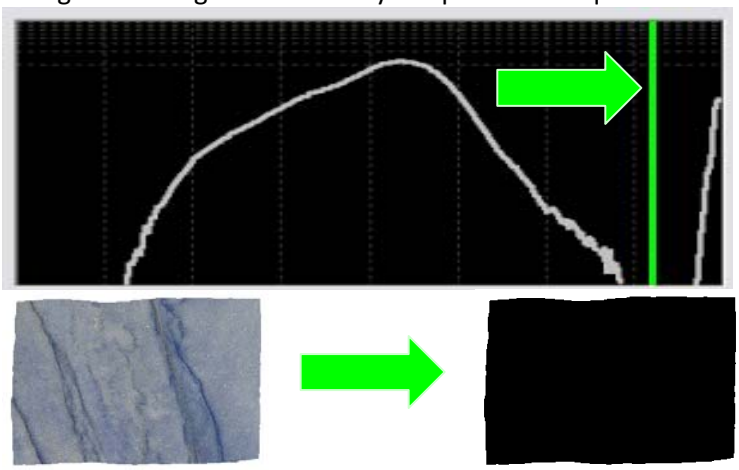
Profiles 

The profile recognition command is able to detect the contour of a shape when the contrast of the light with respect to the background is high enough to be able to clearly distinguish the edges. To improve the effectiveness of this command, we recommend to position the templates to be recognized on an uniform background, with good lighting and contrast, as in the examples below.

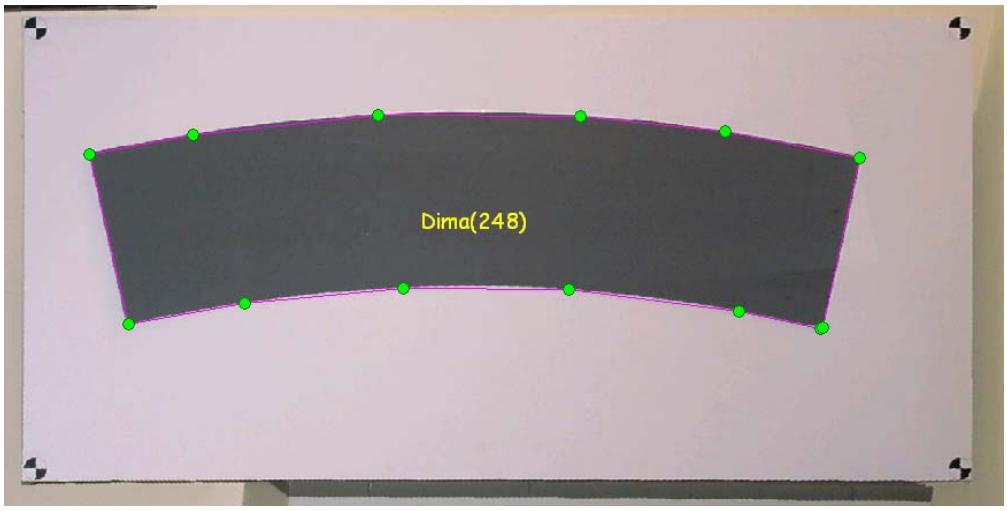




When this command is activated, the parameters for automatic recognition of the profiles are immediately proposed:

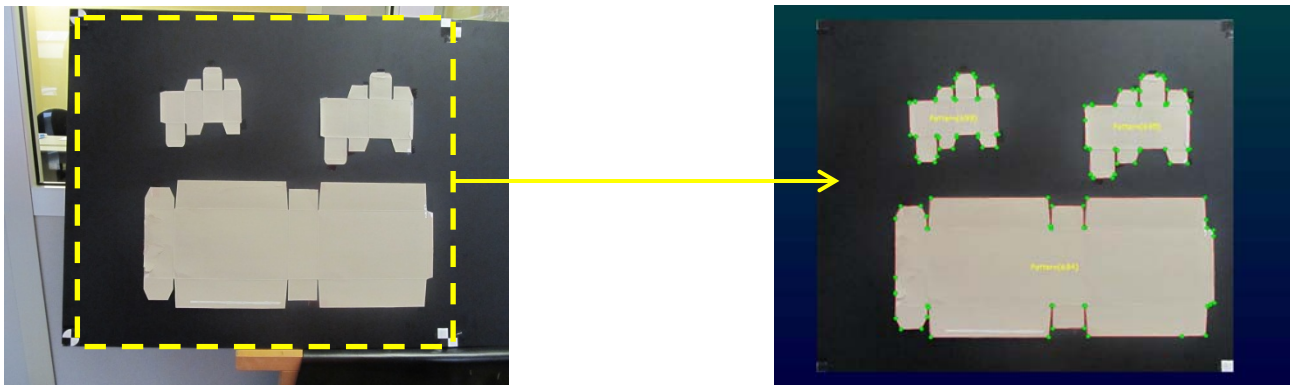
Threshold	It is the brightness threshold to distinguish the background from the template. There is no general rule since the colours of the background, of the light and of the templates are subject to significant changes. Generally, the ideal value is 128, yet if you want to proceed by trial and error, it is necessary to use the COLOURS function  , available in the image toolbar and then enable the “binarize” command to find the ideal value, pointing it with the mouse on the diagram, until the background image shows clearly the profile to acquire. 
Tolerance	It is the tolerance used to return the points which create the profile of the template. It makes no sense to have a tolerance value lower than the lowest of the values of Scale X and Scale Y of the image. For this reason these values (SX and SY) are displayed in correspondence with the field label.
Chord error	It represents the maximum chord error used to trim the points of the recognized profiles. This error does not modify the precision of the points, it simply removes the points which can be unnecessary for template recognition purposes. If you enter 0, all points are always returned. Obviously, it makes no sense to enter a chord error value lower than the tolerance.

Minimum block	To avoid that image noise or small objects outside the field are recognized as profiles, it is possible to set a minimum size of the recognized profiles.



The recognized profiles are created as special blocks in the drawing, with highlighted vertexes and with the generic name TEMPLATE and a serial number which automatically increases. It is always possible to change the name of these blocks accessing the command “Block List” in the Block toolbar, yet it is not possible to change the serial number of the block.

If the image has many noisy elements, we recommend to crop the part of the image containing the templates before proceeding with profile recognition by means of the “CUT” command in the image toolbar:



Once the template profiles are obtained, it is possible to operate manually to enhance the results obtained by means of automatic recognition.

TIP:

- Repeatedly using the **N** button, it is possible to change the display of the recognized profiles
- At this stage, it may be useful to temporarily disable the display of the bitmap using button **B** on the keyboard.

Delete 

To delete a point from the profile, just approach the desired point where a small cross will be displayed. A simple click is enough to confirm the deletion of the point.
Otherwise, it is possible to press the right button on a point; a small menu is displayed where it is possible to select the “DELETE” button and then confirm the deletion.

Add 

To add a point just move to the middle of two existing points; a preview of the new profile will be displayed. A simple click is enough to confirm the addition of the point.

Move 

To move a point just move near the point you want to move; a preview of the changed profile will be displayed. To confirm the new position, just click.
Otherwise, it is possible to press the right button on a point; a small menu is displayed where it is possible to select the “MOVE” button and then confirm the new position of the point.
CAUTION: any arc in the drawing will be transformed into segments.

Orthogonal 

The purpose of this command is to accurately set the orthogonality of the desired elements of the recognized profile with respect to a main element (called MASTER) of the profile itself.

When you activate this command, you are immediately prompted to enter a tolerance angle, used to establish, with respect to the master entity, whether the other entities are to be considered as parallel or perpendicular.

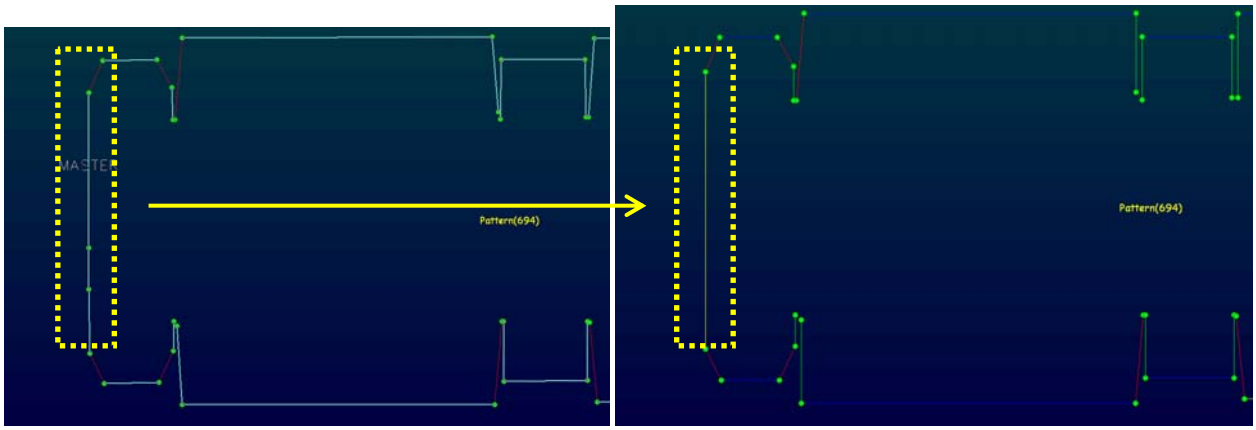
Then proceed by selecting the MASTER entity, just clicking near it. Now you can proceed in two different ways:

1. Keep selecting “manually” the items which shall be made orthogonal with respect to the master entity.
2. Press the END button on the keyboard and let the system automatically establish, according to the set tolerance, which entities are potentially orthogonal with respect to the master entity. Later, it is possible to operate manually to add further items.

During selection, it is possible to remove an item just re-selecting it. It is possible as well to select a different master entity holding the **CTRL** button pressed.

At selection end, a further pressure of the **END** button applies the commands to all the selected entities which will be set as perfectly orthogonal with respect to the master entity.

Besides: any selected entity which is in line will be replaced by a single segment which joins all of them.



If it is not possible to automatically obtain the template profile from the image, it is always possible to proceed manually, building the profile entity by entity, using a few specific commands.

During the manual reconstruction of the template profiles, the ends of the open profiles shall be highlighted by red points. To close the profile, just position the mouse pointer near the initial end.

Line (create) 

Creates a linear stroke, starting from a freehand point on the drawing. Or, positioning near an OPEN template profile, it is possible to proceed with the creation of the existing profile.

Tangent arc (create) 

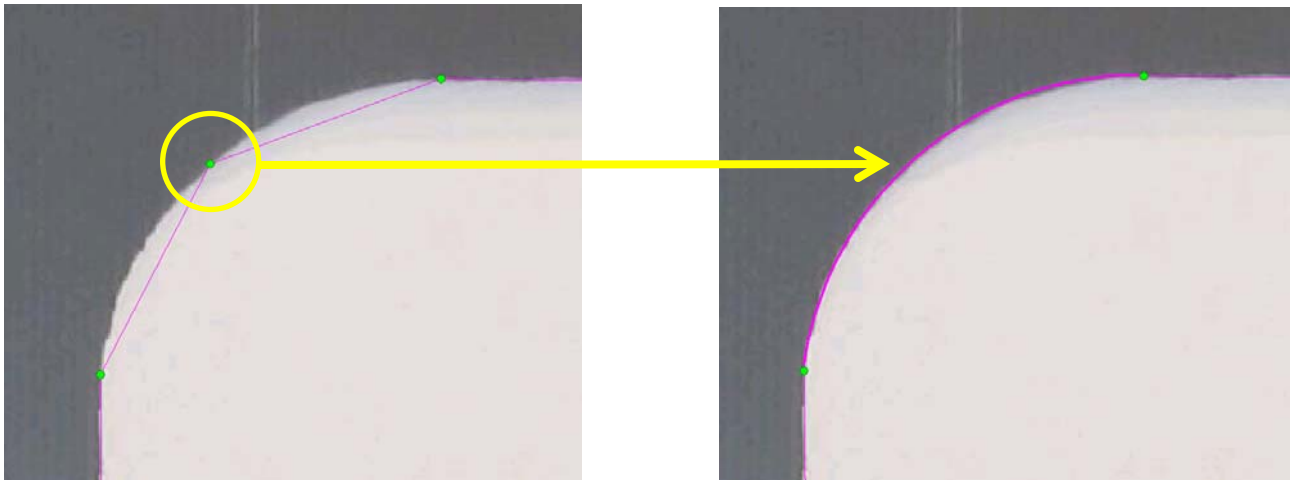
Creates a round stroke, tangent to the previous entity. Positioning near an OPEN template profile, it is possible to proceed with a round stroke which preserves the tangency of the selected end. Or, during profile creation, it is possible to create the circular stroke keeping the previous point, just selecting the new command.

Arc (create) 

Creates a round stroke which passes through three points. Positioning near an OPEN template profile, it is possible to proceed with a round stroke which preserves the selected end. Or, during profile creation, it is possible to create the circular stroke keeping the previous point, just selecting the new command.

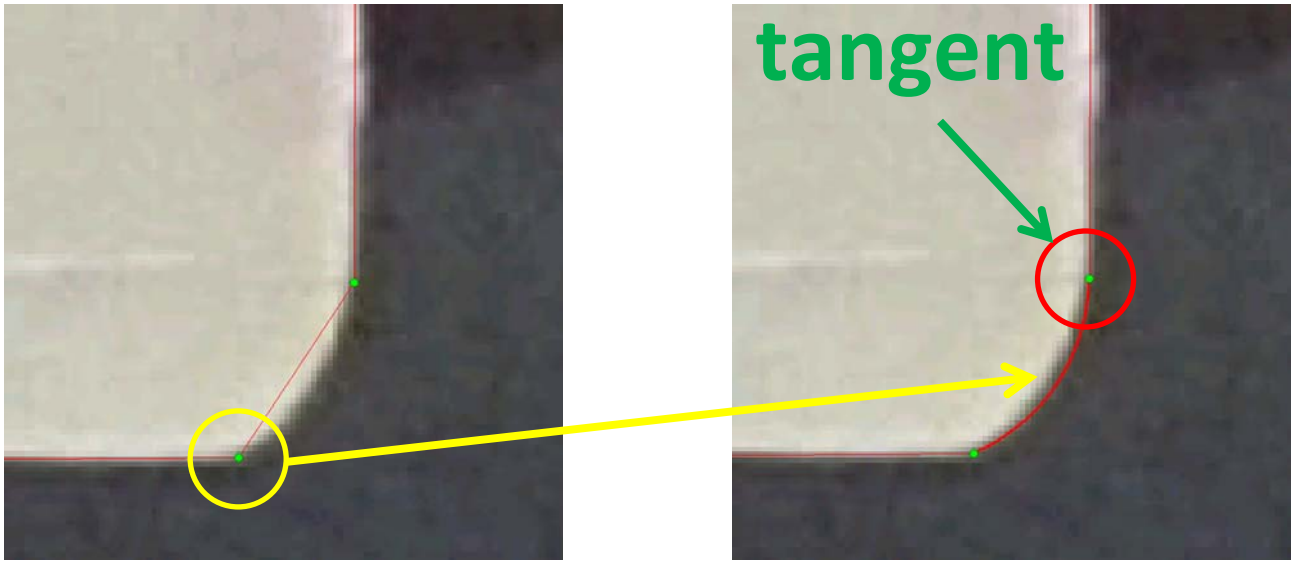
Arc (change) 

It is possible to change the profile of an existing template adding an arc passing through three sequential points, just selecting the middle point.



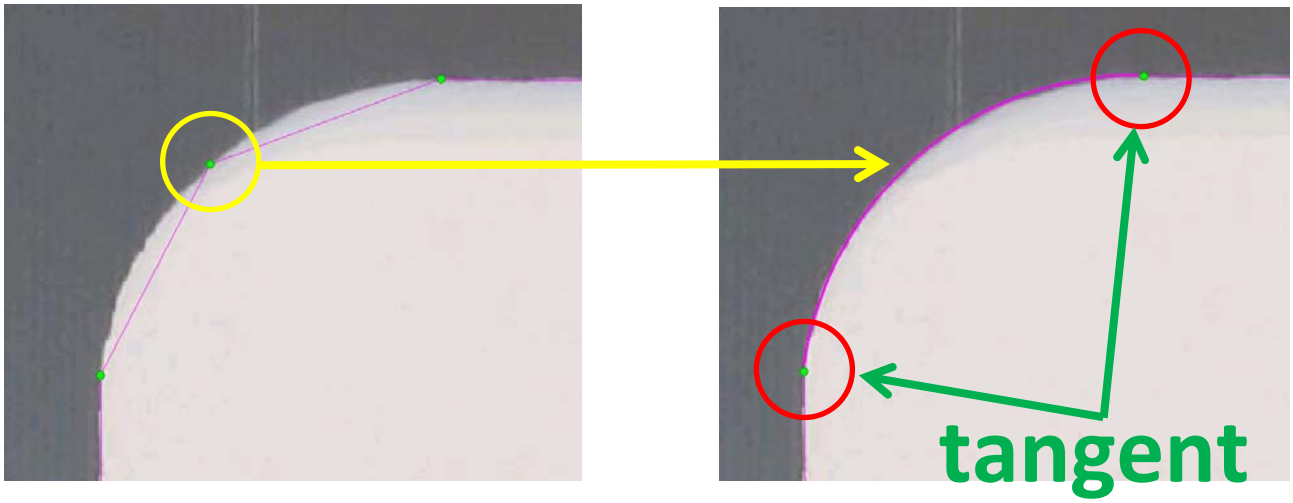
Arc tangent to 1 end (change) 

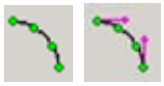
It is possible to change the profile of an existing template entering an arc instead of a linear stroke, tangent to the previous entity, just selecting the arc end point.



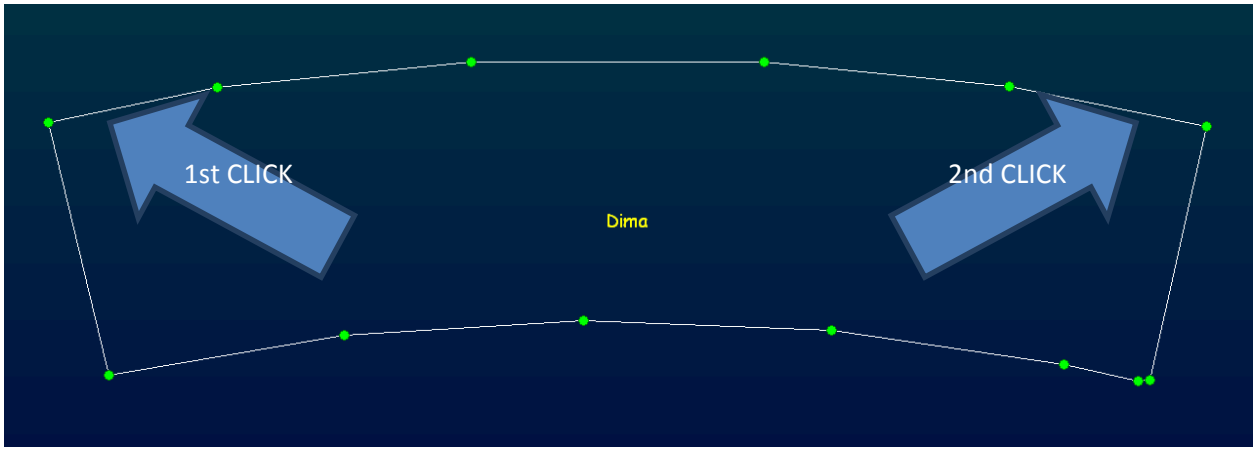
Arc tangent to 2 ends (change) 

It is possible to change the profile of an existing template entering a arc passing through one point and tangent to the adjacent points, selecting the middle point. Please, note that the points just before and after the selected one will be moved, and the adjacent entities will be stretched or shortened.



Curve / Tangent curve (change) 

It is possible to change the profile of an existing template adding a curve passing through a selected stroke. This command can create several points and entities which are added to the profile, yet it is mandatory to obtain a smooth trend. On the first click, it is necessary to indicate the entity and the start point, on the second click the entity and the end point, then the curve is automatically created. The tangent curve command adds the first and last item of the curve respectively tangent to the entities of the profile.



Mobile Kit composition scheme

For correct assembly, start from the left using the glyphs positioned on the lockpins

, on the right use the glyphs positioned on the holes