



NUMERIČKI UPRAVLJANE MAŠINE U OBRADI DRVETA

B SOLID



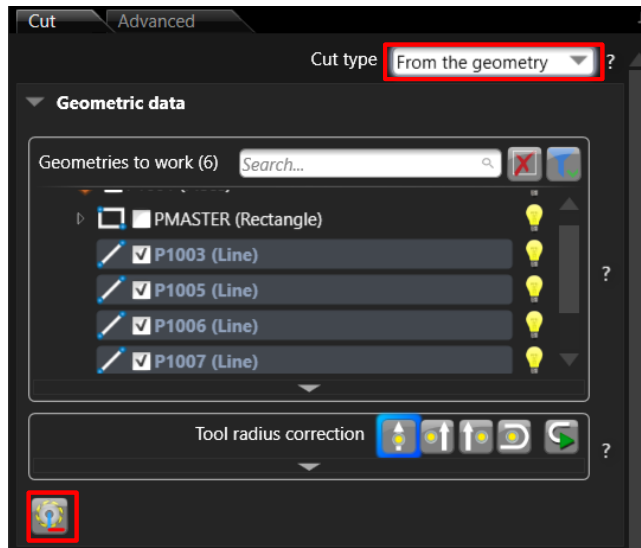
OBRADA REZANJEM



Machinings



Cut - From the geometry



Geometric data:

- **Geometries to work:** it specifies the list of geometries to be machined.
- **Tool radius correction:** as mentioned, it is used to specify the tool radius correction in reference to selected geometry.
- **Blade correction:** it enables or disables the correction of the blade radius as it enters and leaves the piece (*Figure 1 and Figure 2*).

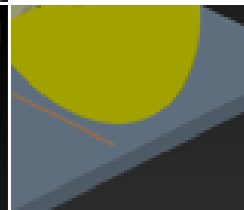
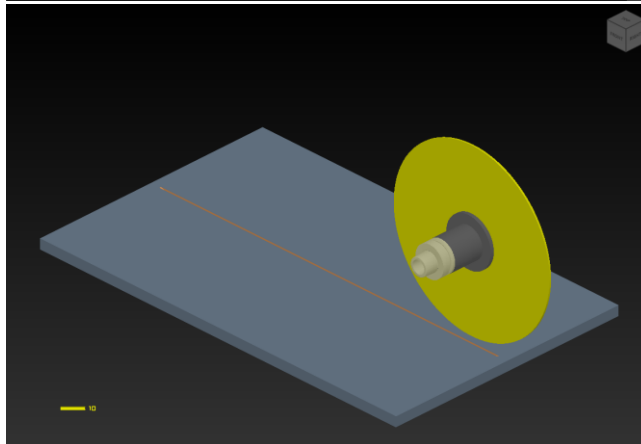


Figure 1

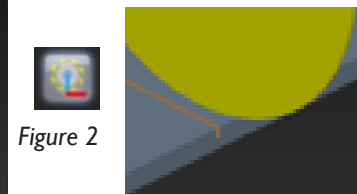
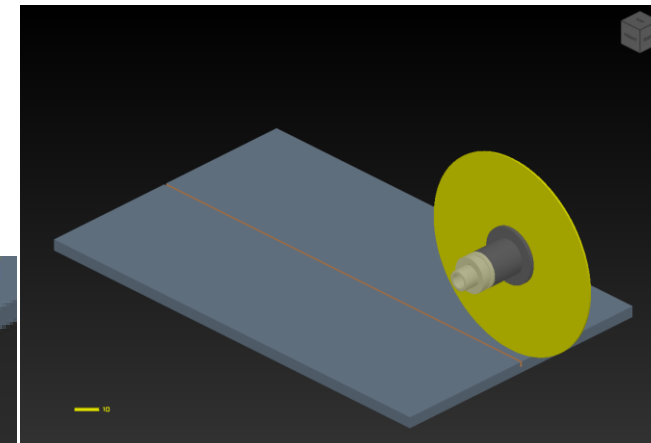
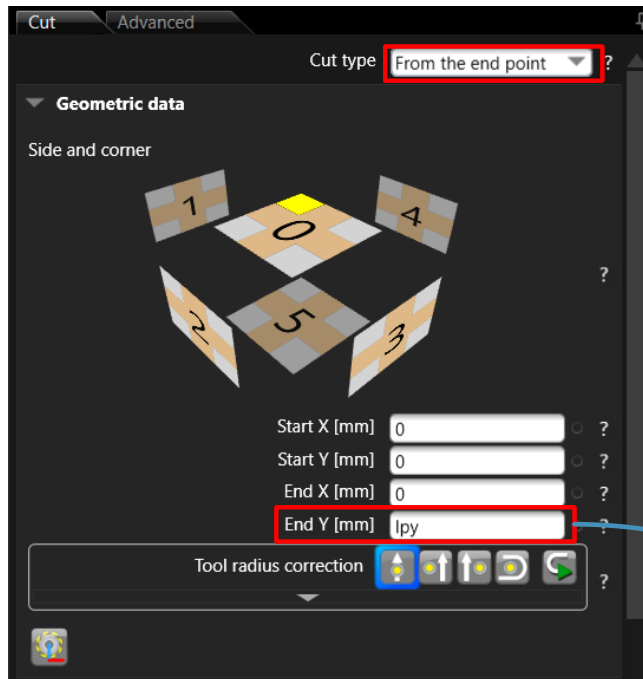


Figure 2



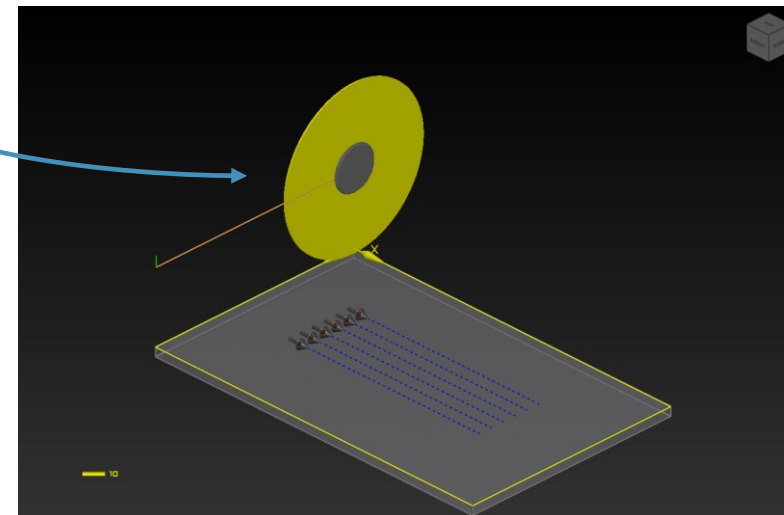
Machinings

Cut - From the end point



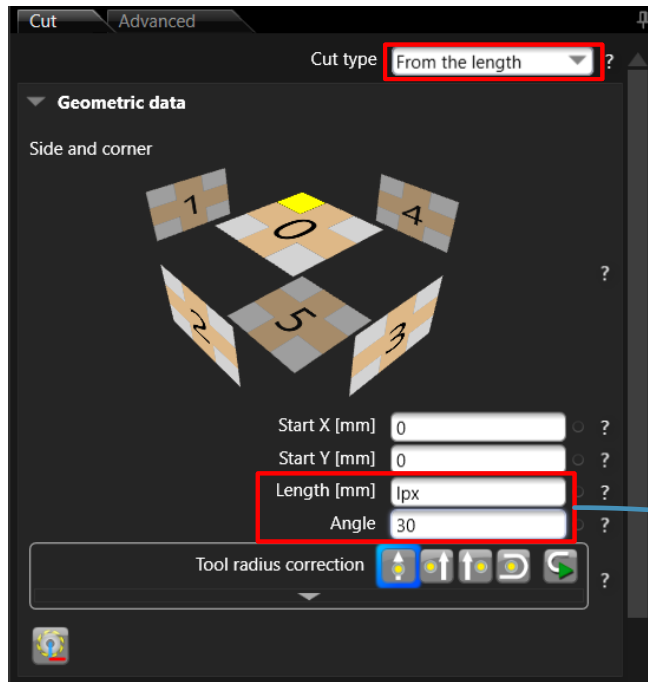
Geometric data:

- **Side and corner:** it specifies the starting corner(s) and face(s) from which to start cutting.
- **Start X and Y [mm]:** used to specify the start X and Y coordinates of the cutting.
- **End X and Y [mm]:** used to specify the end X and Y coordinates of the cutting.



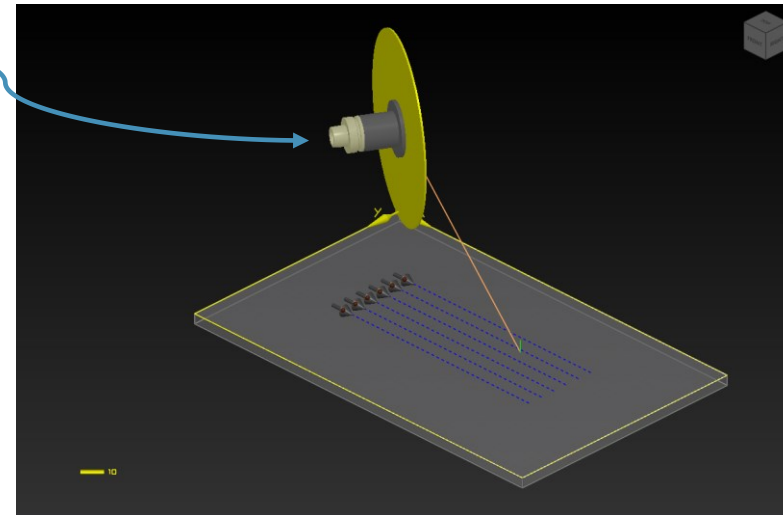
Machinings

Cut - From the length



Geometric data:

- **Side and corner:** it specify the starting corner(s) and face(s) from which to start cutting.
- **Start X and Y [mm]:** used to specify the start X and Y coordinates of the cutting.
- **End X and Y [mm]:** used to specify the end X and Y coordinates of the cutting.



Machinings

Cut - Tool data

Tool data

Tool name

FRESA350

Description: Lama_su_cono Diameter [mm]: 350
Working length [mm]: 98 Advance: 10000 Rotation: 6000
Depth [mm]: 0

Depth [mm] ?

Total thickness [mm] ?

Through ☐ ?

Lead-in

Initial extension [mm] ?

Lead-out

Final extension [mm] ?

Tool data:

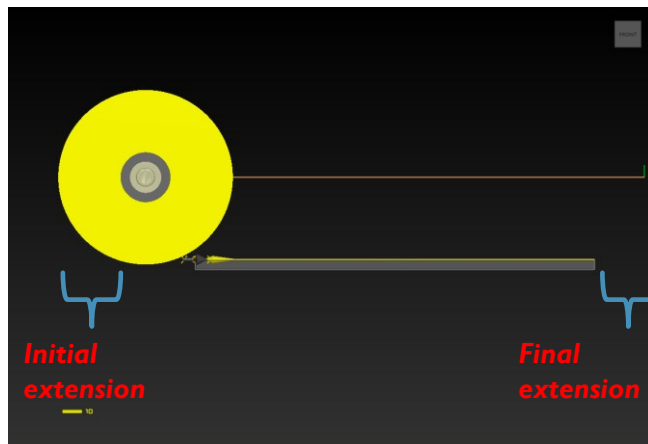
- **Depth [mm]:** it specify the depth of the cut machining.
- **Total thickness [mm]:** used to specify the total thickness (width) of the cut.
- **Through:** used to specify if the cut milling is through or not.

Lead-in:

- **Initial extension [mm]:** it specify the initial extension of the cut machining.

Lead-out:

- **Final extension [mm]:** it specify the final extension of the cut machining.



Machinings

Cut - Vertical pass data, Speed/Safety data, Machining data

Vertical pass data

Number of Passes 1 ?
Two-directional passes ?
End pass [mm] 0.000 ?

Speed data

Tool data ☒ ?
Machining speed 10000 ?
Descent speed 25000 ?
Lead-in/lead-out speed 0 ?
Rotation speed 6000 ?

Safety data

Safety data from tool ☒ ?
Jig safety [mm] 10.000 ?
Unclamp safety [mm] 25.000 ?

Machining data

Angle AZ 0 ?
Excess material [mm] 0 ?

Vertical pass data:

- **Number of Passes:** it identify the number of machining to be performed until the depth has been reached.
- **Two-directional passes:** if checked, the tool work in alternate directions when making the next movements; the tool changes direction each time it makes a new movement.
- **End pass [mm]:** it specify the depth that the tool must reach during the last movement (in the case of multiple number of Passes).

Speed/Safety data:

- Same settings as seen in Boring machining.

Machining data:

- **Angle AZ:** it specify the blade tilt (positive or negative) on the zero face of the piece (Figure 1).
- **Excess material [mm]:** it specify the excess material that will be left during the cut (The value depends on “Tool radius correction” field)

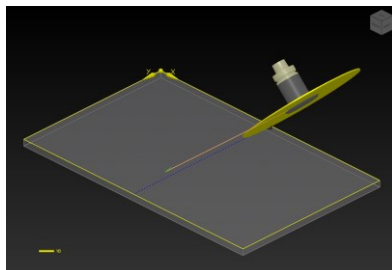


Figure 1
Angle AZ: 45

Machinings

Cut - Advanced data (Overview)

Properties

Name ?

Execute machining ?

Layers ?

Save default

Additional machining data

Optimisable ☒ ?

Safe descent onto recess ☒ ?

Recess Z [mm] ?

Reverse possible ☒ ?

Reverse the cutting direction ☐ ?

Spindle ?

Type of positioning ?

Hood position ?

Floating ☐ ?

Presser ☐ ?

Chip cleaning blow ☐ ?

AirTool ☐ ?

AirJet ☐ ?

Ioniser ☐ ?

Lubricator ☐ ?

Maintain deflector ☐ ?

Properties:

- Same settings as seen in Boring machining.

Additional machining data

- Same settings as seen in Boring machining, except for:
 - **Reverse possible:** it enables or disables a change in the blade movement direction; the user is advised to enable this field in order to prevent errors during program optimisation, as the programmed drawing direction does not always correspond to the default direction of the blade.
 - **Reverse the cutting direction:** it forces the blade to make the cut by reversing its movement direction; whatever the direction of the programmed machining operation, the blade direction of movement will be reversed.

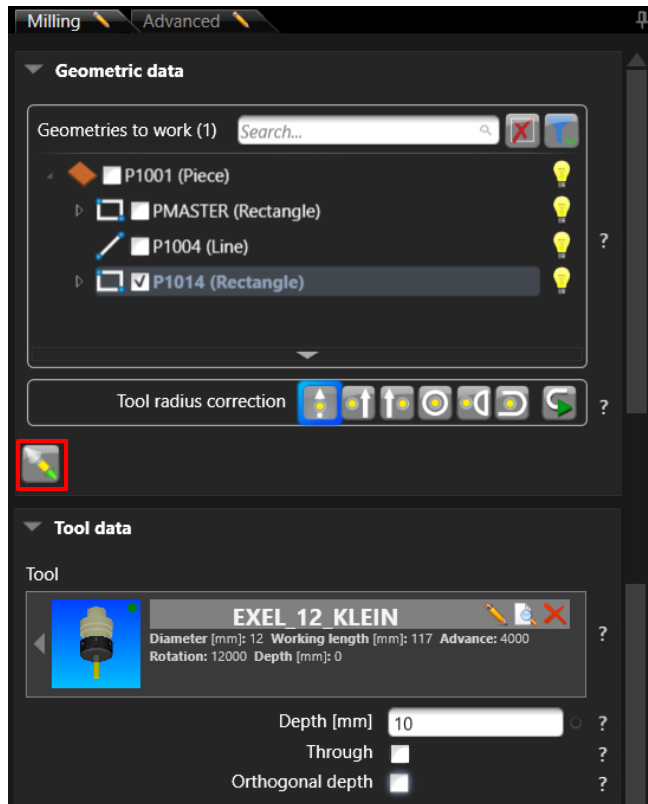
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Machinings



Milling - Geometric data/Tool data



Geometric data:

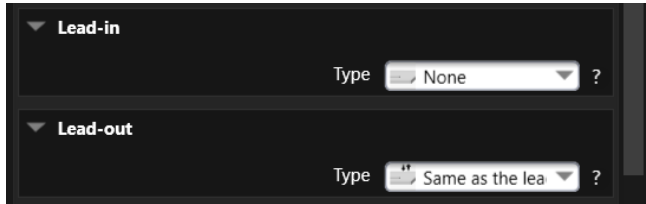
- **Geometries to work:** it specify the list of geometries to be machined.
- **Tool radius correction:** as mentioned, it is used to specify the tool radius correction in reference to selected geometry.
- **Lead-in point selection:** it allow the user to select a custom lead-in point in order to start the machining.

Tool data:

- **Depth [mm]:** it specify the depth of the milling machining.
- **Through:** used to specify if the milling is through or not.
- **Orthogonal depth:** it allow the user to choose whether or not the depth should be considered “orthogonal” compared to the selected geometry.

Machinings

Milling - Lead-in/Lead-out

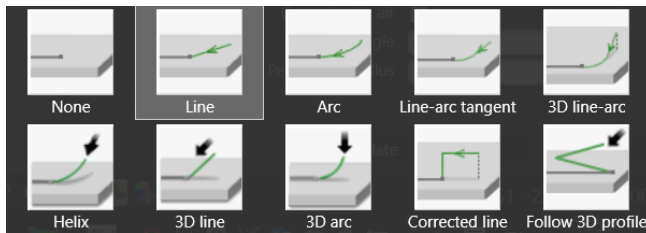


Lead-in/Lead-out:

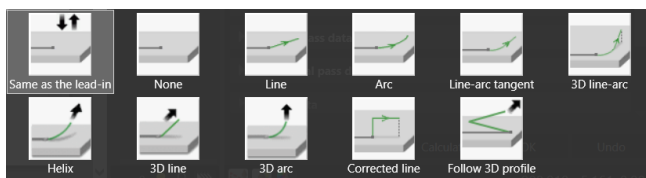
It allow to specify how the tool enter or leave the piece:

- **None:** the tool descends at right angles and directly arrives at the machining start point.
- **Line:** the tool descends by following a line perpendicular to the face; it enters the piece and reaches the machining start point via a short linear path to correct its position.
- **Arc:** the tool descends by following a line perpendicular to the face; it enters the piece and reaches the machining start point via a short arc path to correct its position
- **Line-arc tangent:** the tool descends by following a line perpendicular to the face; it enters the piece and reaches the machining start point by forming a tangent line and arc.
- **3D line-arc:** the tool descends by following a tilted line; it enters the piece and reaches the machining start point via a short arc path to correct its position.

Lead-in



Lead-out

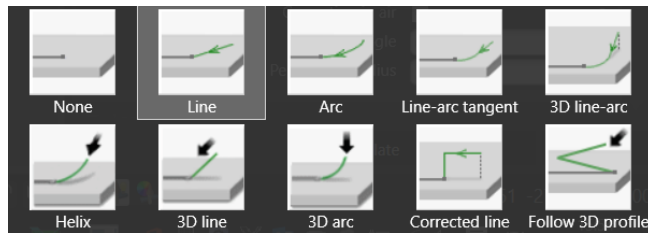


Machinings

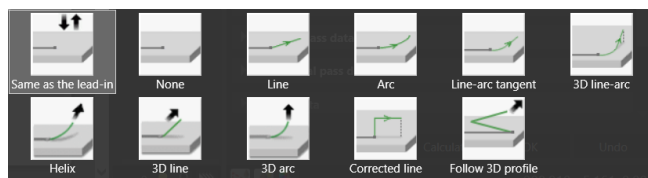
Milling - Lead-in/Lead-out



Lead-in



Lead-out



Lead-in/Lead-out:

It allow to specify how the tool enter or leave the piece:

- **Helix:** the tool generates a line in the air, parallel to the face along which it makes the correction; it descends along a spiral path and enters the piece, directly reaching the machining start point.
- **3D line:** the tool generates a line in the air, parallel to the face along which it makes the correction. It descends along a tilted path and enters the piece, directly reaching the machining start point.
- **3D Arc:** the tool generates a line in the air, parallel to the face along which it makes the correction; it descends along an arc path and enters the piece, directly reaching the machining start point.
- **Connected Line:** the tool generates a line in the air, parallel to the face along which it makes the correction; it descends along an arc path and enters the piece, directly reaching the machining start point.

Machinings

Milling - Lead-in/Lead-out

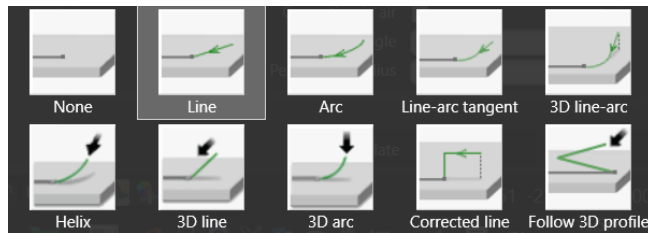


Lead-in/Lead-out:

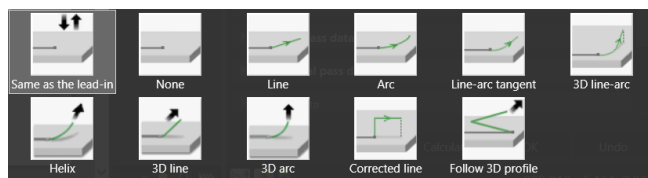
It allow to specify how the tool enter or leave the piece:

- **Follow 3D profile:** the tool descends along a tilted line and enters the piece, directly reaching the machining start point. The use of this type of entrance is only allowed with closed profiles.
- **Same as the lead-in (only for lead-out):** used to select the same strategy used for lead-in.

Lead-in



Lead-out



Machinings

Milling - Vertical pass data/Horizontal pass data

The screenshot shows a software interface with two sections: 'Vertical pass data' and 'Horizontal pass data'. Each section contains several input fields and checkboxes, each followed by a question mark icon.

Vertical pass data:

- Vertical passes: 1
- End pass [mm]: 0
- Bidirectional: ☒
- Incremental steps: ☐
- Eliminate lead-outs: ☐

Horizontal pass data:

- Horizontal passes: 1
- Multipass step [mm]: 0
- End pass [mm]: 0
- Bidirectional: ☐

Horizontal pass data:

- **Horizontal passes:** it specify the number of horizontal stages to be performed on the surface of the programmed face.
- **Multipass step [mm]:** it specify the step between the movements indicated in the Horizontal movements data field (i.e. the distance between one movement and the next, starting from the programmed geometry position).
- **End pass [mm]:** it specify the distance from the last horizontal movement, to add a final movement.
- **Bidirectional [mm]:** if checked, the tool work in alternate directions when making the next movements; the tool changes direction each time it makes a new movement.

Vertical pass data:

- **Vertical passes:** the tool descends along a tilted line and enters the piece, directly reaching the machining start point. The use of this type of entrance is only allowed with closed profiles.
- **End pass [mm]:** used to specify the depth that the tool must reach during the last movement in the case of multiple movements.
- **Bidirectional [mm]:** if checked, the tool work in alternate directions when making the next movements; the tool changes direction each time it makes a new movement.
- **Incremental steps:** if checked, it enables or disables the creation of vertical movements, constantly increasing the descent between one movement and the next.
- **Eliminate lead-outs:** it enables or disables the joining of the stages programmed in the Vertical movements data field; when checked, the tool performs all the movements without emerging from the piece.

Machinings

Milling - Speed/Safety data, Machining data

Speed data

Tool data
☒
?

Machining speed
4000.000
?

Descent speed
5000.000
?

Lead-in/lead-out speed
0.000
?

Impact speed
0.000
?

Rotation speed
12000.000
?

Safety data

Safety data from tool
☒
?

Jig safety [mm]
10.000
?

Unclamp safety [mm]
30.000
?

Machining data

Excess material [mm]
0.000
?

Start Z [mm]
0
?

End Z [mm]
0
?

Percentage length
true
?

Distance / Travel [mm]
0
?

Initial extension [mm]
0
?

Final extension [mm]
0
?

Deceleration distance [mm]
0
?

Deceleration speed
2000
?

Angle AZ
0.000
?

Angle AR
0.000
?

TCP tracking
☐
?

Continuous machining
☐
?

Maximum distance
0.01
?

Fillet radius
0
?

Remove overlaps
☐
?

Speed/Safety data:

- Same settings as seen in Boring/Cut machining.

Machining data:

- Excess material [mm]:** it specify the excess material that will be left during the milling (The value depends on “Tool radius correction” field).
- Start Z [mm]:** it specify the depth reached by the tool at the machining start point; this value is added to that indicated in the field Depth.
- End Z [mm]:** it specify the depth reached by the tool at the machining end point; this value is added to that indicated in the field Depth.
- Percentage length:** used to specify the kind of value that will be entered in “Distance / Travel [mm]” field; if true a percentage value will be entered, if false a relative value will be entered.

Machinings

Milling - Machining data

▼ Machining data

Excess material [mm]	0.000	?
Start Z [mm]	0	?
End Z [mm]	0	?
Percentage length	true	?
Distance / Travel [mm]	0	?
Initial extension [mm]	0	?
Final extension [mm]	0	?
Deceleration distance [mm]	0	?
Deceleration speed	2000	?
Angle AZ	0.000	?
Angle AR	0.000	?
TCP tracking	☐	?
Continuous machining	☐	?
Maximum distance	0.01	?
Fillet radius	0	?
Remove overlaps	☐	?

Machining data:

- **Distance / Travel [mm]:** it specify, starting form the start point of the machining, the portion of the entire profile requiring machining.
- **Initial extension [mm]:** it specify the extension or shortening of the machining path starting related to the start point (*Figure 1*).
- **Final extension [mm]:** it specify the extension or shortening of the machining path related to the end point.
- **Deceleration distance [mm]:** it specify the distance between the tool deceleration point and the point of geometric discontinuity.
- **Deceleration speed:** it specify the tool deceleration speed.
- **Angle AZ:** it specify the tool tilt angle in relation to the geometry drawn on the piece face (*Figure 2, 1*).
- **Angle AR:** it specify the tool rotation angle (*Figure 2, 2*).

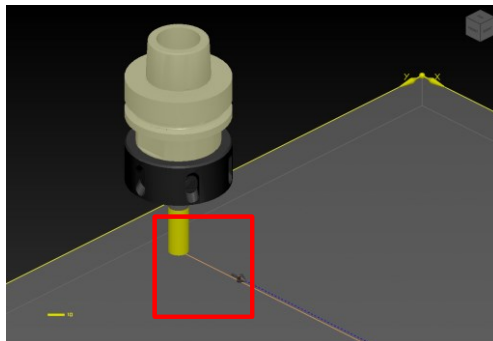


Figure 1

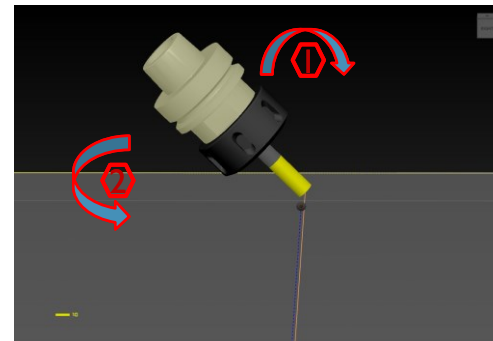


Figure 2

Machinings

Milling - Machining data

▼ Machining data

Excess material [mm]	0.000	?
Start Z [mm]	0	?
End Z [mm]	0	?
Percentage length	true	?
Distance / Travel [mm]	0	?
Initial extension [mm]	0	?
Final extension [mm]	0	?
Deceleration distance [mm]	0	?
Deceleration speed	2000	?
Angle AZ	0.000	?
Angle AR	0.000	?
TCP tracking	☐	?
Continuous machining	☐	?
Maximum distance	0.01	?
Fillet radius	0	?
Remove overlaps	☐	?

Machining data:

- **TCP Tracking:** if checked it makes use of the C-axis for performing interpolated milling operations with the tool at right angles to the profile to be machined (*Figure 1*).
- **Continuous machining:** it specify the extension or shortening of the machining path starting related to the start point.
- **Maximum distance:** if checked it enables the continuous machining (without interruptions) of repeated profiles, even if they don't perfectly coincide.
- **Fillet radius:** in case of continuing machinings it allow to specify a fillet radius
- **Remove overlaps:** in case of continuing machinings it allow to remove overlapping geometries.

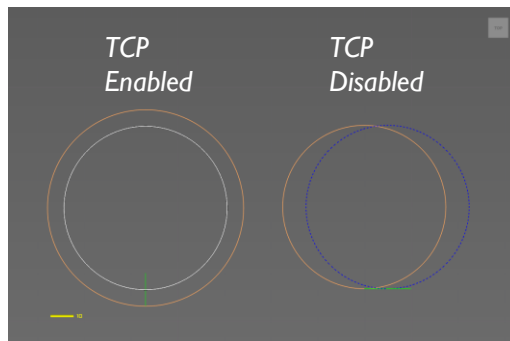
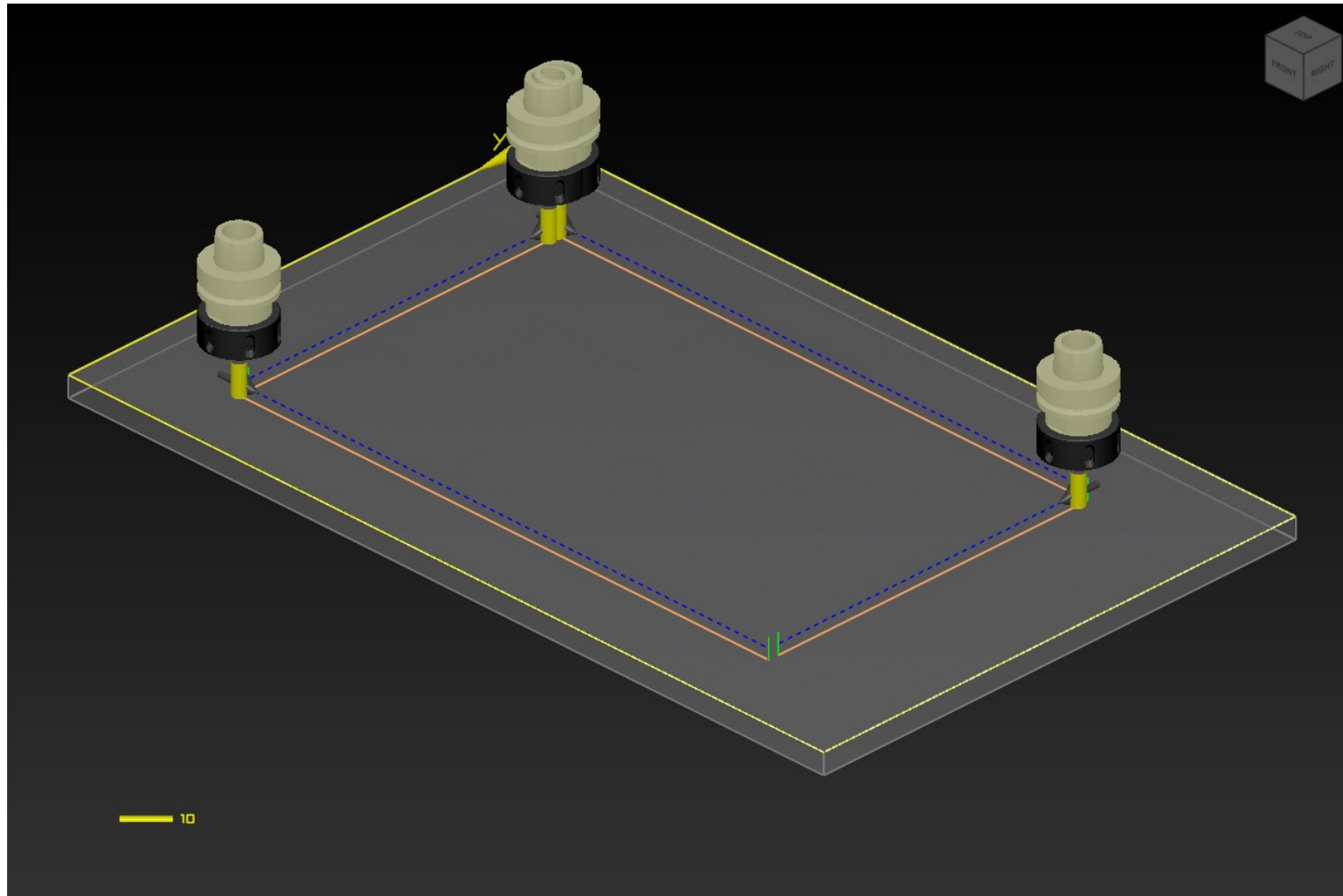


Figure 1

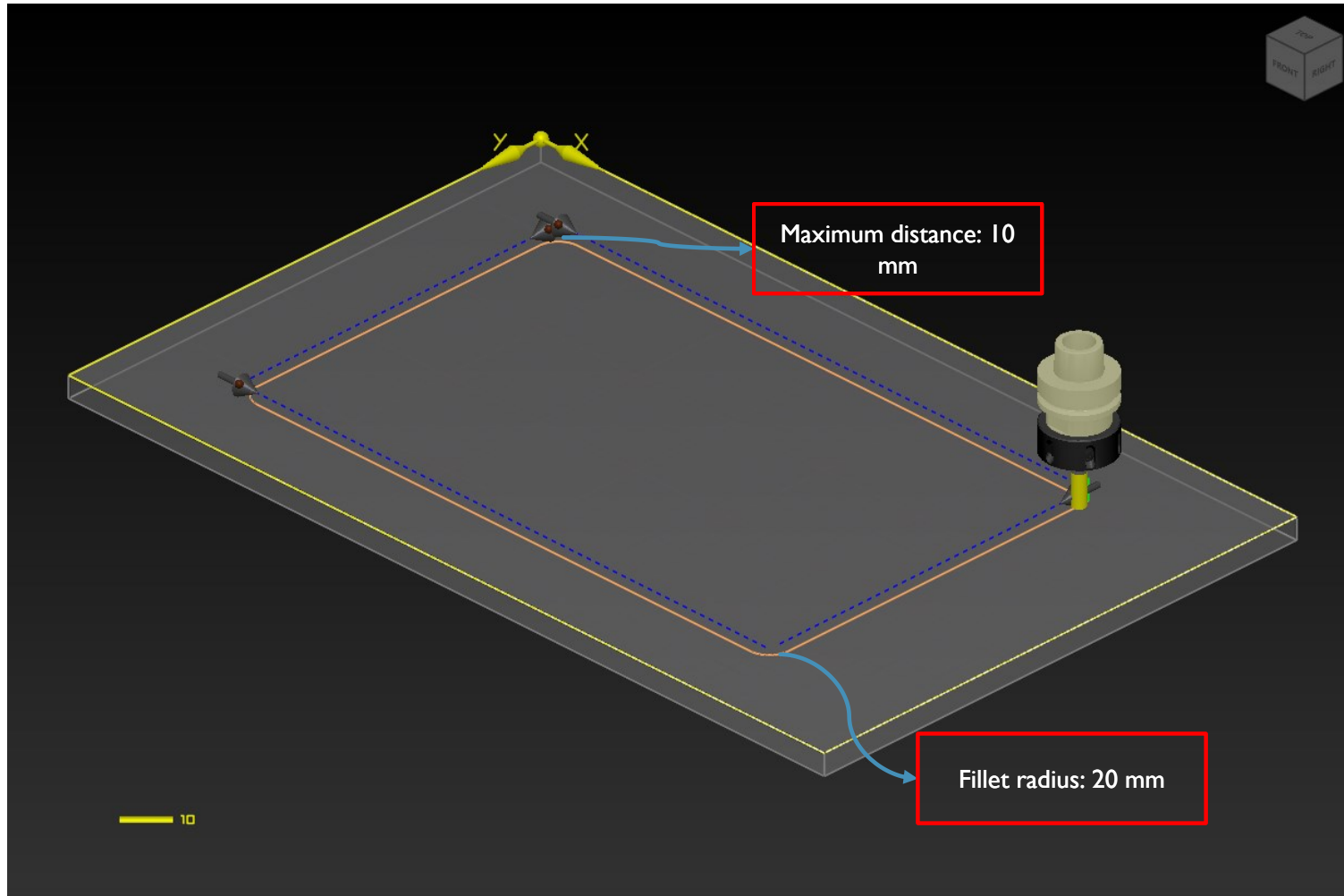
Machinings

Milling - Disabled Continuous machining



Machinings

Milling - Enabled Continuous machining



Machinings

Milling - Chip deflector data

Chip deflector data

Enable deflector ☐ ?

Maintain deflector ☐ ?

Rotate on the lead-in section ☐ ?

Chip deflector data

Enable deflector ☒ ?

Deflector name

 **ADEF7** ?

Description: ADEF7 Working dimensions in Z: 200 ?

Fixed deflector ☐ ?

Distance [mm] 5.000 ?

Thickness [mm] 0.000 ?

Initial distance [mm] 20.000 ?

Final distance [mm] 80.000 ?

Deflector rotation 60.000 ?

Slow-down at corners ☐ ?

Rotate on the lead-in section ☐ ?

Chip deflector data

Enable deflector ☒ ?

Deflector name

 **ADEF7** ?

Description: ADEF7 Working dimensions in Z: 200 ?

Fixed deflector ☒ ?

Fixed deflector angle 0.000 ?

Rotate on the lead-in section ☐ ?

Chip deflector data:

- **Enable deflector:** if checked it enables or disables the use of the chip deflector.
- **Maintain deflector:** if checked it disables the depositing of the deflector in the magazine during the tool change operation.
- **Fixed deflector:** if checked it enables the insertion of a fixed angle ("Fixed deflector angle" field) for rotating the chip deflector so that the casing does not collide with the piece being machined.
- **Distance [mm]:** it define the safety distance between the chip deflector and the piece surface already machined/to be machined.
- **Thickness [mm]:** it define the thickness of the removed material.
- **Initial distance [mm]:** it define the distance between the point of geometrical discontinuity of the machining trajectory and the point where the chip deflector must start rotating.
- **Final distance [mm]:** it define the distance between the point of geometrical discontinuity of the machining trajectory and the point where the chip deflector must stop rotating.
- **Deflector rotation:** it specify the rotation of the chip deflector, from the rotation start point to the point of geometric discontinuity of the machining trajectory.
- **Slow-down at corners:** if checked it reduces the rotation speed of the chip deflector near rounded corners.
- **Rotate on the lead-in section:** if checked it allow to rotate the chip deflector during the lead-in phase of the machining.

Machinings

Milling - Advanced data (Overview)

Properties

Name: P1003 ?

Execute machining: true ?

Layers: Layer 0 ?

Save default

Additional machining data

Optimisable ☒ ?

Safe descent onto recess ☒ ?

Recess Z [mm]: 0 ?

Spindle: ?

Type of positioning: By position ?

Hood position: 0 ?

Floating ☐ ?

Presser ☐ ?

Chip cleaning blow ☐ ?

AirTool ☐ ?

AirJet ☐ ?

Ioniser ☐ ?

Lubricator ☐ ?

Connect machining operation ☐ ?

Explode into tangent sections ☐ ?

Enabling the cutter management ☐ ?

Properties:

- Same settings as seen in Boring/Cut machining.

Additional machining data

- Same settings as seen in Boring machining, except for:
 - **Connect machining operation:** it enables or disables the possibility to link one machining operation with another that has the same properties; If checked, the tool will not rise between one machining operation and the next.
 - **Explode into tangent sections:** it enables or disables the generation of multiple milling operations on the basis of the non-tangent points found on the profile being machined (depending on “Tangency tolerance” field); If checked, the machining path is divided into several milling operations.

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Machinings



Pocketing/Roughing (3-axis) - Geometric data/Tool data



Geometric data:

- **Geometries to work:** it specify the list of geometries to be machined.
- **Reverse travel:** as mentioned, it allow to invert the machining direction for selected geometries.
- **Lead-in point selection:** it allow the user to select a custom lead-in point in order to start the machining.

Tool data:

- **Tool:** it allow to select the tool to perform pocketing machining.

Machinings

Pocketing/Roughing (3-axis) - General, Lead-in/Lead-out

General

Tool data ☒

Rotation speed 12000

Machining speed 4000

% Lead-in speed 100

% Lead-out speed 100

Z safety position [mm] 10

Z pushing position [mm] 0

Lead-in

Type Line

Section length [mm] 150.000

Angle 45.000

Lead-out

Type Same as the lea

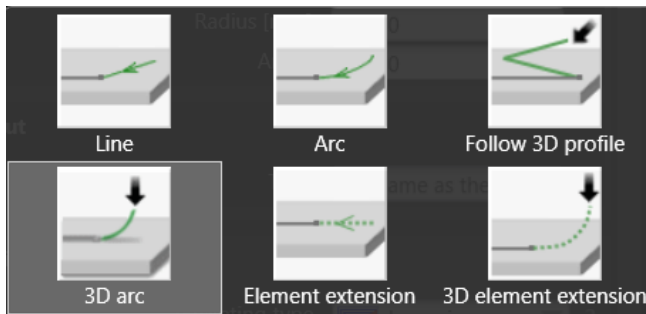
General:

- Tool data:** If enables, it allow to use the user defined values related to the tool; if disabled it allow to override default tool values.

Lead-in:

- Same settings as seen in Milling machining, except for:
 - Element extension:** used to bring forward the entry of the tool in the piece; the tool descends by following a line perpendicular to the face and It enters the piece in the point established in “Section length [mm]” field, then reaches the machining start point by correcting its position.
 - 3D element extension:** used to bring forward the entry of the disc-shaped tool in the piece; the tool descends by following a line perpendicular to the face and it enters the piece in the point established in “Section length [mm]” field, then reaches the machining start point by correcting its position.

Lead-in

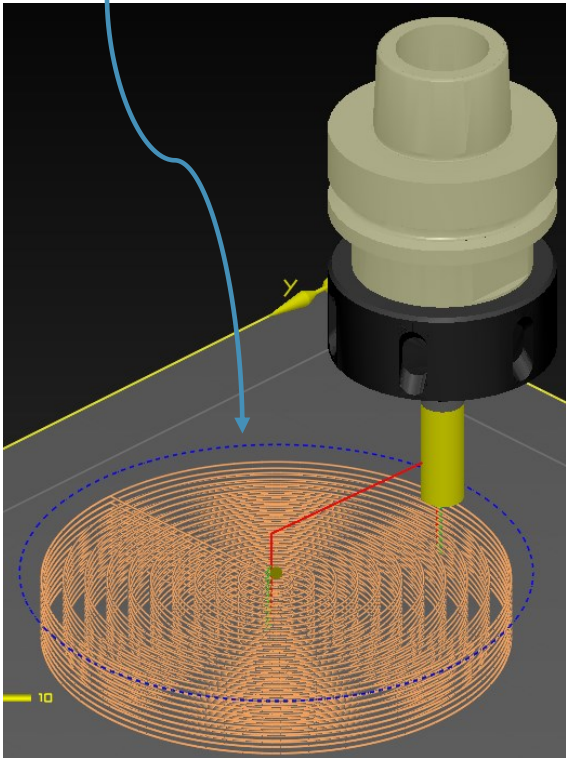


Machinings

Pocketing/Roughing (3-axis) - Machining data

▼ Machining data

Pocketing type	 Incoming conc.	?
Working depth [mm]	LPZ	?
Z step [mm]	2	?
Excess material [mm]	0	?
Distance between passes [mm]	6	?



Machining data:

- **Pocketing type:**
 - **Incoming concentric:** pocketing strategy which consists of concentric profiles that go from the outside of the profile inwards.
- **Working depth [mm]:** it specifies the depth of the machining operation.
- **Z step [mm]:** it specifies, in mm, the depth of each movement; this value is strictly correlated with “Number of passes in Z” field (Advanced tab) and the modification of one of the two causes the other field to be automatically updated.
- **Excess material [mm]:** it allows to specify, in mm, the over material to be left after the machining.
- **Distance between passes [mm]:** it allows to specify the distance between one movement and the next.

Machinings

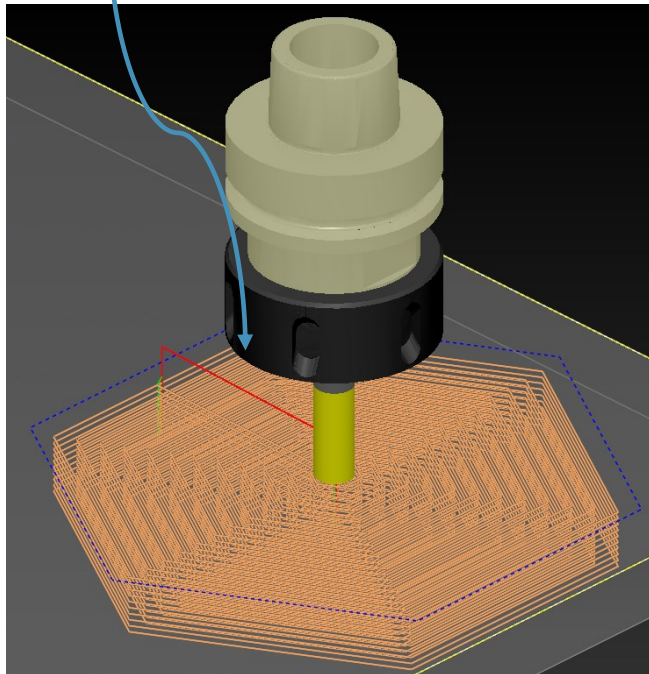
Pocketing/Roughing (3-axis) - Machining data

▼ Machining data

Pocketing type	Outgoing conc	?
Working depth [mm]	LPZ	?
Z step [mm]	2	?
Excess material [mm]	0	?
Distance between passes [mm]	6	?

Machining data:

- **Pocketing type:**
 - **Outgoing concentric:** pocketing strategy which consists of concentric profiles that go from the inside of the profile outwards.
- **Working depth [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Z step [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Excess material [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Distance between passes [mm]:** same settings as seen for “Incoming concentric” pocketing type.



Machinings

Pocketing/Roughing (3-axis) - Machining data

▼ Machining data

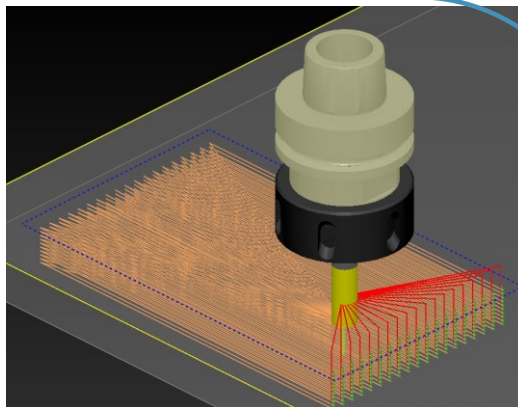
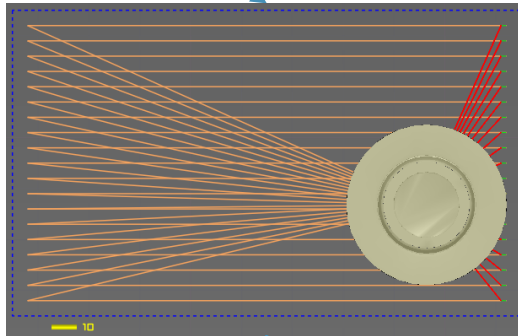
Pocketing type Single direction ?

Working depth [mm] LPZ ?

Z step [mm] 2 ?

Excess material [mm] 0 ?

Distance between passes [mm] 6 ?



Machining data:

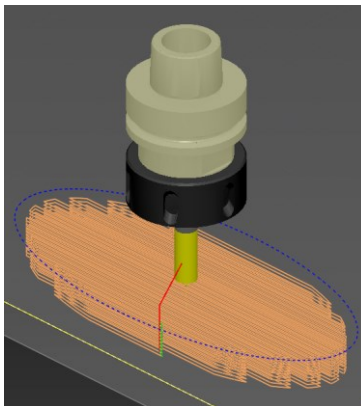
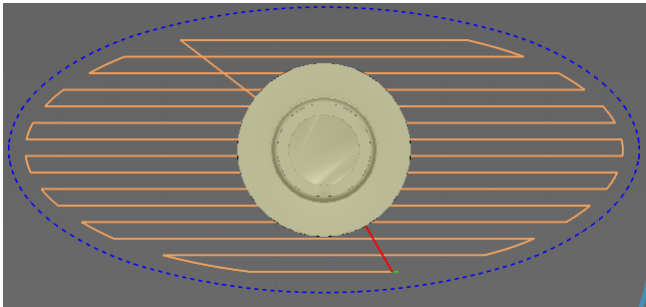
- **Pocketing type:**
 - **Single direction:** pocketing strategy which consists of parallel lines machinings.
- **Working depth [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Z step [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Excess material [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Distance between passes [mm]:** same settings as seen for “Incoming concentric” pocketing type.

Machinings

Pocketing/Roughing (3-axis) - Machining data

▼ Machining data

Pocketing type	 Zig zag	?
Working depth [mm]	LPZ	?
Z step [mm]	2	?
Excess material [mm]	0	?
Distance between passes [mm]	6	?



Machining data:

- **Pocketing type:**
 - **Zig zag:** pocketing strategy which consists of continuous machinings in parallel lines.
- **Working depth [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Z step [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Excess material [mm]:** same settings as seen for “Incoming concentric” pocketing type.
- **Distance between passes [mm]:** same settings as seen for “Incoming concentric” pocketing type.

Machinings

Pocketing/Roughing (3-axis) - Advanced data (Overview)

Properties

Name: P1005 ?

Execute machining: true ?

Layers: Layer 0 ?

Save default

Machining strategy

Enable number of passes in Z: ☒ ?

Number of passes in Z: 5 ?

Start Z [mm]: 0 ?

% Feed first pass: 80 ?

Angle between passes: 5 ?

Rotary axis speed: 4000 ?

Intermediate Z retractions [mm]: 10 ?

Normal tracking: ☒ ?

Profiling passes: ☐ ?

Shaped pocketing: ☐ ?

Priority to passes in Z: ☐ ?

Optimisation of passes in Z: ☐ ?

Eliminate retractions between passes: ☐ ?

Properties:

- Same settings as seen in Boring/Cut machining.

Machining strategy

- **Enable number of passes in Z:** it enable “number of passes in Z” field and disable “Z step [mm]” parameter.
- **Number of passes in Z:** it enables the number of stages affecting the depth of the programmed machining operation; this value is linked to the one defined in the Z step data field; the modification of either of them leads to the automatic updating of the other one.
- **Start Z [mm]:** it specify the machining operation start point (Z position).

- **% Feed first pass:** it specify the percentage to reduce the tool forward movement speed during the first movement or during all movements that can be calculated according to the total tool forward movement speed.
- **Angle between passes:** it specify the tilt of the movements on the surface, in relation to the start side.

Machinings

Pocketing/Roughing (3-axis) - Advanced data (Overview)

The screenshot shows the 'Advanced' settings panel for 'Pocketing/roughing'. The 'Advanced' tab is highlighted with a red box. The panel is divided into two sections: 'Properties' and 'Machining strategy'.

Properties:

- Name: P1005
- Execute machining: true
- Layers: Layer 0
- Save default button

Machining strategy:

- Enable number of passes in Z: ☒
- Number of passes in Z: 5
- Start Z [mm]: 0
- % Feed first pass: 80
- Angle between passes: 5
- Rotary axis speed: 4000
- Intermediate Z retractions [mm]: 10
- Normal tracking: ☒
- Profiling passes: ☐
- Shaped pocketing: ☐
- Priority to passes in Z: ☐
- Optimisation of passes in Z: ☐
- Eliminate retractions between passes: ☐

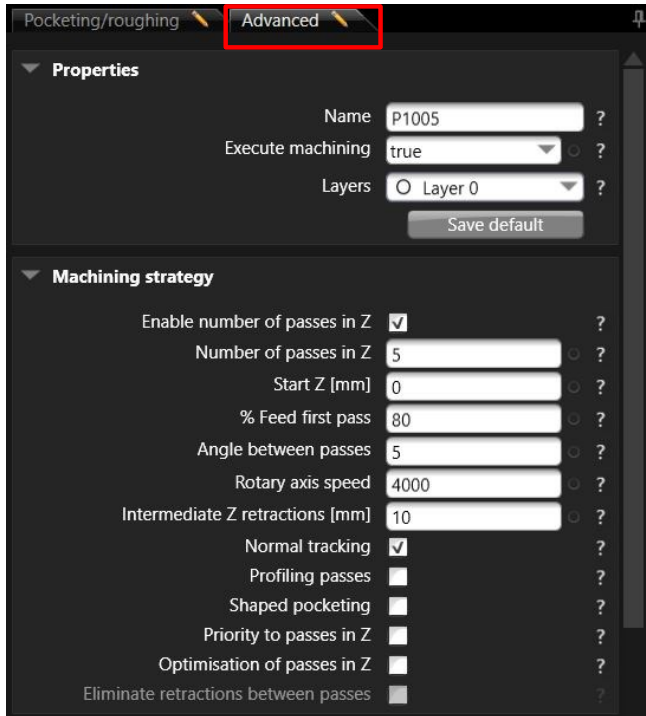
Machining strategy

- **Rotary axis speed:** it specify the tool axis speed.
- **Number of passes in Z:** it enables the number of stages affecting the depth of the programmed machining operation; this value is linked to the one defined in the Z step data field; the modification of either of them leads to the automatic updating of the other one.
- **Start Z [mm]:** it specify the machining operation start point (Z position).
- **% Feed first pass:** it specify the percentage to reduce the tool forward movement speed during the first movement or during all movements that can be calculated according to the total tool forward movement speed.

- **Angle between passes:** it specify the tilt of the movements on the surface, in relation to the start side.
- **Rotary axis speed:** it specify the tool speed.
- **Immediate Z retractions [mm]:** it specify the safety position of the tool between one movement and the next.

Machinings

Pocketing/Roughing (3-axis) - Advanced data (Overview)



Properties

Name: P1005 ?

Execute machining: true ?

Layers: Layer 0 ?

Save default

Machining strategy

Enable number of passes in Z: ☒ ?

Number of passes in Z: 5 ?

Start Z [mm]: 0 ?

% Feed first pass: 80 ?

Angle between passes: 5 ?

Rotary axis speed: 4000 ?

Intermediate Z retractions [mm]: 10 ?

Normal tracking: ☒ ?

Profiling passes: ☐ ?

Shaped pocketing: ☐ ?

Priority to passes in Z: ☐ ?

Optimisation of passes in Z: ☐ ?

Eliminate retractions between passes: ☐ ?

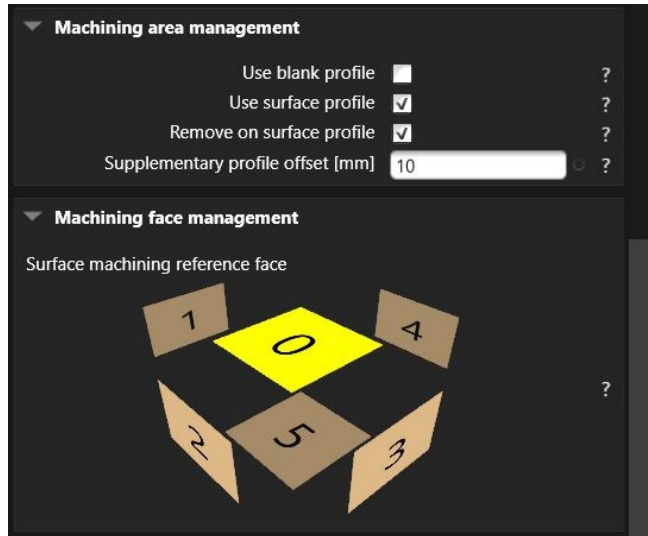
Machining strategy

- **Normal tracking:** it enables or disables the adaptation of the tool to the direction of the programmed geometry; if checked the tool will tilt in order to follow the direction of the programmed machining operation path.
- **Profiling passes:** it enables or disables the machining operations related to the profiling of the selected geometry.
- **Shaped pocketing:** it enables or disables the machining operation, following the profile of the surface created.
- **Priority to passes in Z:** if checked it enables the creation of the machining operations, taking into account the number of depth movements.

- **Priority to passes in Z:** if checked it enables the creation of the machining operations, taking into account the number of depth movements.
- **Optimization of passes in Z:** it enables or disables the automatic calculation of the steps in Z, so that the tool descends evenly.
- **Eliminate retractions between passes in Z:** it allow to choose whether or not the withdrawal of the tool from the piece between one movement and the next should be performed; if checked, the tool performs all operations one after another, without leaving the piece.

Machinings

Pocketing/Roughing (3-axis) - Advanced data (Overview)



Machining area management

- **Use blank profile:** if checked it enables the machining of the rough part around the selected geometry (*only in case of machinings on surfaces*)
- **Use surface profile:** if checked, the machining operation path stays within the perimeter of the surface to be machined.
- **Remove on surface profile:** it enables or disables the calculation of the machining operation path according to the radius of the tool; If checked, the tool extends outside the profile by a value equal to its radius.

- **Supplementary profile offset [mm]:** it specifies the distance from the perimeter of the machinable surface, so that the path of the machining operation leaves a margin or extends outside of the profile of the surface

Machining face management

- **Surface machining reference face:** it allows to specify the reference face through which working the surface.

Machinings

Pocketing/Roughing (3-axis) - Advanced data (Overview)

Tolerances

Solid subdivision tolerance 0.05 ?

Solid machining accuracy 0.1 ?

Flat area management

Flat area machining ☐ ?

Flat area search angle 1 ?

Additional machining data

Type of positioning By position ?

Hood position 0 ?

Optimisable ☒ ?

Spindle ?

Tolerances

- **Solid subdivision tolerance:** it allow to specify the tolerance that defines the precision of the curvature of the created surfaces.
- **Solid machining accuracy:** it specify the Index for defining the precision of the machining operation on curved surfaces, in order to calculate the tool trajectories.

Flat area management

- **Flat area machining:** it enables or disables the machining of flat surfaces on the basis of the plane that the machining operation has been applied to.
- **Flat area search angle:** it specify the angle below which a surface is considered flat, calculated starting from the construction plane. All surfaces with angles between zero and the value shown in this field are considered flat and are therefore machined.

Additional machining data

- *Same settings as seen for previous machining.*

Machinings



Re-working - Geometric data/Tool data



Geometric data:

- **Geometries to work:** it specify the list of geometries to be machined.
- **Reverse travel:** as mentioned, it allow to invert the machining direction for selected geometries.
- **Lead-in point selection:** it allow the user to select a custom lead-in point in order to start the machining.

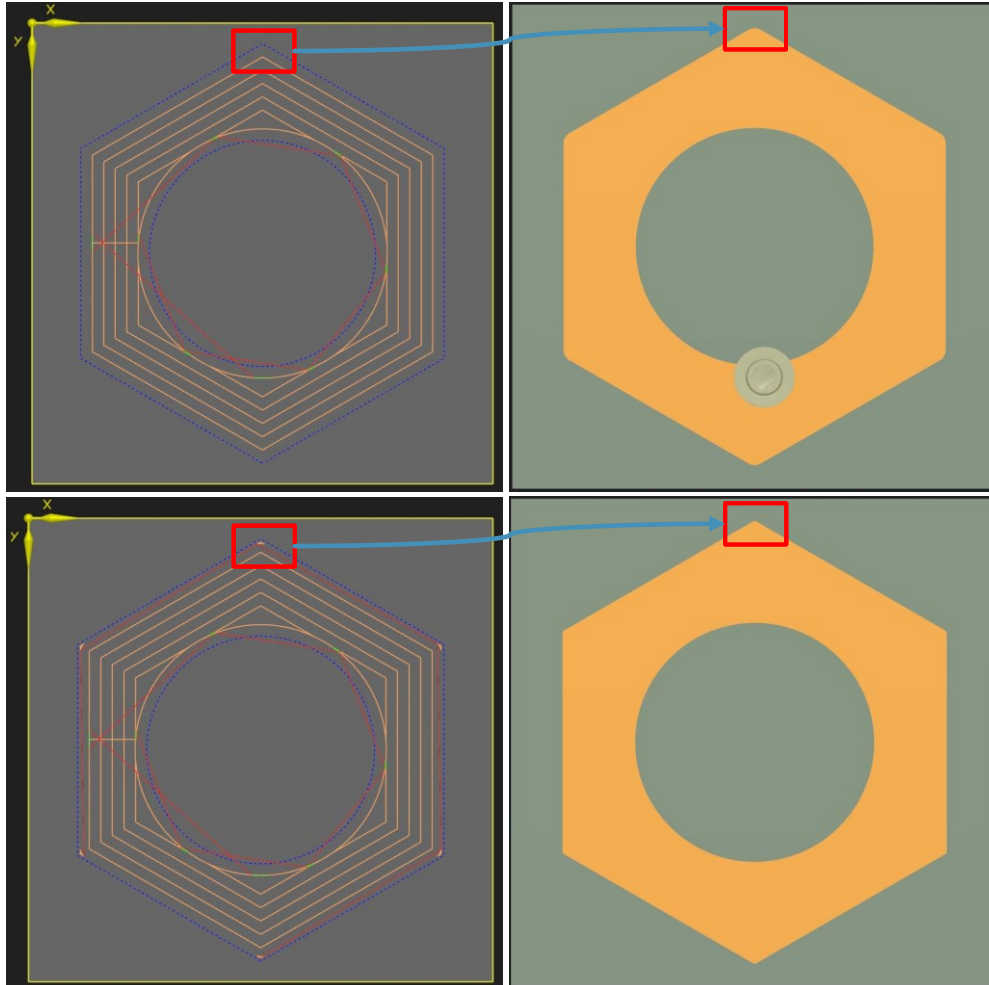
Tool data:

- **Previous tool:** it allow to specify the tool used to perform the previous machining; in specific situations, when selecting the geometry, it will automatically show the tool previously used.
- **Tool:** it allow to specify the tool used to perform the Re-working machining.

Machinings



Re-working – Example of sharper corners



Without Re-working

- Rounded corners

With Re-working

- Sharper corners

Machinings



Re-working - General/Lead-in/Lead-out

General

Tool data ☒

Rotation speed 18000

Machining speed 12000

% Lead-in speed 100

% Lead-out speed 100

Z safety position [mm] 40

Z pushing position [mm] 10

Lead-in

Type Follow 3D profil

Section length [mm] 150.000

Angle 90.000

Lead-out

Type Same as the lea

General:

- Same settings as seen for previous machining.

Lead-in/Lead-out:

- Same settings as seen for previous machining (Only “Follow 3D profile” and “3D Arc” available).

Tool data:

- **Previous tool:** it allow to specify the tool used to perform the previous machining; in specific situations, when selecting the geometry, it will automatically show the tool previously used.
- **Tool:** it allow to specify the tool used to perform the Re-working machining.

Machinings



Re-working - Machining data

Machining data

Finish type

Concentric in Z

?

Working depth [mm]

10

?

Z step [mm]

10

?

Distance between passes [mm]

1

?

Excess material [mm]

0

?

Finishing width [mm]

0

?

Finish type:

- **Concentric in Z:** Finishing path strategy which consists of concentric path with fixed distance in Z between one line and the next.
- **Parallel in Z:** finishing path strategy which consists of paths using parallel lines.

Working depth [mm]:

- It specify, in mm, the working depth of the machining.

Z step [mm]:

- It specify, in mm, the depth of each moving.

Distance between passes [mm]:

- It specify, in mm, the distance between each passes.

Excess material [mm]:

- It specify, in mm, the over material to be left.

Finishing width [mm]:

- It specify the size of the area to be finished off, starting from the tool path.

Machinings



Re-working - Advanced tab (Overview)

Re-working Advanced

Properties

Name: P1007 ?

Execute machining: true ?

Layers: Layer 0 ?

Save default

Additional machining data

Spindle: ?

Chip cleaning blow: ?

AirTool: ?

AirJet: ?

Ioniser: ?

Lubricator: ?

Type of positioning: By position ?

Hood position: 0 ?

Optimisable: ☒ ?

Machining strategy

Machining mode: One Way ?

Machining direction: From in to out ?

Enable number of passes in Z: ?

Number of passes in Z: 10 ?

Start Z [mm]: 0 ?

Angle between passes: 0 ?

% Feed first pass: 60 ?

Priority to passes in Z: ?

Optimisation of passes in Z: ?

Uniform distance between passes: ☒ ?

Eliminate retractions between passes: ?

Z safety retraction: ?

Profiling passes: ?

Properties/Additional machining data:

- Same settings as seen for previous machining.

Machining strategy:

Same settings as seen for “Pocketing/Roughing (3-axis)” machining except for:

- **Machining mode:** (“Parallel in Z” strategy must be selected) it allow to choose between “one way” (Each single movement is separate from the following one, and the tool ascends) or “Zig zag” machining mode (The movements are all connected).
- **Machining direction:** (“Concentric in Z” strategy must be selected) it allow to specify the direction in which the tool performs the machining operation when the concentric or spiral paths are activated (“From in to out” or “From out to in”).

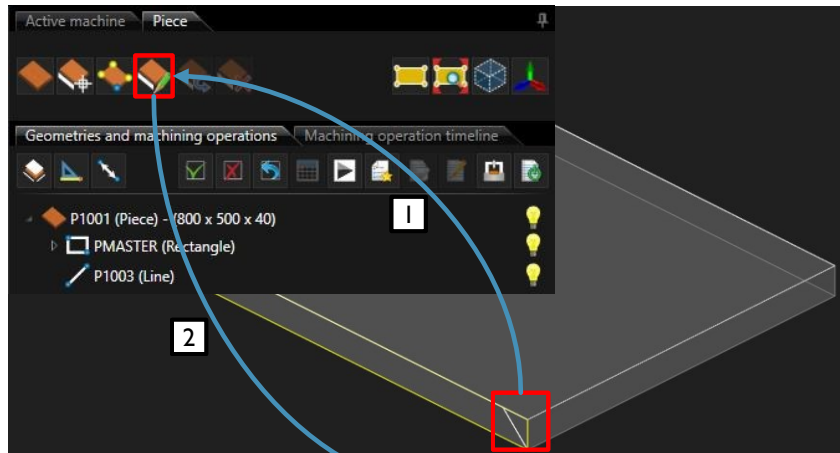
OBRADA OBIMNIM GLODANJEM

DIMENZIONISANJE I PROFILISANJE PLOČA



Custom Faces

Custom Face (45° Panel Cut) - Creation

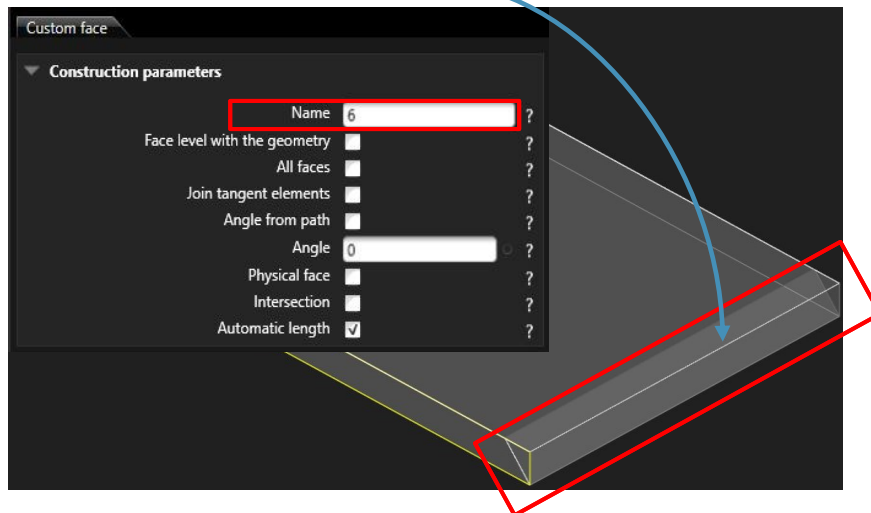


Custom Faces

- Allows to create new faces in which to place new drawings and machinings.
- Specific buttons allow to manage the custom faces created.

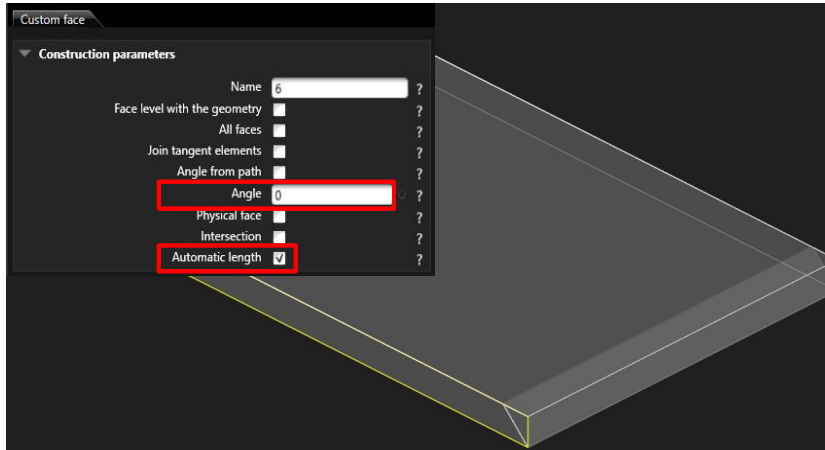
Custom Face Creation Button

- It allows the creation of the custom face inside the piece (**Name**).
- It works with all kinds of 2D geometries (open and closed drawings)
- It allows to recursively create new custom faces starting from another custom face.
- Different parameters available in order to manage the outcome while creating a new face.
- In the example shown, starting from a line drawn on the lateral face (with 45° inclination), a new face is created.



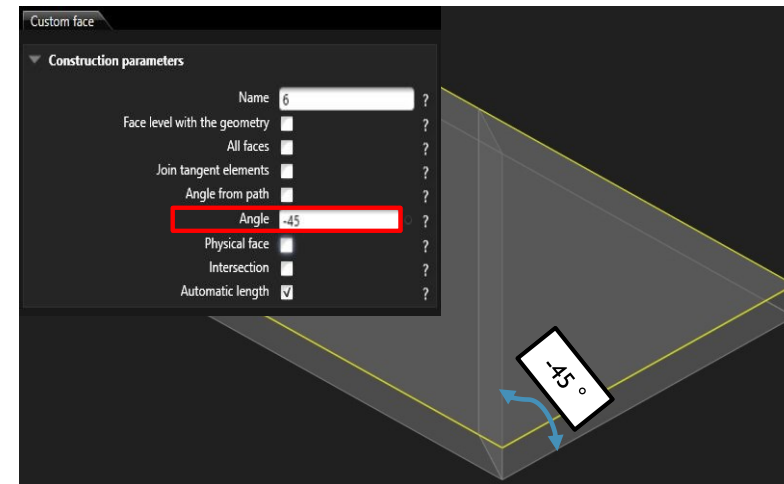
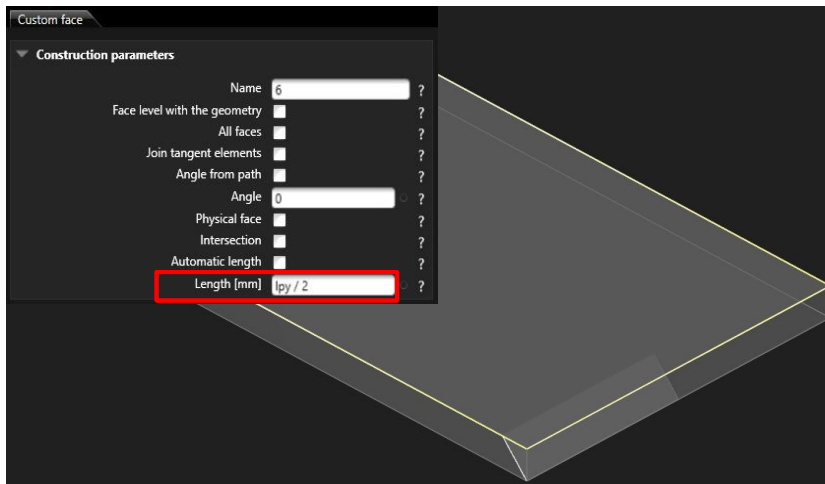
Custom Faces

Custom Face (45° Panel Cut) - Length / Angle



Custom Faces

- It's possible to select the **Automatic length** parameter for face creation (in this case the custom face length will reach the panel end) or put a custom defined length (**Length [mm]** parameter).
- **Angle** parameter allow to specify the desired angle for custom face creation.



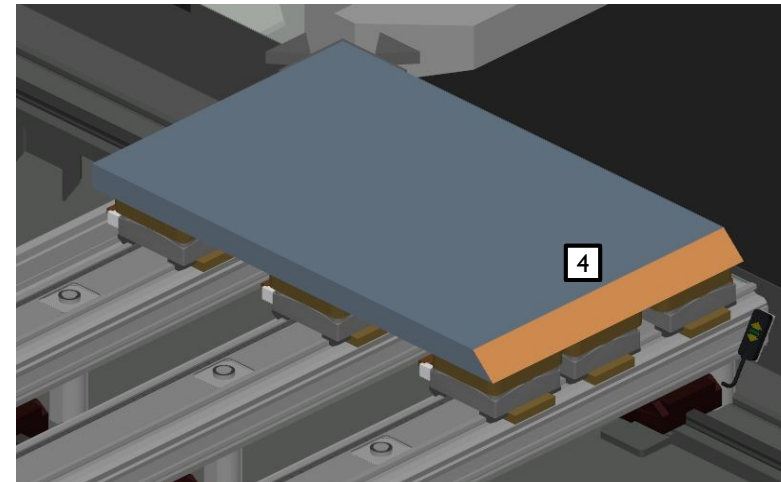
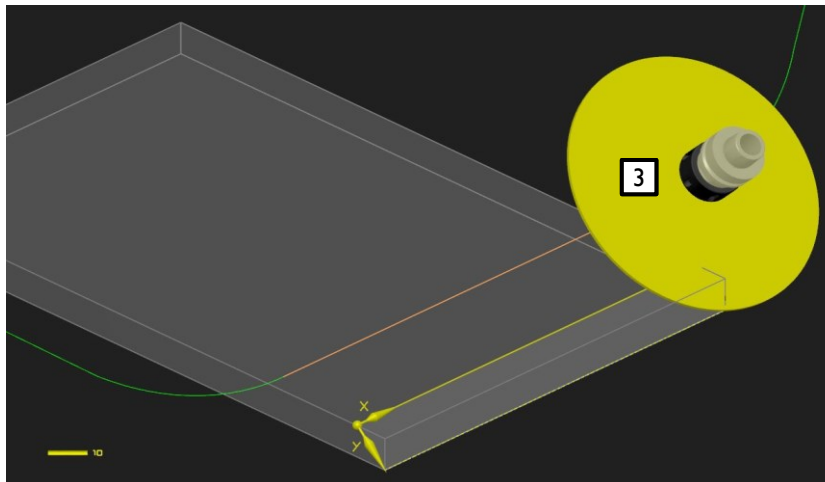
Custom Faces

Custom Face (45° Panel Cut) - CAD Design and Machine Simulation



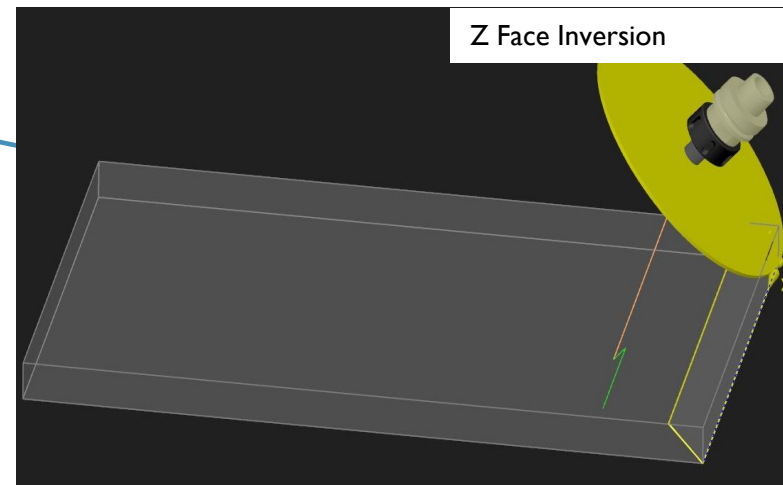
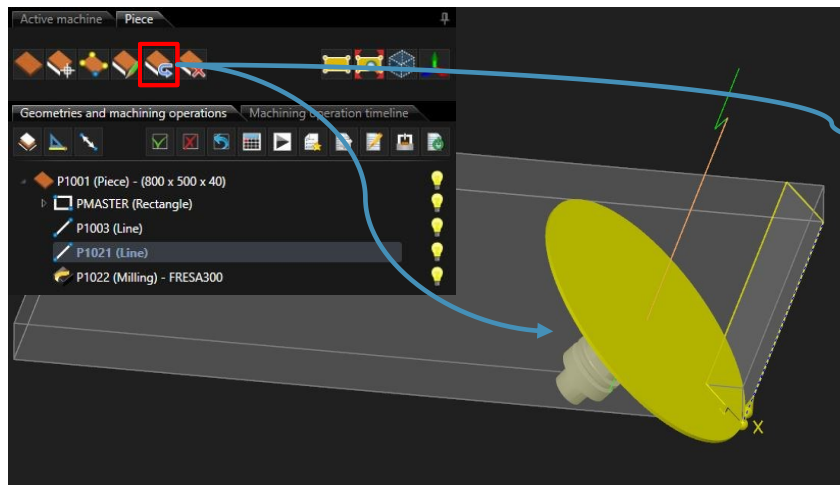
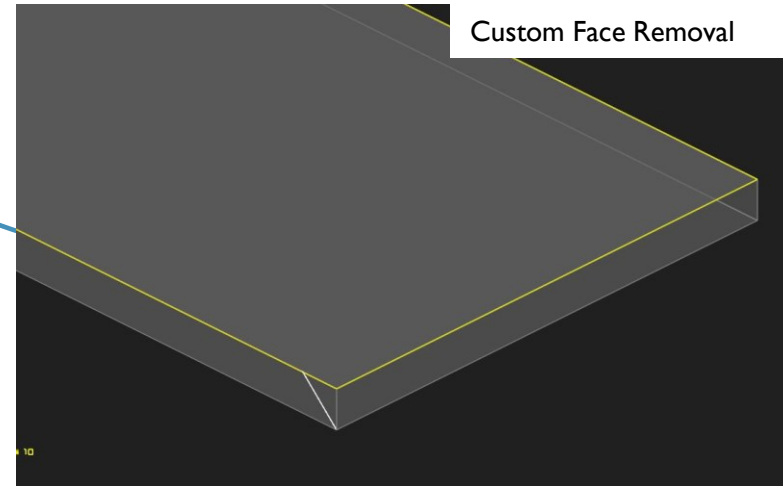
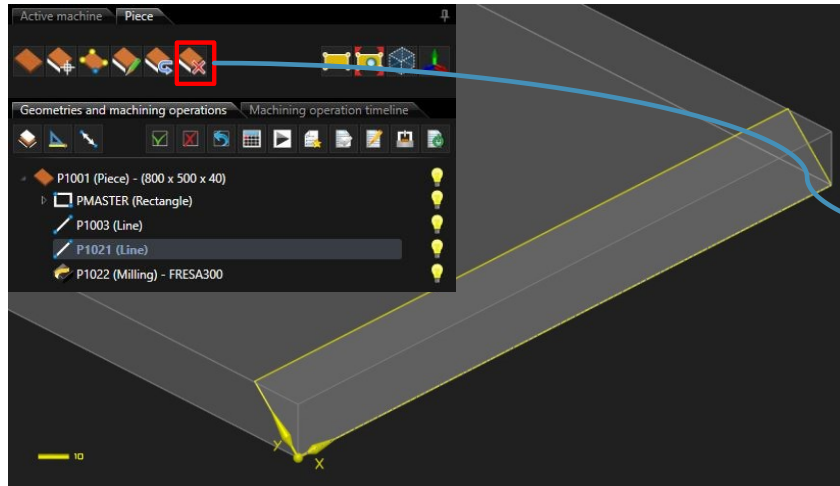
Custom Faces

- After selecting the Custom Face selection (1) a line has been drawn as a reference to the cut machining (2).
- Blade Cut machining (3).
- Machine simulation outcome (4).



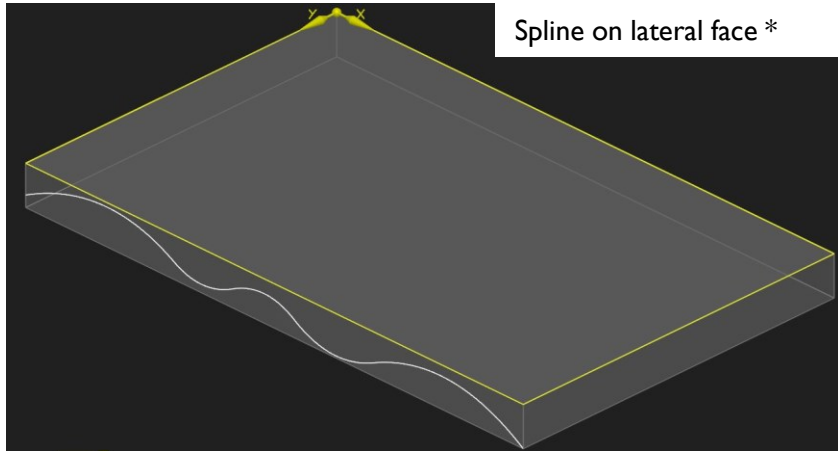
Custom Faces

Custom Face (45° Panel Cut) - Removal and Face Reversal



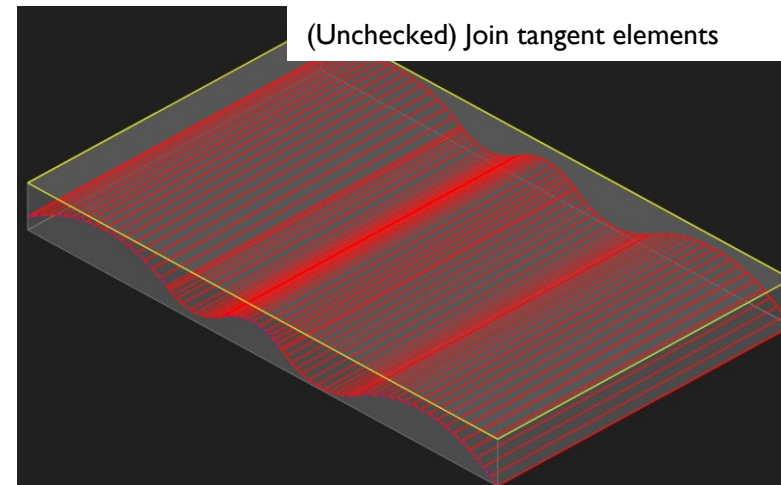
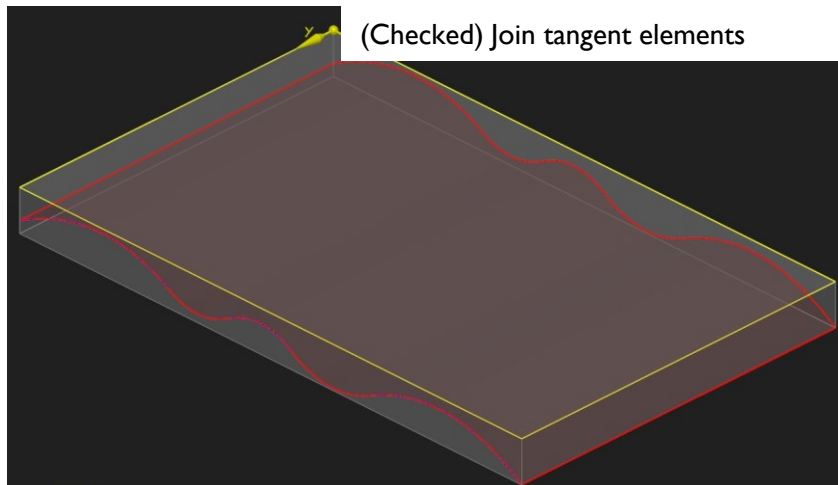
Custom Faces

Custom Face - Join tangent elements



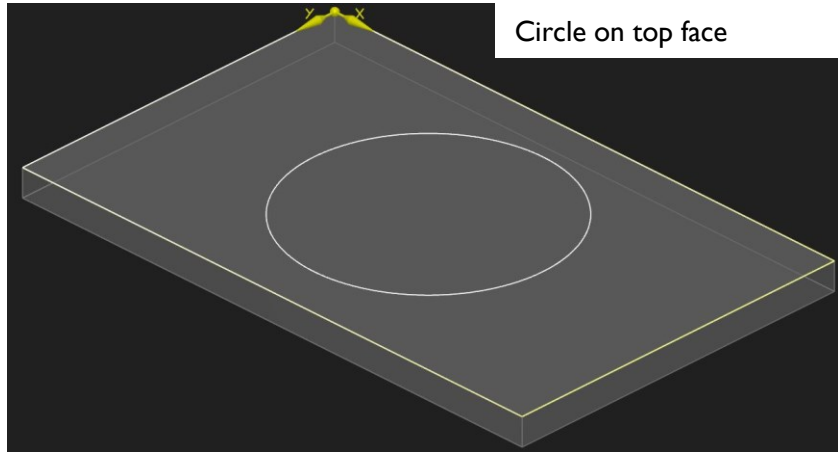
Custom Faces

- **Join tangent elements** parameter allow to simplify tangent different custom faces into a single custom face.



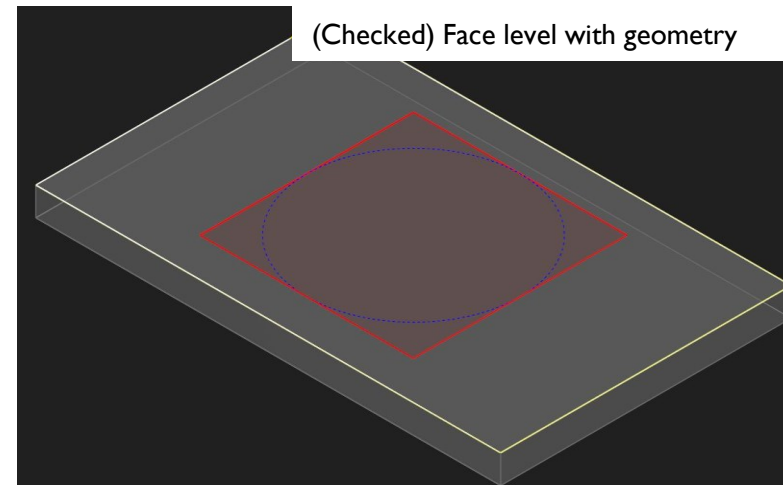
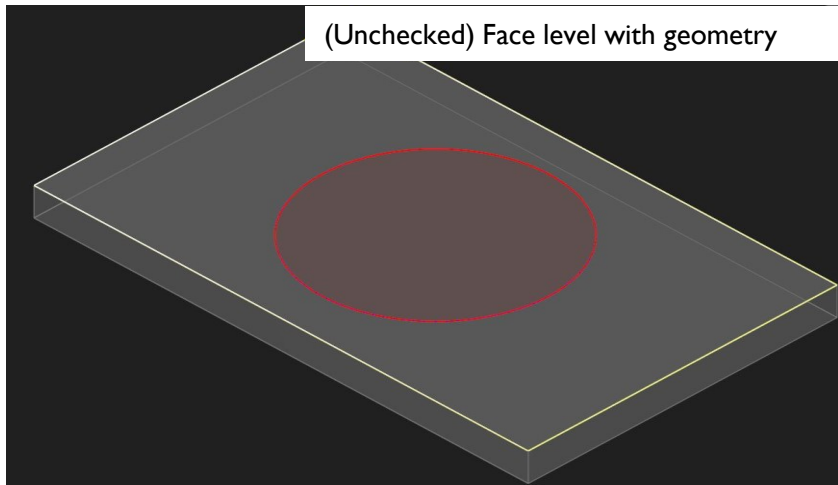
Custom Faces

Custom Face - Face level with geometry



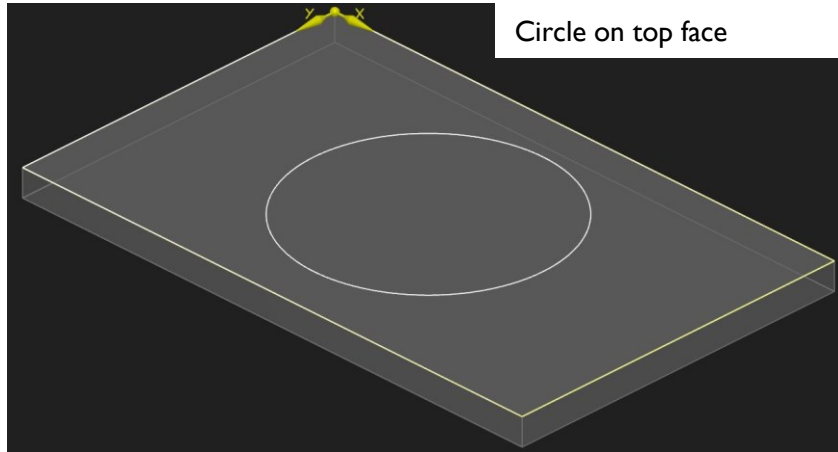
Custom Faces

- **Face level with geometry** parameter allow to create a custom face that is the **bounding rectangle** for the given geometry.



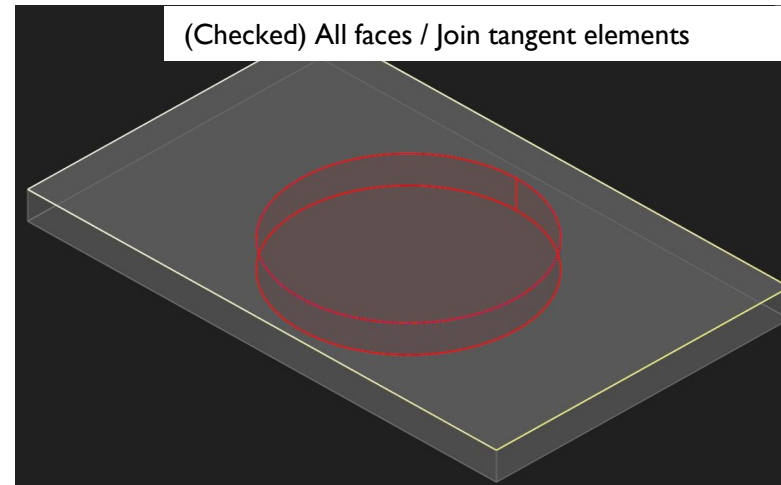
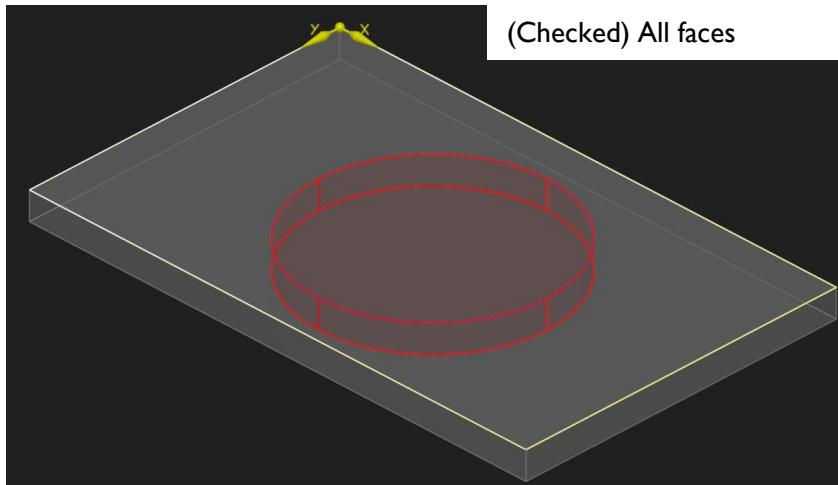
Custom Faces

Custom Face - All faces



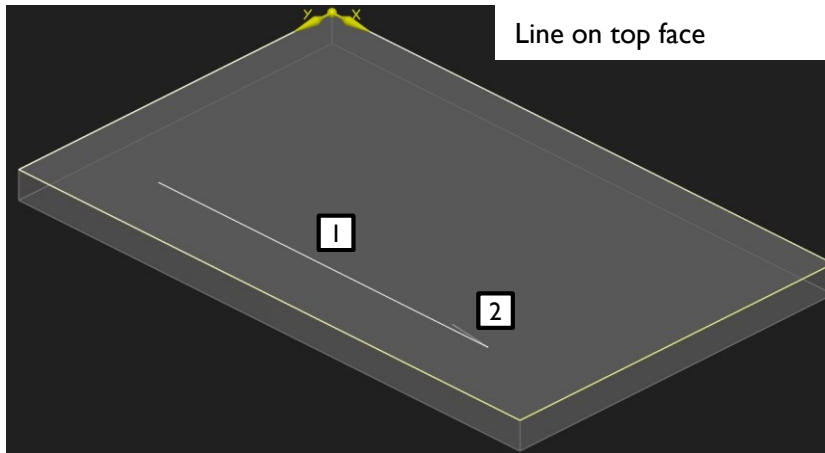
Custom Faces

- **Face level with geometry** parameter allow to create a custom face that is the **bounding rectangle** for the given geometry.



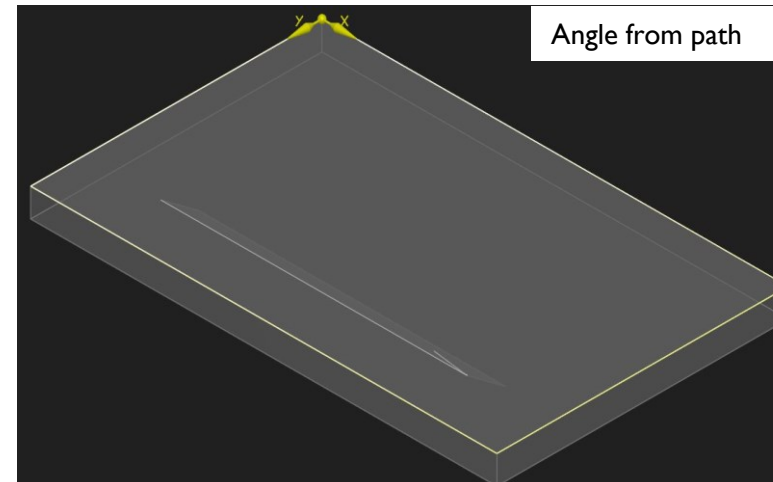
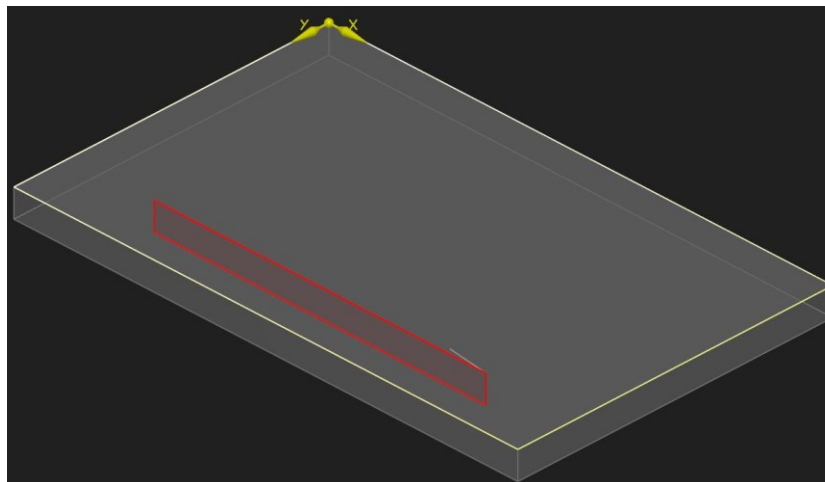
Custom Faces

Custom Face - Angle from path



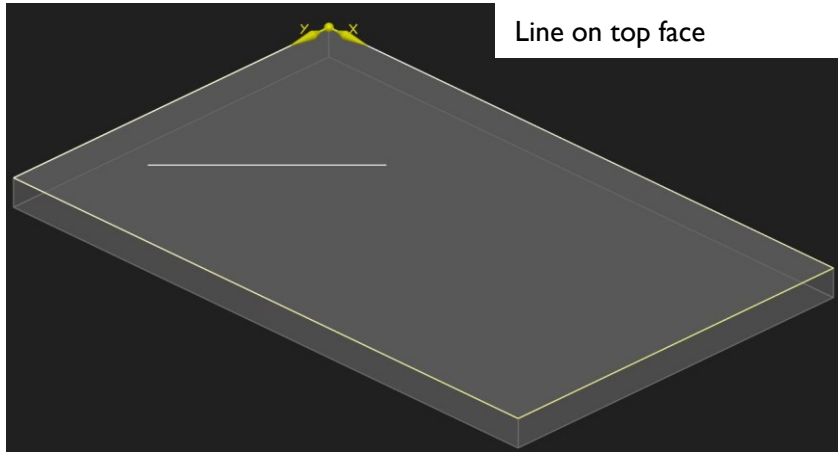
Angle from path:

- It is possible to create a custom face by just selecting two geometries:
 - Reference geometry (1)
 - Path (2)



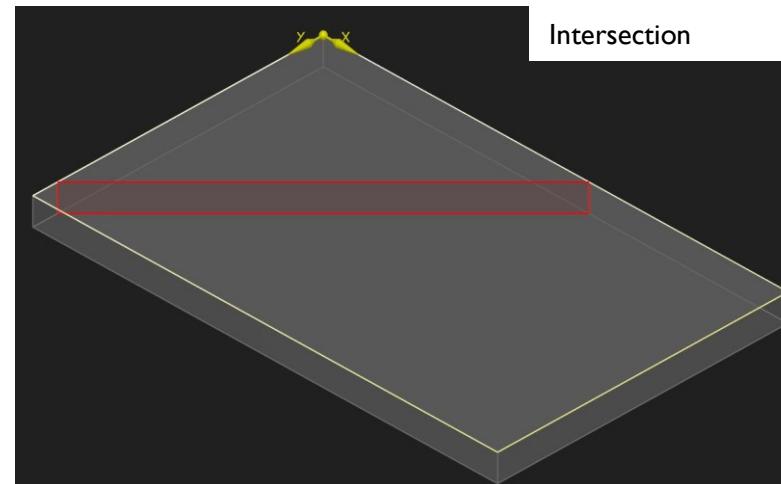
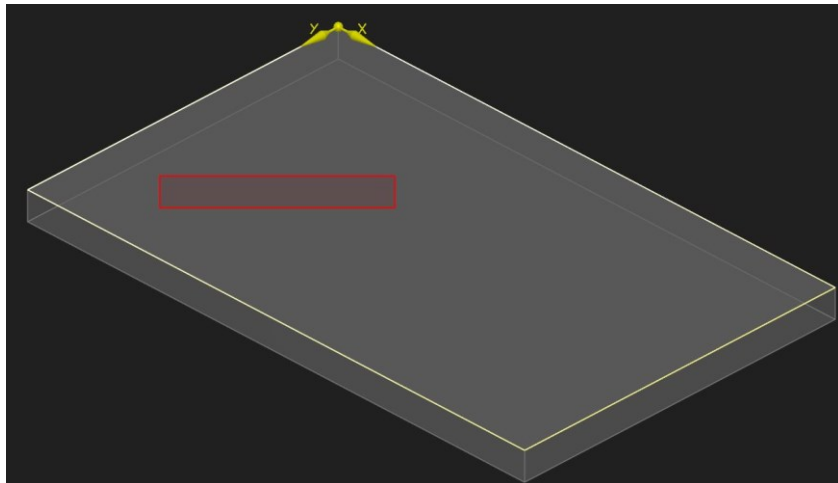
Custom Faces

Custom Face - Intersection



Intersection:

- It extends the created geometry until it intersects the piece sides that are perpendicular to the starting geometry.



Custom Faces

Custom Face – Final Example

