design2machine

BTLx interface description

Version:	*BTLx 2.1*
Last modified:	*10.03.2022*
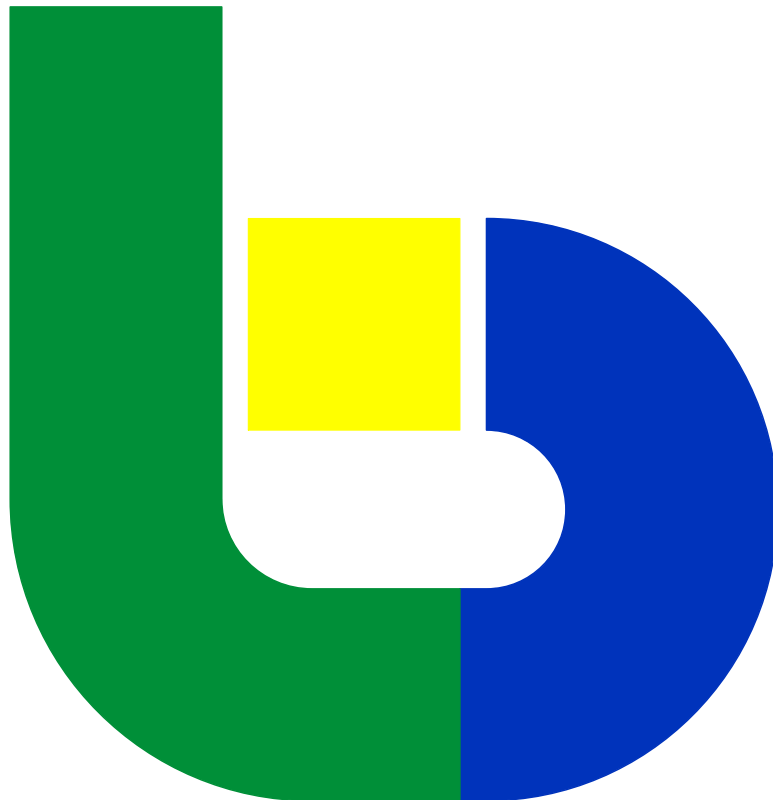
Common Data Interface for Wood Working Machines

The following interface description is designed for the structured representation of the data relevant to the manufacturing process.

It does not contain any machine specific data. This allows the interface to be used as a common data interface.

If there is a need to prepare the data stored in this interface for some special wood working machine or some special control, then these data should be imported by a suitable CAM system and then properly processed.

This documentation is a graphical appendix to the BTLX schema. You can find this schema at

https://www.design2machine.com/btlx/BTLx_2_0_0.xsd

BTLx files are identified by the ".btlx" file extension.

A BTLx file contains general data related to the project, information about the building elements as well as the relationship between them and parametric descriptions of the processings of each building element.

In order to minimize storage space requirements, the specification defines compressed BTLx files which are identified by the ".btlz" file extension. Such a file has to be a standard zip file and may only contain a single BTLx file.

For more information or questions regarding the BTLx format, please contact:

<div align="center">

www.design2machine.com

info@design2machine.com

</div>

Content

History

| Date	Modification	Build	Page
23.03.2017	Lap: Definition of LeadAngle and LeadInclination	1.0	30, 31
23.03.2017	Birdsmouth: Definition of LeadAngle and LeadInclination	1.0	23, 24
13.06.2017	LongitudinalCut: Changed definiton of ToolPosition	1.0	11
06.11.2018	RidgeValleyCut: StartDepht can also be < 0	1.0	16
16.09.2019	Dovetail: Better description	1.0	58,59,60
19.05.2017	New Element for Shape. Geometry of part in X3D Format	1.1	105
17.11.2017	Birdsmouth: Correction at LeadAngle and LeadInclination	1.1	23, 24
26.07.2019	Dovetail: Better description	1.1	58,59,60
04.03.2020	SawCut: Changed limit of Angle from 0/+180 to -180/+180	1.1	18
20.07.2020	Japanese Tenon	2.0	64
20.07.2020	Japanese Mortise	2.0	62
20.07.2020	NURBSCurve	2.0	106
20.07.2020	NURBSPatch	2.0	106
20.07.2020	Face limited top or Bottom	2.0	105
20.07.2020	X3D Shape	2.0	8
20.07.2020	SawCut Limits	2.0	19
26.10.2020	Contour: Better description for Depth and DepthBounded	2.0	104, 105
26.10.2020	House: Better description for StartDepth	2.0	54
05.11.2020	Remark: Part attributes "Count" and "Transformations"	2.0	4
05.11.2020	Tenon: description for LengthLimitedTop and LengthLimitedBottom	2.0	51
05.11.2020	Contour: Correlation between ContourType and Line attributes	2.0	104
06.11.2020	Mortise: description for LengthLimitedTop and LengthLimitedBottom	2.0	53
09.07.2021	Graphically corrections: sawcut (Machine limits) and lap (No StartDepth)	2.0	19, 33
28.12.2021	Annotations: Processings, which trim the part	2.1.0	11,14,38,45,70,72,75,92,103
28.12.2021	Types of Rawparts	2.1.0	4
28.12.2021	Contour: CrampAngleRefType	2.1.0	108
28.12.2021	RecessAdvType: Description	2.1.0	7

General

These drawings are a graphical appendix to the description in the XML schema.

Recess
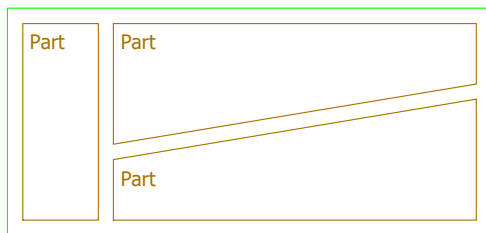
Recess = automatic
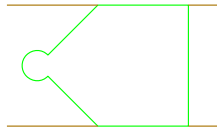
Recess = manual
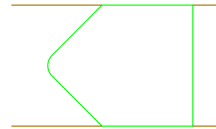
Additional manual work is necessary.

RawPart

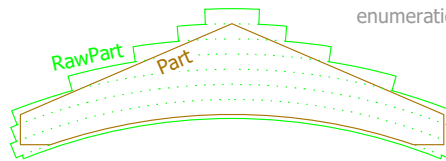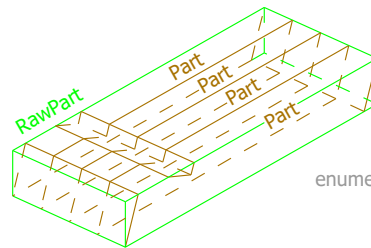RawPart   enumeration value = **nesting**

Part   Part

Part

RawPart   enumeration value = **beam**

Part   Part   Part

enumeration value = **blank**

RawPart Part

RawPart Part Part Part Part

enumeration value = **package**

AligmentType

LocationType   =   bottomRail
                or topRail
                or bottomRailAngled
                or topRailAngled
                or horizontalComponent
                or verticalComponent
                or angledComponent

topRail
topRailAngled
topRailAngled
topRail
verticalComponent
bottomRail

topRail
topRail
verticalComponent
bottomRail

topRailAngled
topRailAngled
verticalComponent
bottomRail
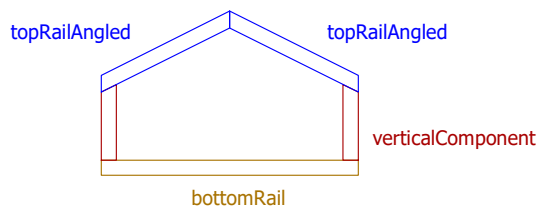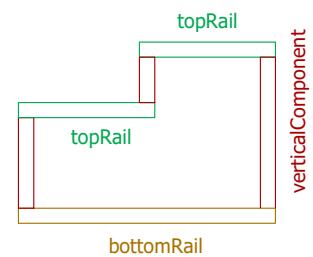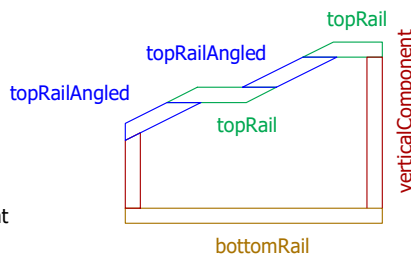
Part attributes "Count" and "Transformations"

If Count > 1 for a part, there have to be Count Transformations.   This condition is not controlled by the XML schema.
Each Transformation must have an own GUID.   This condition is controlled by the XML schema.
GUID must be unique.   This condition is not controlled by the XML schema.
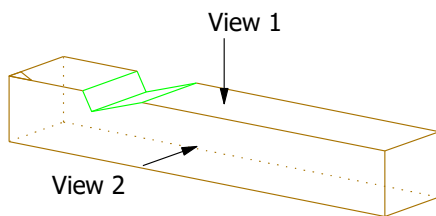
ReferenceSide

Z

(0,0,0)

Y

X

Project
coordinate
system

width

height

length

PartRef

YVector

ReferencePoint

X

Z

XVector

Y

RS : Reference Side
RE : Reference Edge

RS 3

RS 2

RE 2

RE 3

RS 6

RS 5

RS 1

RE 1

RS 4

RE 4

RE 1

Y

X

Z

2

3

6

5

4

1

RS 6

StartX

StartY

RS 5

StartY

StartX

Referenceplane

ReferenceSide
in Processing

Z

Y

X

ReferencePoint.Z

ReferencePoint.X

ReferencePoint.Y

Z

YVector

XVector

StartX

StartY

PartRef

If no referenceplane is declared,
the parameters of the processings refer
to a ReferenceSide.

If there is a referenceplane declared,
the parameters of the processings refer
to this coordinate system.

The ReferencePlane refers to the PartRef.

View

Most of the processings are drawn by a view orthogonal to the reference side.
Otherwise the zeropoint of the reference side is displayed with a brown line.

View 1

View 2

View 1
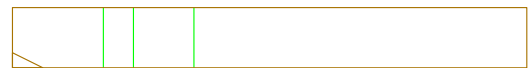
View 2
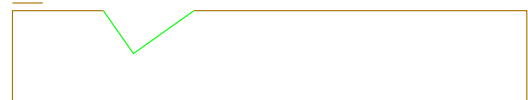
Part in a rawpart, part in composite, composite in composite

Z

(0,0,0)   Y

X

Project
coordinate
system

Subpart refers to the coordinate-system of
the rawpart, part in composite or composite in composite.

Y
YVector   PartRef

Rawpart or Composite
(Superior part)

Z   XVector   X

Part or Composite
(sub part)

Z

Y

YVector   XVector   X

Camber

Part with camber

Part without camber (standard)

StartingPoint

Camber

EndPoint

CamberPoint
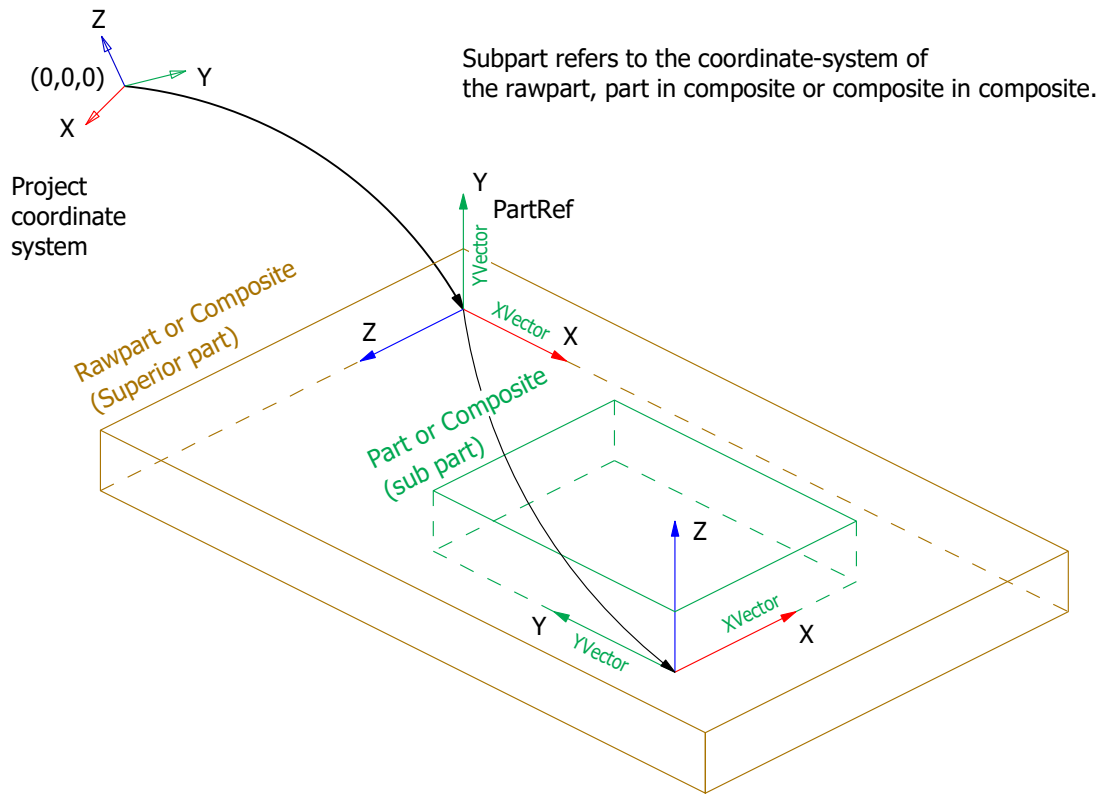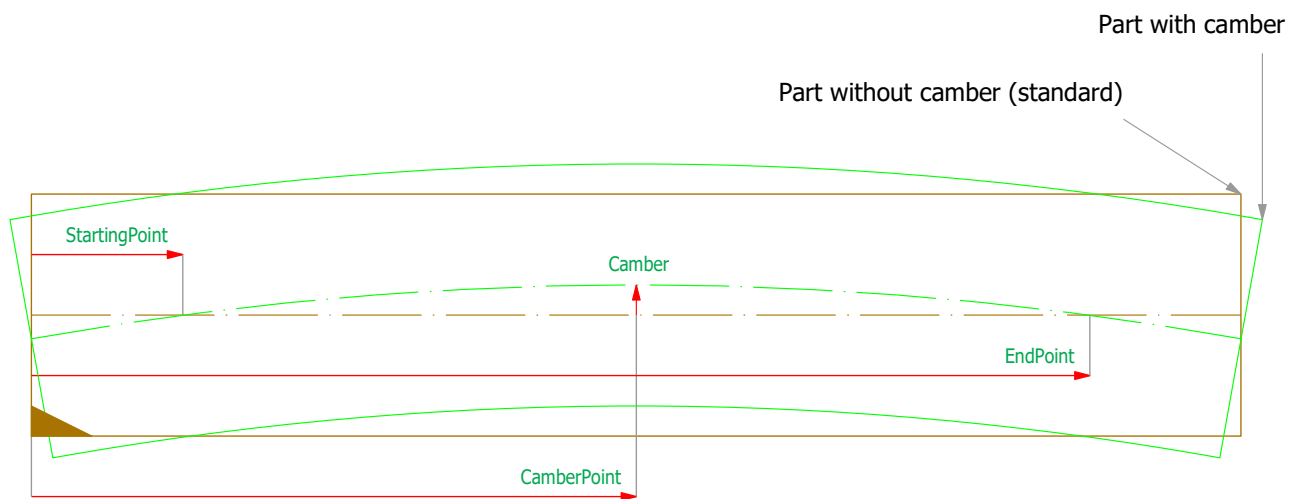
All processings are defined in the part without camber.

RecessAdvType

enumeration value =

Primarily for:
    Lap
    Pocket
    Mortise

Presentation is schematic / exemplarily

?   automatic

exact
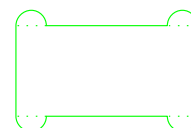
directionWidth
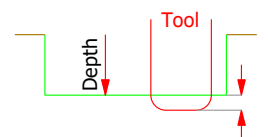
Depth   Tool   directionDepth
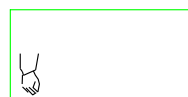
manual
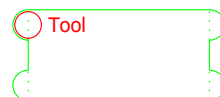
Tool   directionLength
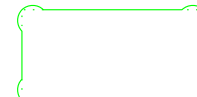
directionDiagonal

X3D Shape

With the Element <Shape> you can define the geomtry of a part.
A part is build with several faces. The volume is closed.
All points of a face are coplanar and counterclockwise.
The coordinates of the points refer to the ReferencePoint of the part.
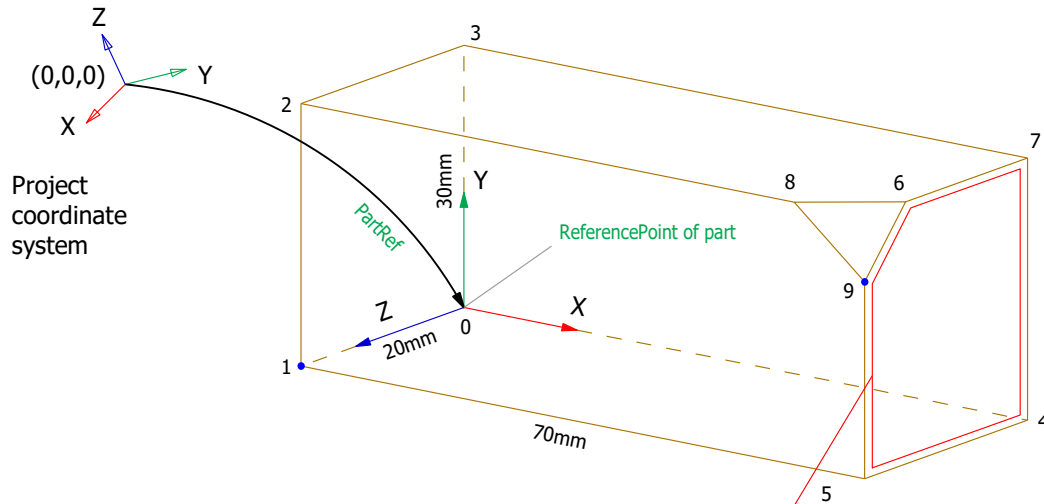

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<X3D profile="CADInterchange" version="3.3" xmlns:xsd="http://www.w3.org/2001/XMLSchema-instance" xsd:noNamespaceSchemaLocation=
 <head/>                                                          "http://www.web3d.org/specifications/x3d-3.3.xsd">
  <Scene>
    <Shape>
      <Appearance>
        <Material diffuseColor="0.6 0.6 0.6" emissiveColor="0.4 0.4 0.4"/>
      </Appearance>
      <IndexedFaceSet convex="false" coordIndex="0 1 2 3 -1 4 7 6 9 5 -1 1 5 9 8 2 -1 2 8 6 7 3  -1 3 7 4 0 -1 0 4 5 1 -1 9 6 8 -1">
        <Coordinate point="0.0 0.0 0.0 0.0 0.0 20.0 0.0 30.0 20.0  0.0 30.0 0.0  70.0 0.0 0.0  70.0 0.0 20.0  70.0 30.0 15.0  70.0 30.0 0.0  61.25 30.020  70.0 22.5 20"/>
      </IndexedFaceSet>
    </Shape>
  </Scene>
 </head>
</X3D>
```

point 1   x   y   z   point 9

a face

Separator between 2 faces

List of Processings

JackRafterCut

Orientation = start

StartY = 0
StartDepth = 0

Orientation = end

StartY = 0
StartDepth = 0
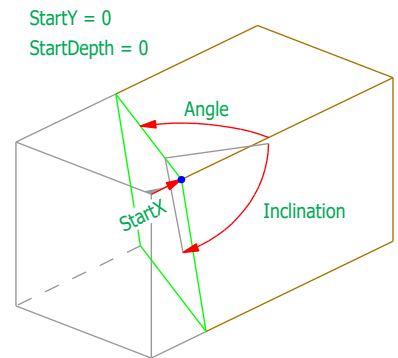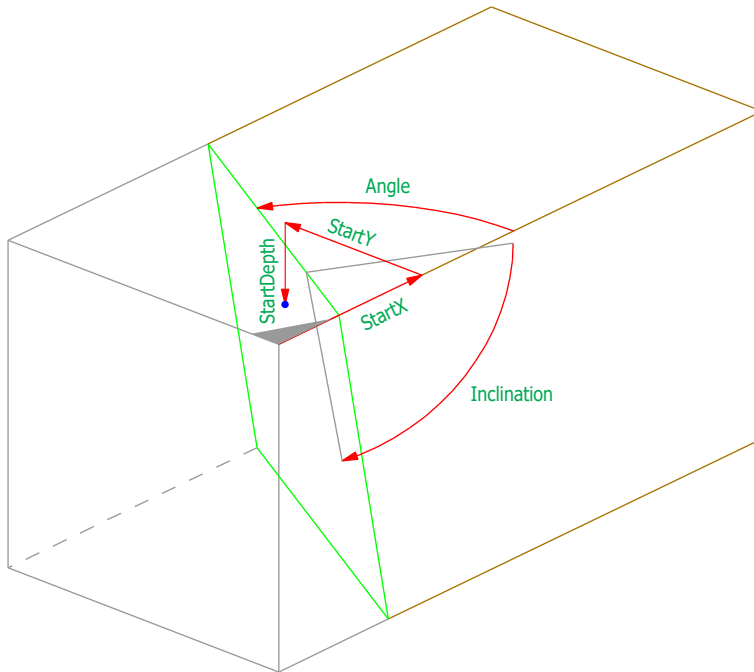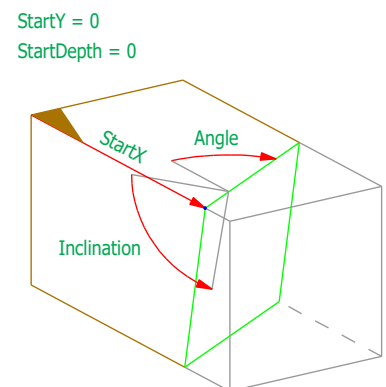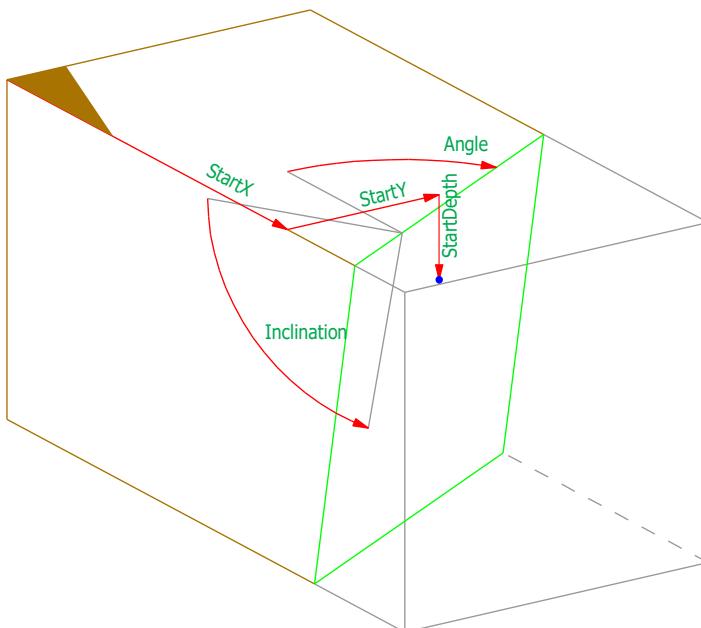
JackRafterCut

Parameters JackRafterCut

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthType	0.0	0.0	50000.0
StartDepth	WidthType	0.0	0.0	50000.0
Angle	AngleType	90.0	0.1	179.9
Inclination	AngleType	90.0	0.1	179.9

This processing trims the part, even it is on a ReferencePlane

Examples:

LongitudinalCut

Inclination > 0

ToolPosition = right   ToolPosition = center   ToolPosition = left

Inclination < 0

ToolPosition = right   ToolPosition = center   ToolPosition = left
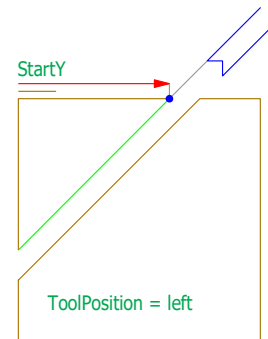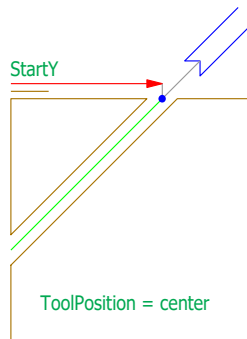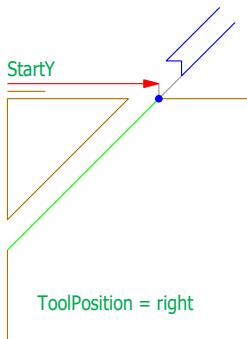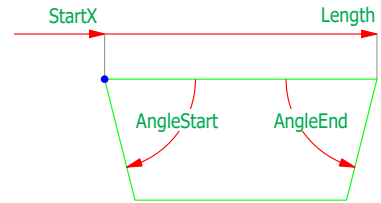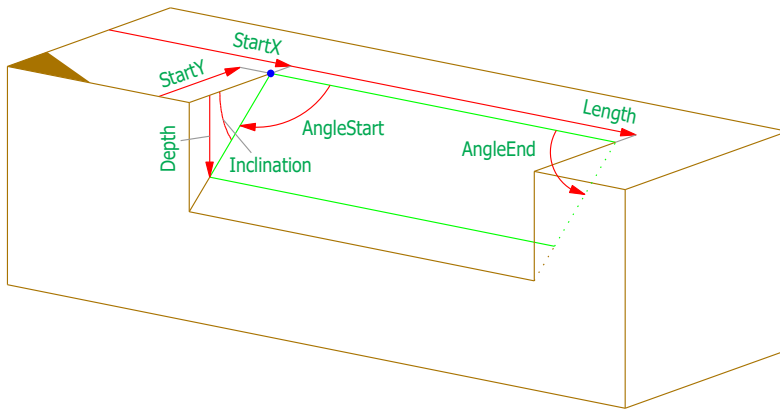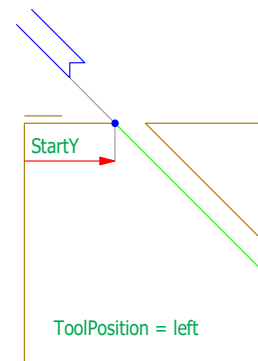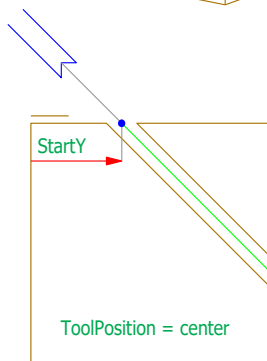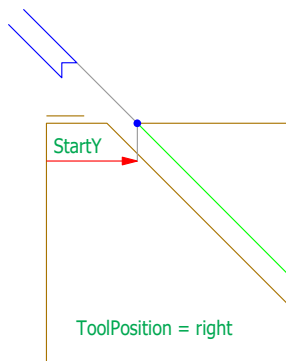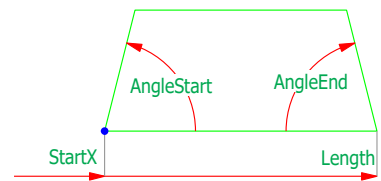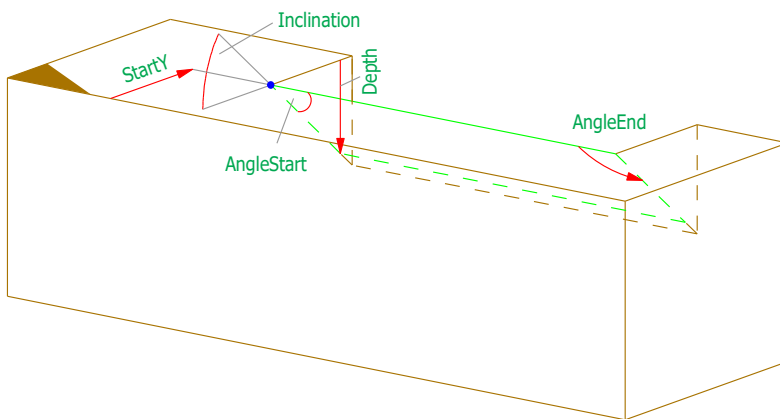
Parameters Longitudinal Cut

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthType	0.0	0.0	50000.0
Inclination	Inclination2Type	45.0	-90.0	90.0
StartLimited	BooleanType	no	no	yes
EndLimited	BooleanType	no	no	yes
Length	LengthType	0.0	0.0	100000.0
DepthLimited	BooleanType	no	no	yes
Depth	WidthType	0.0	0.0	50000.0
AngleStart	AngleType	90.0	0.1	179.9
AngleEnd	AngleType	90.0	0.1	179 .0
ToolPosition	ToolPositionType	left	left/center/right	

StartLimited	EndLimited	
yes	yes	
no	yes	
yes	no	
no	no	

DoubleCut

Orientation = start
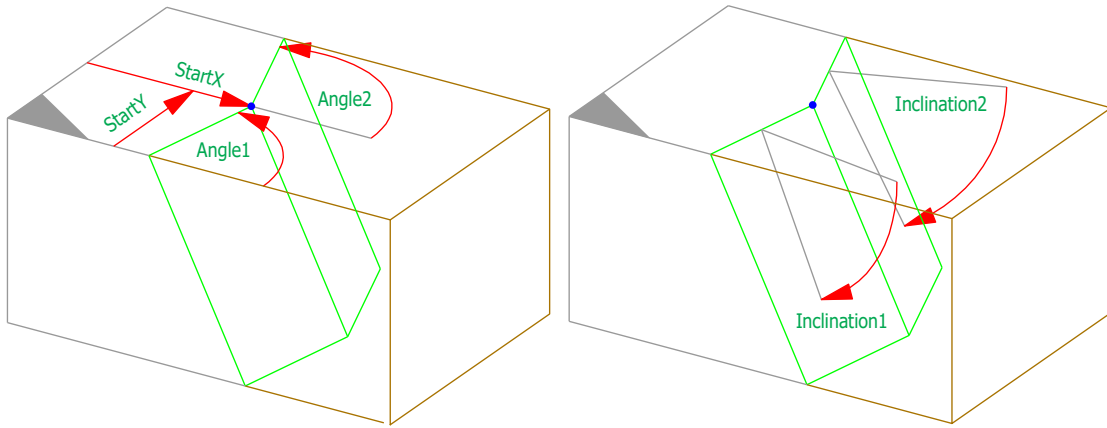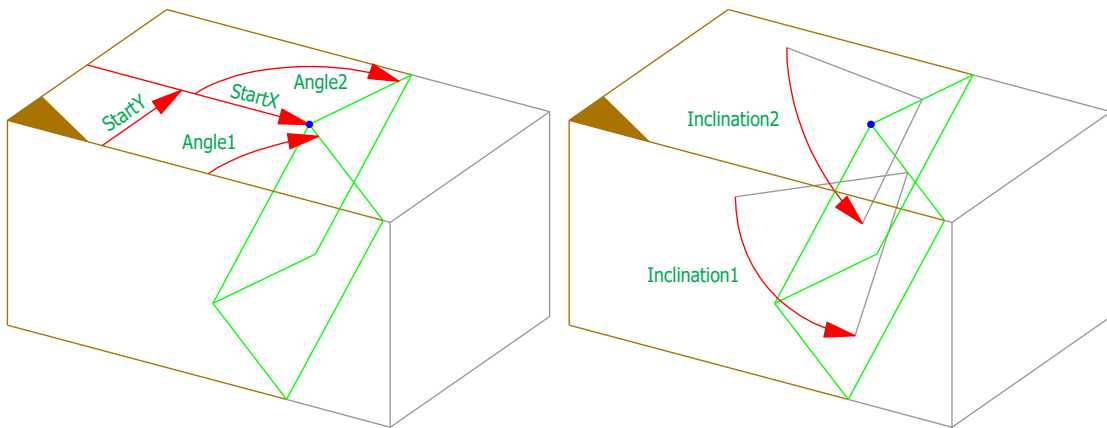
Orientation = end

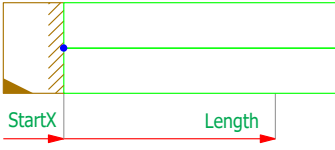This processing trims the part, even it is on a ReferencePlane
Examples:

Parameters Double Cut

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	50.0	-50000.0	50000.0
Angle1	AngleType	45.0	0.1	179.9
Inclination1	AngleType	90.0	0.1	179.9
Angle2	AngleType	90.0	0.1	179.9
Inclination2	AngleType	90.0	0.1	179.9

RidgeValleyCut
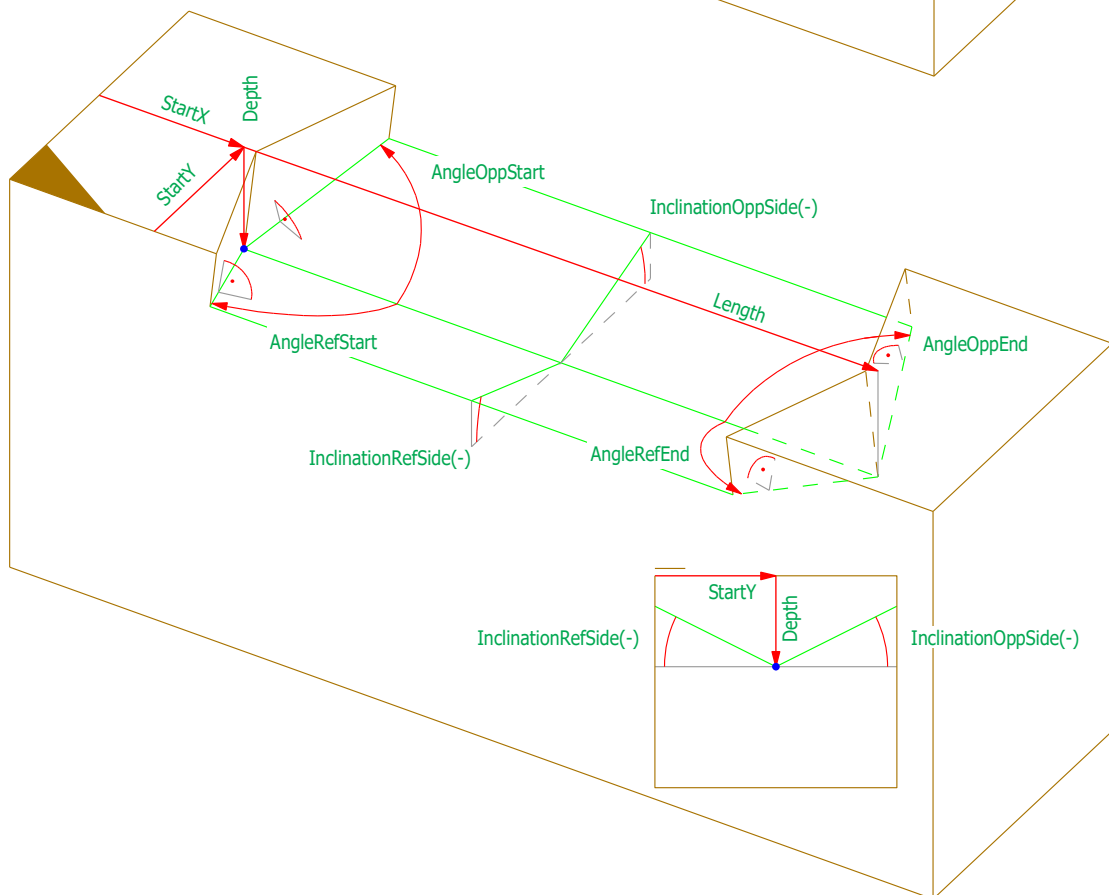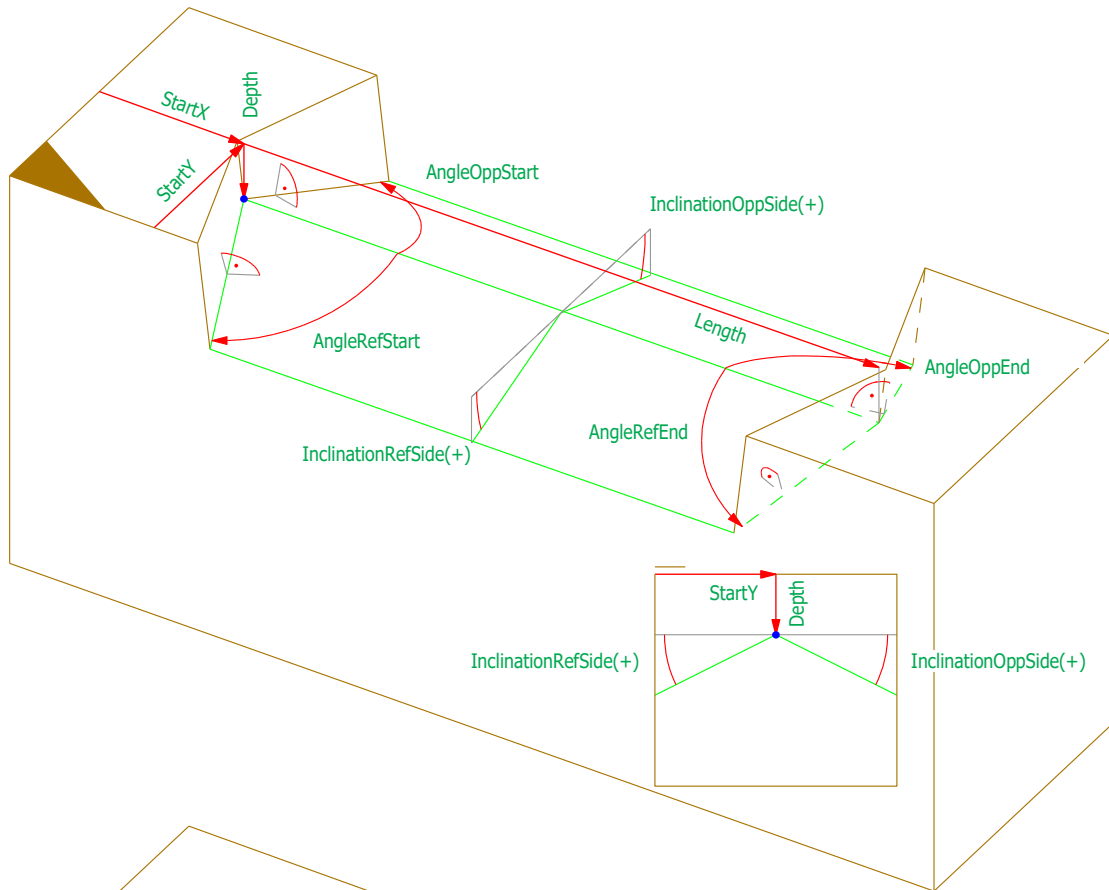
RidgeValleyCut

Parameters RidgeValleyCut

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthType	50.0	0.0	50000.0
StartDepth	WidthNType	0.0	-50000.0	50000.0
InclinationRefSide	InclinationType	45.0	-89.9	89.9
InclinationOppSide	InclinationType	45.0	-89.9	89.9
StartLimited	BooleanType	no	no	yes
EndLimited	BooleanType	no	no	yes
Length	LengthType	0.0	0.0	100000.0
AngleRefStart	AngleType	90.0	0.1	179.9
AngleRefEnd	AngleType	90.0	0.1	179.9
AngleOppStart	AngleType	90.0	0.1	179.9
AngleOppEnd	AngleType	90.0	0.1	179.9

StartLimited	EndLimited	
yes	yes	
no	yes	
yes	no	
no	no	

SawCut
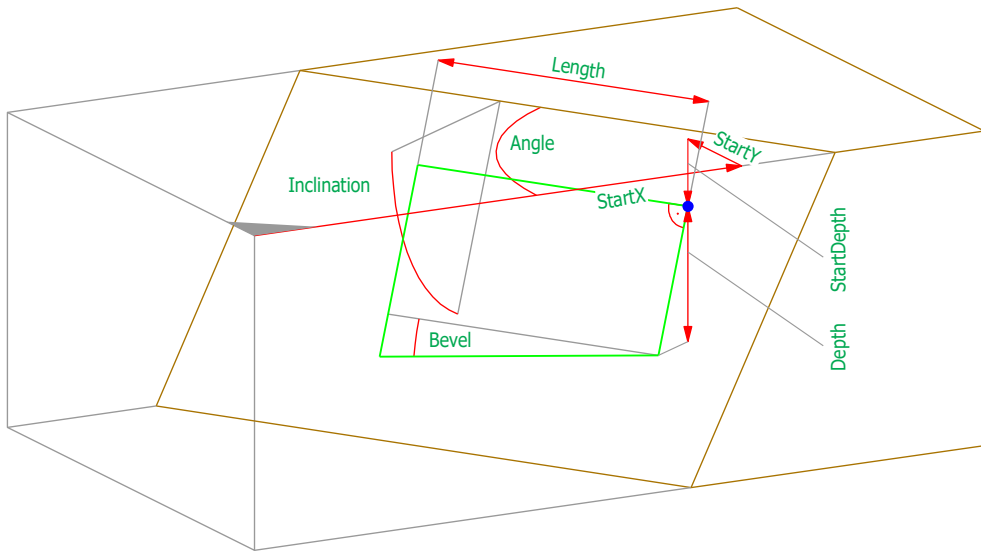
ToolPosition = left
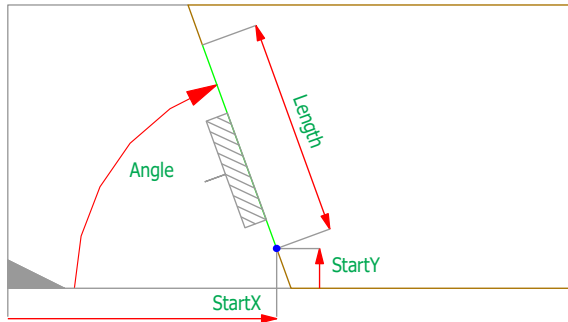
ToolPosition = right
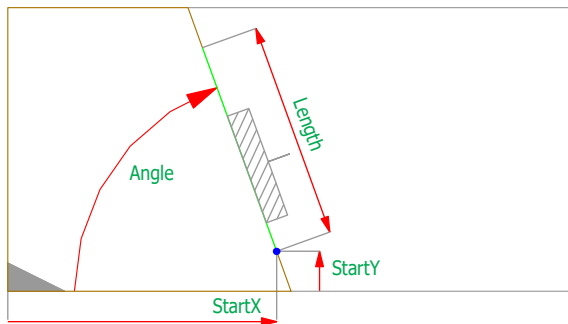
ToolPosition = center
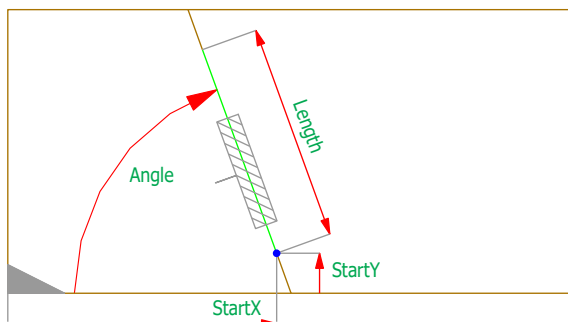
Parameters SawCut

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	0.0	-50000.0	50000.0
StartDepth	WidthNType	0.0	-50000.0	50000.0
Angle	Angle2Type	90.0	-180.0	180.0
Inclination	AngleType	90.0	0.1	179.9
Bevel	InclinationType	0.0	-89.9	89.9
Length	LengthType	0.0	0.0	100000.0
Depth	WidthType	50.0	0.0	50000.0
ToolPosition	ToolPositionType	left	left/center/right	
MachiningLimits	MachiningLimitType	yes	no	yes
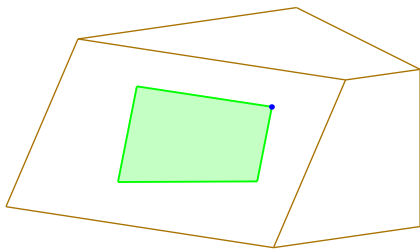
FaceLimitedStart =yes
FaceLimitedEnd =yes
FaceLimitedBottom =yes
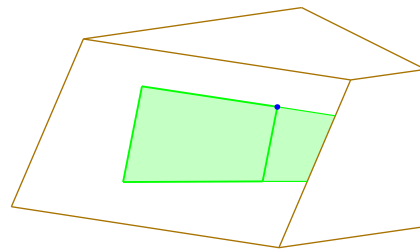
FaceLimitedStart =no
FaceLimitedEnd =yes
FaceLimitedBottom =yes
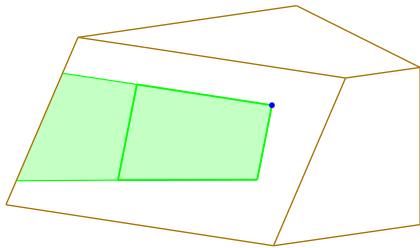
FaceLimitedStart =yes
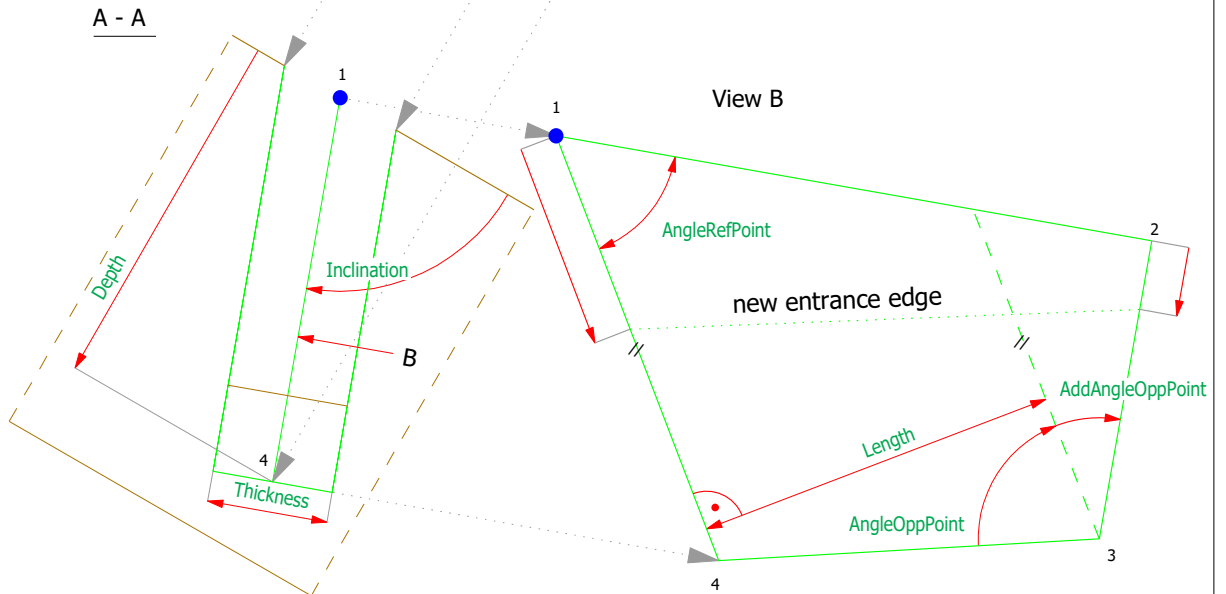FaceLimitedEnd =no
FaceLimitedBottom =yes
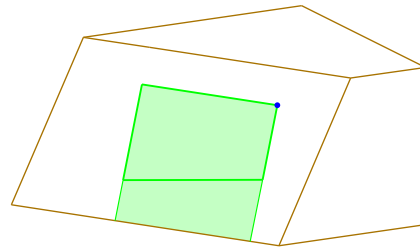
FaceLimitedStart =yes
FaceLimitedEnd =yes
FaceLimitedBottom =no

Slot

StartDepth = 0
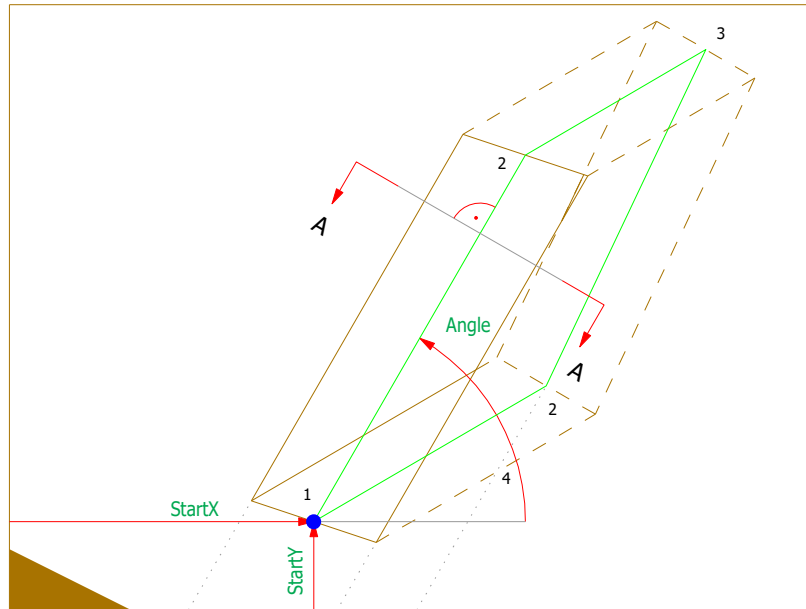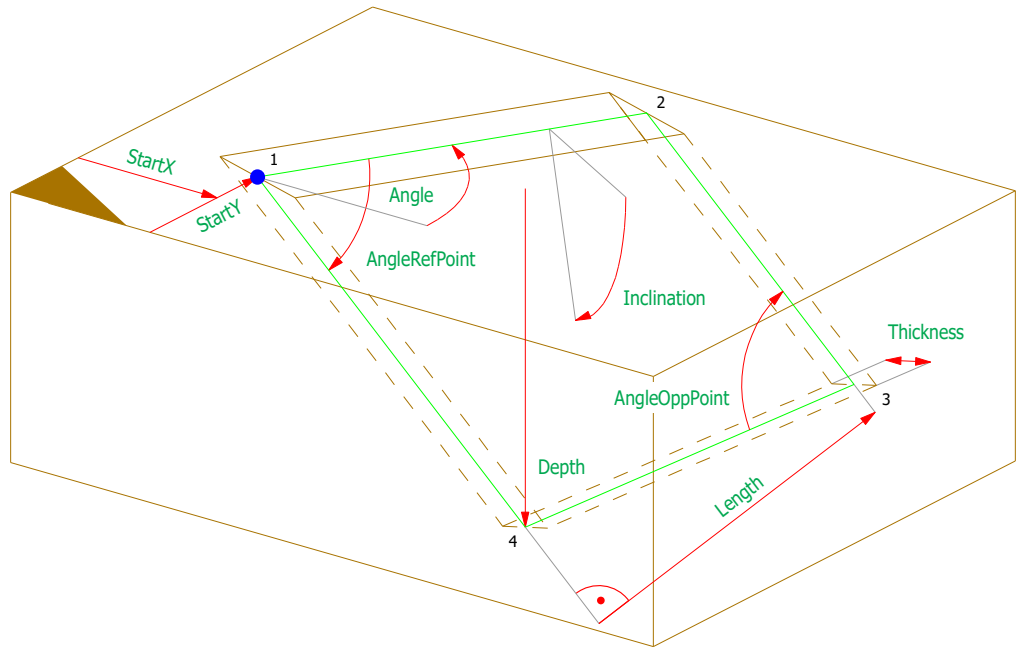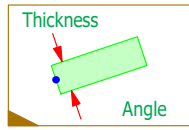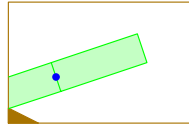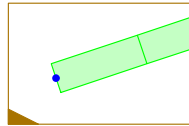

A - A

View B

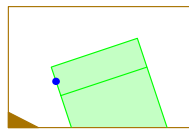new entrance edge

MachiningLimits

FaceLimitedStart = yes
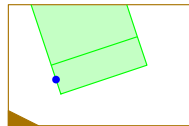FaceLimitedEnd = yes
FaceLimitedFront = yes
FaceLimitedBack = yes
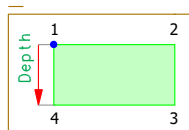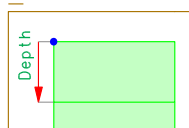
FaceLimitedStart = no

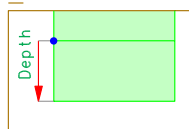FaceLimitedEnd = no

FaceLimitedFront = no

FaceLimitedBack = no

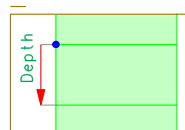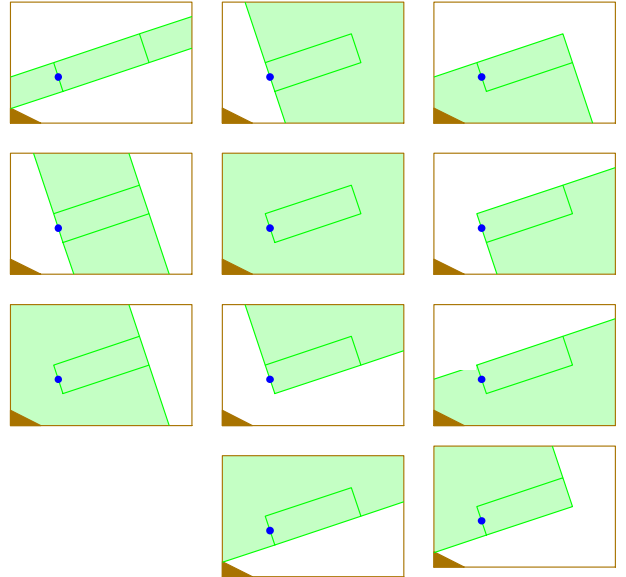FaceLimitedTop = yes
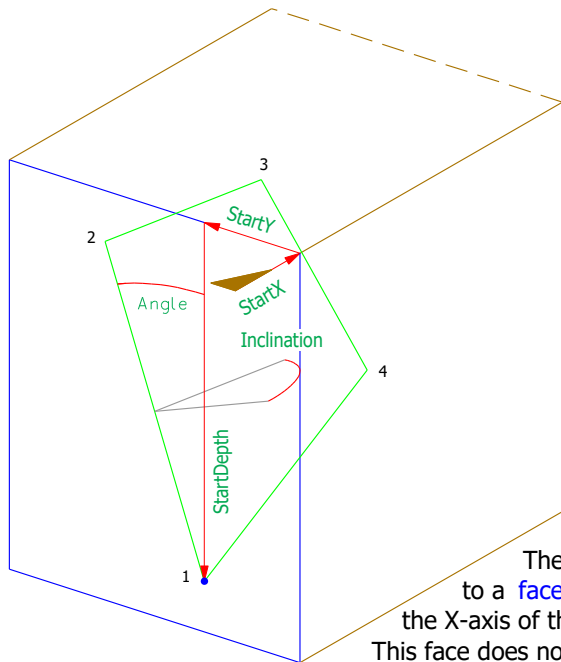
FaceLimitedBottom = yes

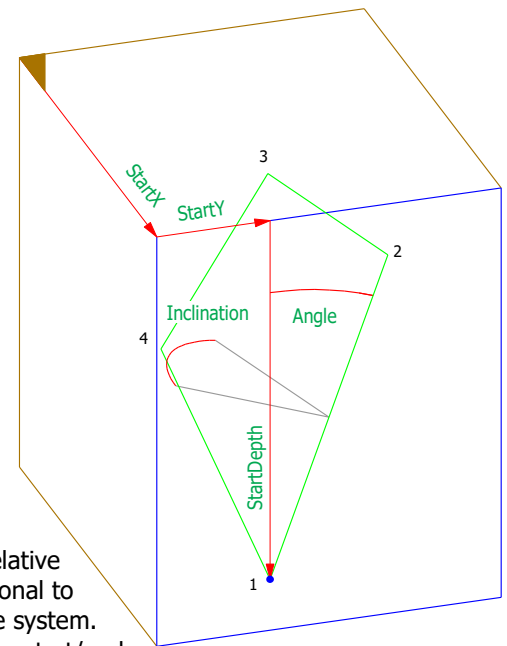FaceLimitedBottom = no

FaceLimitedTop = no

Other combinations :

StartDepth <> 0

Orientation = start   Orientation = end

The slot is defined relative to a face, which is orthogonal to the X-axis of the part coordinate system. This face does not have to be at the start/end of the beam.
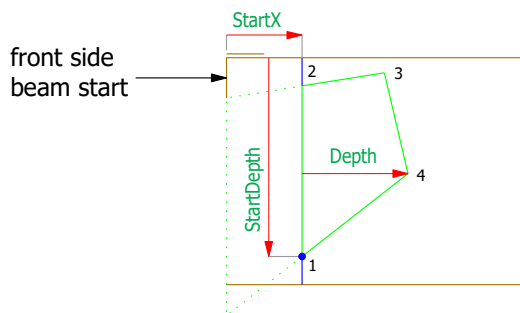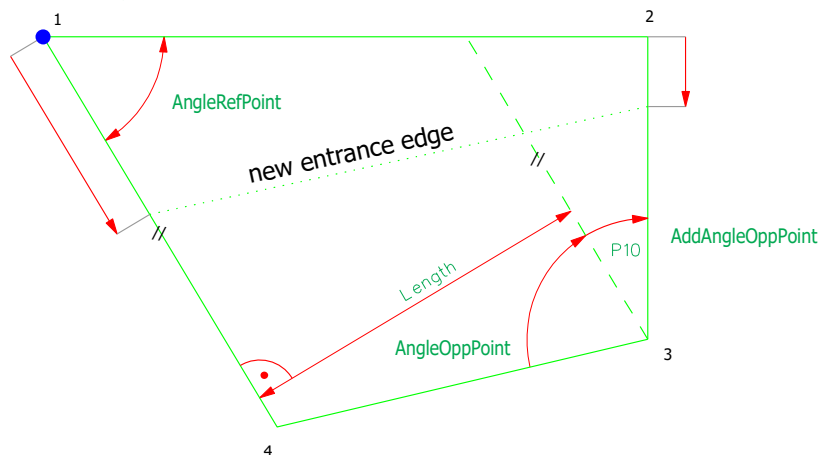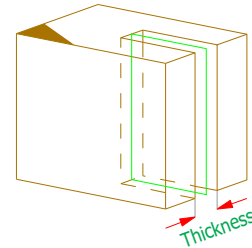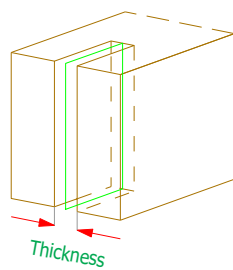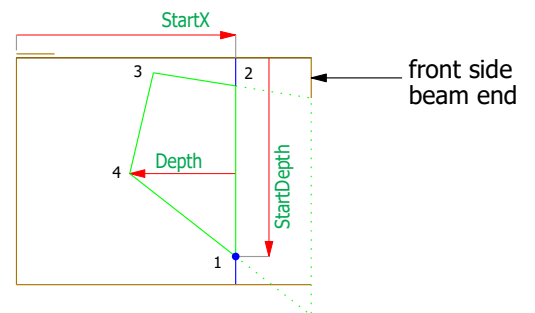
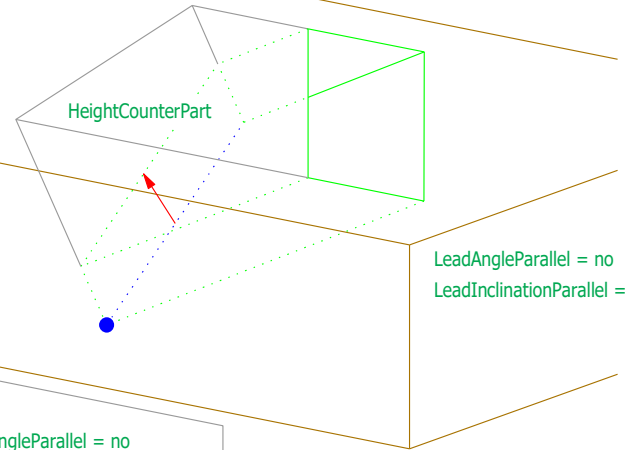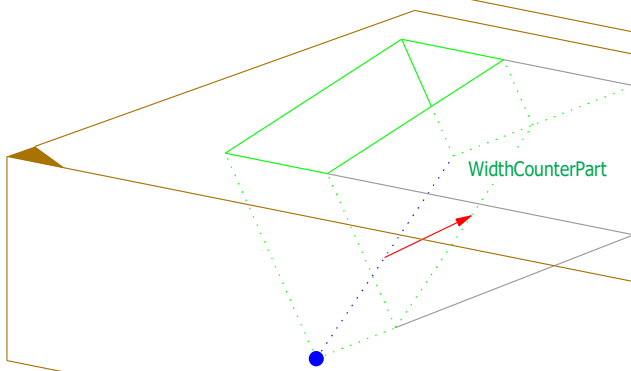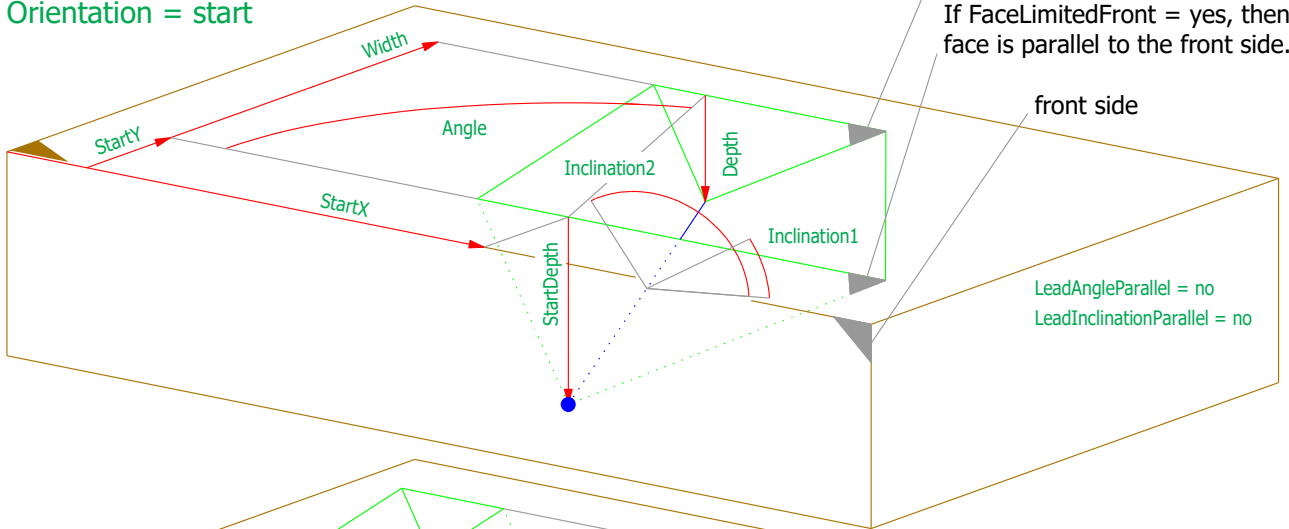The slot is not limited towards the front sides when StartDepth <> 0.

front side beam start

front side beam end

Parameters Slot

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	0.0	-50000.0	50000.0
StartDepth	WidthType	0.0	0.0	50000.0
Angle	Inclination2Type	0.0	-90.0	90.0
Inclination	AngleType	90.0	0.1	179.9
Length	LengthType	200.0	0.0	100000.0
Depth	WidthType	10.0	0.0	50000.0
Thickness	WidthType	10.0	0.0	50000.0
AngleRefPoint	AngleType	90.0	0.1	179.9
AngleOppPoint	AngleType	90.0	0.1	179.9
AddAngleOppPoint	AngleNType	0.0	-179.9	179.9
MachiningLimits	MachiningLimitType			

BirdsMouth

Orientation = start
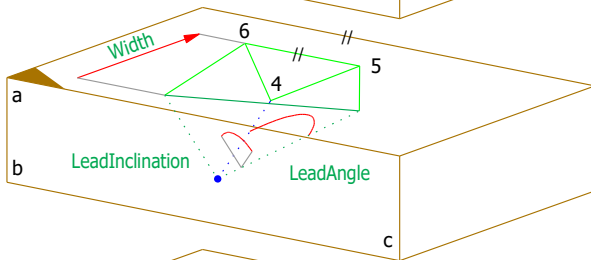
If FaceLimitedBack = yes, then this face is parallel to the front side.

If FaceLimitedFront = yes, then this face is parallel to the front side.

front side

Width

StartY

Angle

StartX

Inclination2

Depth

Inclination1

StartDepth

LeadAngleParallel = no
LeadInclinationParallel = no

WidthCounterPart

HeightCounterPart

LeadAngleParallel = no
LeadInclinationParallel = no

Width

LeadAngleParallel = no
LeadInclinationParallel = no

Location of LeadAngle
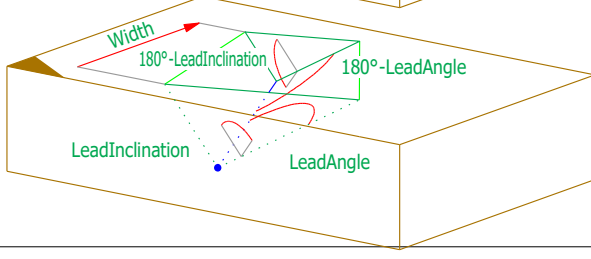
Width

6

5

4

a

b

LeadInclination

LeadAngle

c

Face 4-5-6 || Face a-b-c
FaceLimitedFront = yes
LeadAngleParallel = yes
LeadInclinationParallel = yes

Simple example

Angle = 90
StartDepth = Depth

Width

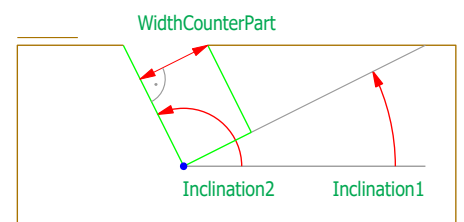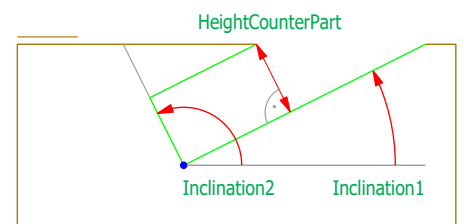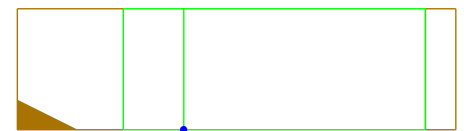180°-LeadInclination

180°-LeadAngle

a

3

2

b

1

c

Face 1-2-3 || Face a-b-c
FaceLimitedBack = yes
LeadAngleParallel = yes
LeadInclinationParallel = yes

HeightCounterPart

Inclination2   Inclination1

Width

180°-LeadInclination

180°-LeadAngle

LeadInclination

LeadAngle

FaceLimitedFront = yes
FaceLimitedBack = yes
LeadAngleParallel = yes
LeadInclinationParallel = yes

WidthCounterPart

Inclination2   Inclination1

Orientation = end

If FaceLimitedBack = yes, then this face is parallel to the front side.

If FaceLimitedFront = yes, then this face is parallel to the front side.

front side

Width

StartY

StartX

Inclination1

Depth

Angle

StartDepth

Inclination2

LeadAngleParallel = no
LeadInclinationParallel = no

WidthCounterPart

P15

HeightCounterPart
AngleEnd

LeadAngleParallel = no
LeadInclinationParallel = no

Width

LeadAngleParallel = no
LeadInclinationParallel = no

Location of LeadAngle

Width

6

5

LeadAngle

4

a

b

LeadInclination

c

Face 4-5-6 || Face a-b-c
FaceLimitedFront = yes
LeadAngleParallel = yes
LeadInclinationParallel = yes

Width

180°-LeadAngle

180°-LeadInclination

a

3

b

2

1

c

Face 1-2-3 || Face a-b-c
FaceLimiteBack = yes
LeadAngleParallel = yes
LeadInclinationParallel = yes

Width

180°-LeadAngle
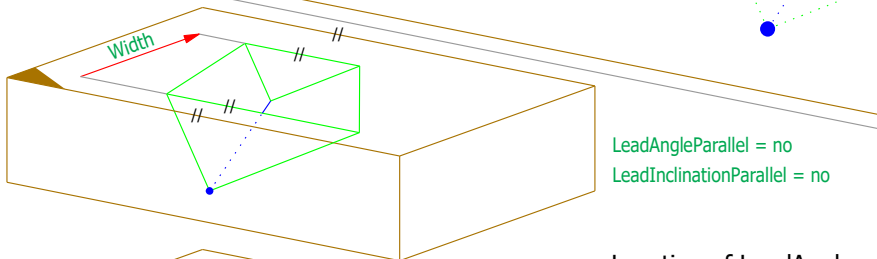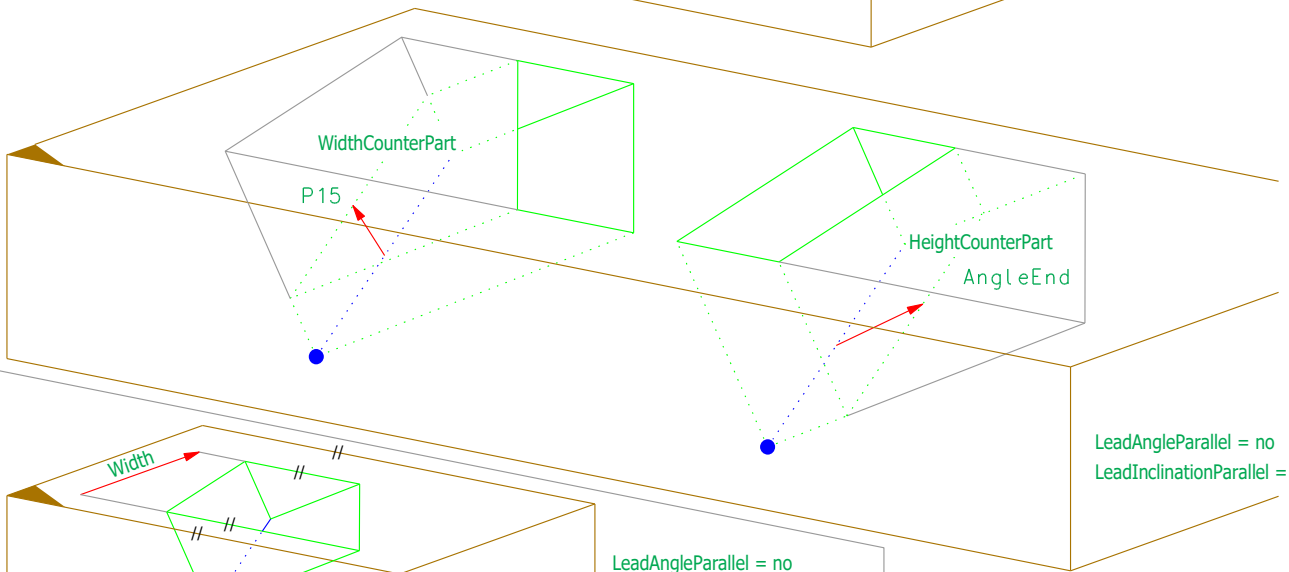
180°-LeadInclination

LeadAngle

LeadInclination
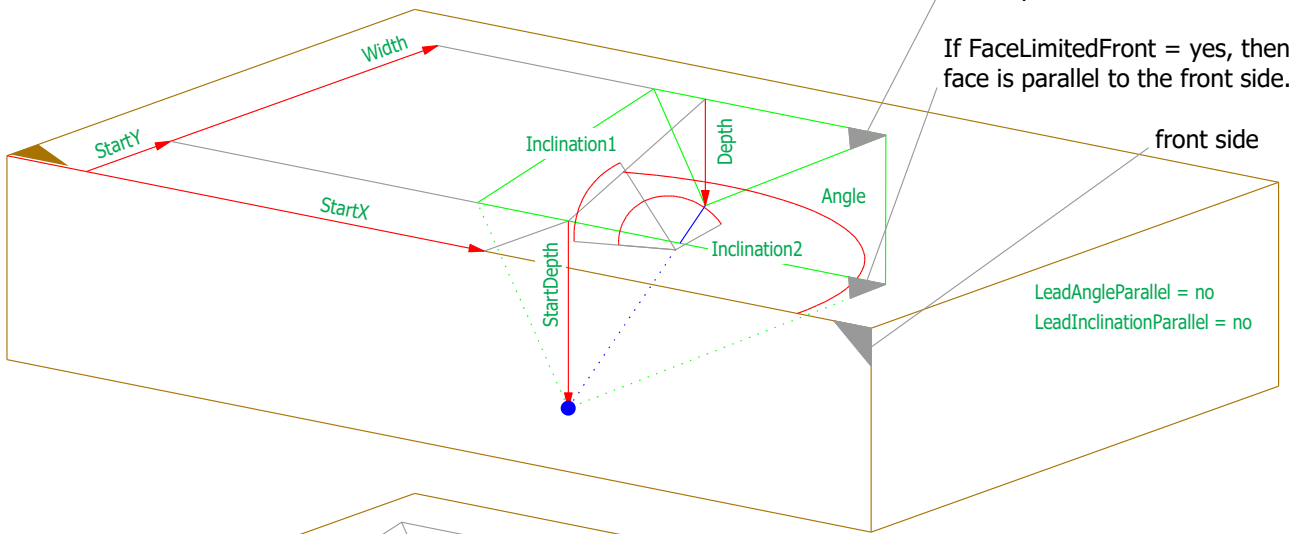
FaceLimitedFront = yes
FaceLimitedBack = yes
LeadAngleParallel = yes
LeadInclinationParallel = yes

Simple example

Angle = 90
StartDepth = Depth

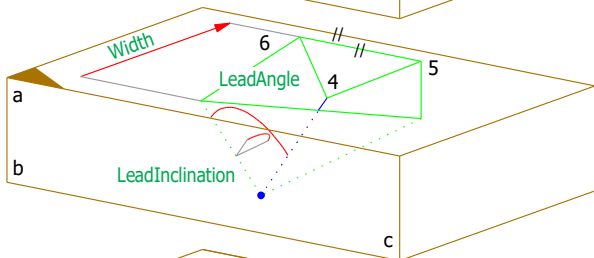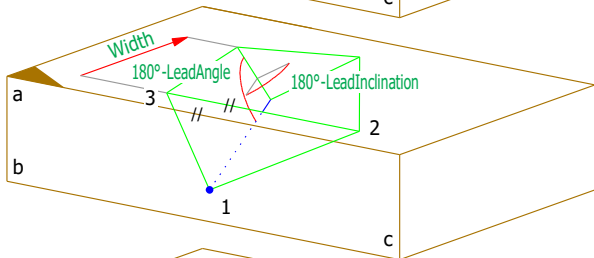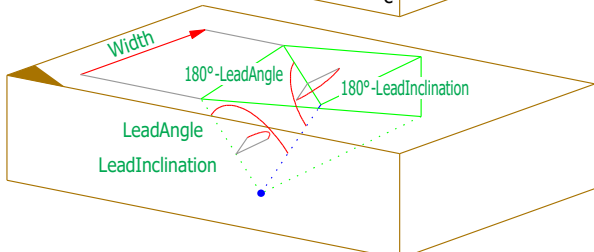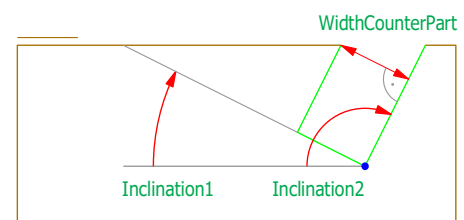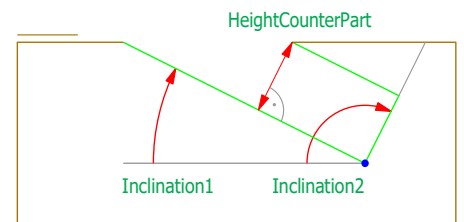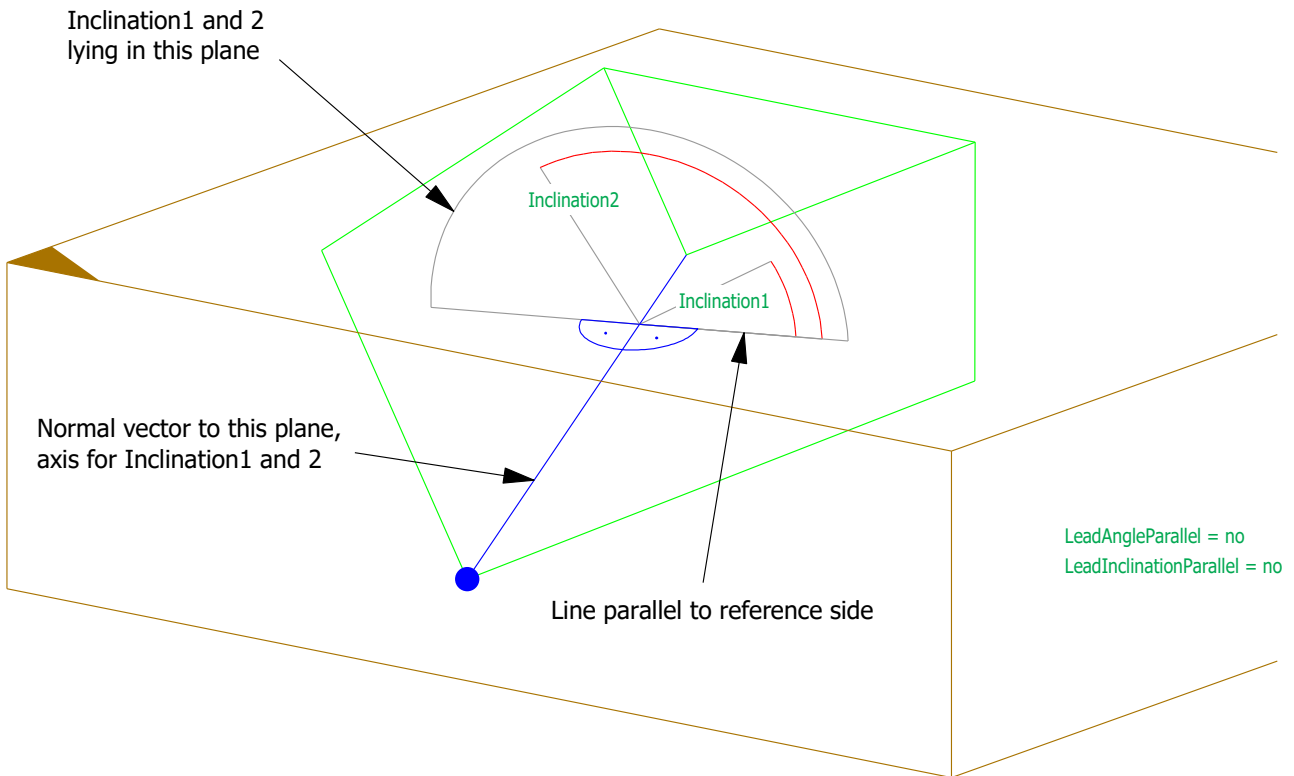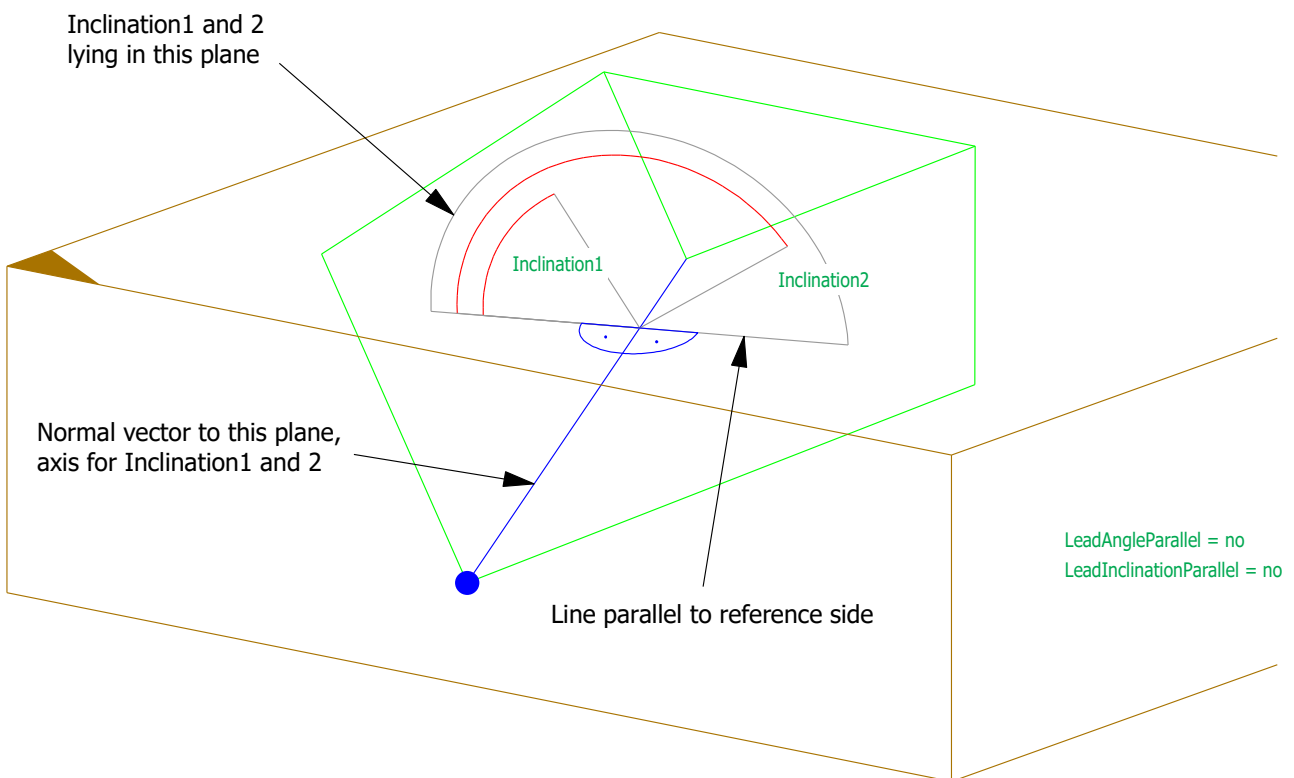HeightCounterPart

Inclination1   Inclination2

WidthCounterPart

Inclination1   Inclination2

Orientation = start

Another presentation of Inclination1 and Inclination2

Inclination1 and 2
lying in this plane

Inclination2

Inclination1

Normal vector to this plane,
axis for Inclination1 and 2

Line parallel to reference side

LeadAngleParallel = no
LeadInclinationParallel = no

Orientation = end

Another presentation of Inclination1 and Inclination2

Inclination1 and 2
lying in this plane

Inclination1

Inclination2

Normal vector to this plane,
axis for Inclination1 and 2

Line parallel to reference side

LeadAngleParallel = no
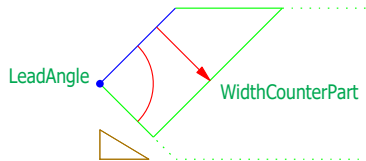LeadInclinationParallel = no
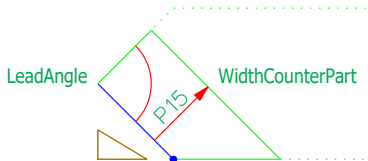
Orientation = start

Another presentation of parameters

View orthogonal to face "Inclination1"

The counterpart enters at the reference edge.

The counterpart enters at opposite of the reference edge.

LeadAngle   WidthCounterPart=0

LeadAngle   WidthCounterPart=0

Depth

Angle

Width

StartDepth=0

StartX   StartY

LeadAngle   WidthCounterPart

P15

LeadAngle   WidthCounterPart

Depth=0

Angle

Width
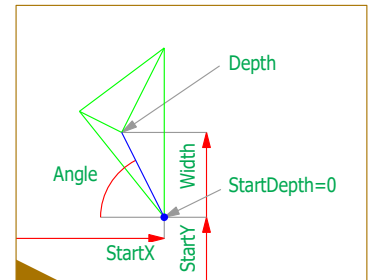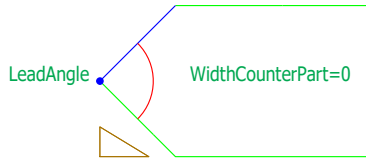
StartDepth

StartX   StartY

Orientation = end

Another presentation of parameters

View orthogonal to face "Inclination1"

The counterpart enters at the reference edge.

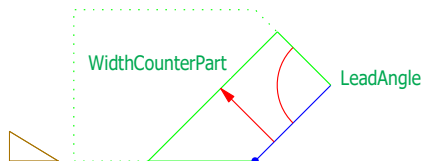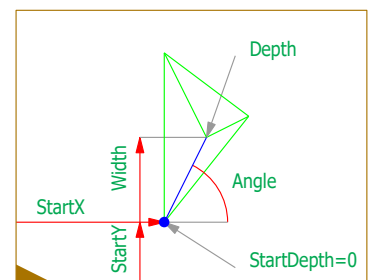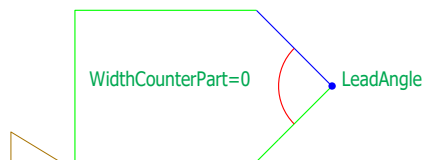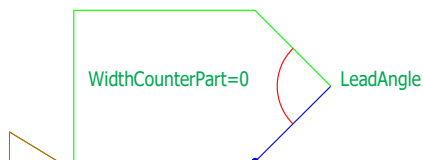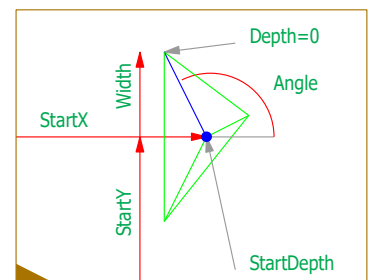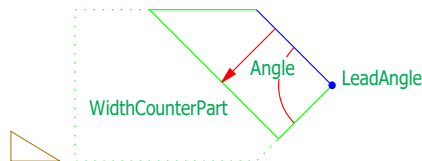The counterpart enters at opposite of the reference edge.

WidthCounterPart   LeadAngle

Angle   LeadAngle

WidthCounterPart

Depth=0

Angle

StartX   Width

StartY   StartDepth

WidthCounterPart=0   LeadAngle

WidthCounterPart=0   LeadAngle

Depth

Angle

Width   StartX

StartY   StartDepth=0

Parameters BirdsMouth

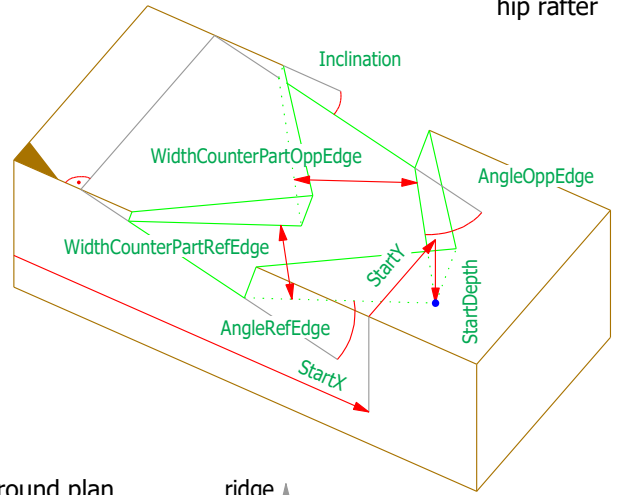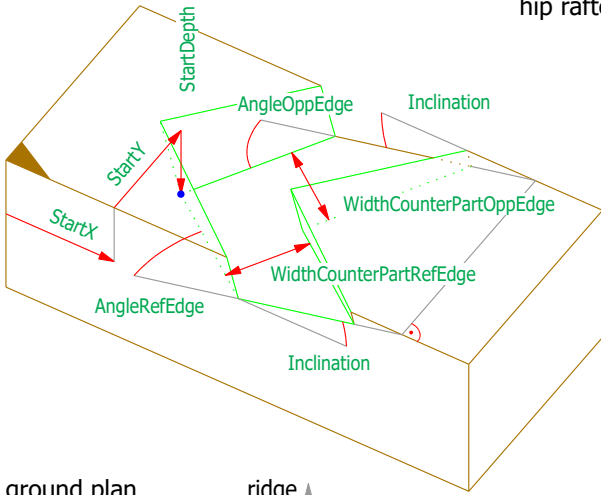| Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	0.0	-50000.0	50000.0
StartDepth	WidthType	20.0	0.0	50000.0
Angle	AngleType	90.0	0.1	179.9
Inclination1	Angle2Type	45.0	0.0	180.0
Inclination2	Angle2Type	135.0	0.0	180.0
Depth	WidthType	20.0	0.0	50000.0
Width	WidthType	0.0	0.0	50000.0
WidthCounterPartLimited	BooleanType	no	no	yes
WidthCounterPart	WidthType	120.0	0.0	50000.0
HeightCounterPartLimited	BooleanType	no	no	yes
HeightCounterPart	WidthType	120.0	0.0	50000.0
FaceLimitedFront	BooleanType	no	no	yes
FaceLimitedBack	BooleanType	no	no	yes
LeadAngleParallel	BooleanType	yes	no	yes
LeadAngle	AngleType	90.0	0.1	179.9
LeadInclinationParallel	BooleanType	yes	no	yes
LeadInclination	AngleType	90.0	0.1	179.9
RafterNailHole	BooleanType	no	no	yes

HipValleyRafterNotch

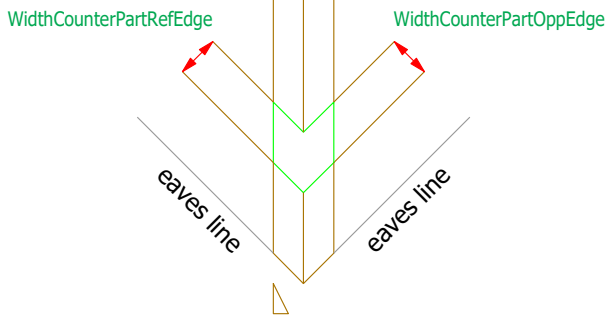Orientation = start

Orientation = end

hip rafter

ground plan   ridge

WidthCounterPartRefEdge   WidthCounterPartOppEdge
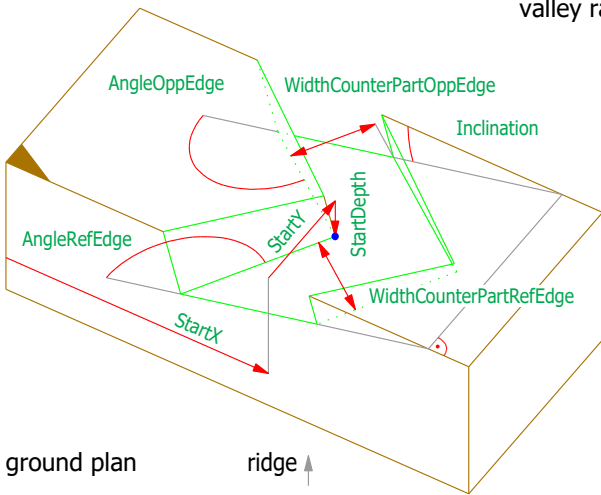
eaves line   eaves line

hip rafter

ground plan   ridge

WidthCounterPartOppEdge   WidthCounterPartRefEdge

eaves line   eaves line

valley rafter

ground plan   ridge

WidthCounterPartRefEdge   WidthCounterPartOppEdge

eaves line   eaves line

valley rafter

ground plan   ridge

WidthCounterPartRefEdge   WidthCounterPartOppEdge
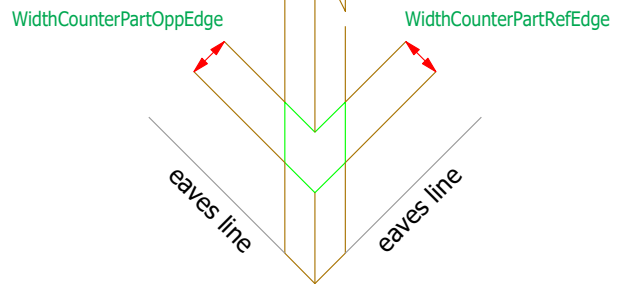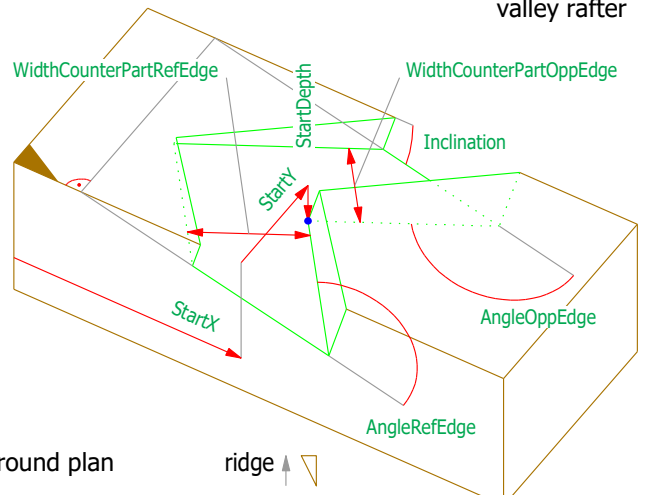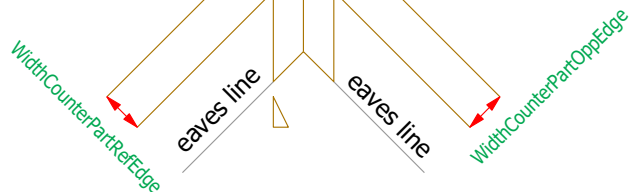
eaves line   eaves line
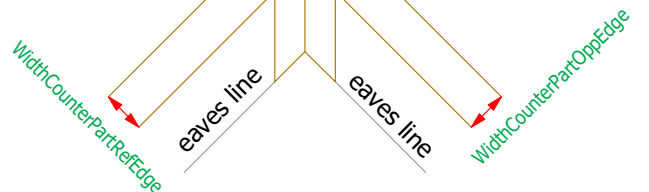
Parameters HipValleyRafterNotch

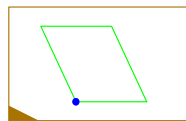| Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	−100000	100000
StartY	WidthNType	0.0	−50000	50000
StartDepth	WidthType	20.0	0.0	50000
AngleRefEdge	AngleType	45.0	0.1	179.9
AngleOppEdge	AngleType	45.0	0.1	179.9
Inclination	Angle2Type	30.0	0.0	180.0
WidthCounterPartRefEdgeLimited	BooleanType	no	no	yes
WidthCounterPartRefEdge	WidthType	0.0	0.0	50000
WidthCounterPartOppEdgeLimited	BooleanType	no	no	yes
WidthCounterPartOppEdge	WidthType	0.0	0.0	50000
RafterNailHole	BooleanType	no	no	yes

Lap

Orientation = start

axis for Inclination

If LeadAngleParallel = yes and
LeadInclinationParallel = yes
then these 2 faces are
parallel to the front side.

Width

StartY

Angle

Inclination

StartX

Depth

Slope

Length

LeadAngleParallel = yes
LeadInclinationParallel = yes

180°-LeadInclination

LeadInclination

LeadAngle

LeadAngle

Location of LeadAngle:

Width
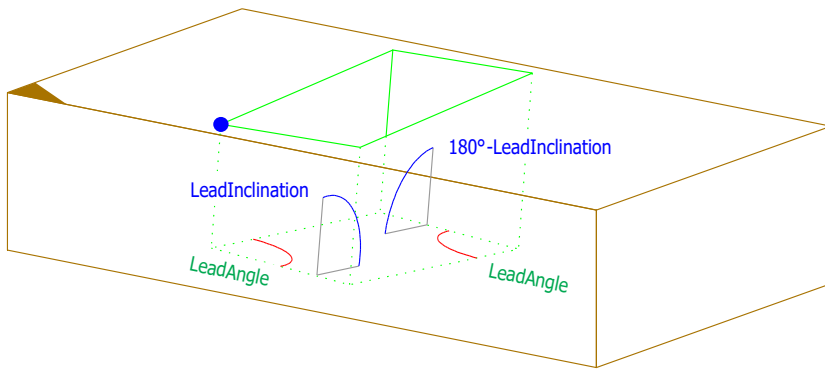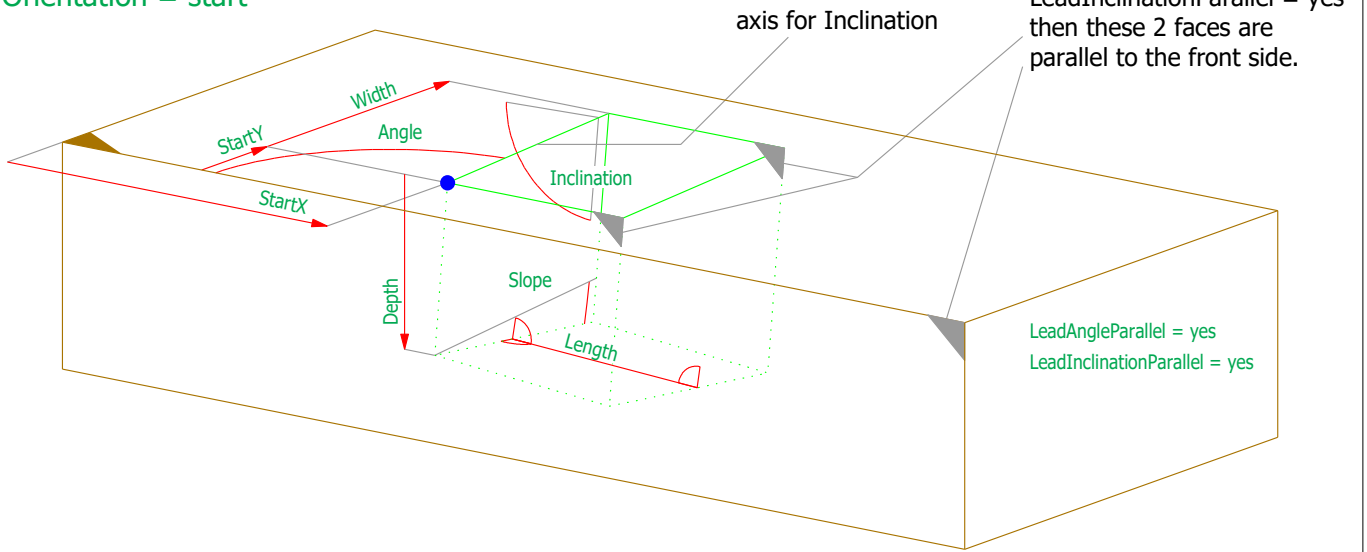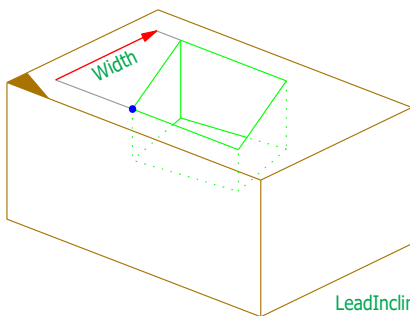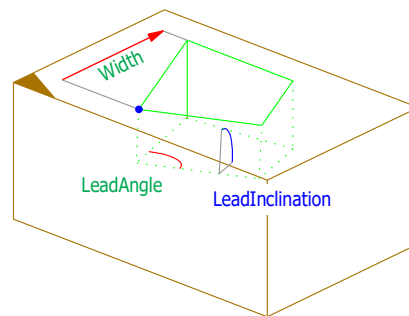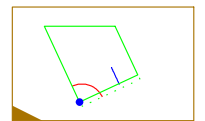
FaceLimitedBack= no

FaceLimitedFront = no

LeadAngleParallel and
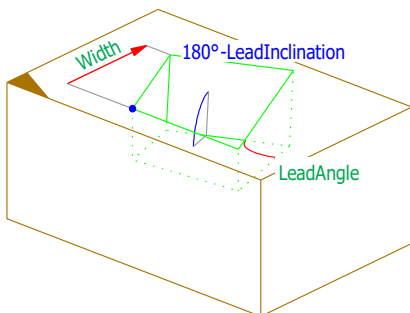LeadInclinationParallel are meaningless

Width

LeadAngle

LeadInclination

FaceLimitedBack = no

FaceLimitedFront = yes
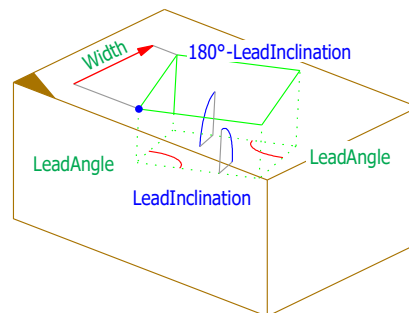
LeadAngleParallel = no
LeadInclinationParallel = no

Width

180°-LeadInclination

LeadAngle

FaceLimitedBack = yes

FaceLimitedFront = no

LeadAngleParallel = no
LeadInclinationParallel = no

Width
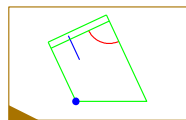
180°-LeadInclination

LeadAngle

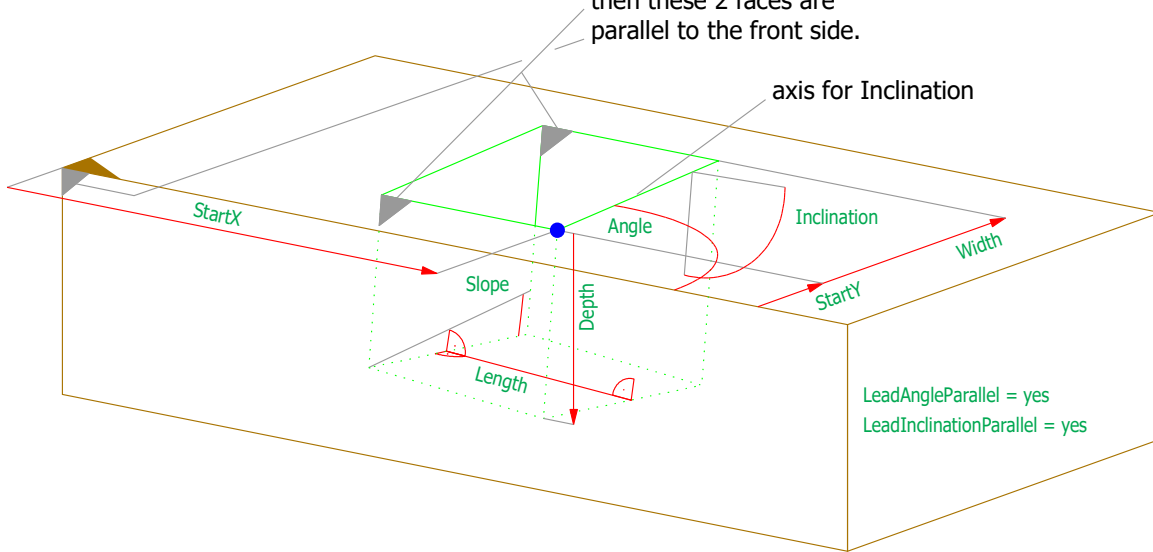LeadAngle

LeadInclination

FaceLimitedBack = yes
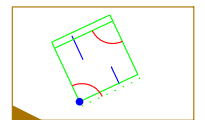
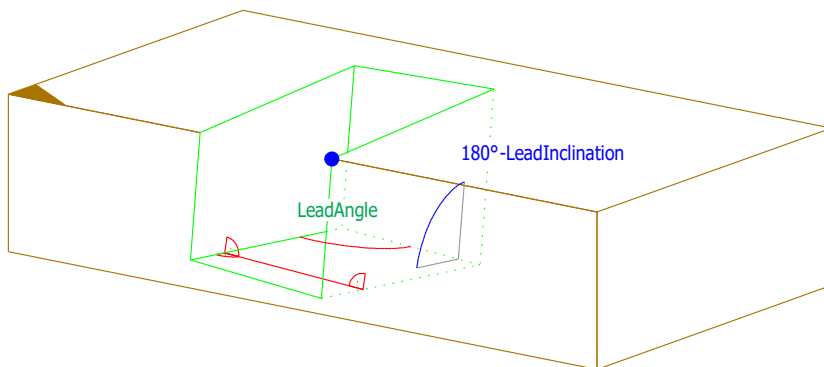FaceLimitedFront = yes

LeadAngleParallel = no
LeadInclinationParallel = no

Orientation = end

If LeadAngleParallel = yes and
LeadInclinationParallel = yes
then these 2 faces are
parallel to the front side.

axis for Inclination

StartX

Angle   Inclination

Width

Slope   StartY

Depth

Length

LeadAngleParallel = yes
LeadInclinationParallel = yes

Location of LeadAngle: LeadAngleParallel = no
                                LeadInclinationParallel = no

180°-LeadInclination

LeadAngle

FaceLimitedBack = yes
FaceLimitedFront = no

LeadInclination

LeadAngle

FaceLimitedBack = no
FaceLimitedFront = yes

LeadInclination   LeadAngle   180°-LeadInclination

LeadAngle
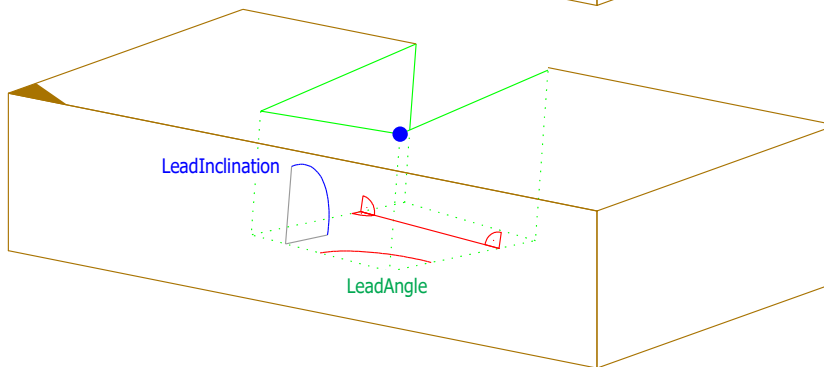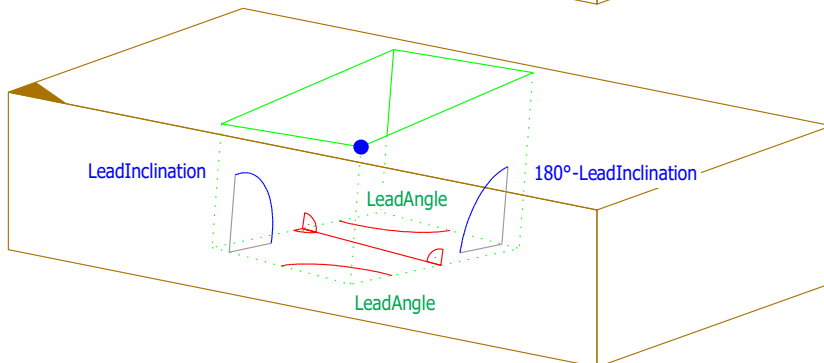
FaceLimitedBack = yes
FaceLimitedFront = yes

Parameters Lap

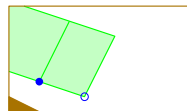| Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000	100000
StartY	WidthNType	0.0	-50000.0	50000
Angle	AngleType	90.0	0.1	179.9
Inclination	AngleType	90.0	0.1	179.9
Slope	InclinationType	0.0	-89.9	89.9
Length	LengthType	200.0	0.0	100000
Width	WidthType	50.0	0.0	50000.0
Depth	WidthNType	40.0	-50000.0	50000.0
LeadAngleParallel	BooleanType	yes	no	yes
LeadAngle	AngleType	90.0	0.1	179.9
LeadInclinationParallel	BooleanType	yes	no	yes
LeadInclination	AngleType	90.0	0.1	179.9
MachiningLimits	MachiningLimitType			

MachiningLimits
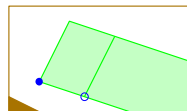

Reference point for Orientation = start

Reference point for Orientation = end

FaceLimitedTop

FaceLimitedStart

FaceLimitedBack

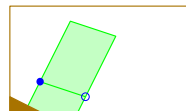FaceLimitedFront

FaceLimitedEnd

FaceLimitedBottom

FaceLimitedStart = yes
FaceLimitedEnd = yes
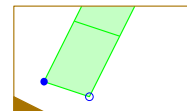FaceLimitedFront = yes
FaceLimitedBack = yes

FaceLimitedStart = no
FaceLimitedEnd = yes
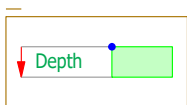FaceLimitedFront = yes
FaceLimitedBack = yes

FaceLimitedStart = yes
FaceLimitedEnd = no
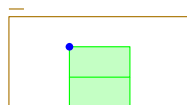FaceLimitedFront = yes
FaceLimitedBack = yes

FaceLimitedStart = yes
FaceLimitedEnd = yes
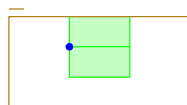FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = yes
FaceLimitedEnd = yes
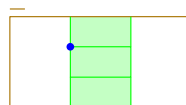FaceLimitedFront = yes
FaceLimitedBack = no

Depth

FaceLimitedBottom = yes
FaceLimitedTop = yes
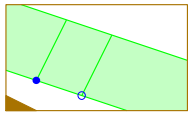
FaceLimitedBottom = no
FaceLimitedTop = yes

FaceLimitedBottom = yes
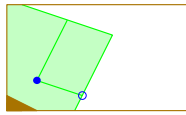FaceLimitedTop = no

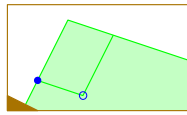FaceLimitedTop = no
FaceLimitedTop = no

Other combinations of MachineLimits

FaceLimitedStart = no
FaceLimitedEnd = no
FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = no
FaceLimitedEnd = yes
FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = yes
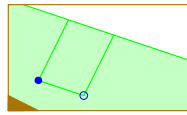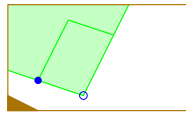FaceLimitedEnd = no
FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = no
FaceLimitedEnd = no
FaceLimitedFront = no
FaceLimitedBack = yes
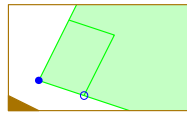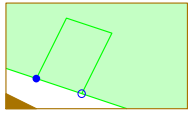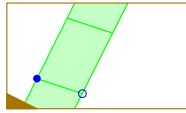
FaceLimitedStart = no
FaceLimitedEnd = yes
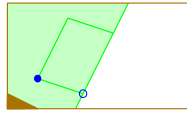FaceLimitedFront = yes
FaceLimitedBack = no

FaceLimitedStart = yes
FaceLimitedEnd = no
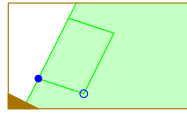FaceLimitedFront = yes
FaceLimitedBack = no

FaceLimitedStart = no
FaceLimitedEnd = no
FaceLimitedFront = yes
FaceLimitedBack = no

FaceLimitedStart = yes
FaceLimitedEnd = yes
FaceLimitedFront = no
FaceLimitedBack = no

FaceLimitedStart = no
FaceLimitedEnd = yes
FaceLimitedFront = no
FaceLimitedBack = no

FaceLimitedStart = yes
FaceLimitedEnd= no
FaceLimitedFront = no
FaceLimitedBack = no

FaceLimitedStart = no
FaceLimitedEnd = no
FaceLimitedFront = no
FaceLimitedBack = no

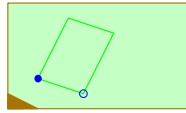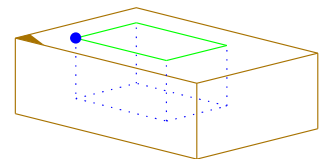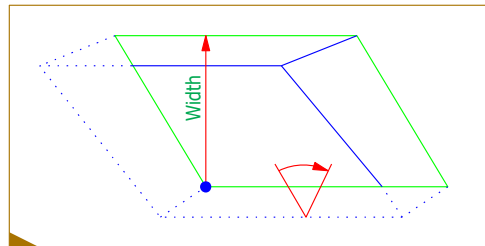## LeadAngle:

LeadAngleParallel = yes
LeadInclinationParallel = yes
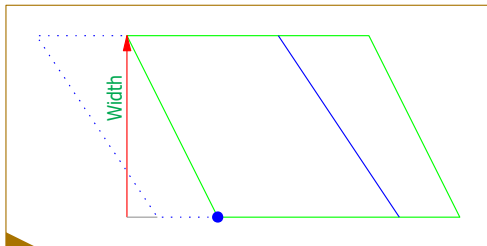
LeadAngleParallel = yes
LeadInclinationParallel = no

LeadAngleParallel = no
LeadInclinationParallel = yes
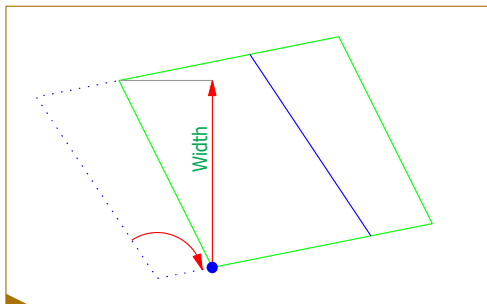
LeadAngleParallel = no
LeadInclinationParallel = no
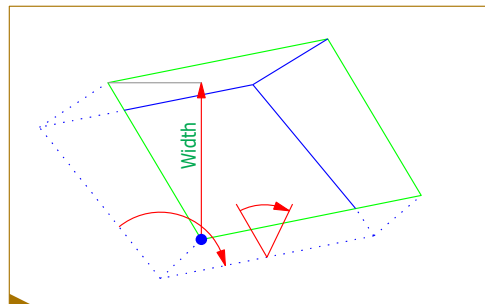
LogHouseHalfLap

Orientation = start
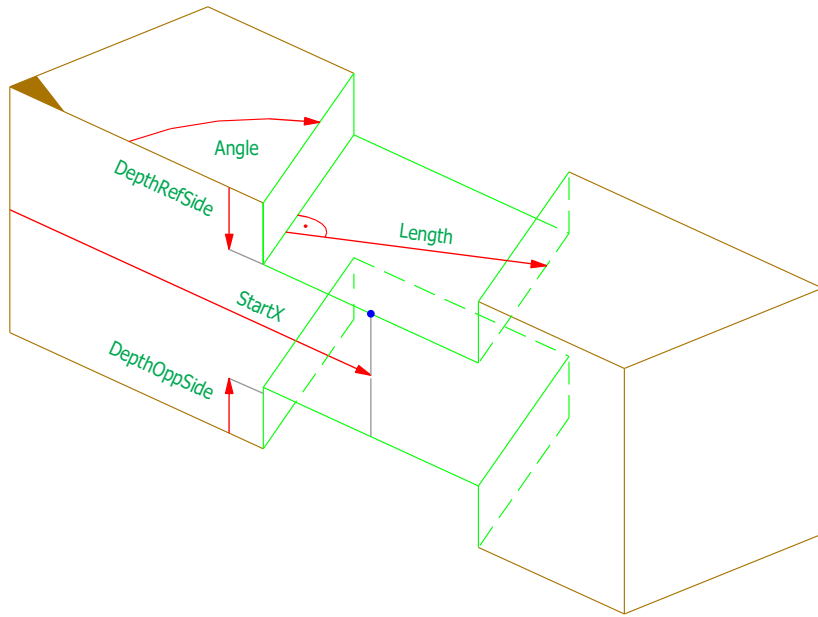
Orientation = end
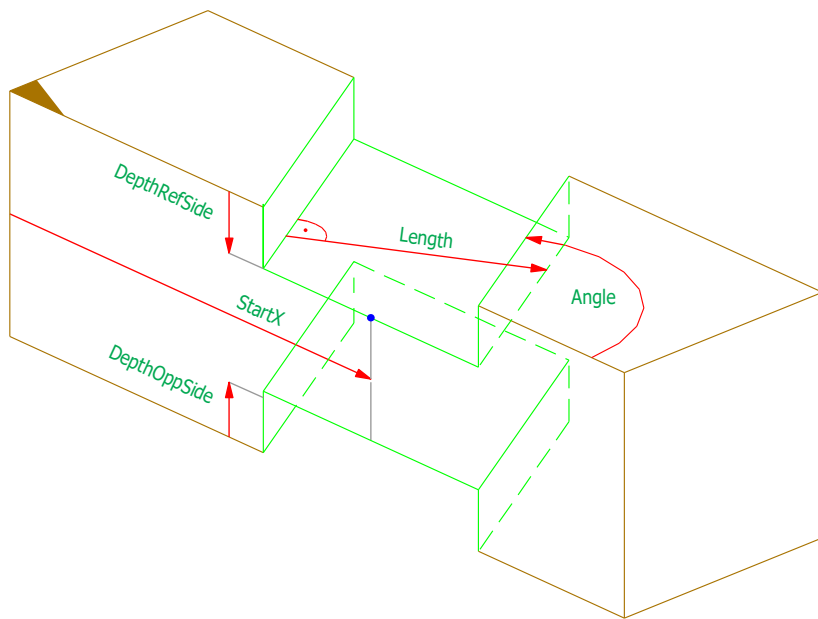
LogHouseHalfLap

Parameters LogHouseHalfLap

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
Angle	AngleType	90.0	0.1	179.9
Length	WidthType	120.0	0.0	50000.0
DepthRefSide	WidthType	20.0	0.0	50000.0
DepthOppSide	WidthType	20.0	0.0	50000.0

FrenchRidgeLap
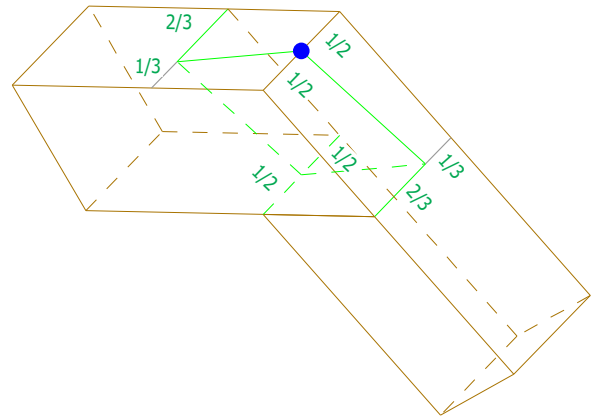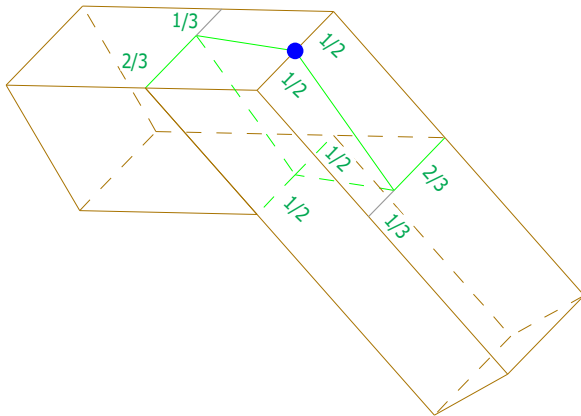
The length of the lap is equal to the width of reference side.

Orientation = start
RefPosition = refedge
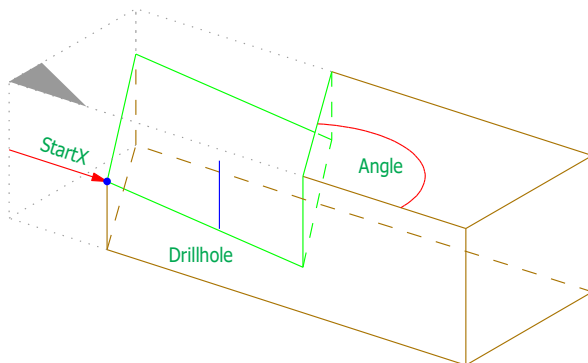
Orientation = start
RefPosition = oppedge
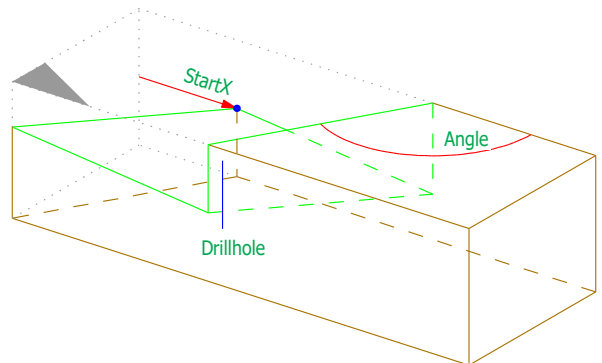
Orientation = end
RefPosition = oppedge
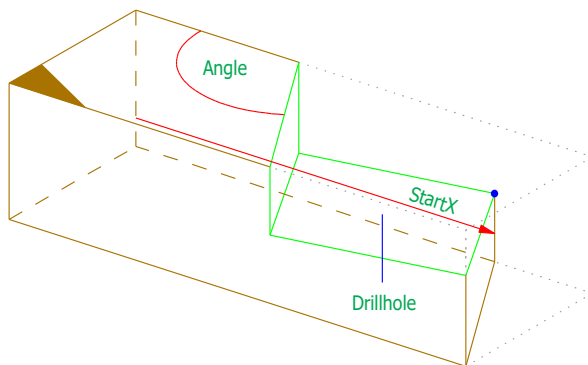
Orientation = end
RefPosition = refedge
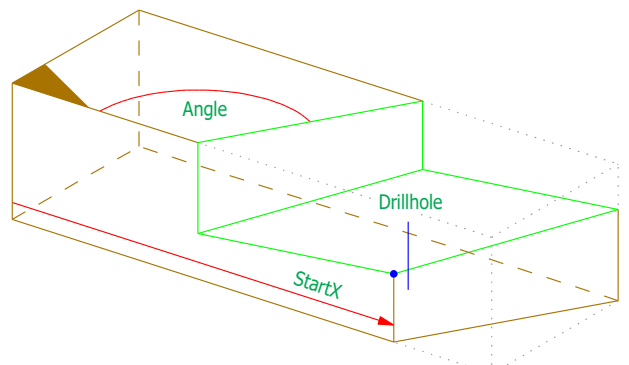
Parameters FrenchRidgeLap

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
Angle	AngleType	90.0	0.1	179.9
RefPosition	EdgePositionType	refedge	refedge	oppedge
Drillhole	BooleanType	no	no	yes
DrillholeDiam	LengthSType	0.0	0.0	1000.0

This processing trims the part, even it is on a ReferencePlane

Examples:

Chamfer

Orientation = start

ChamferExit = orthogonal

StartX — Length

ChamferExit = angular

StartX — Length

ChamferExit = round

StartX — Length

Orientation = end

ChamferExit = orthogonal

Length — StartX

ChamferExit = angular

Length — StartX

ChamferExit = round

Length — StartX

StartLimited = yes

StartLimited = no

EndLimited = yes

EndLimited = no

width — Y

height

Part coordinate system

Z — X

RefSide 3

ChamferEdge23

ChamferEdge34

RefSide 2

RefSide 4

ChamferEdge12

ChamferEdge41

RefSide 1

Depth

Parameters Chamfer

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartLimited	BooleanType	no	no	yes
EndLimited	BooleanType	no	no	yes
Length	LengthType	0.0	0.0	100000.0
Depth	double	1.0	0.0	100.0
ChamferEdge12	BooleanType	yes	no	yes
ChamferEdge23	BooleanType	yes	no	yes
ChamferEdge34	BooleanType	yes	no	yes
ChamferEdge41	BooleanType	yes	no	yes
ChamferExit	ChamferExitType	orthogonal	orthogonal/angular/round	

LogHouseJoint

LapPosition = symmetric
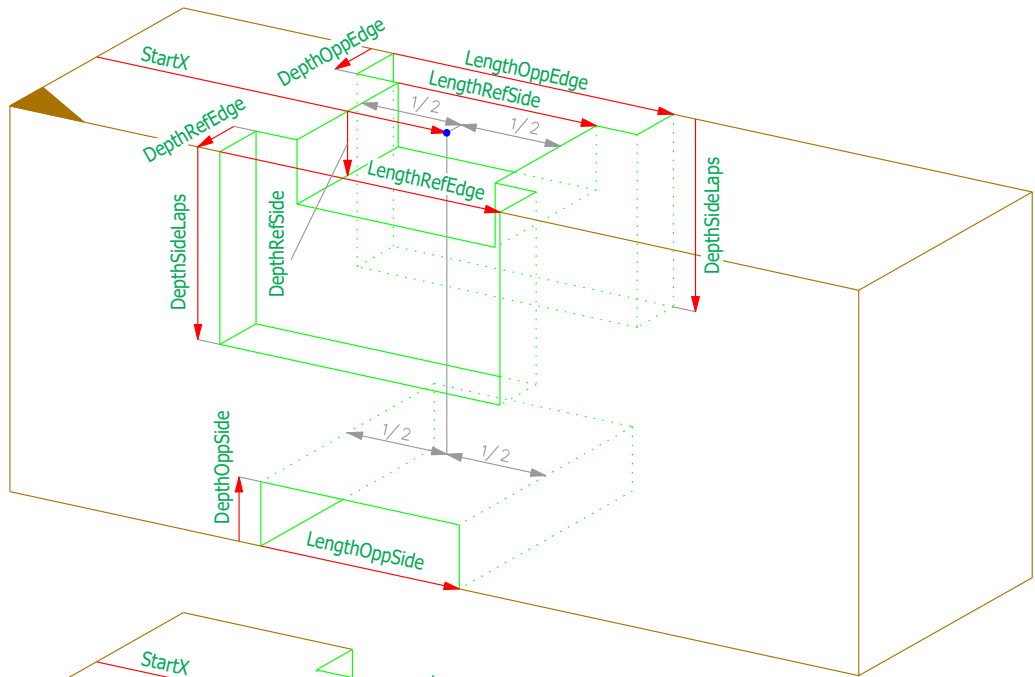
LapPosition = forward

LapPosition = backward

DepthSideLaps

SideLapsLimited = yes

DepthSideLaps

SideLapsLimited = no

DepthOppEdge

ArcOppEdgeStart

DepthRefEdge

ArcOppEdgeEnd

ArcRefEdgeStart

ArcRefEdgeEnd

LengthRefSide

StartX

ArcCenter

ArcCenter

The center of the arcs are placed on the reference side.

LengthRefSide

ArcDepth

ArcRadius

ArcRadius
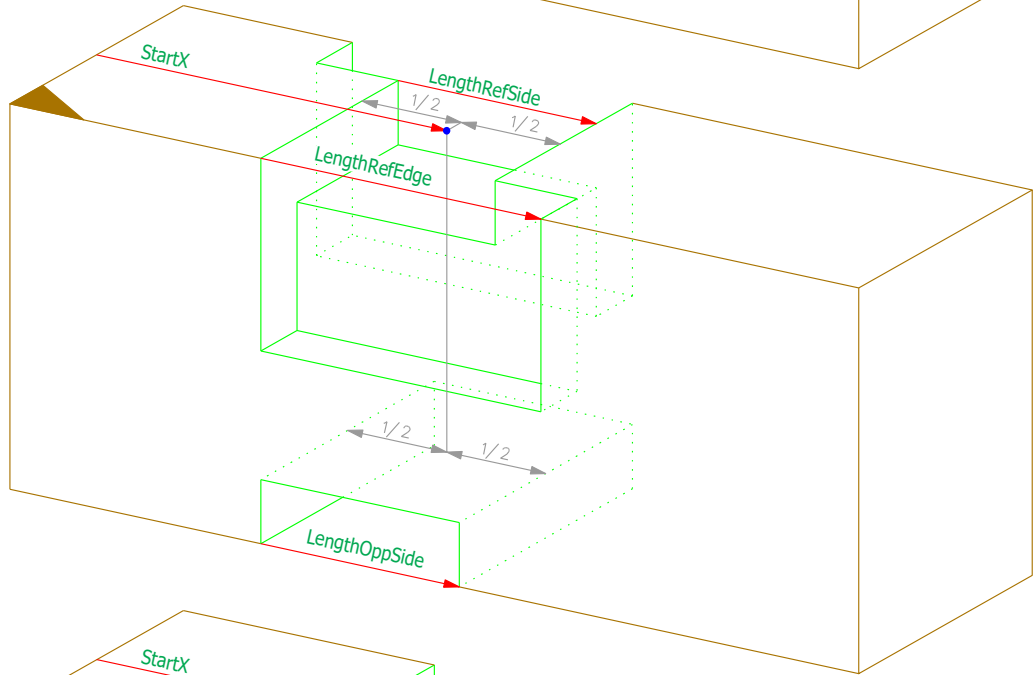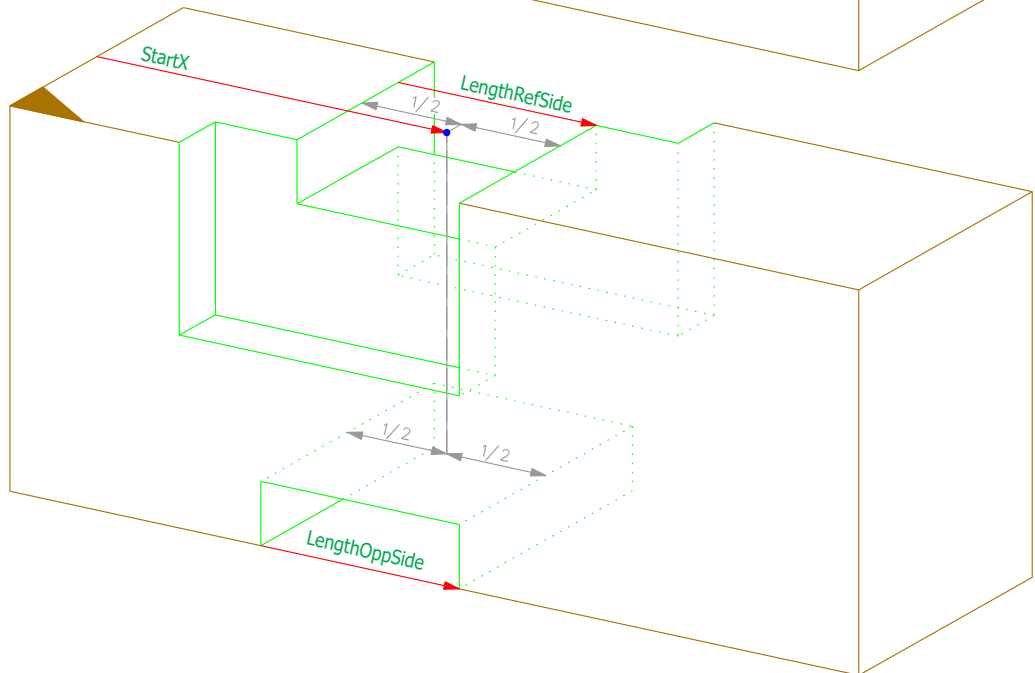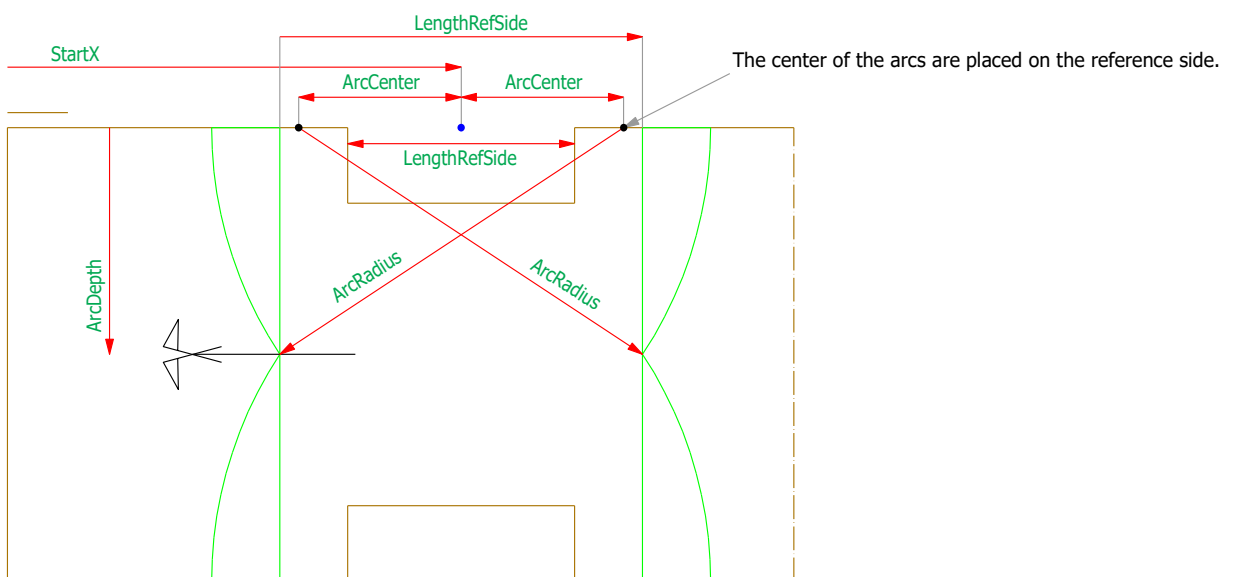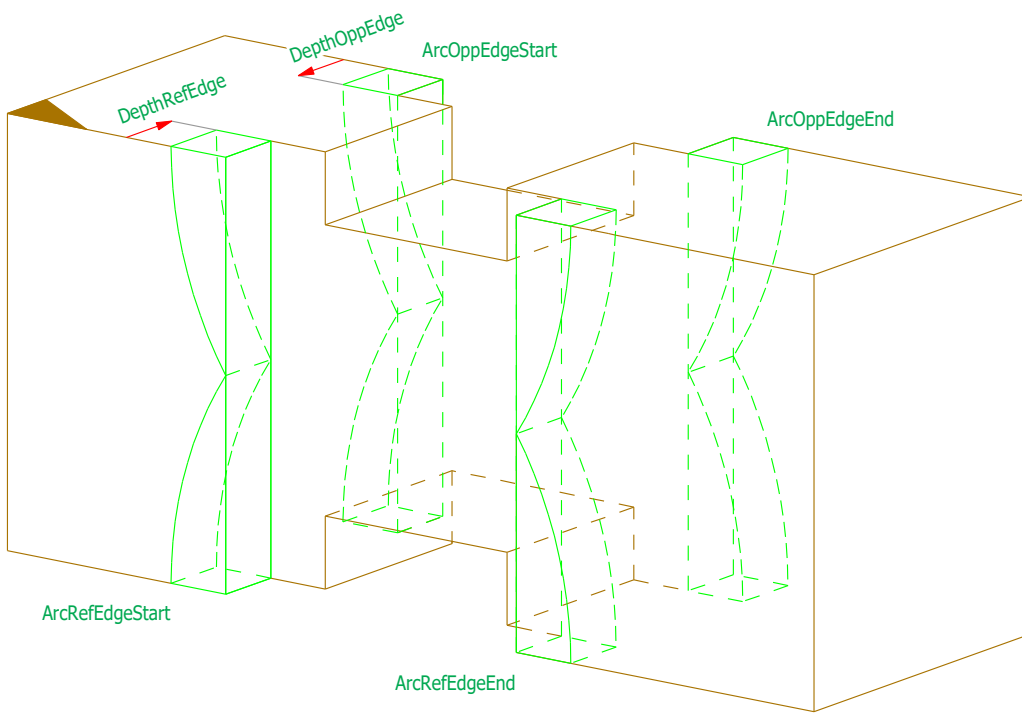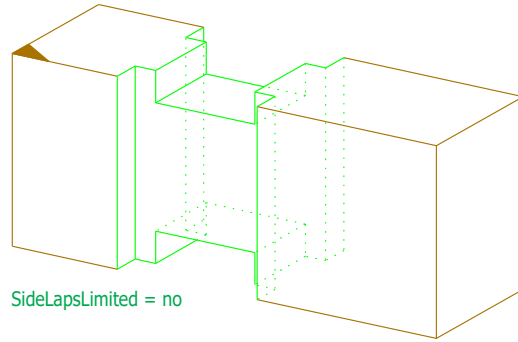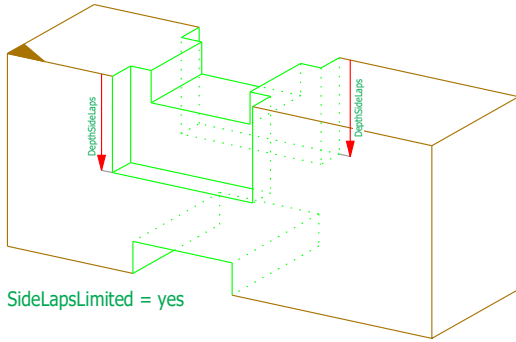
Parameters LogHouseJoint

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
SideLapsLimited	BooleanType	no	no	yes
DepthSideLaps	WidthType		0.0	50000.0
LapPosition	LogLapPositionType	symmetric	symmetric/forward/backward	
LengthRefSide	WidthType	100.0	0.0	50000.0
DepthRefSide	WidthType	10.0	0.0	50000.0
LengthOppSide	WidthType	100.0	0.0	50000.0
DepthOppSide	WidthType	10.0	0.0	50000.0
LengthRefEdge	WidthType	100.0	0.0	50000.0
DepthRefEdge	WidthType	10.0	0.0	50000.0
LengthOppEdge	WidthType	100.0	0.0	50000.0
DepthOppEdge	WidthType	10.0	0.0	50000.0
Drillhole	BooleanType	no	no	yes
ArcRefEdgeStart	BooleanType	no	no	yes
ArcRefEdgeEnd	BooleanType	no	no	yes
ArcOppEdgeStart	BooleanType	no	no	yes
ArcOppEdgeEnd	BooleanType	no	no	yes
ArcRadius	WidthType	120.0	0.0	50000.0
ArcDepth	WidthNType	60.0	-50000.0	50000.0
ArcCenter	WidthType	120.0	0.0	50000.0

LogHouseFront

Orientation = start

RefSideOnly = yes

RefSideOnly = no

Angle

DepthOppEdge

StartX

Length

StartDepth

DepthRefEdge

DepthOppEdge

StartDepth

DepthRefEdge

Orientation = end

RefSideOnly = yes

RefSideOnly = no

DepthRefEdge

StartX

Length

DepthOppEdge

StartDepth

Angle

DepthRefEdge

StartDepth

DepthOppEdge
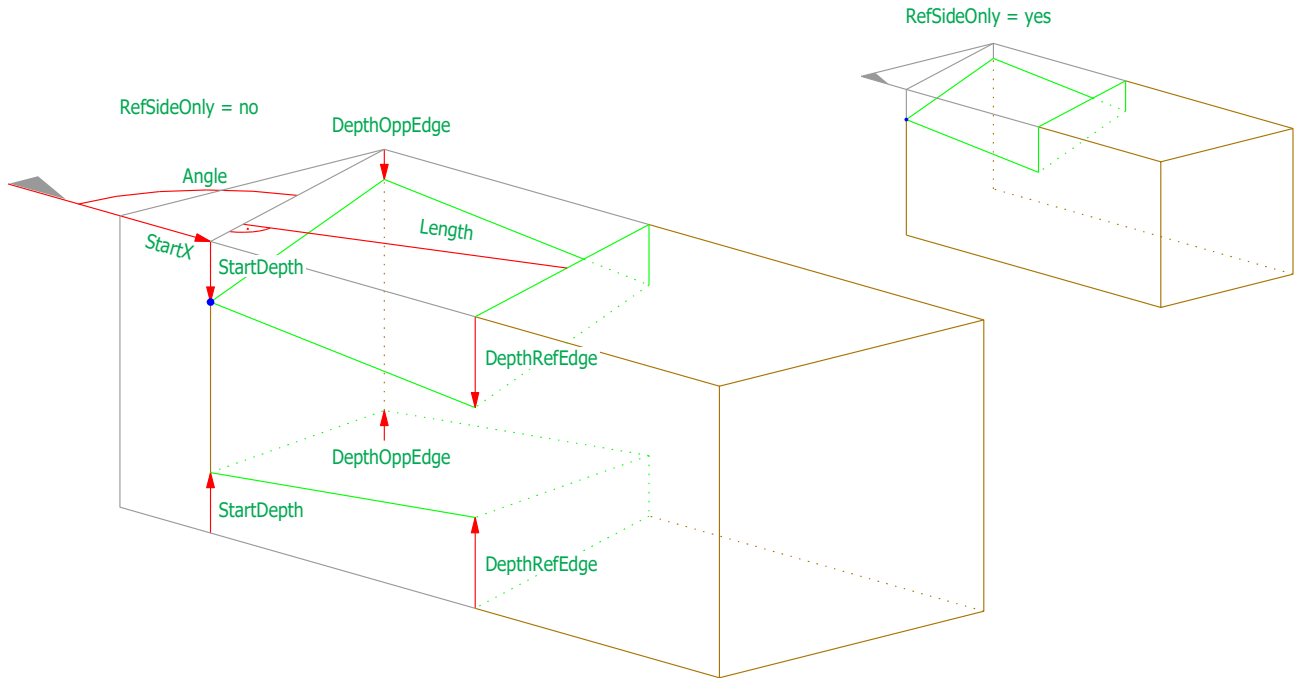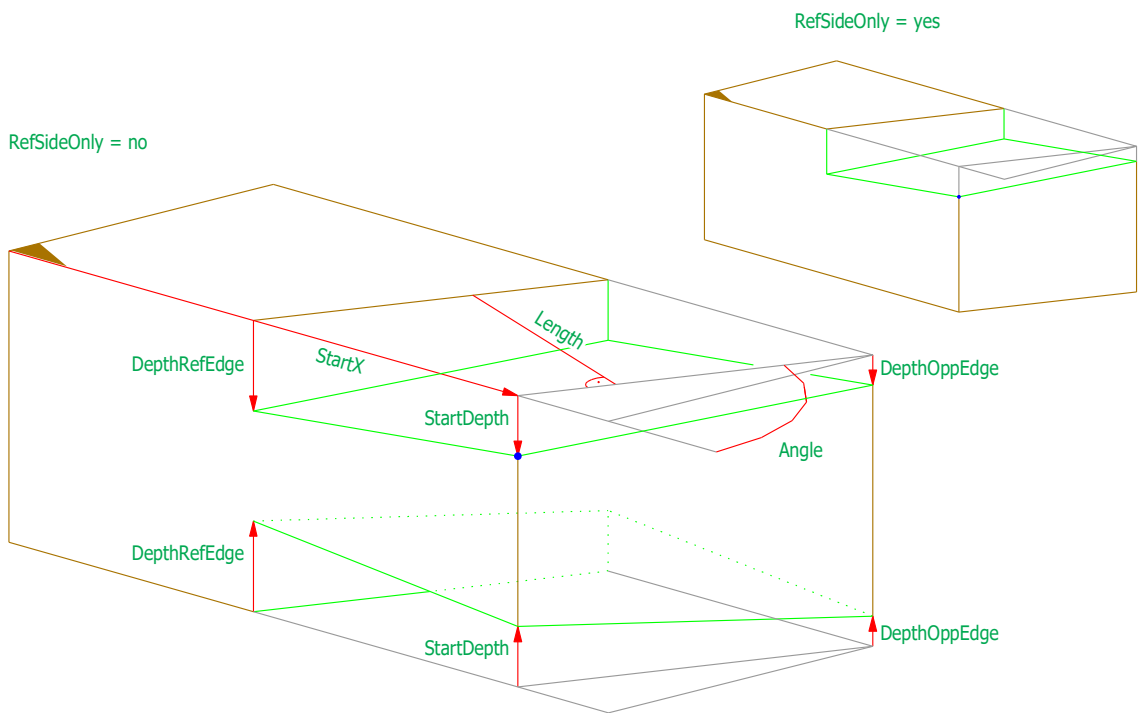
Parameters LogHouseFront

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartDepth	WidthType	20.0	0.0	50000.0
Angle	AngleType	90.0	0.1	179.9
Length	WidthType	120.0	0.0	50000.0
DepthRefEdge	WidthType	20.0	0.0	50000.0
DepthOppEdge	WidthType	20.0	0.0	50000.0
RefSideOnly	BooleanType	no	no	yes

This processing trims the part, even it is on a ReferencePlane

Examples:

Pocket

here: TiltStartSide = 90
         TiltEndSide = 90
         TiltRefSide = 90
         TiltOppSide = 90

here: TiltStartSide = 90
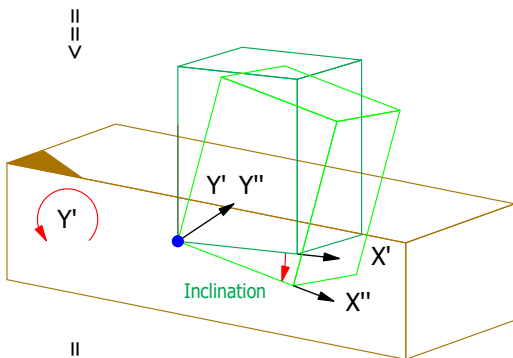   TiltEndSide = 90
         TiltRefSide = 90
         TiltOppSide = 90
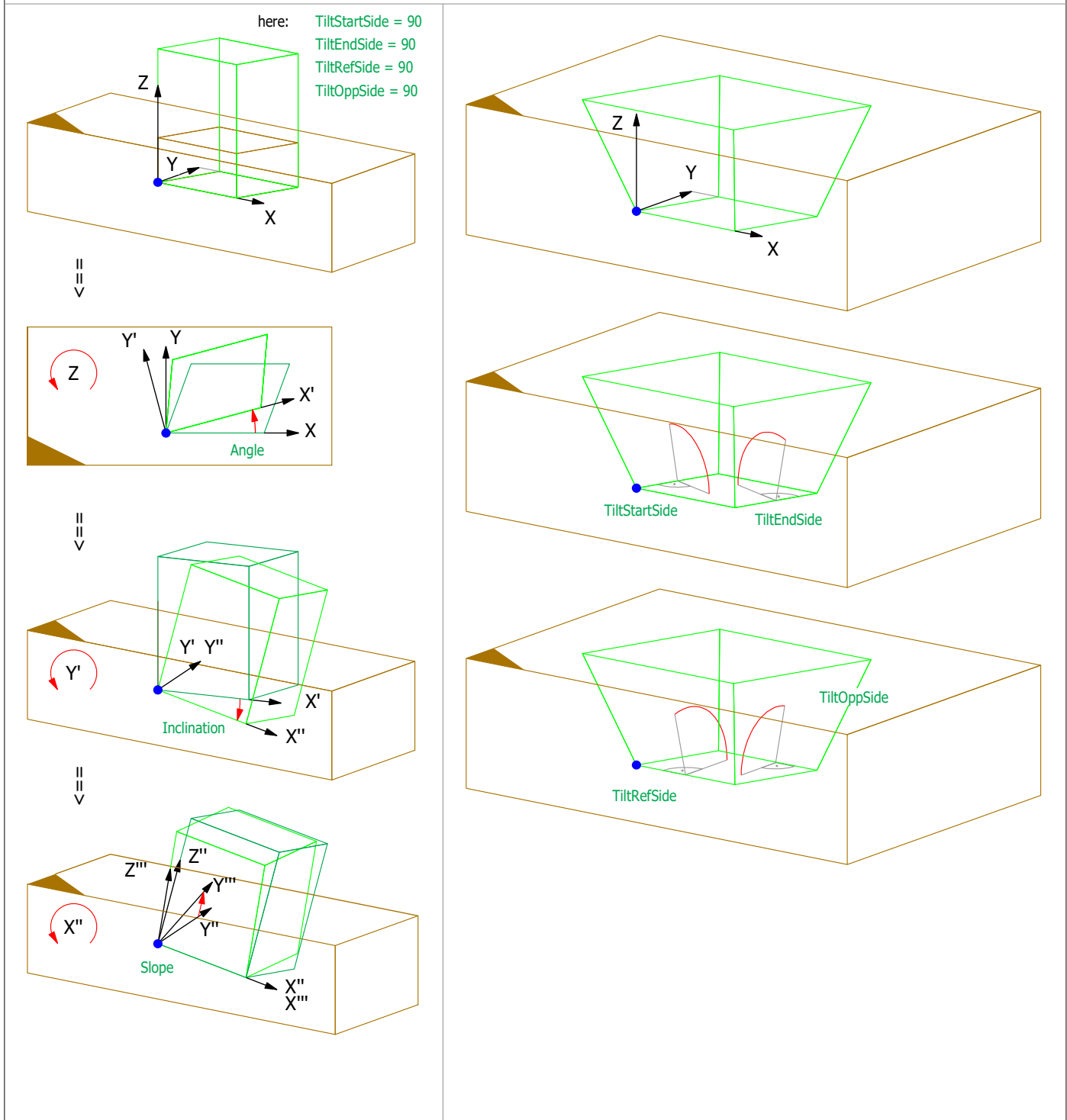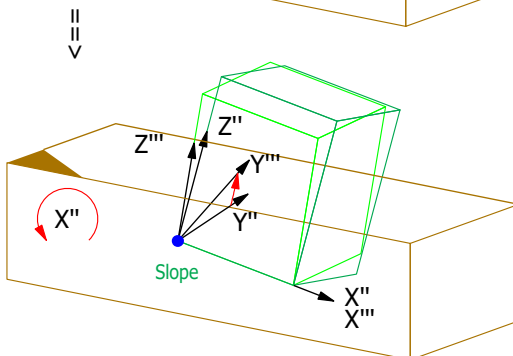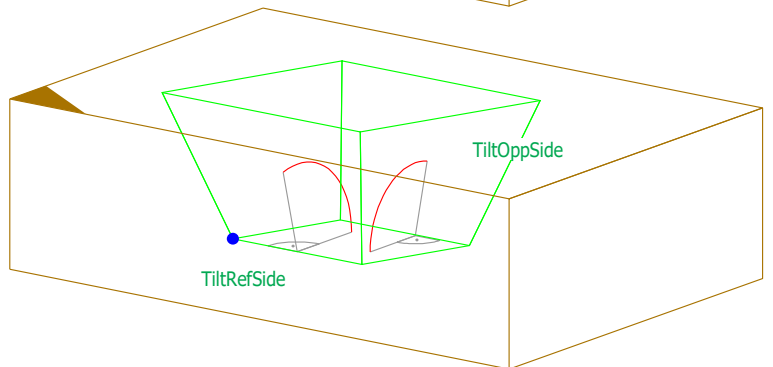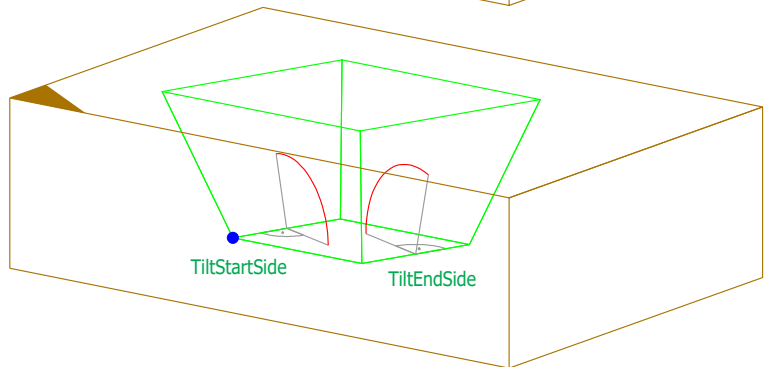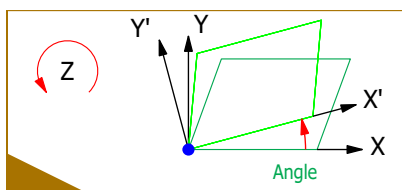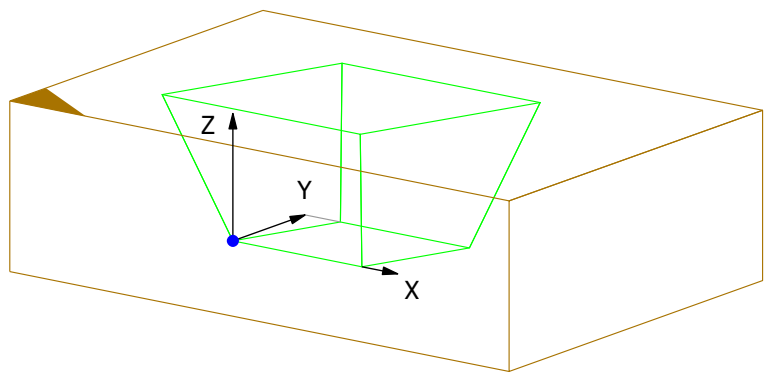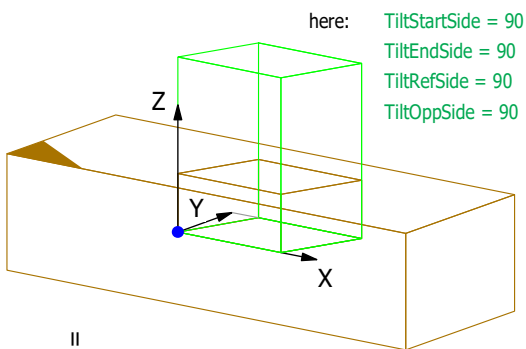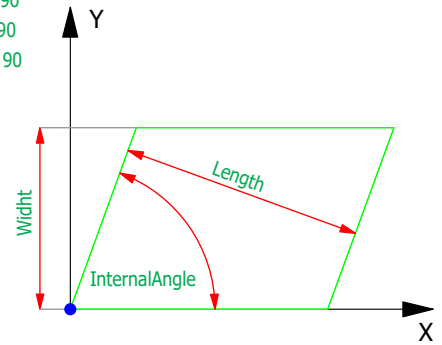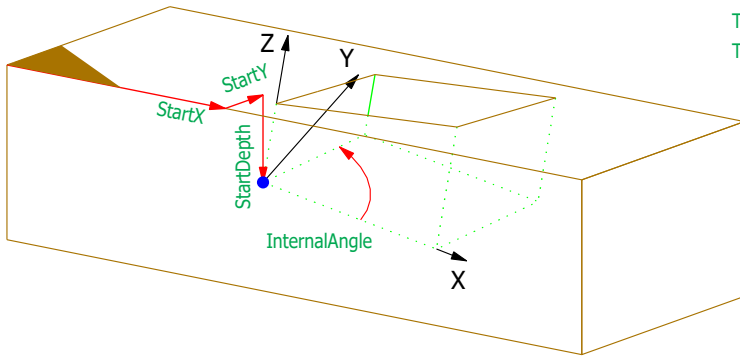
Parameters Pocket

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	0.0	-50000.0	50000.0
StartDepth	WidthNType	0.0	-50000.0	50000.0
Angle	AngleNType	0.0	-179.9	179.9
Inclination	AngleNType	0.0	-179.9	179.9
Slope	AngleNType	0.0	-179.9	179.9
Length	LengthType	200.0	0.0	100000.0
Width	WidthType	50.0	0.0	50000.0
InternalAngle	AngleType	90.0	0.1	179.9
TiltRefSide	AngleType	90.0	0.1	179.9
TiltEndSide	AngleType	90.0	0.1	179.9
TiltOppSide	AngleType	90.0	0.1	179.9
TiltStartSide	AngleType	90.0	0.1	179.9
MachiningLimits	MachiningLimitType			

MachiningLimits

FaceLimitedStart = yes
FaceLimitedEnd = yes
FaceLimitedFront = yes
FaceLimitedBack = yes

FaceLimitedStart = no
FaceLimitedEnd = yes
FaceLimitedFront = yes
FaceLimitedBack = yes

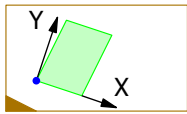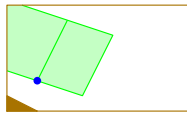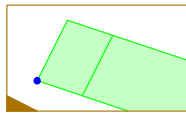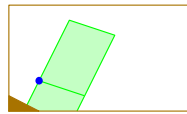FaceLimitedStart = yes
FaceLimitedEnd = no
FaceLimitedFront = yes
FaceLimitedBack = yes

FaceLimitedStart = yes
FaceLimitedEnd = yes
FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = yes
FaceLimitedEnd = yes
FaceLimitedFront = yes
FaceLimitedBack = no

FaceLimitedBottom = yes
FaceLimitedTop = no

FaceLimitedBottom = no
FaceLimitedTop = no

Other combinations of MachineLimits

FaceLimitedStart = no
FaceLimitedStart = no
FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = no
FaceLimitedStart = yes
FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = yes
FaceLimitedStart = no
FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = no
FaceLimitedStart = no
FaceLimitedFront = no
FaceLimitedBack = yes

FaceLimitedStart = no
FaceLimitedStart = yes
FaceLimitedFront = yes
FaceLimitedBack = no

FaceLimitedStart = yes
FaceLimitedStart = no
FaceLimitedFront = yes
FaceLimitedBack = no

FaceLimitedStart = no
FaceLimitedStart = no
FaceLimitedFront = yes
FaceLimitedBack = no

FaceLimitedStart = yes
FaceLimitedStart = yes
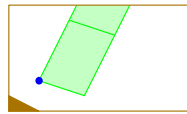FaceLimitedFront = no
FaceLimitedBack = no

FaceLimitedStart = no
FaceLimitedStart = yes
FaceLimitedFront = no
FaceLimitedBack = no
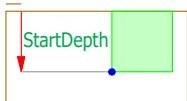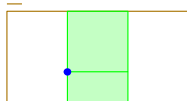
FaceLimitedStart = yes
FaceLimitedStart = no
FaceLimitedFront = no
FaceLimitedBack = no

FaceLimitedStart = no
FaceLimitedStart = no
FaceLimitedFront = no
FaceLimitedBack = no

Drilling
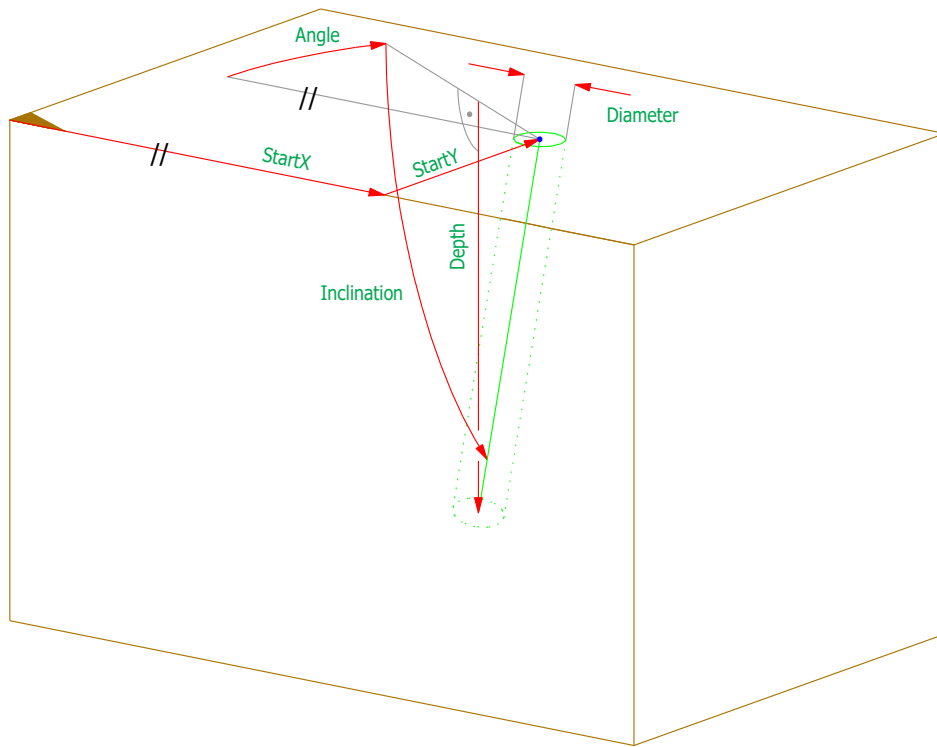
DepthLimited = yes
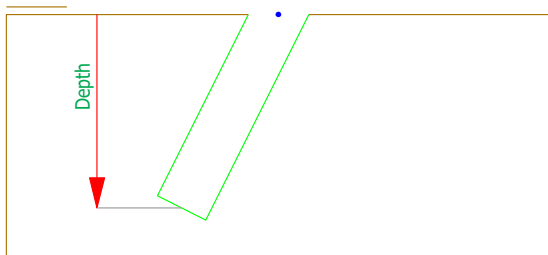
DepthLimited = no
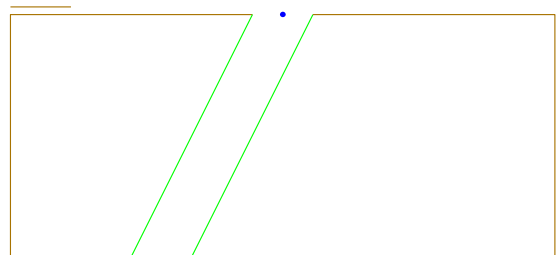
Parameters Drilling

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	0.0	-50000.0	50000.0
Angle	Angle3Type	0	0.0	360.0
Inclination	AngleType	90.0	0.1	179.9
DepthLimited	BooleanType	yes	no	yes
Depth	WidthType	50.0	0.0	50000.0
Diameter	DiameterType	20.0	0.0	50000.0

Tenon

Orientation = start

StartDepth
Rotation
Rotation
StartY
StartX
Height
Length
Width
Angle
Inclination
Rotation

Orientation = end

StartY
StartX
StartDepth
Rotation
Height
Length
Width
Angle
Inclination
Rotation
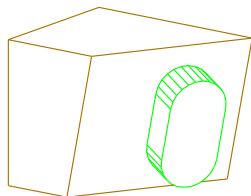
Chamfer = no   Chamfer = yes
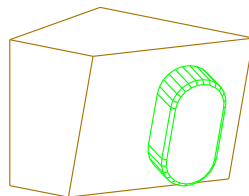
Parameters Tenon

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	50.0	-50000.0	50000.0
StartDepth	WidthNType	50.0	-50000.0	50000.0
Angle	AngleType	90.0	0.1	179.9
Inclination	AngleType	90.0	0.1	179.9
Rotation	AngleType	90.0	0.1	179.9
LengthLimitedTop	BooleanType	yes	no	yes
LengthLimitedBottom	BooleanType	yes	no	yes
Length	WidthType	80.0	0.0	50000.0
Width	LengthSType	40.0	0.0	1000.0
Height	LengthSType	40.0	0.0	1000.0
Shape	TenonShapeType	automatic		
ShapeRadius	LengthSType	20.0	0.0	1000.0
Chamfer	BooleanType	no	no	yes

Shape = automatic　　Shape = square　　Shape = round　　Shape = rounded　　Shape = radius

The tenon can be square, round or machine defined depending on the capabilities of the machine.

tool's radius at mortise:

tool
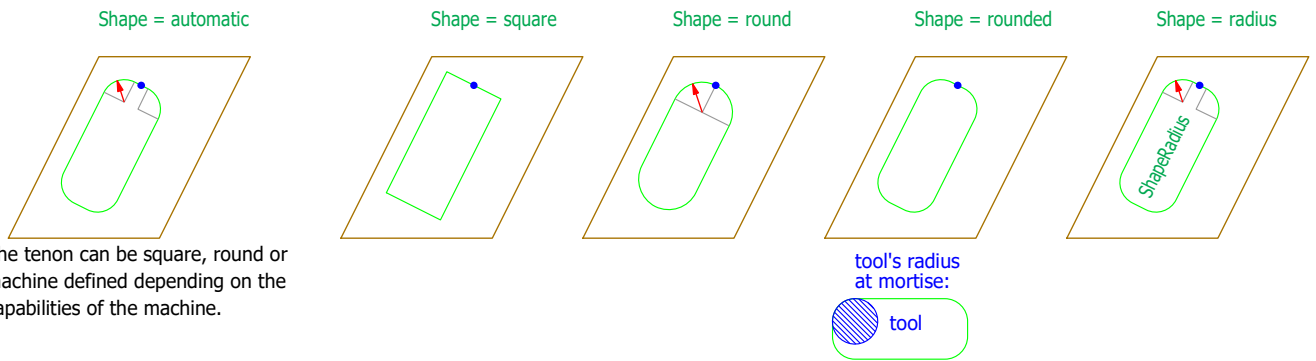
Effective shape　　　View perpendicularly on cut face

LengthLimitedTop = NO		LengthLimitedTop = YES	
StartDepth > 0	StartDepth < 0	StartDepth > 0	StartDepth < 0

or　　　　　or

Here: No statement about LengthLimitedBottom

LengthLimitedBottom = NO		LengthLimitedBottom = YES	

Here: No statement about LengthLimitedTop

| end = "inside" | end = "outside" | end = "inside" | end = "outside" |

end

Length

or　　　　　or
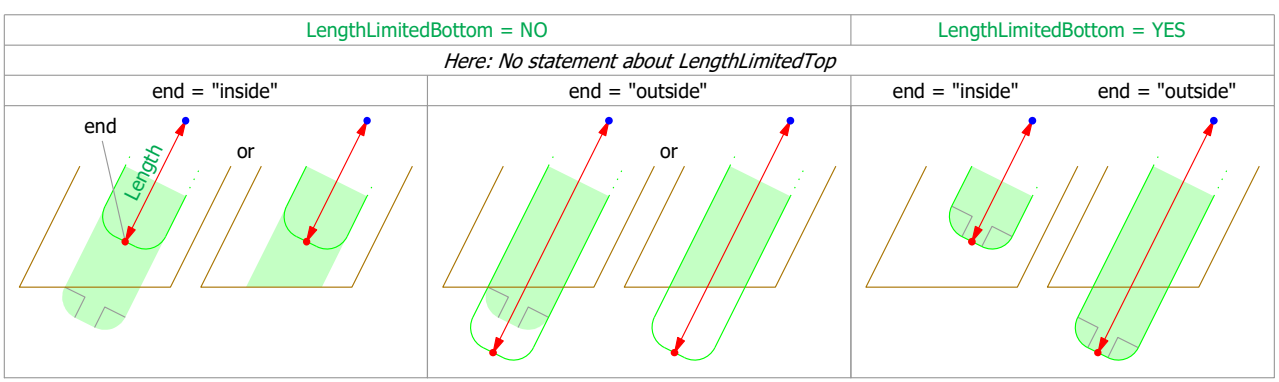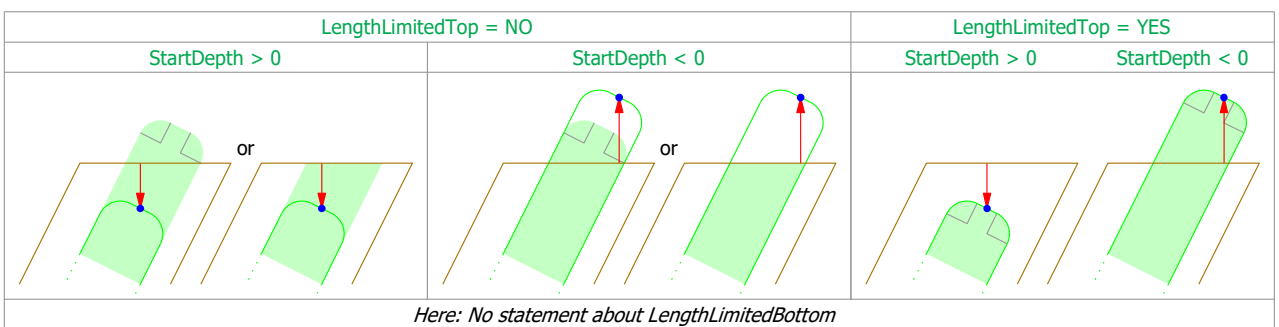
Mortise

Orientation = start

①

Inclination = 90
Slope = 90

Inclination = 90
Slope = 90 - rotation(1-3)

||
||
∨

②

1'=1
3'=3
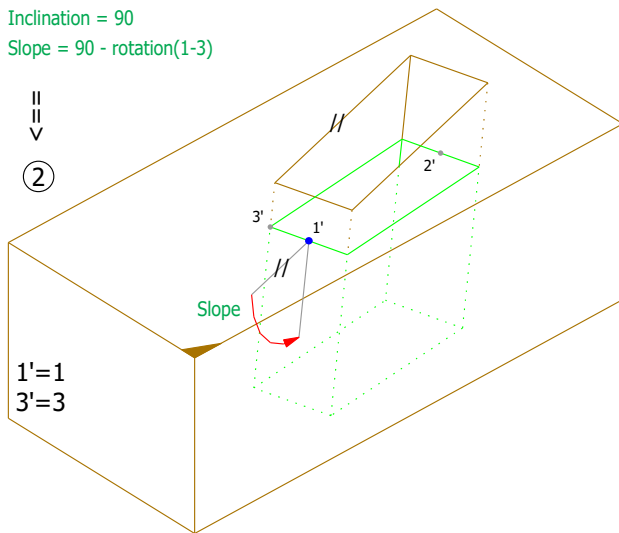
Inclination = 90 - rotation(1'-2')

||
||
∨

③

1"=1'
2"=2'
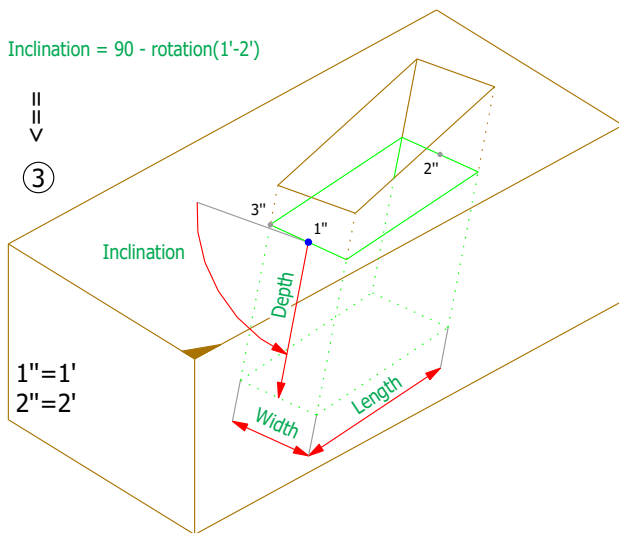
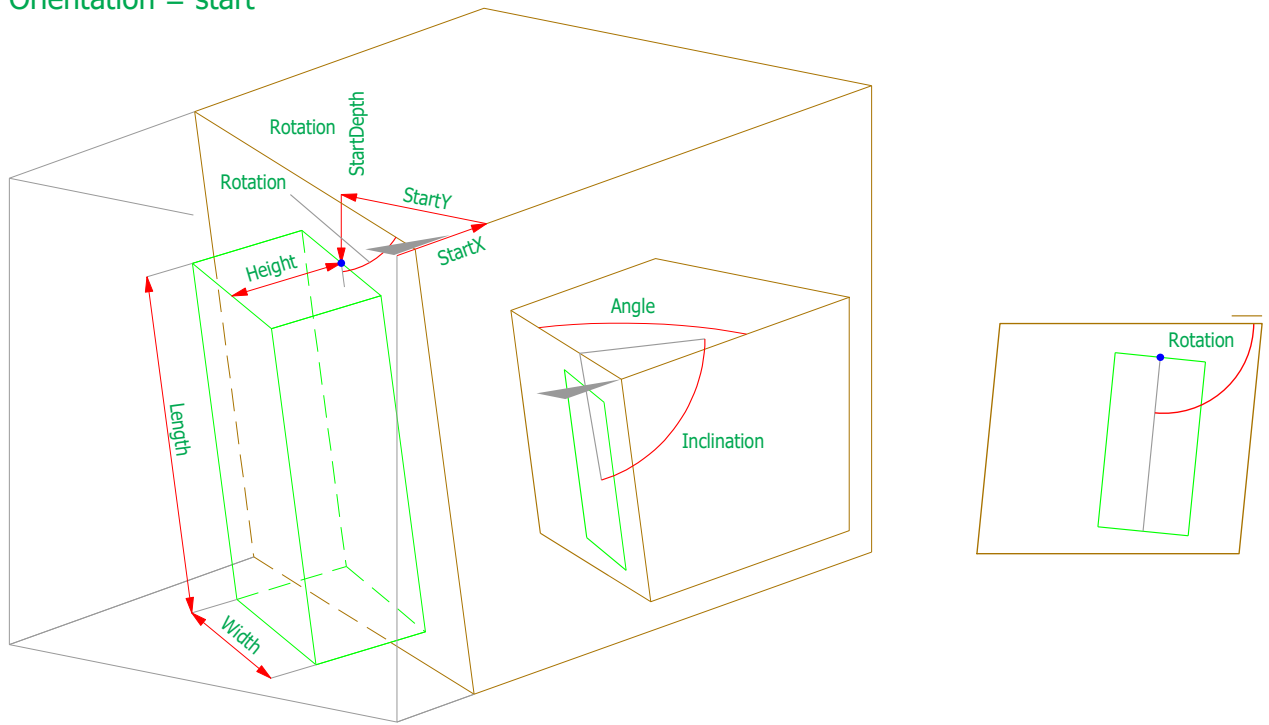## Parameters Mortise
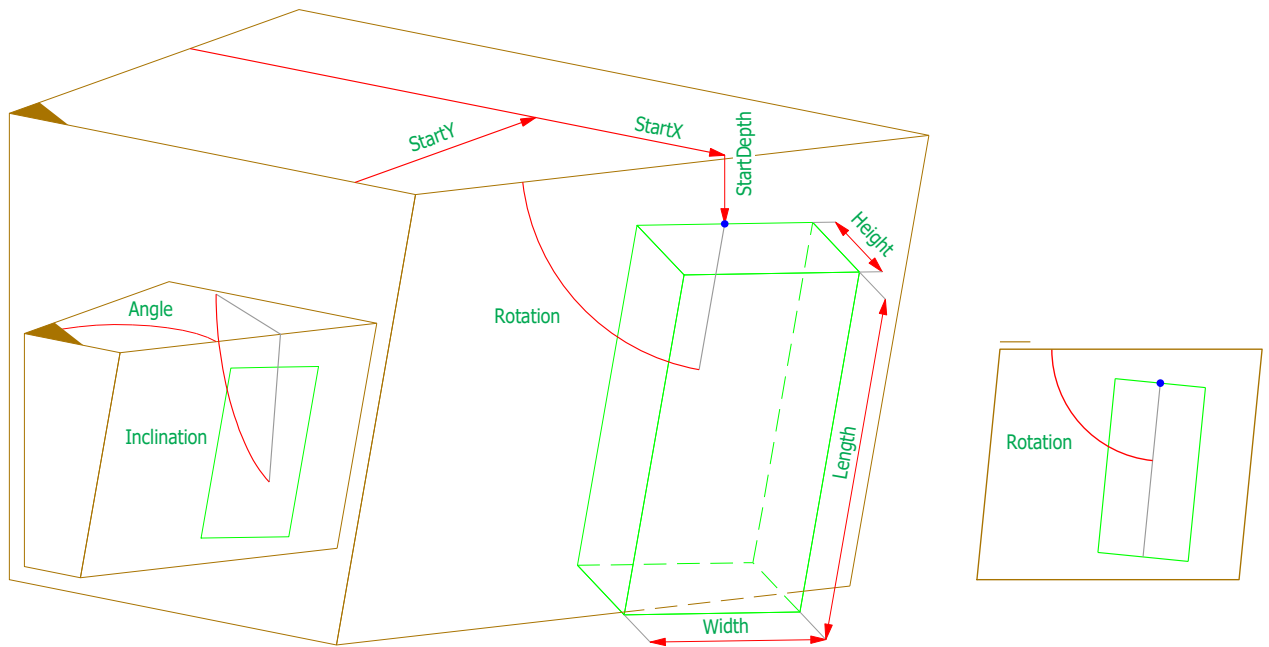
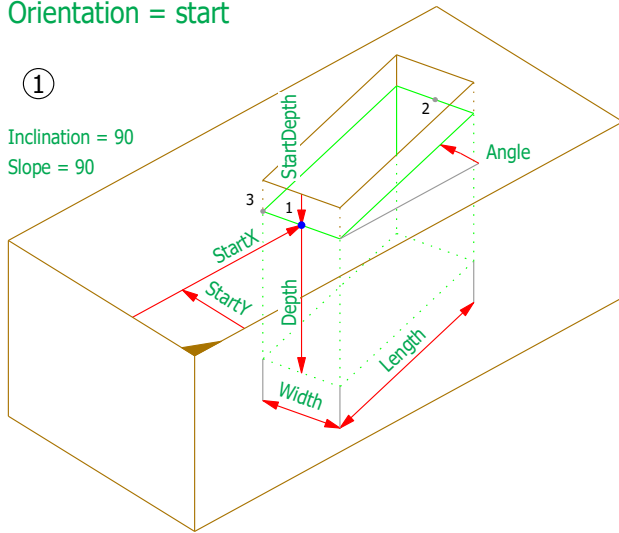| Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	−100000.0	100000.0
StartY	WidthNType	50.0	−50000.0	50000.0
StartDepth	WidthType	0.0	0.0	50000.0
Angle	Angle2NType	0.0	−180.0	180.0
Inclination	AngleType	90.0	0.1	179.9
Slope	AngleType	90.0	0.1	179.9
LengthLimitedTop	BooleanType	yes	no	yes
LengthLimitedBottom	BooleanType	yes	no	yes
Length	WidthType	80.0	0.0	50000.0
Width	LengthSType	40.0	0.0	1000.0
Depth	LengthSType	40.0	0.0	1000.0
Shape	TenonShapeType	automatic		
ShapeRadius	LengthSType	20.0	0.0	1000.0

Shape = automatic

Shape = square

Shape = round

R = Width/2

Shape = rounded

tool radius

Shape = radius

R = ShapeRadius

The mortise can be square, round or machine defined, depending on the capabilities of the machine.
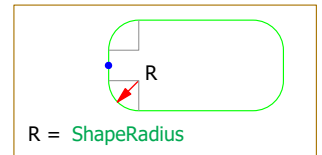
Effective shape

LengthLimitedTop = NO		LengthLimitedTop = YES	
start = "inside"	start = " outside	start = "inside"	start = " outside

StartX
StartY
or

or

Here: No statement about LengthLimitedBottom

LengthLimitedBottom = NO		LengthLimitedBottom = YES	
Here: No statement about LengthLimitedTop			
end = "inside"	end = "outside"	end = "inside"	end = "outside"

end
Length
or

or

House

Tenon or DovetailTenon   House

StartDepth   StartDepth

StartX

StartX

Length

Height

Height

Length

green: Parameters for House.
blue: Parameters for Tenon or DovetailTenon

Parameters House

The House has same parameters as the Tenon.

HouseMortise

StartX

StartX

StartDepth

Depth

Depth

HouseMortise   Mortise or DovetailMortise
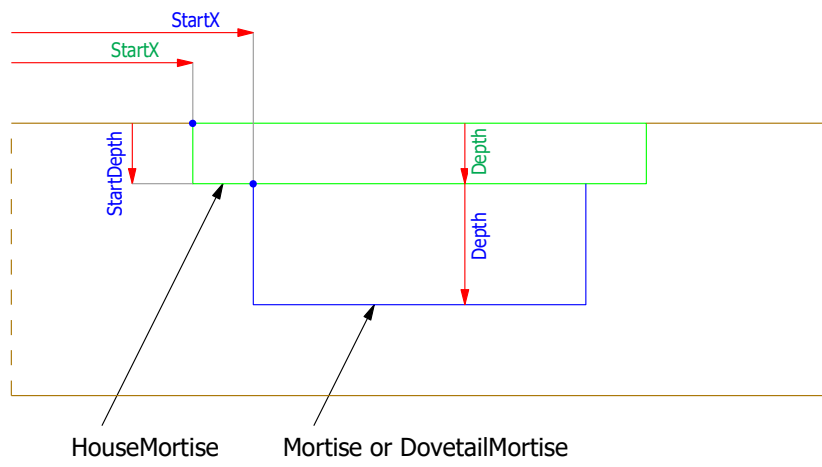
Parameters HouseMortise

The HouseMortise has same parameters as the Mortise.

DovetailTenon

Orientation = start

Inclination Angle Rotation

Orientation = end

Inclination Angle Rotation

StartDepth StartY StartX Height Length

Length ShapeRadius ShapeRadius ConeAngle Width
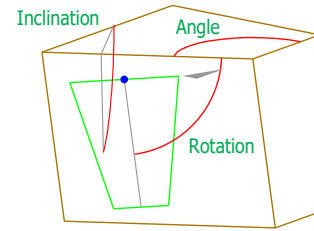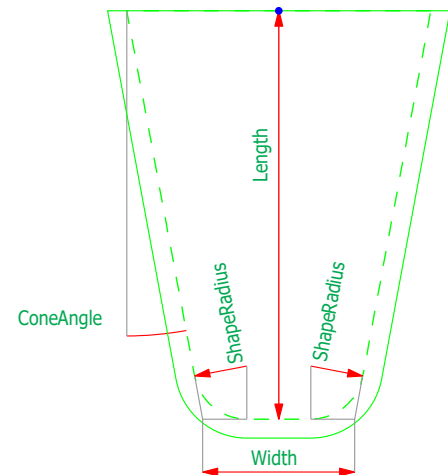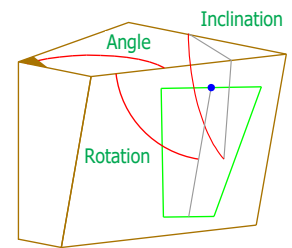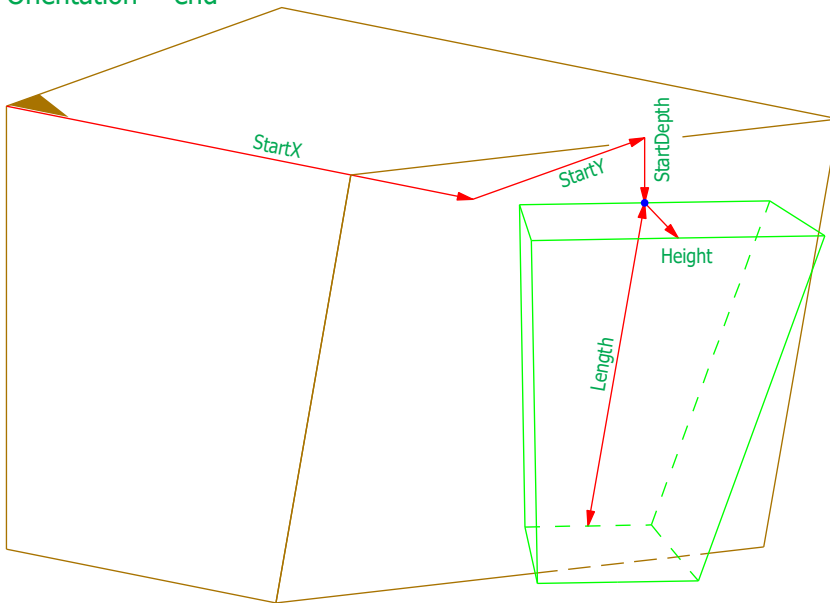
Parameters DovetailTenon

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	50.0	-50000.0	50000.0
StartDepth	WidthNType	50.0	-50000.0	50000.0
Angle	AngleType	90.0	0.1	179.9
Inclination	AngleType	90.0	0.1	179.9
Rotation	AngleType	90.0	0.1	179.9
LengthLimitedTop	BooleanType	yes	no	yes
LengthLimitedBottom	BooleanType	yes	no	yes
Length	WidthType	80.0	0.0	50000.0
Width	LengthSType	40.0	0.0	1000.0
Height	LengthSType	28.0	0.0	1000.0
ConeAngle	double		0.0	30.0
UseFlankAngle	BooleanType	no	no	yes
FlankAngle	double	15.0	5.0	35.0
Shape	TenonShapeType	automatic		
ShapeRadius	LengthSType	20.0	0.0	1000.0

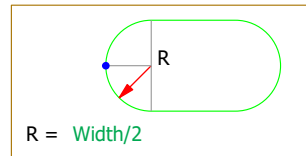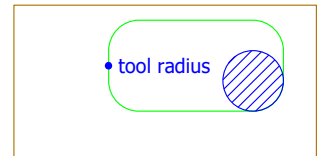LengthLimitedTop = yes   LengthLimitedTop = no   LengthLimitedBottom = yes   LengthLimitedBottom = no

Shape = automatic   = square   = round   = rounded   = radius

The machine decides which shape will be produced.

Width

tool radius

ShapeRadius

ShapeRadius and Width must be coherent.
This condition is not controlled by the XML schema

FlankAngle

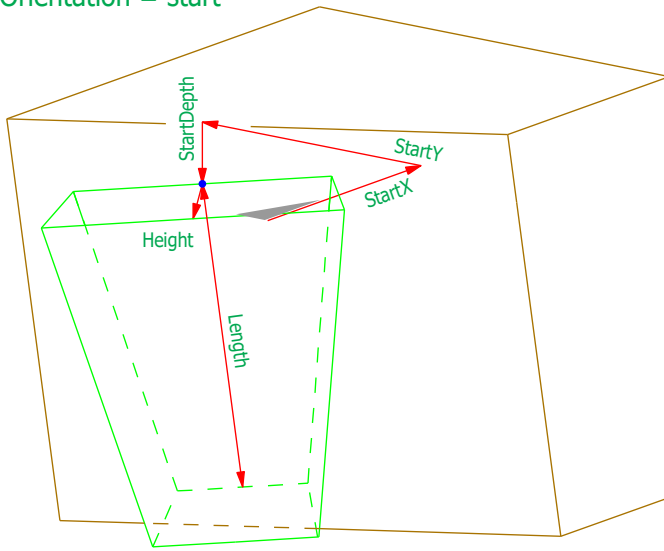UseFlankAngle = no:
Shape of dovetail must be done with FlankAngle of the tool from machine.
UseFlankAngle = yes:
Shape of dovetail must be done with the parameter FlankAngle

DovetailMortise

Angle = 0°
Slope = 0°
Inclination = 0°

Examples:

Angle = -20°
Slope = 90°
Inclination = 0°

Angle = -110°
Slope = 0°
Inclination = -90°

General Direction of DovetailMortise:
1. Rotation round Z axis = Angle
2. Rotation round Y axis = Slope
3. Rotation round X axis = Inclination
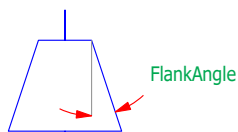
Parameters DovetailMortise

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	50.0	-50000.0	50000.0
StartDepth	WidthType	0.0	0.0	50000.0
Angle	Angle2NType	0.0	-180.0	180.0
Inclination	AngleType	90.0	0.1	179.9
Slope	AngleType	90.0	0.1	179.9
LimitationTop	LimitationTopType	limited		
LengthLimitedBottom	BooleanType	yes	no	yes
Length	WidthType	80.0	0.0	50000.0
Width	LengthSType	40.0	0.0	1000.0
Depth	LengthSType	28.0	0.0	1000.0
ConeAngle	double		0.0	30.0
UseFlankAngle	BooleanType	no	no	yes
FlankAngle	double	15.0	5.0	35.0
Shape	TenonShapeType	automatic		
ShapeRadius	LengthSType	20.0	0.0	1000.0

LimitationTop= limited   LimitationTop = unlimited   LimitationTop = pocket   LengthLimitedBottom = yes   LengthLimitedBottom = no

Shape = automatic   = square   = round   = rounded   = radius

The machine decides which shape will be produced.

tool radius

ShapeRadius

Width

ShapeRadius and Width must be coherent.
This condition is not controlled by the XML schema

FlankAngle

UseFlankAngle = no:
    Shape of dovetail must be done with FlankAngle of the tool from machine.
UseFlankAngle = yes:
    Shape of dovetail must be done with the parameter FlankAngle

Japanese Mortise

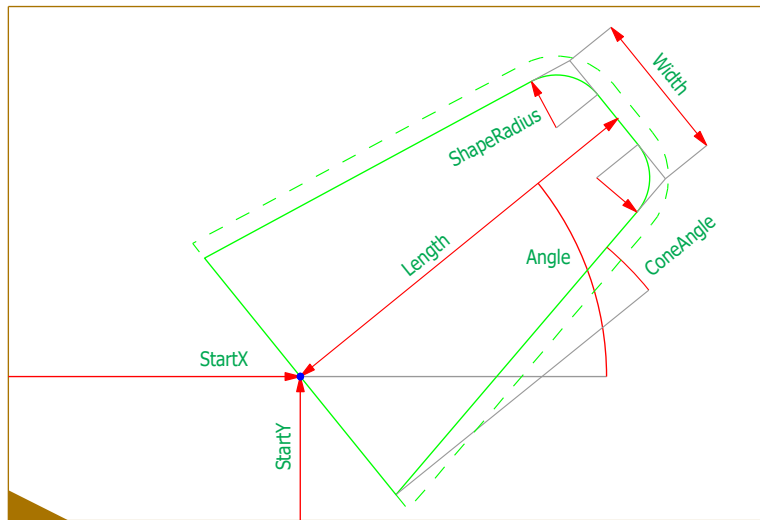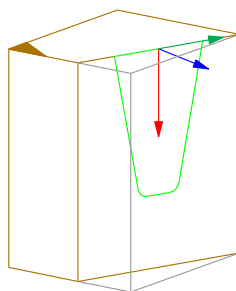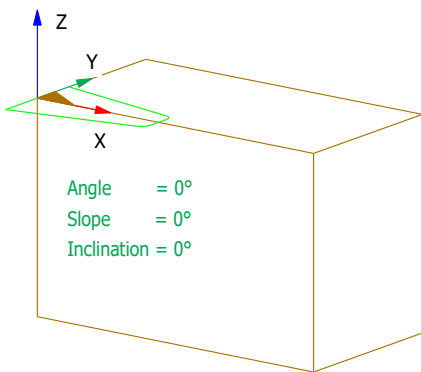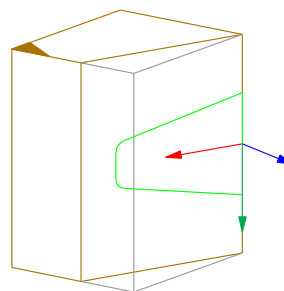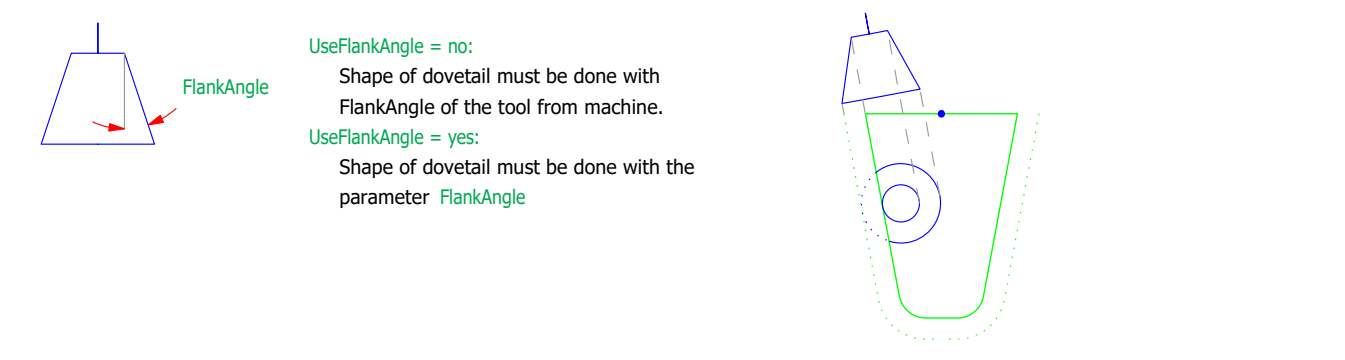| Orientation = start	Orientation = end

Parameters JapaneseTenon

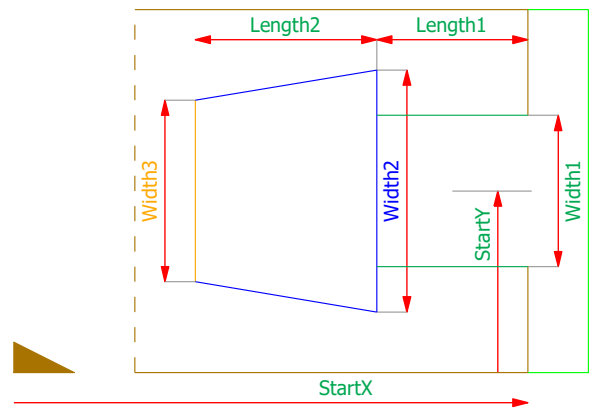| Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	50.0	-50000.0	50000.0
Width1	LengthType	40.0	0.0	10000.0
Length1	LengthType	50.0	0.0	10000.0
Width2	LengthType	60.0	0.0	10000.0
Length2	LengthType	50.0	0.0	10000.0
Width3	LengthType	40.0	0.0	10000.0
ConeAngle	Double	30.0	0.0	30.0
MiddlePlane	LengthType	0.0	0.0	10000.0
Offset	LengthType	30.0	0.0	10000.0
UseLap	BooleanType	yes	no	yes
LapOffset	LengthType	10.0	0.0	10000.0
LapDepth	LengthType	20.0	0.0	10000.0

JapaneseTenon

Orientation = start	Orientation = end

Length2   Length1   Length1   Length2

Width3   Width2   StartY   Width1   Width1   StartY   Width2   Width3

StartX   StartX

Length2   Length1   Length1   Length2

LapOffset   LapDepth   Offset   Offset   LapOffset   LapDepth

Width2
Width3
Width1

Referenceedege in case of Orientatiion = start   Referenceedege in case of Orientatiion = end

ConeAngle   MiddlePlane

LapOffset   Offset

Parameters JapaneseTenon

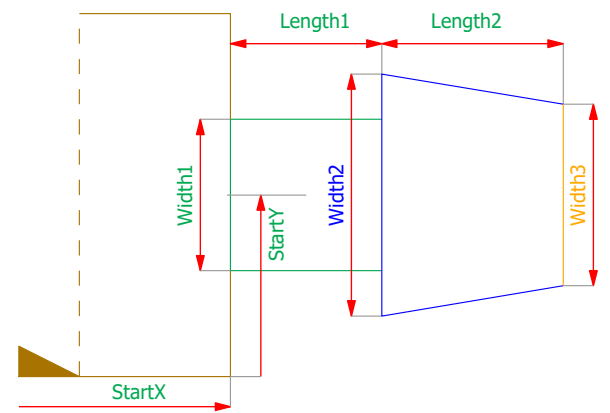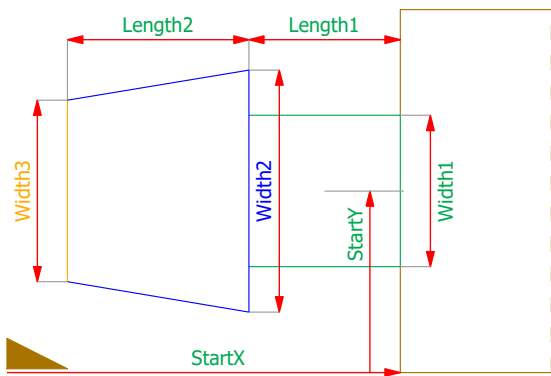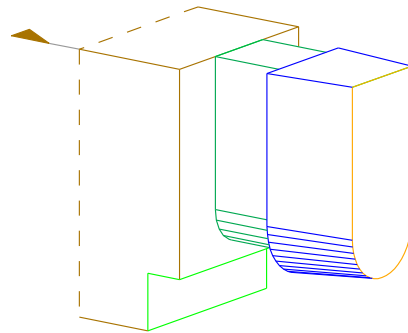| Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	−100000.0	100000.0
StartY	WidthNType	50.0	−50000.0	50000.0
Width1	LengthType	40.0	0.0	10000.0
Length1	LengthType	50.0	0.0	10000.0
Width2	LengthType	60.0	0.0	10000.0
Length2	LengthType	50.0	0.0	10000.0
Width3	LengthType	40.0	0.0	10000.0
ConeAngle	Double	30.0	0.0	30.0
MiddlePlane	LengthType	0.0	0.0	10000.0
Offset	LengthType	30.0	0.0	10000.0
UseLap	BooleanType	yes	no	yes
LapOffset	LengthType	10.0	0.0	10000.0
LapDepth	LengthType	20.0	0.0	10000.0

Marking

MarkingStyle = single
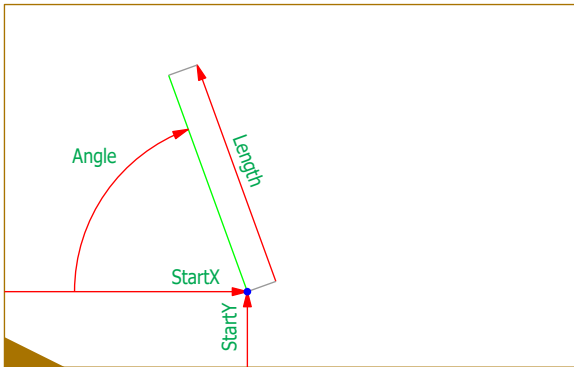
MarkingStyle = double
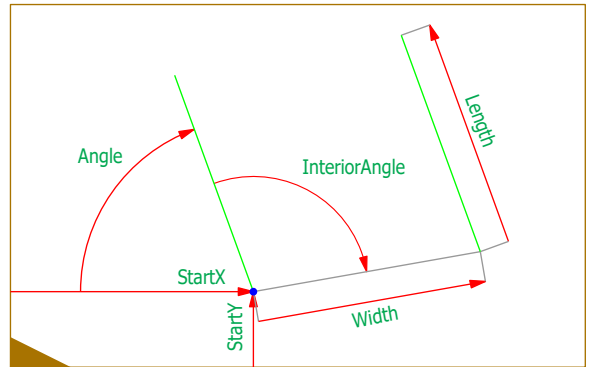
MarkingStyle = square
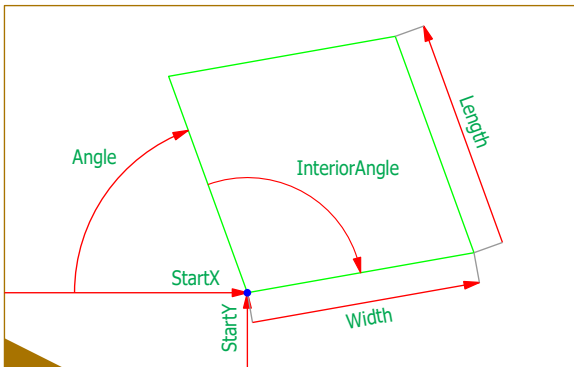
Parameters Marking

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	0.0	-50000.0	50000.0
Angle	Angle2NType	0	-180.0	180.0
LengthLimited	BooleanType	no	no	yes
Length	WidthType	20.0	0.0	50000.0
Width	WidthType	100.0	0.0	50000.0
InteriorAngle	AngleType	90.0	0.1	179.9
Style	MarkingStyleType	single	single/double/square	

Text
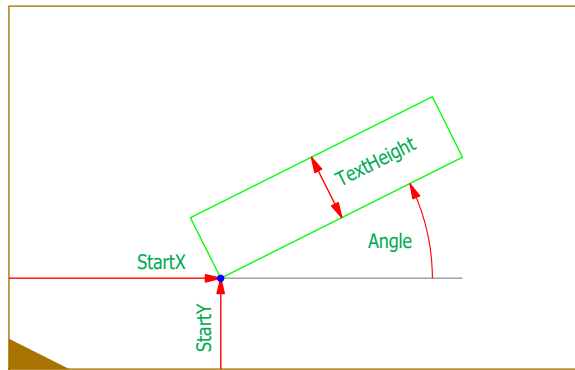
Text = "ABCD"

AlignmentHorizontal				
		left	center	right
AlignmentVertical	bottom	ABCD	ABCD	ABCD TextHeight
	center	ABCD	ABCD	ABCD
	top	ABCD	ABCD	ABCD

Text = "ABCD\nEF\nGHI"

| AlignmentMultiline		
left	center	right
ABCD EF GHI	ABCD EF GHI	ABCD EF GHI TextHeight

StackedMarking	
no	yes
ABCD	ABCD

Parameters Text

Name	Type	Default	Min	Max
StartX	LengthPosType	0	-100000	100000
StartY	WidthNType	0	-50000	50000
Angle	Angle2NType	0	-180	180
AlignmentVertical	AlignmentVerticalType	bottom		
AlignmentHorizontal	AlignmentHorizontalType	left		
AlignmentMultiline	AlignmentHorizontalType	left		
StackedMarking	BooleanType	no	no	yes
TextHeightAuto	BooleanType	yes	no	yes
TextHeight	WidthType	20	0	50000
Text	xs:string			

SimpleScarf

Orientation = start
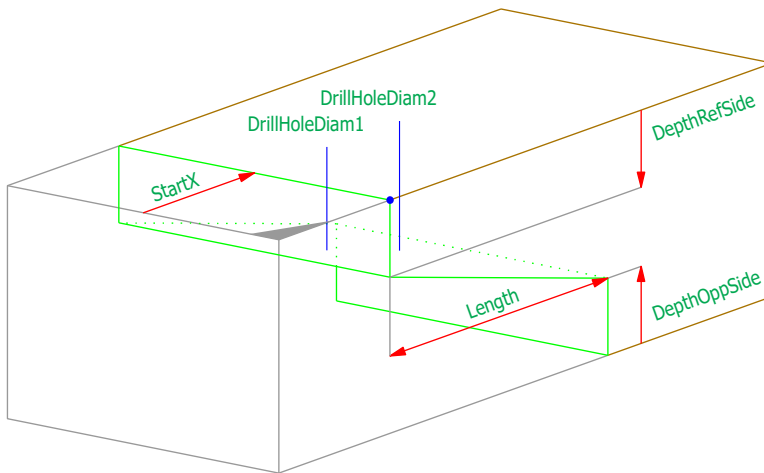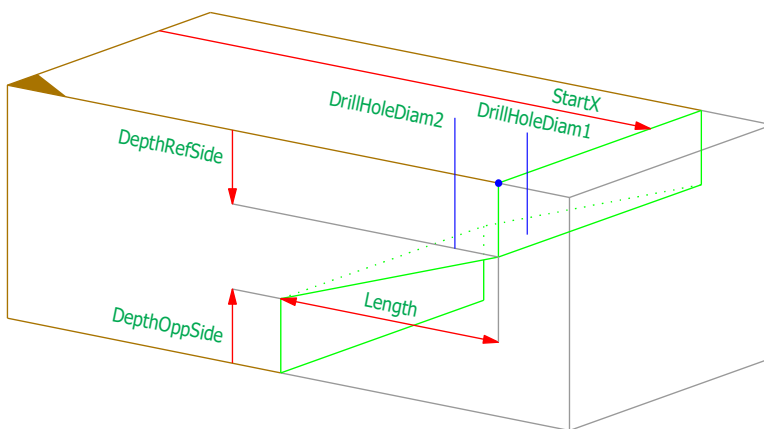
Orientation = end

This processing trims the part, even it is on a ReferencePlane
Examples:

Parameters SimpleScarf

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
Length	WidthType	200.0	0.0	50000.0
DepthRefSide	WidthType	20.0	0.0	50000.0
DepthOppSide	WidthType	20.0	0.0	50000.0
NumDrillHole	byte	0	0	2
DrillHoleDiam1	LengthSType	20.0	0.0	1000.0
DrillHoleDiam2	LengthSType	20.0	0.0	1000.0

ScarfJoint

Orientation = start
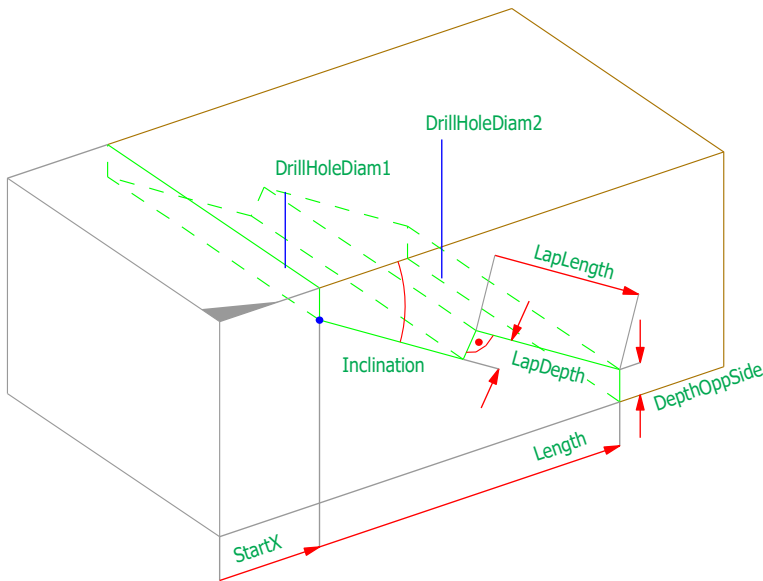
ScarfShape = classic

ScarfShape = refside

ScarfShape = baseside

Orientation = end
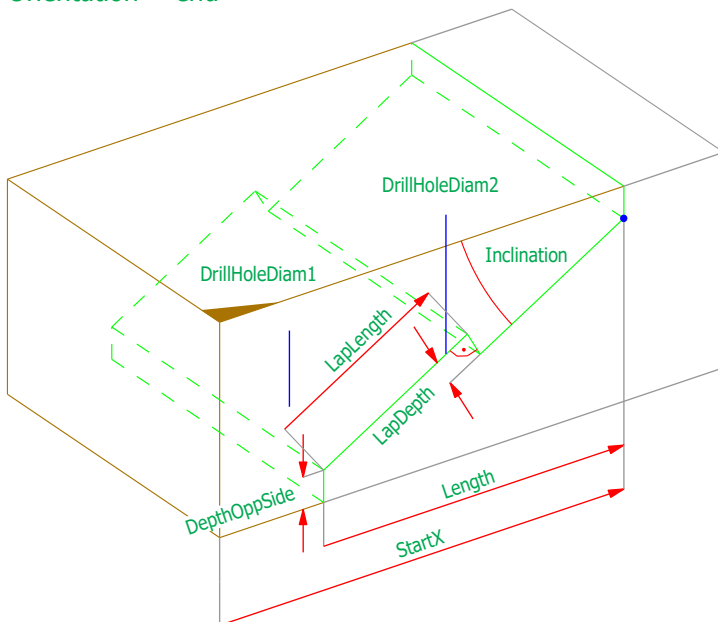
ScarfShape = classic
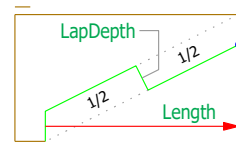
ScarfShape = refside
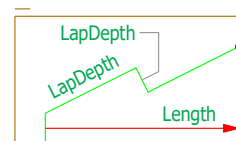
ScarfShape = baseside
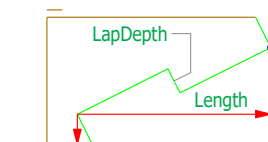
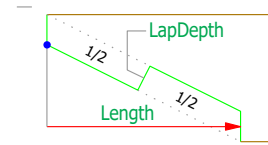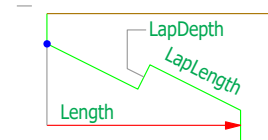This processing trims the part, even it is on a ReferencePlane
Examples:

Parameters ScarfJoint

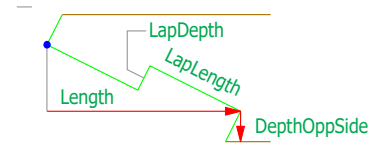| Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
Inclination	Inclination3Type		0.0	90.0
LapLength	WidthType	100.0	0.0	50000.0
LapDepth	WidthType	20.0	0.0	50000.0
Length	WidthType	200.0	0.0	50000.0
DepthOppSide	WidthType	20.0	0.0	50000.0
ScarfShape	ScarfShapeType	refside		
NumDrillHole	byte	0	0	2
DrillHoleDiam1	LengthSType	20.0	0.0	1000.0
DrillHoleDiam2	LengthSType	20.0	0.0	1000.0

StepJoint

Orientation = start   **Orientation = end**

Tenon = no

StepDepth, StartX, StrutInclination, HeelDepth — StepShape = double

StepShape = step
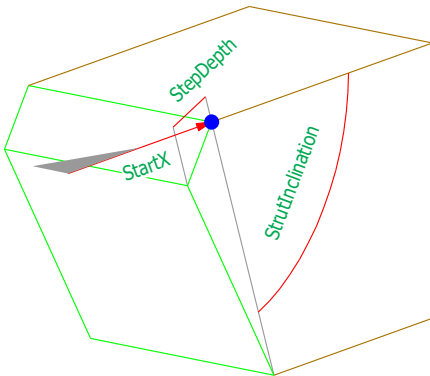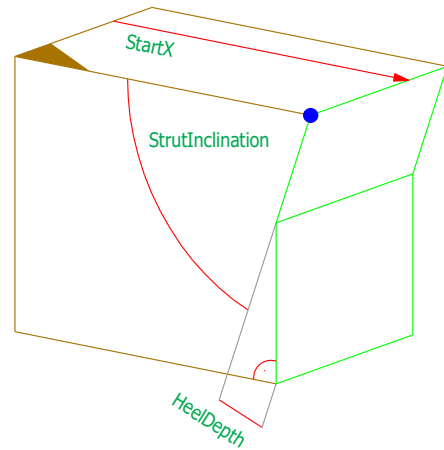
StepDepth, StartX, StrutInclination, HeelDepth — StepShape = heel

Tenon = yes

A — TenonHeight, TenonWidth

B — TenonHeight, TenonWidth

Which style (A or B) is used depends on the machine
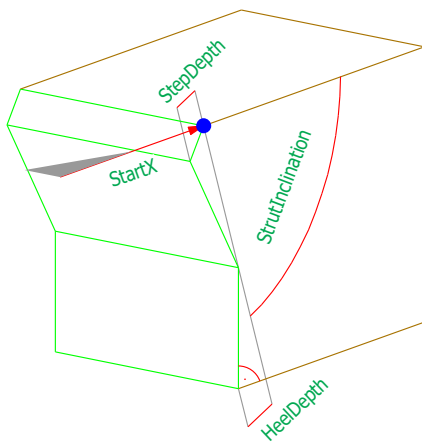
P11=0, P04=0, Length

P11=0, P04=1, Length
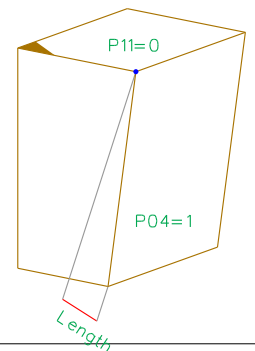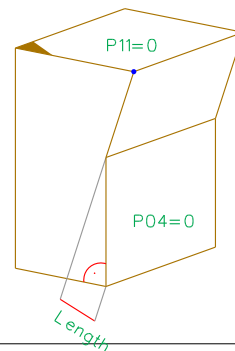
Parameters StepJoint

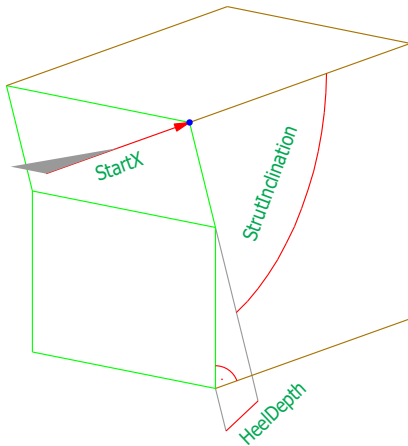| Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StrutInclination	AngleType		0.1	179.9
StepDepth	WidthType	20.0	0.0	50000.0
HeelDepth	WidthType	20.0	0.0	50000.0
StepShape	StepShapeType	double		
Tenon	BooleanType	no	no	yes
TenonWidth	LengthSType	40.0	0.0	1000.0
TenonHeight	LengthSType	40.0	0.0	1000.0
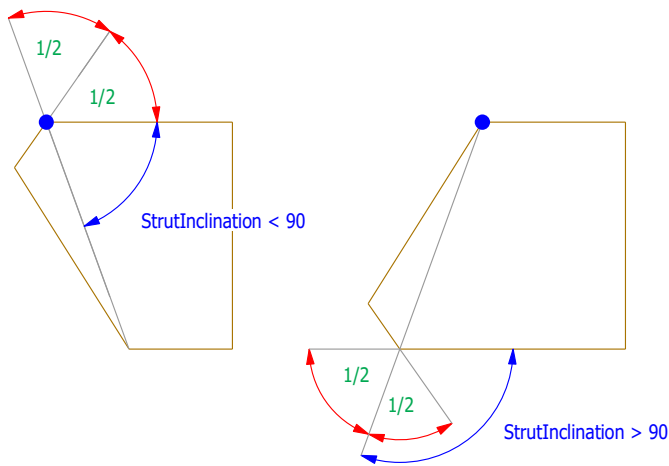
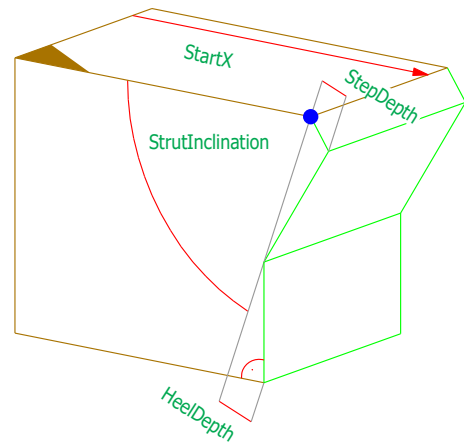This processing trims the part, even it is on a ReferencePlane

Examples:

StepJointNotch

Orientation = start

Orientation = end

StepShape = step

StepShape = heel

StepShape = double

StrutInclination > 90

StrutInclination > 90

StepShape = step

StrutInclination > 90
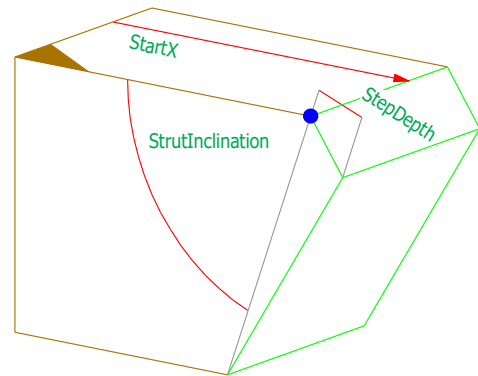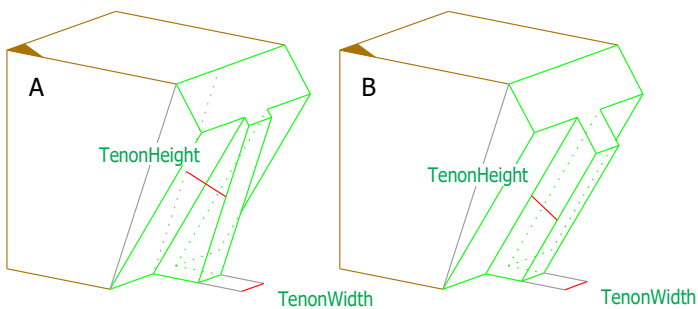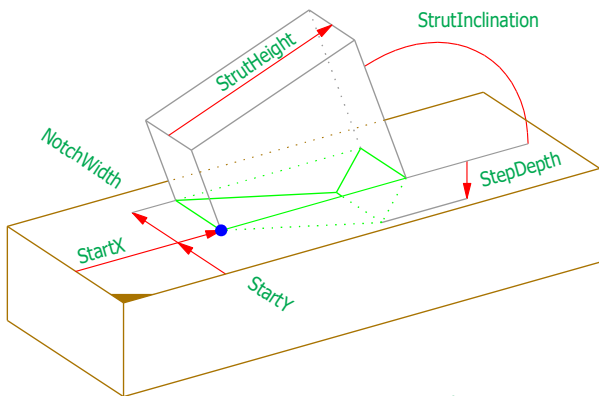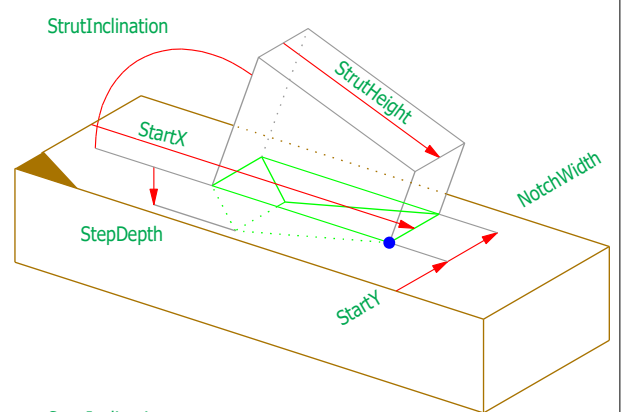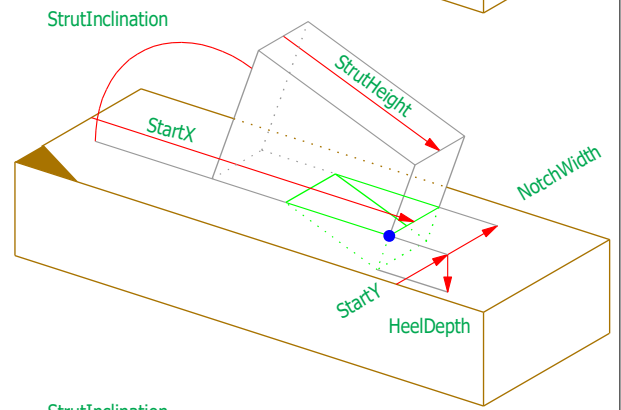
StrutInclination > 90

StepShape = heel

Orientation = start　　　　　Orientation = end

StrutInclination < 90　　　　　StrutInclination < 90

1/2　1/2　　StepDepth　　StepShape = step　　1/2　1/2　StepDepth

StrutInclination < 90　　　　　StrutInclination < 90

1/2　1/2　　HeelDepth　　StepShape = heel　　HeelDepth　1/2　1/2

MortiseHeight　　　MortiseHeight　　MortiseWidth

A　Mortise at StepJointNotch　　B　Mortise at StepJointNotch　　NotchWidth　StartY

Tenon at StepJoint　　　Tenon at StepJoint

Parameters StepJointNotch

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	0.0	-50000.0	50000.0
StrutInclination	AngleType		0.1	179.9
NotchLimited	BooleanType	no	no	yes
NotchWidth	WidthType	20.0	0.0	50000.0
StepDepth	WidthType	20.0	0.0	50000.0
HeelDepth	WidthType	20.0	0.0	50000.0
StrutHeight	WidthType	20.0	0.0	50000.0
StepShape	StepShapeType	double		
Mortise	BooleanType	no	no	yes
MortiseWidth	LengthSType	40.0	0.0	1000.0
MortiseHeight	LengthSType	40.0	0.0	1000.0

Planing

here: PlaneSide3 = yes
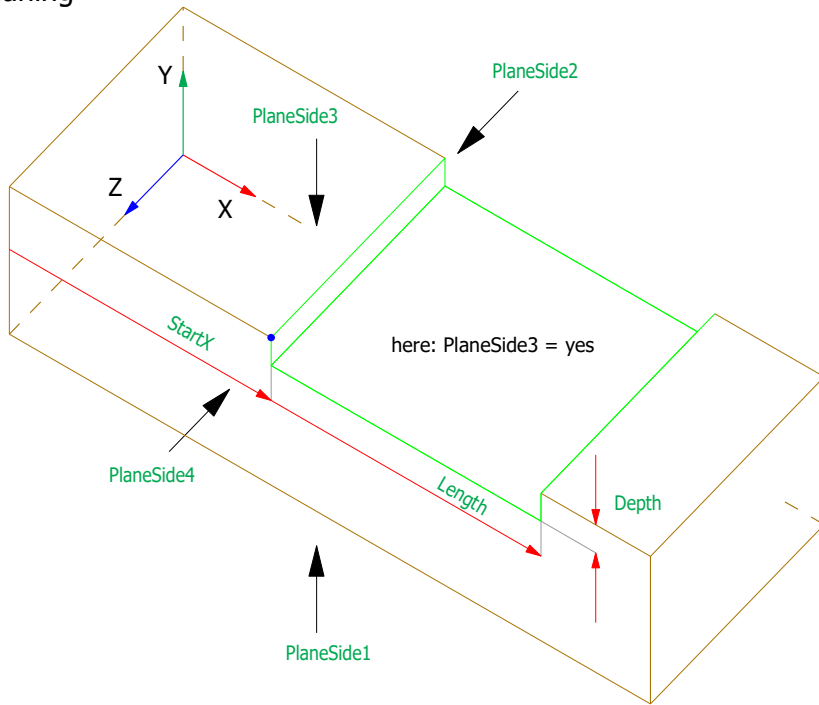
StartLimited	EndLimited	
yes	yes	
no	yes	
yes	no	
no	no	

Examples

PlaneSide1 = yes
PlaneSide2 = no
PlaneSide3 = yes
PlaneSide4 = no

PlaneSide1 = no
PlaneSide2 = no
PlaneSide3 = yes
PlaneSide4 = yes

Parameters Planing

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
Length	LengthType	0.0	0.0	100000.0
Depth	double	1.0	0.0	50.0
StartLimited	BooleanType	no	no	yes
EndLimited	BooleanType	no	no	yes
PlaneSide1	BooleanType	yes	no	yes
PlaneSide2	BooleanType	yes	no	yes
PlaneSide3	BooleanType	yes	no	yes
PlaneSide4	BooleanType	yes	no	yes

ProfileFront

Orientation = start

Radius2 = 0
Rotation2 = 0

Depth

StartX

Rotation1

Radius2

Rotation2

StartRotation

Radius1

Orientation = end

Radius2 = 0
Rotation2 = 0

Rotation2

Radius2

Depth

Rotation1

Radius1
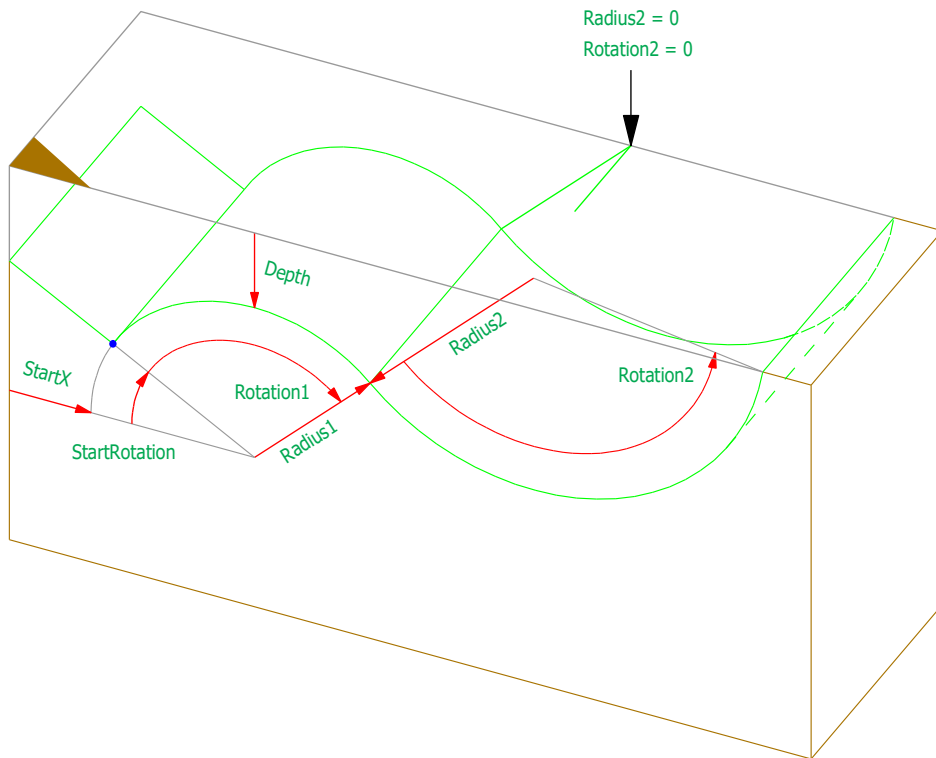
StartX
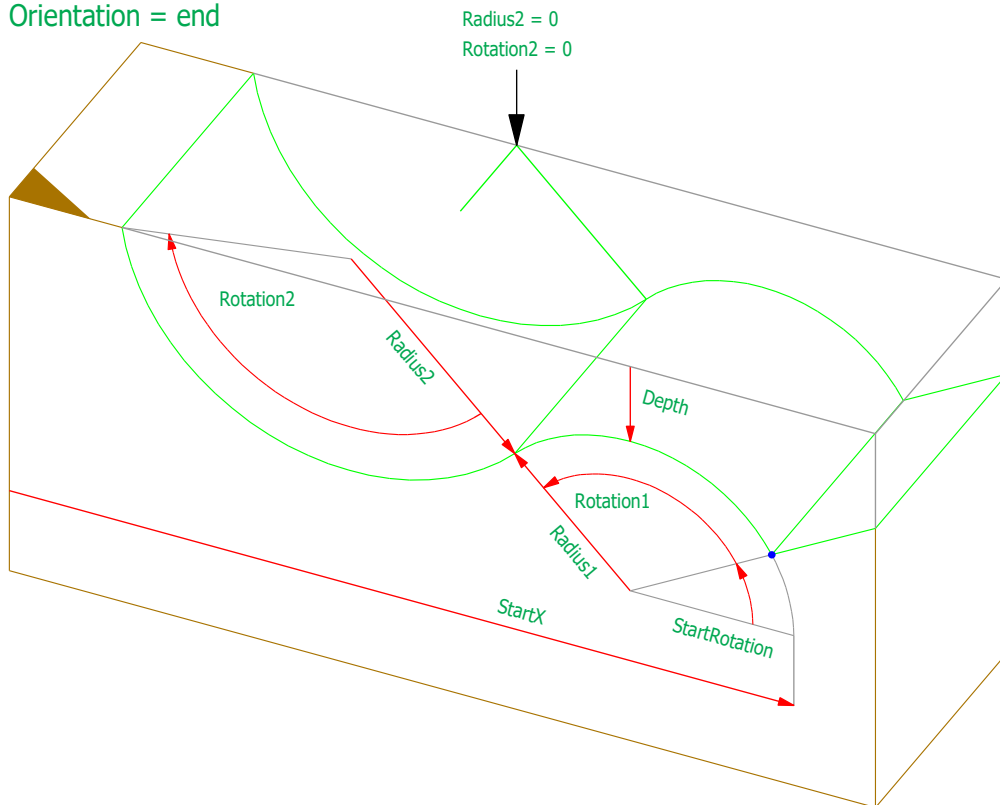
StartRotation

Parameters ProfileFront
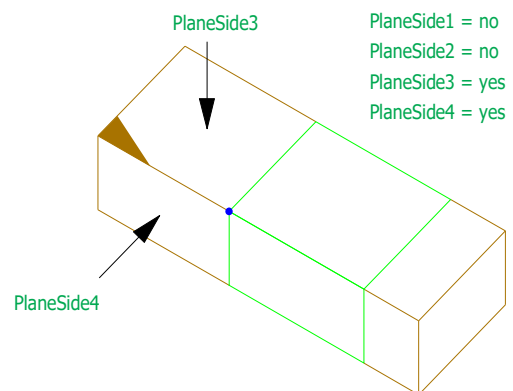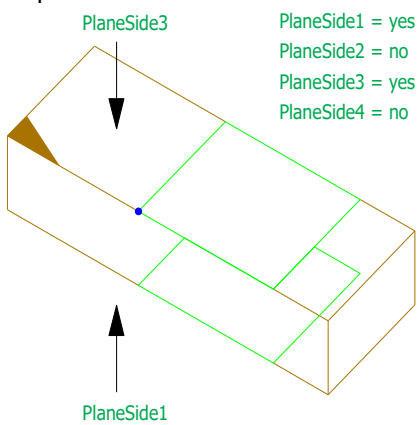
Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
ArcShape	ArcShapeType	convex		
Depth	LengthSType	0.0	0.0	1000.0
StartRotation	Inclination2Type	0.0	-90.0	90.0
Rotation1	Angle2Type	90.0	0.0	180.0
Radius1	LengthSType	250.0	0.0	1000.0
Rotation2	Angle2Type	90.0	0.0	180.0
Radius2	LengthSType	250.0	0.0	1000.0

ProfileCambered

Orientation = start
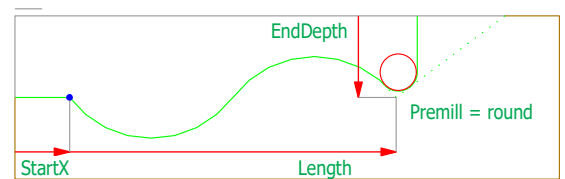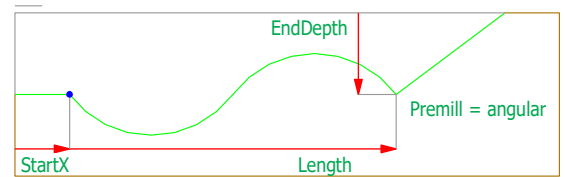
Orientation = end

The curve is defined by a cubic polynom.

$$Y = Ax^3 + Bx^2 + Cx + D$$

The coefficients A, B, C and D must be calculated on the machine side.
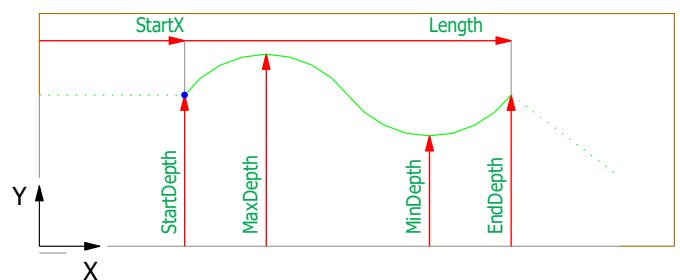
Parameters ProfileCambered

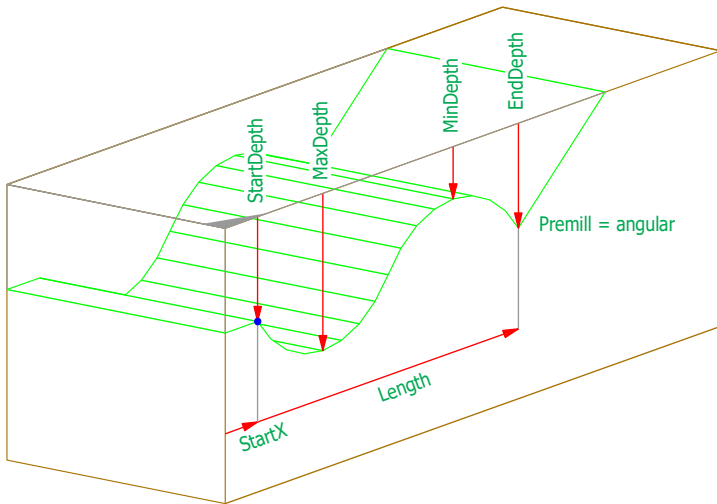| Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
Length	LengthType	0.0	0.0	100000.0
StartDepth	LengthSType	40.0	0.0	1000.0
MaxDepth	LengthSType	60.0	0.0	1000.0
MinDepth	LengthSType	10.0	0.0	1000.0
EndDepth	LengthSType	40.0	0.0	1000.0
Premill	PremillType	angular	round/angular	

RoundArch

ArcShape = concave
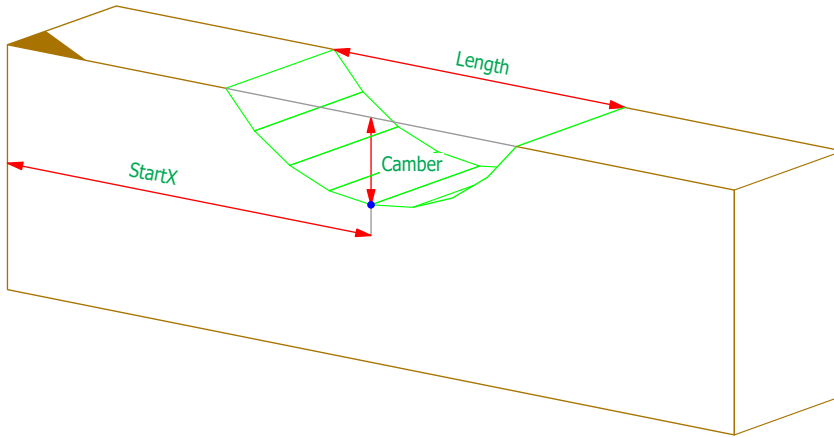
AcrShape = convex

Parameters RoundArch

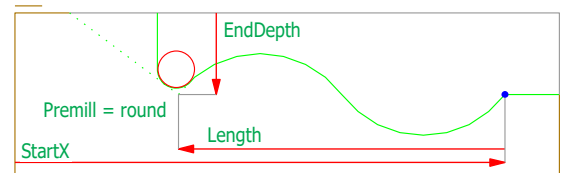| Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	-100000.0	100000.0
Length	LengthType	500.0	0.0	100000.0
Camber	LengthSType	30.0	0.0	1000.0
ArcShape	ArcShapeType	concave		
Premill	PremillType	angular	round/angular	

ProfileHead

Orientation = start
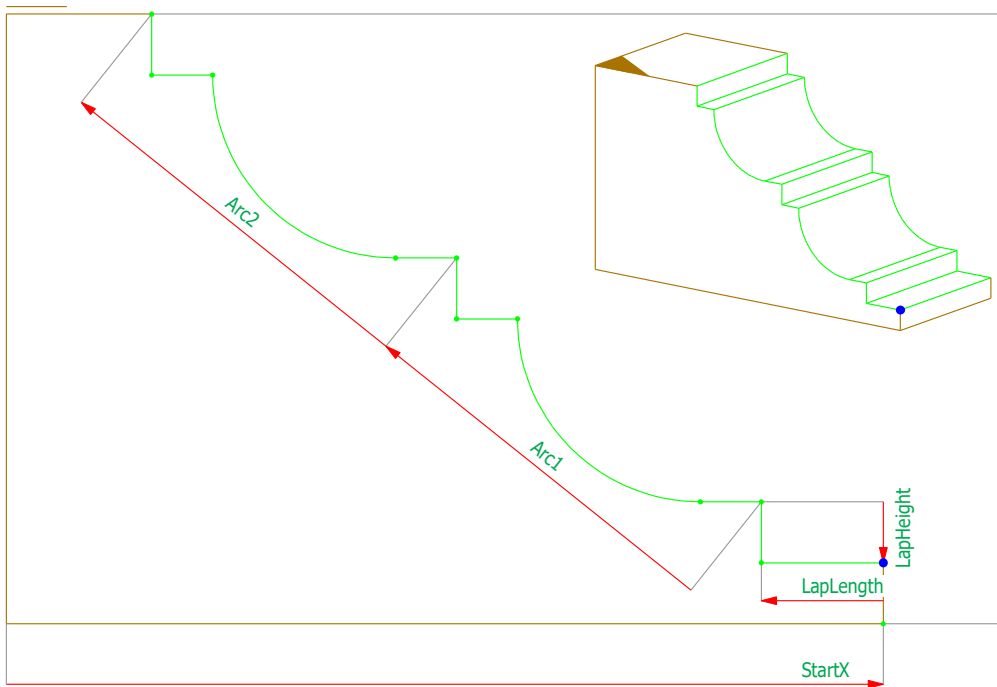
Orientation = end

Parameters ProfileHead
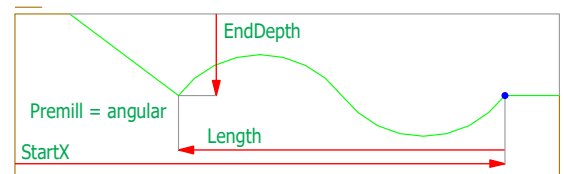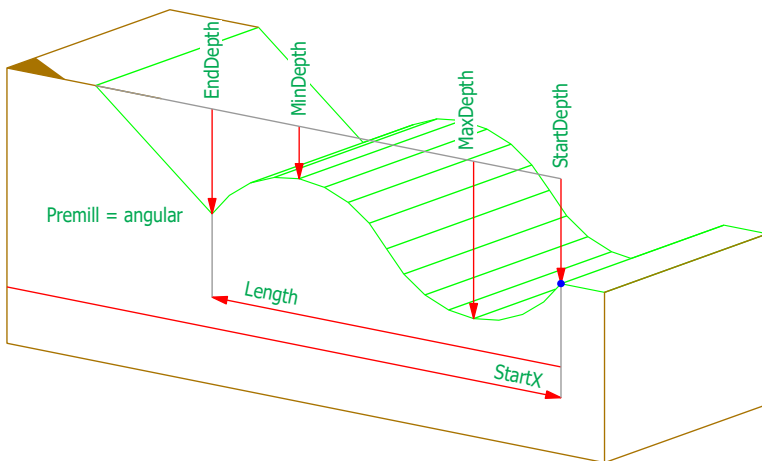
Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
Arc2	ProfileArcType			
LapLength	LengthSType	10.0	0.0	1000.0
LapHeight	LengthSType	10.0	0.0	1000.0

ProfileArcType

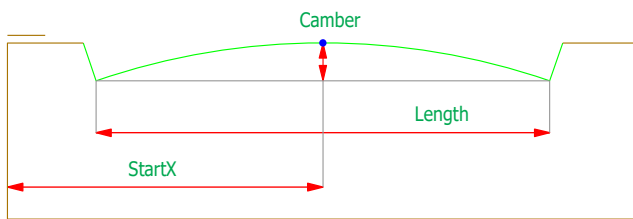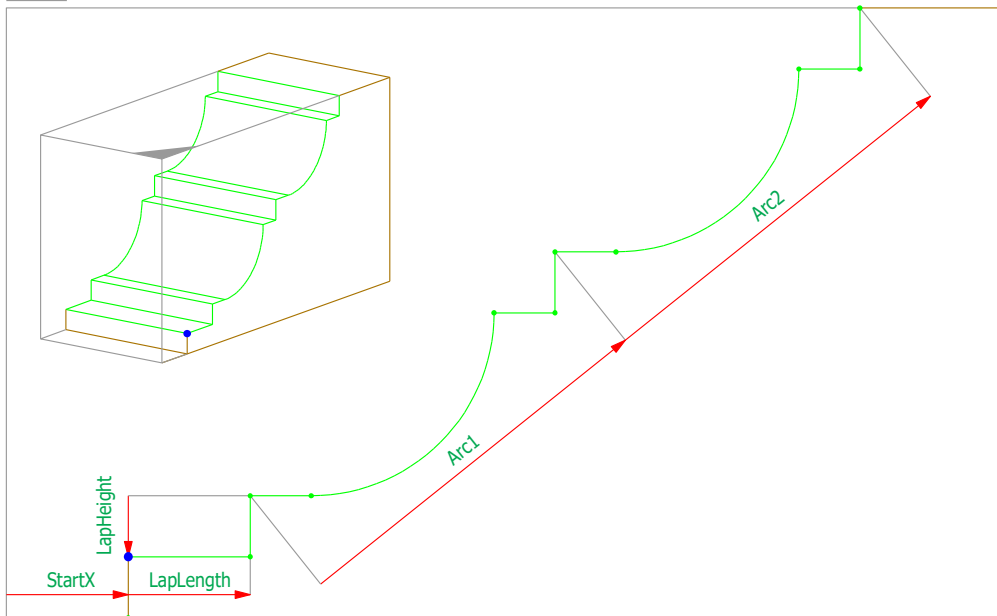| Name	Type			
ArcShape	ArcShapeType	QuarterArc convex	QuarterArc/Segment convex/concave	
LapLength	LengthSType	10.0	0.0	1000.0
LapHeight	LengthSType	10.0	0.0	1000.0
Displacement	LengthSType	10.0	0.0	1000.0

QuarterArc

Radius	LengthSType	50.0	0.0	1000.0

Segment

Length	LengthSType	50.0	0.0	1000.0
Height	LengthSType	50.0	0.0	1000.0
Camber	LengthSType	50.0	0.0	1000.0
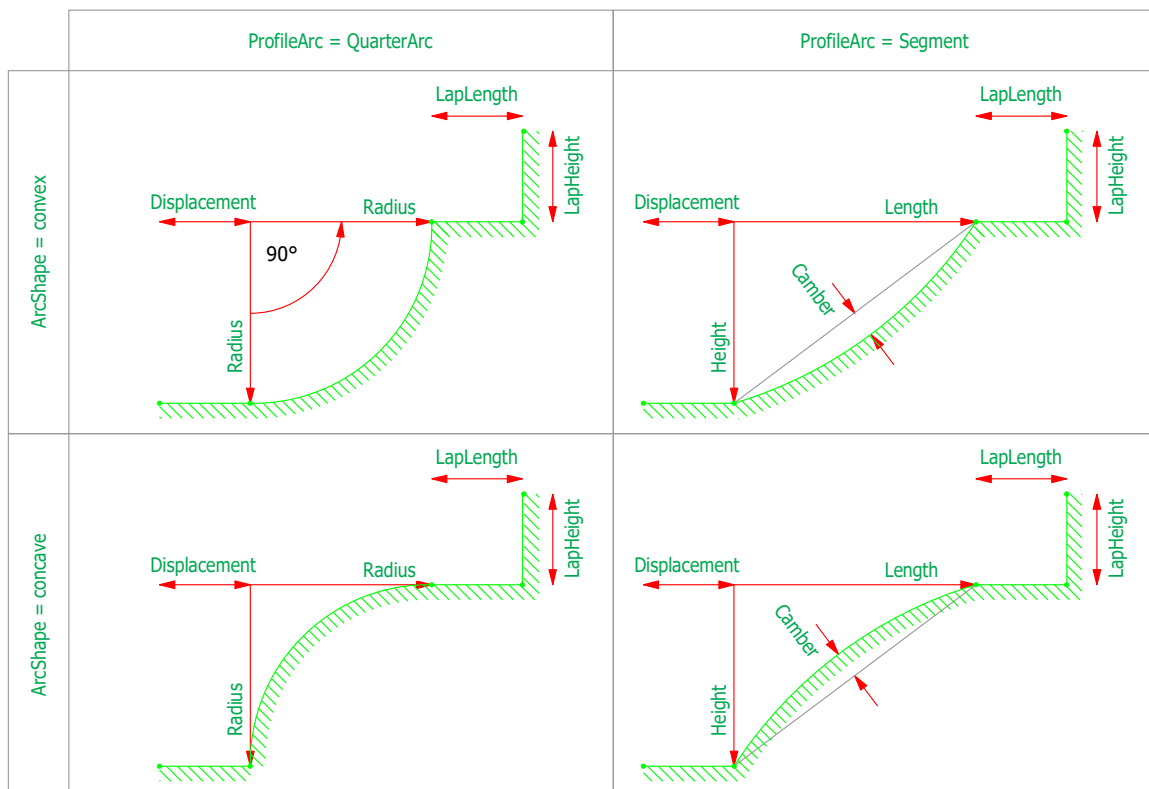
Sphere

Orientation = start
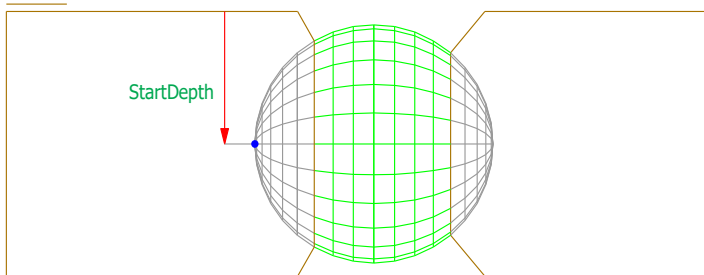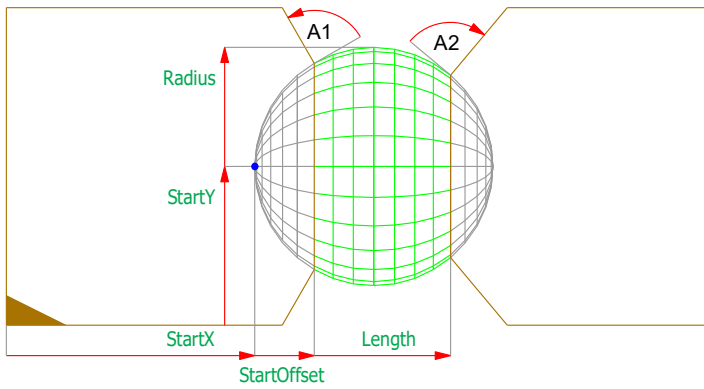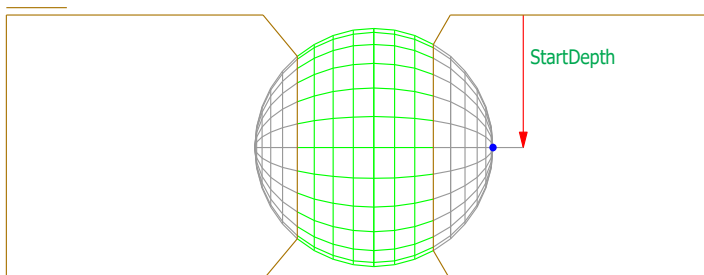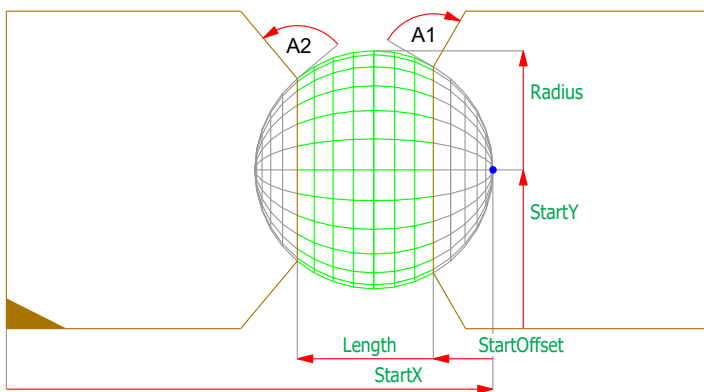
A1 and A2 are defined on the machine side. They depend on the capabilities of the machine.
In this pictures A1 and A2 are 90°.
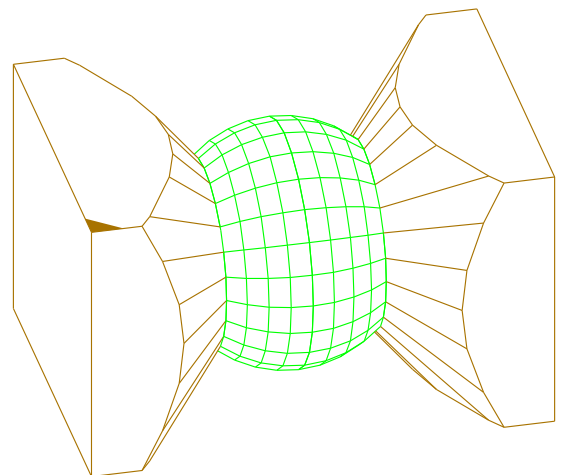
Orientation = end

Parameters Sphere

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthNType	60.0	-50000.0	50000.0
StartDepth	WidthNType	60.0	-50000.0	50000.0
Length	WidthType	50.0	0.0	50000.0
Radius	WidthType	50.0	0.0	50000.0
StartOffset	WidthType	0.0	0.0	50000.0

TriangleCut
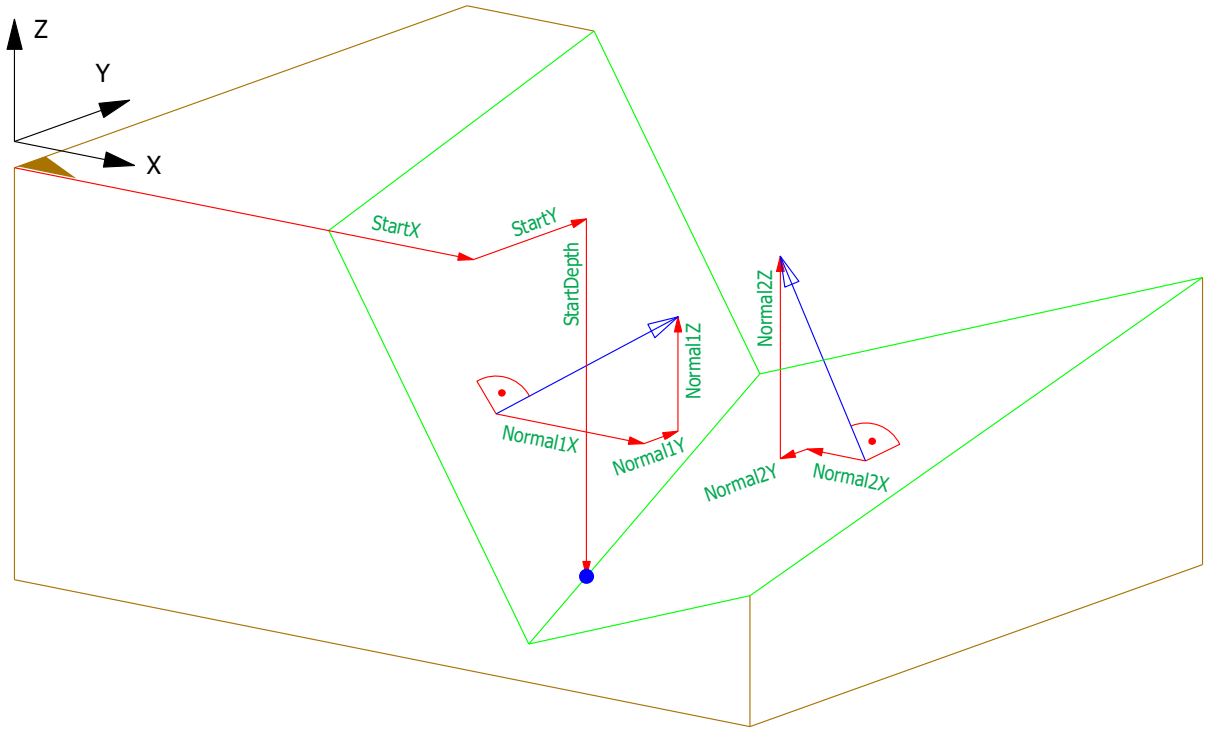
Parameters TriangleCut

Name	Type	Default	Min	Max
StartX	LengthPosType	0.0	−100000.0	100000.0
StartY	WidthNType	60.0	−50000.0	50000.0
StartDepth	WidthNType	60.0	−50000.0	50000.0
Normal1X	WidthNType	1.0	−50000.0	50000.0
Normal1Y	WidthNType	0.0	−50000.0	50000.0
Normal1Z	WidthNType	0.0	−50000.0	50000.0
Normal2X	WidthNType	1.0	−50000.0	50000.0
Normal2Y	WidthNType	0.0	−50000.0	50000.0
Normal2Z	WidthNType	0.0	−50000.0	50000.0

TyroleanDovetail
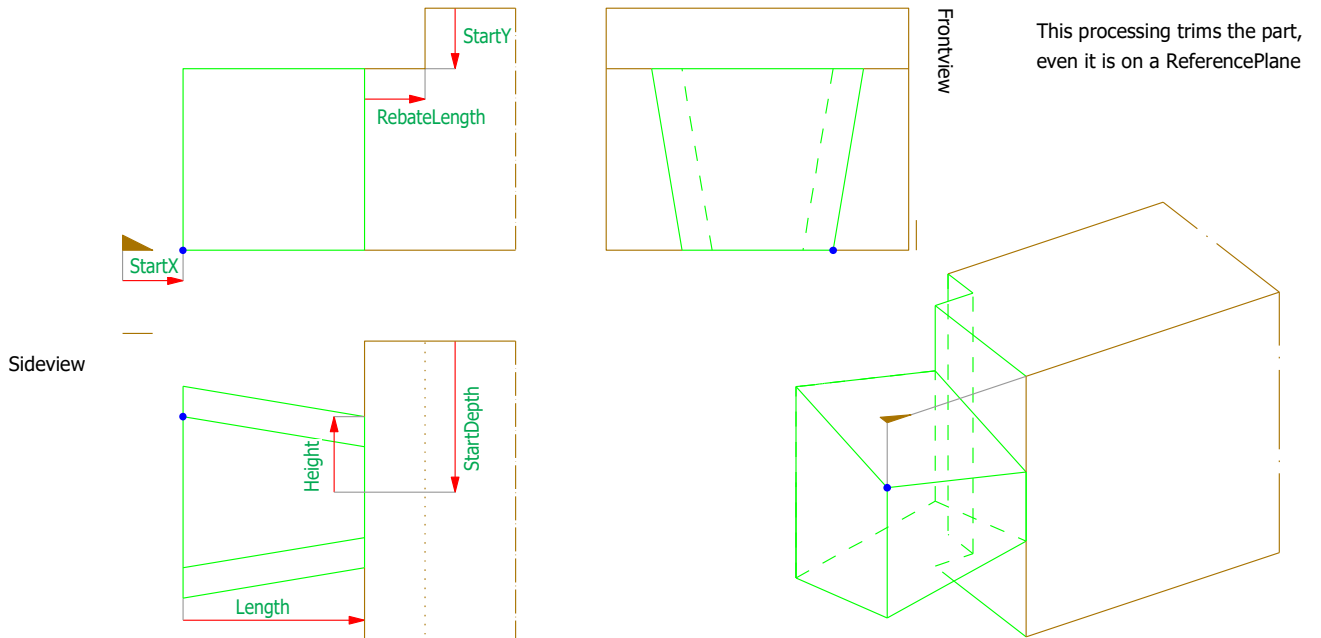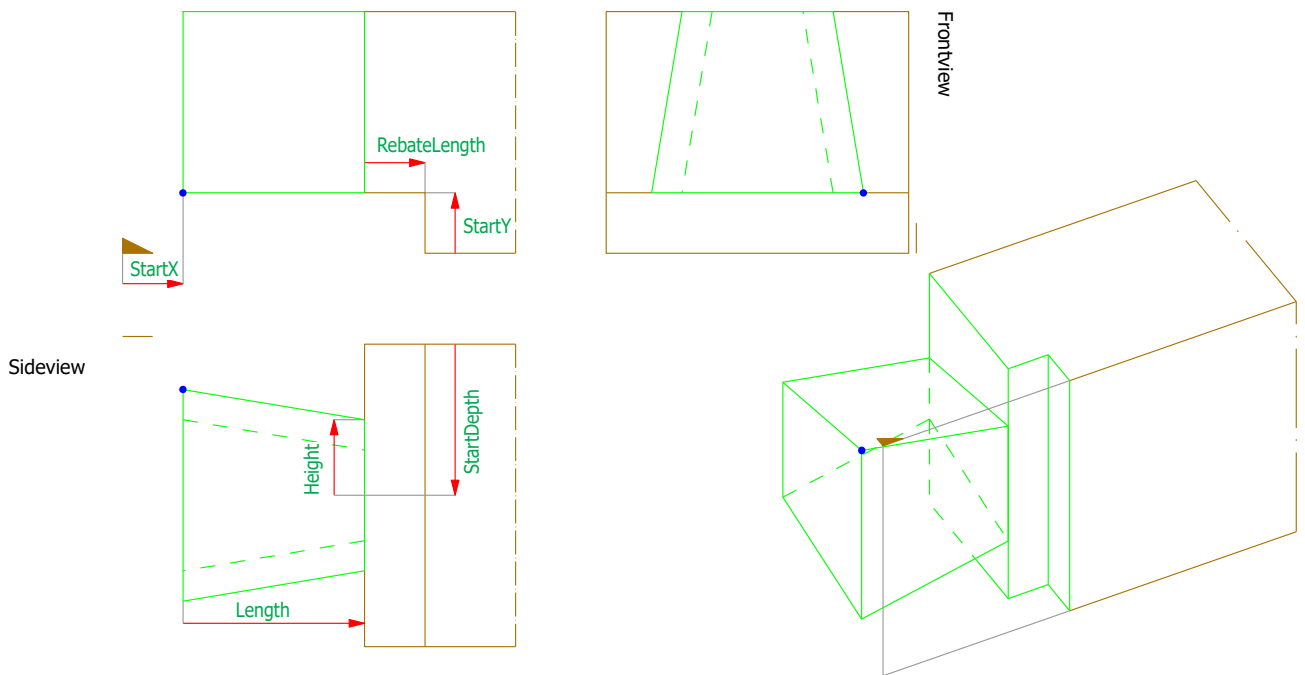
Orientation = start

LapPosition = refedge

StartY

RebateLength

StartX

Frontview

This processing trims the part,
even it is on a ReferencePlane

Sideview

Height/

StartDepth

Length

LapPosition = oppedge

RebateLength

StartX

StartY

Frontview

Sideview

Height/

StartDepth

Length

CutOff = yes

CutOff = no

TyroleanDovetail

Orientation = start

LapPosition = refedge

LapPosition = oppedge

Tool

LapExit = none   LapExit = mitre   LapExit = rebate

LapExit = none   LapExit = mitre   LapExit = rebate

TyroleanDovetail

Orientation = start

LapPosition = refedge

Depth
StartY
Width
Width
RebateLength
StartX
Depth

Frontview

Sideview

Height
StartDepth
Length

LapPosition = oppedge

Depth
Width
Width
RebateLength
Depth
StartY
StartX

Frontview

Sideview

Height/
StartDepth
Length

TyroleanDovetail

Orientation = start

LapPosition = refedge

Sideview

Frontview

StartY

RebateLength

StartX

Profile of tool

Height

StartDepth

Length

Radius

Radius

Path of
top of tool

LapPosition = oppedge

Sideview

Frontview

RebateLength

StartY

StartX

Profile of tool

Height

StartDepth

Length

Radius

Radius

Path of
top of tool

Tool

ArcLength

Profile of tool

d

Radius
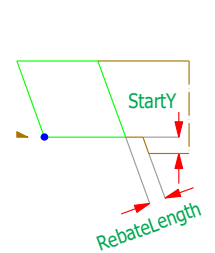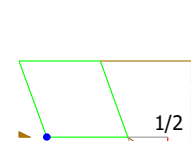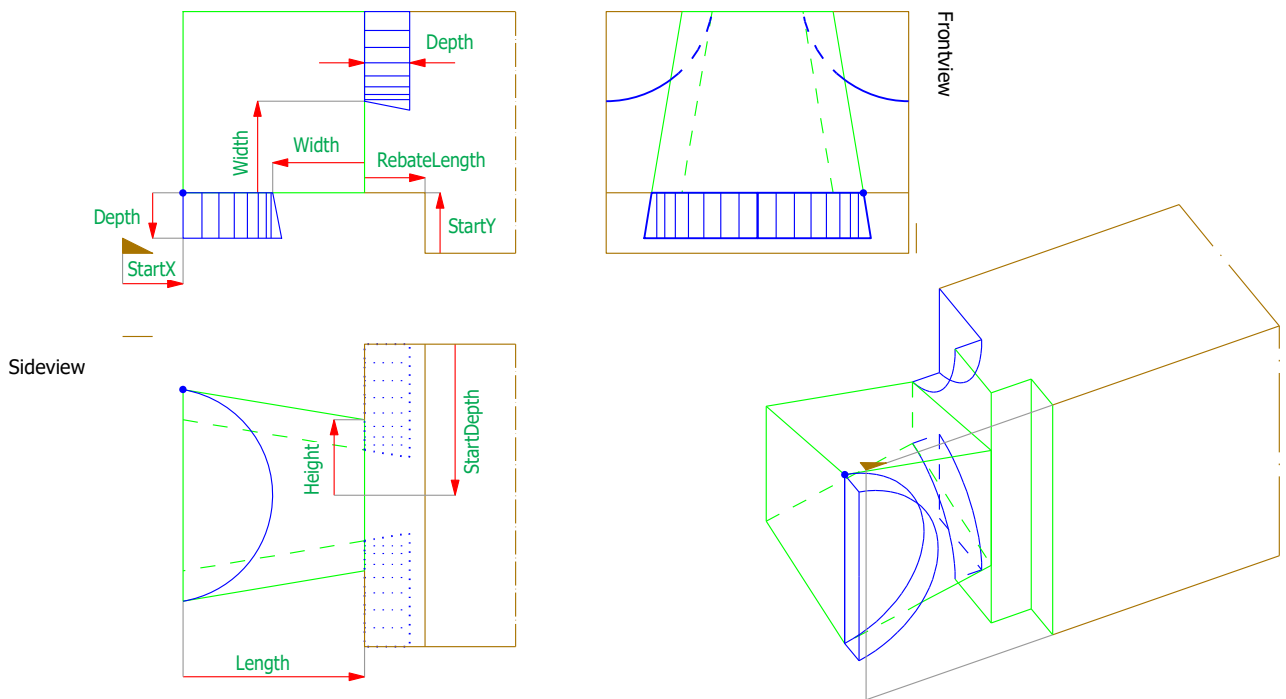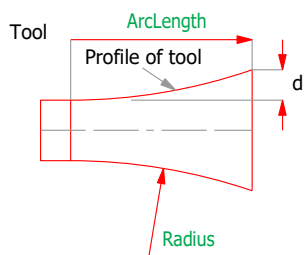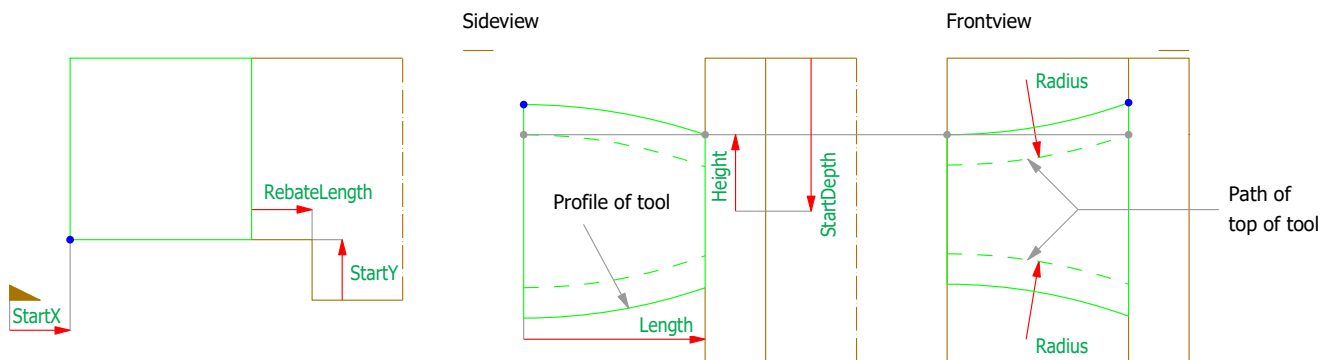
This processing trims the part, even it is on a ReferencePlane
Examples:

TyroleanDovetail

Orientation = end

CutOff = yes   LapPosition = refedge
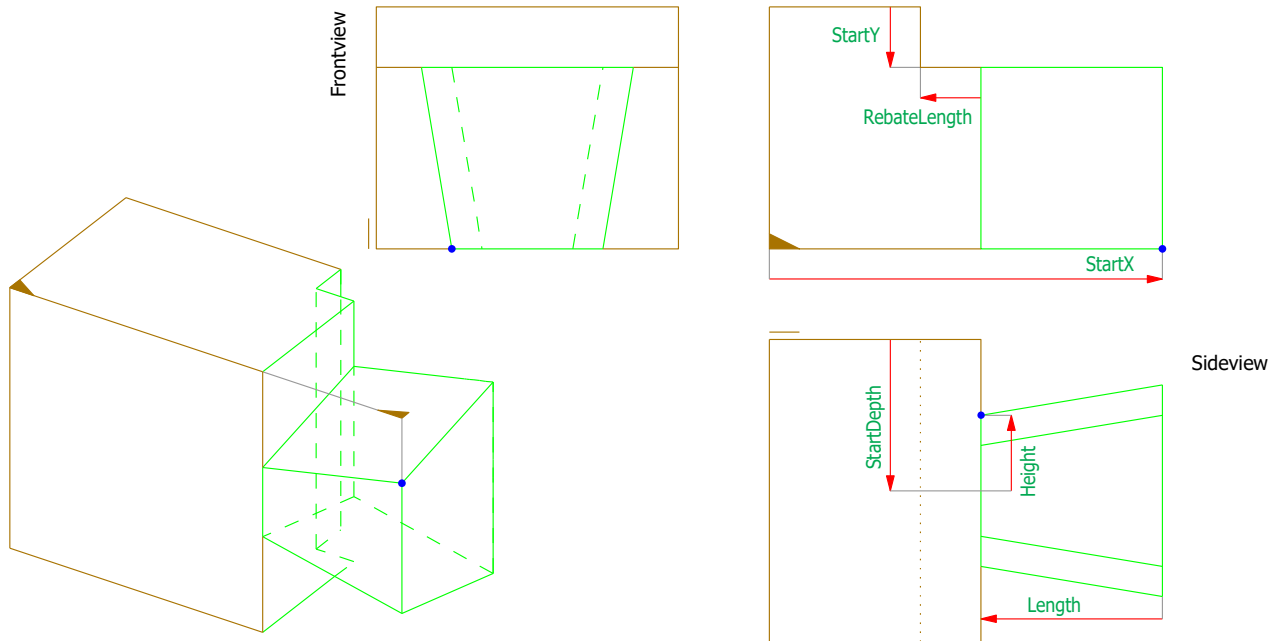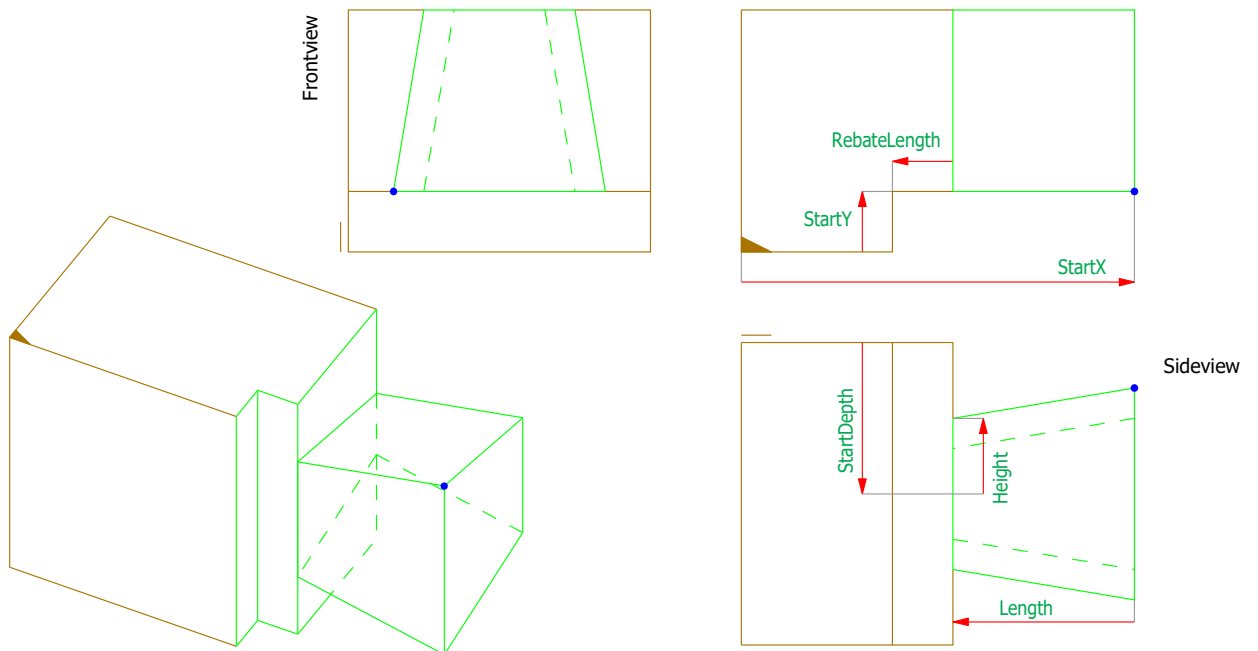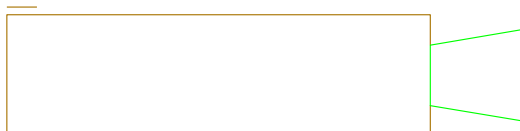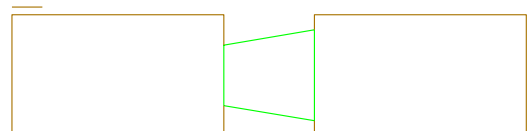
Frontview

StartY

RebateLength

StartX

Sideview

StartDepth

Height

Length

LapPosition = oppedge

Frontview

RebateLength

StartY

StartX

Sideview

StartDepth

Height

Length

CutOff = yes   CutOff = no
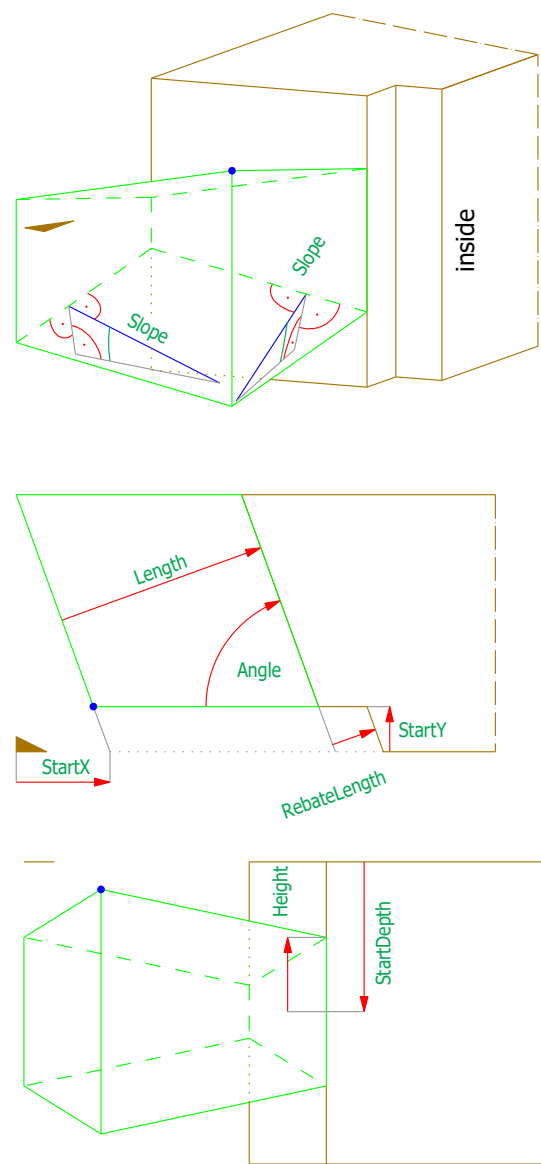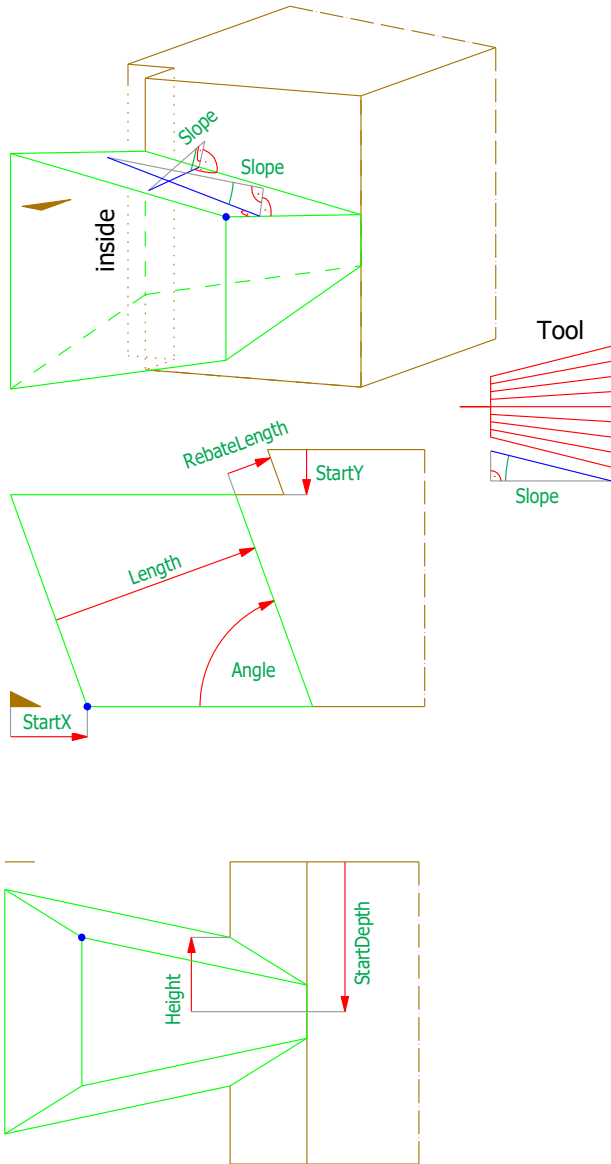
TyroleanDovetail

Orientation = end

LapPosition = refedge	LapPosition = oppedge

Tool

Slope

LapExit = none   LapExit = mitre   LapExit = rebate

LapExit = none   LapExit = mitre   LapExit = rebate
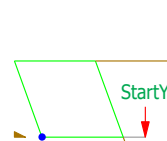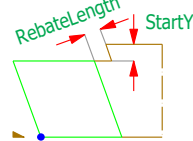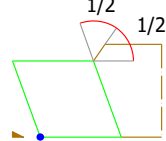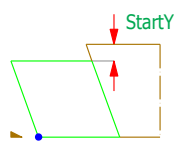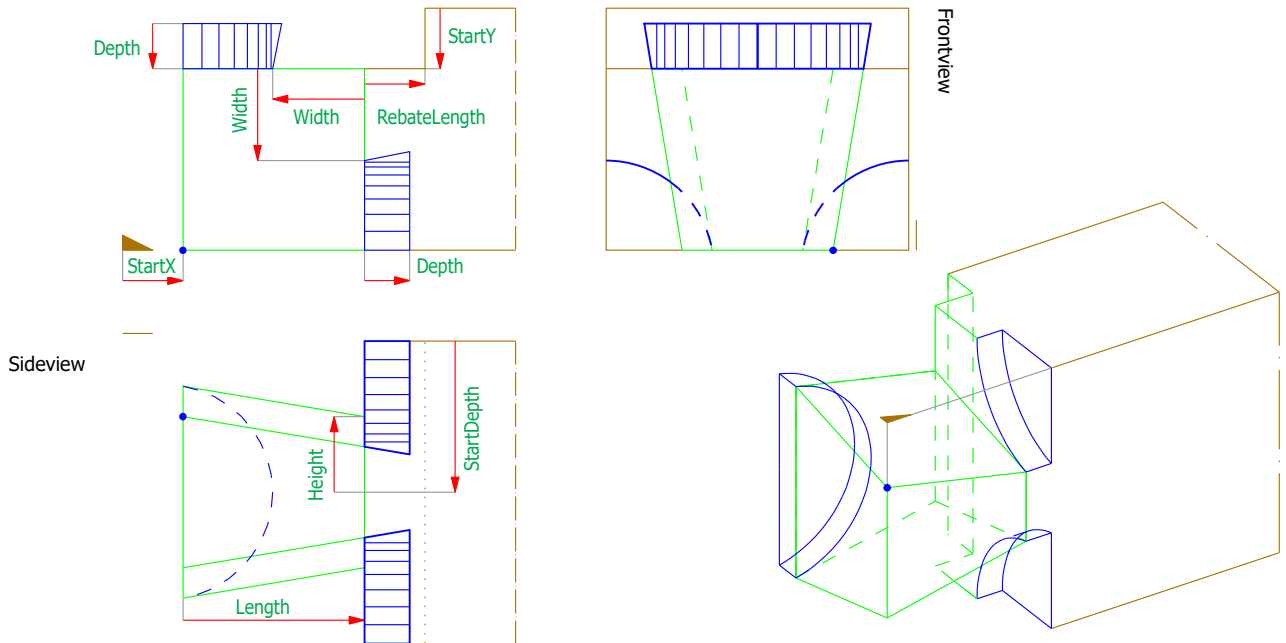
TyroleanDovetail

Orientation = end

LapPosition = refedge

Frontview

StartY

RebateLength

Depth

Width

Width

Depth

StartX

Sideview

StartDepth

Height

Length

LapPosition = oppedge

Frontview

Slope

Depth

Width

Width

RebateLength

StartY

Depth

StartX

Sideview

StartDepth

Slope

Height

Length

TyroleanDovetail

Orientation = end

LapPosition = refedge

Sideview

Frontview

StartY

RebateLength

StartX

StartDepth

Height

Profile of tool

Length

Radius

Radius

Path of
top of tool

LapPosition = oppedge

Sideview

Frontview

RebateLength

StartY

StartX

StartDepth

Height

Profile of tool

Length

Radius

Radius

Path of
top of tool

Tool

ArcLength

Profile of tool

d

Radius
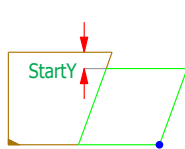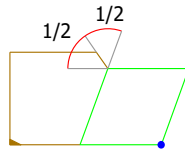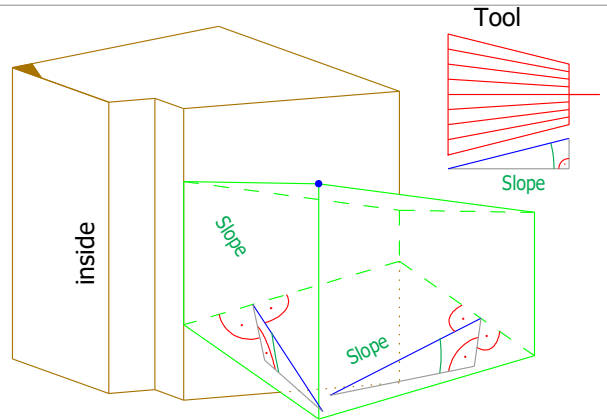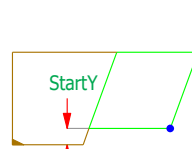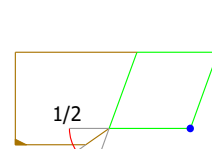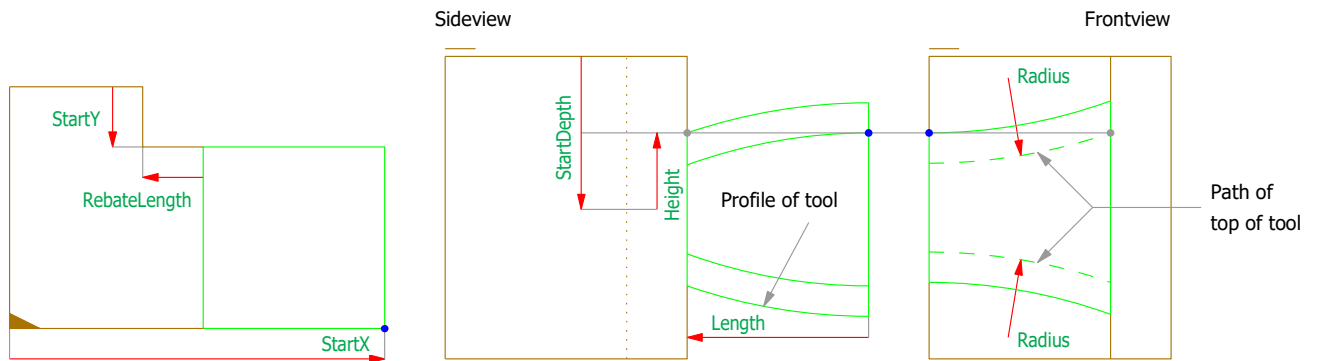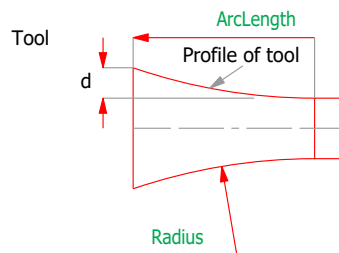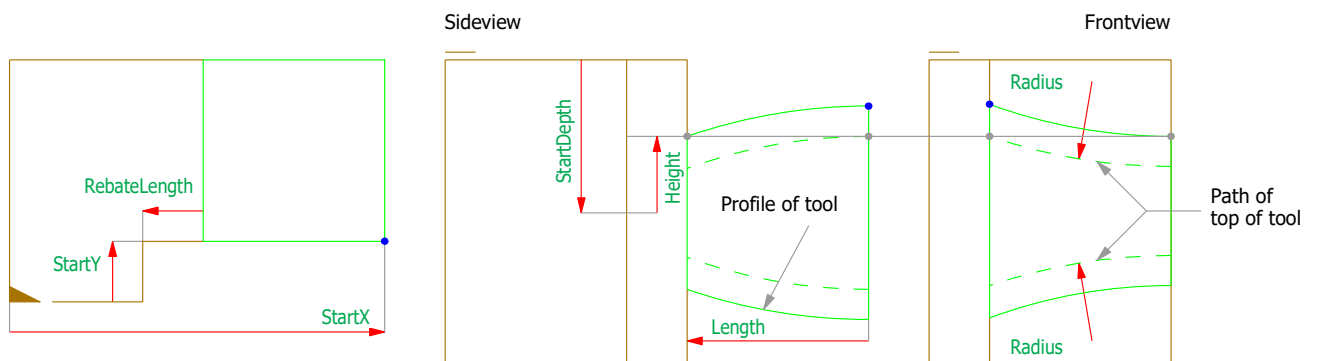
Tyrolean Dovetail

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
CutOff	BooleanType	no	no	yes
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthType	30.0	0.0	50000.0
StartDepth	WidthNType	50.0	-50000.0	50000.0
Angle	AngleType		0.1	179.9
Slope	double		0.0	45.0
Length	WidthType	150.0	0.0	50000.0
RebateLength	WidthType	10.0	0.0	50000.0
Height	WidthType	60	0.0	50000.0
LapPosition	EdgePositionType	refedge	refedge/oppedge	
LapExit	LapExitType	mitre	none/mitre/rebate	
Shape	TyroleanDovetailShapeType	angular	angular/straight	
ProcessSide	ProcessSideType	both	both/refside/oppside	

Frosch

Name	Type	Default	Min	Max
Width	WidthType			
Depth	WidthType			

Klingschrot

Name	Type	Default	Min	Max
Radius	WidthType			
ArcLength	WidthType			

Dovetail

Orientation = start

	LapPosition = refedge	LapPosition = oppedge
Shape = european		
Shape = american		
LapExit	LapExit = none LapExit = mitre LapExit = rebate	LapExit = none LapExit = mitre LapExit = rebate

Dovetail

Orientation = end

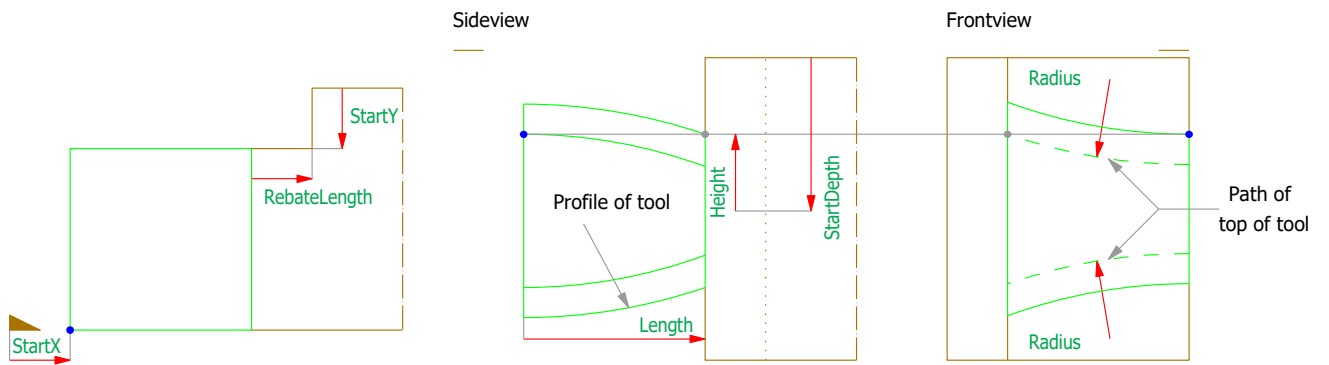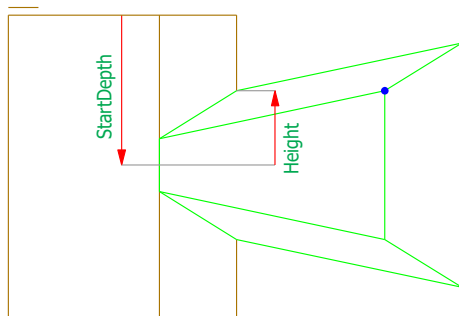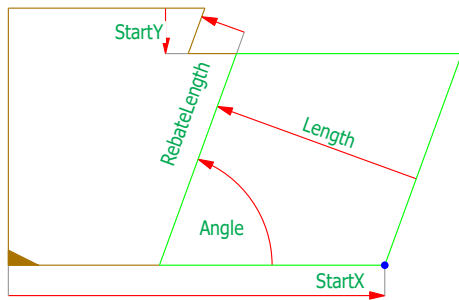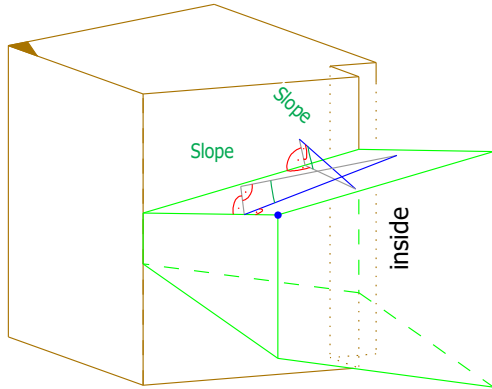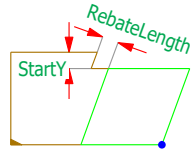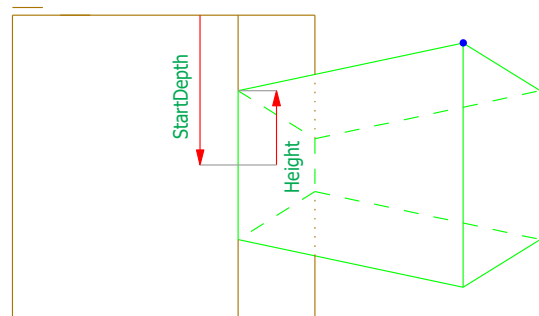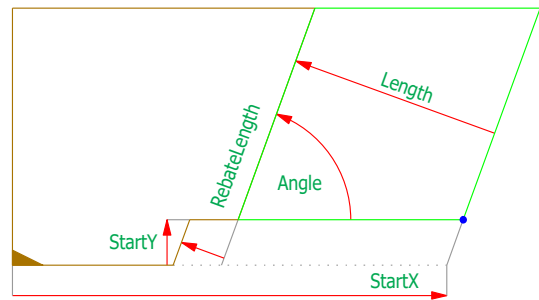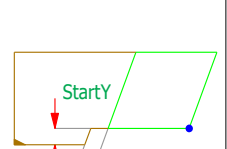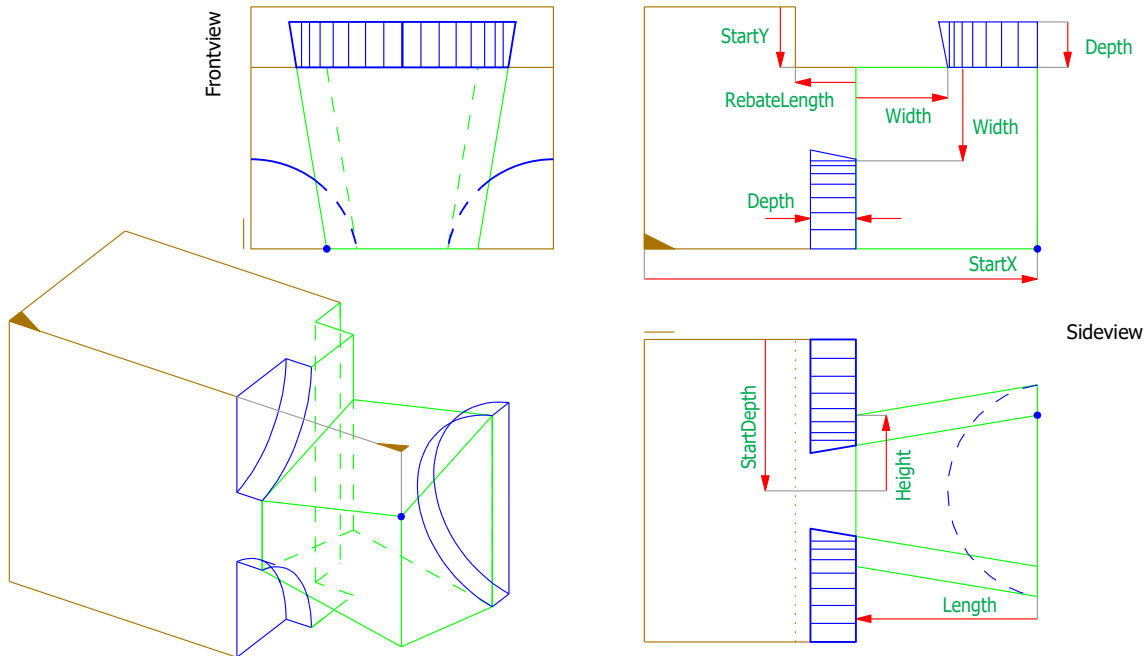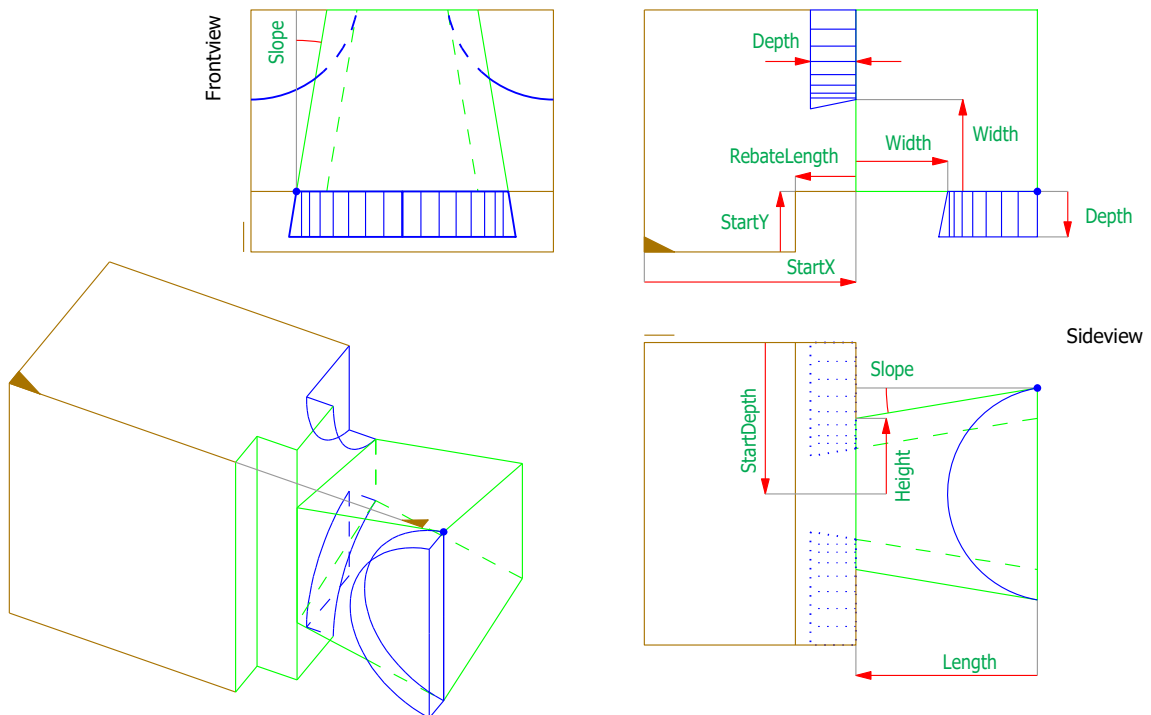|	LapPosition = refedge	LapPosition = oppedge
Shape = european		
Shape = american		
LapExit	LapExit = none / LapExit = mitre / LapExit = rebate	LapExit = none / LapExit = mitre / LapExit = rebate

Dovetail

Name	Type	Default	Min	Max
Orientation	OrientationType		start	end
CutOff	BooleanType	no	no	yes
StartX	LengthPosType	0.0	-100000.0	100000.0
StartY	WidthType	30.0	0.0	50000.0
StartDepth	WidthNType	50.0	-50000.0	50000.0
Slope	double		0.0	45.0
Length	WidthType	150.0	0.0	50000.0
RebateLength	WidthType	10.0	0.0	50000.0
HeightRefSide	WidthType	60	0.0	50000.0
HeightOppSide	WidthType	30.0	0.0	50000.0
LapPosition	EdgePositionType	refedge	refedge/oppedge	
LapExit	LapExitType	mitre	none/mitre/rebate	
Shape	DovetailShapeType	european	european/american	
ProcessSide	ProcessSideType	both	both/refside/oppside	
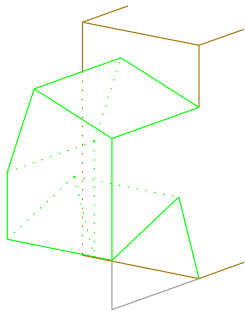
ProcessSide = both   ProcessSide = refside   ProcessSide = oppside
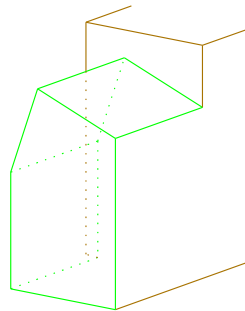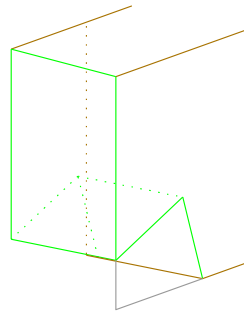
This processing trims the part, even it is on a ReferencePlane
Examples:
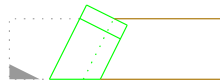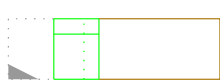
SimpleContour

The elements of a SimpleContour are a Startpoint and
a list of Lines and Arcs.
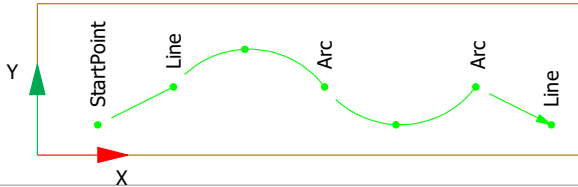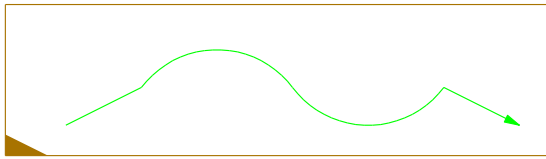
Name	Type
StartPoint	PointType
Line	LineType
Arc	Arctype
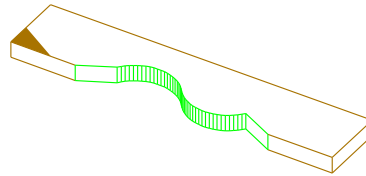
Circle

A circle must be defined
with 2 arcs a 180 degrees.
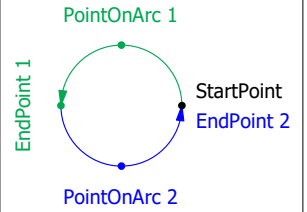
ToolPosition

Toolposition = center
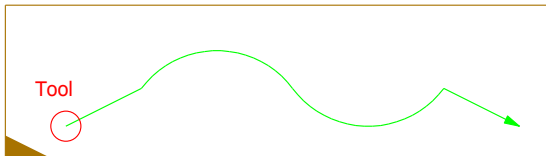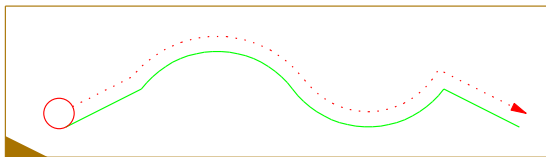
Toolposition = left

Toolposition = right
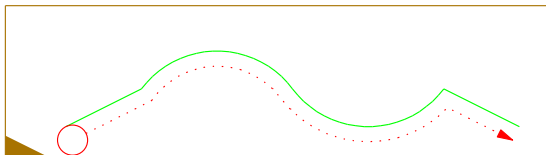
Line attributes

All ContourTypes use the same Linetype. The LineType has different
attributes. But not all attributes are useable for the single ContourTypes.
This correlation is not controlled by the XML schema.

X = useable
O = not useable

| ContourType	Inclination	Recess	Process	FaceLimited	NailSpacing	CrampAngleRef	CrampAngle	ScrewDiameter
FreeContour	X	X	X	X	O	O	O	O
SawContour	X	X	X	X	O	O	O	O
MillContour	X	X	X	X	O	O	O	O
NailContour	O	O	X	O	X	O	O	O
CrampContour	O	O	X	O	X	X	X	X
ScrewContour	O	O	X	O	X	O	O	X
PenContour	O	O	X	O	O	O	O	O
GlueArea	O	O	X	O	O	O	O	O
PlaningArea	O	O	X	O	O	O	O	O
PlasterArea	O	O	X	O	O	O	O	O
LockoutArea	O	O	O	O	O	O	O	O

Depth and DepthBounded

Example: H = 280
          StartPoint.z = 70

Reference Side

70

H = 280
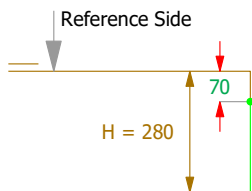
Effective Depth		Depth in BTLx File		
		Depth = 0 or not set	Depth = 210	Depth = 140
DepthBounded in BTLx File	DepthBounded = NO or not set	210	210	210
	DepthBounded = YES	0	210	140

Face limited top or Bottom

StartPoint.z

Depth

| FaceLimitedTop = | yes | no | yes | no |
| FaceLimitedBottom = | yes | yes | no | no |

Top

Bottom
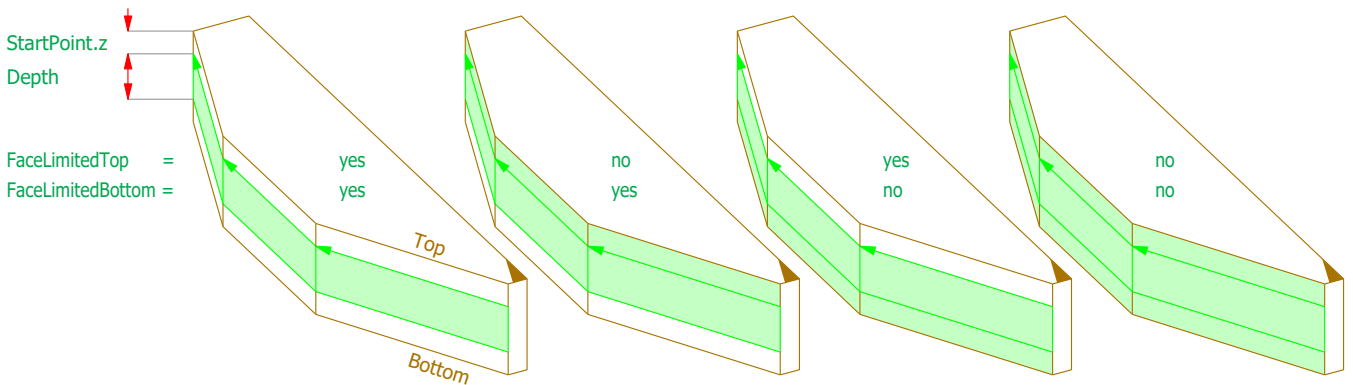
Inclination

In this view the contour is oriented away from the observer.

Toolposition = left or center

Reference Side

Contour

Inclination > 0

Reference Side

Contour

Inclination < 0

Toolposition = right

Reference Side

Contour

Inclination > 0

Reference Side
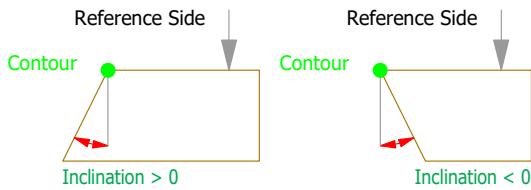
Contour
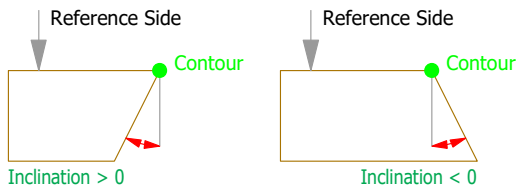
Inclination < 0

The inclination is constant over the length of the segment and is always measured from the tangent of the contour at the actual point.

Inclination4 constant

Inclination4

Inclination3 constant

Inclination3

Inclination2 constant

Inclination2

StartPoint
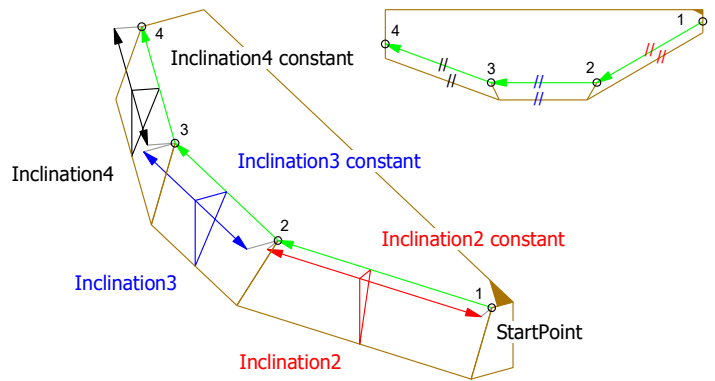
DualContour

Name	Type
PrincipalContour	SimpleContourType
AssociatedContour	SimpleContourType

The PrincipalContour and the AssociatedContour must have the same number of points. The lines between the points on the PrincipalContour and the associated points on the AssociatedContour should not cross each other.

PrincipalContour

AssociatedContour
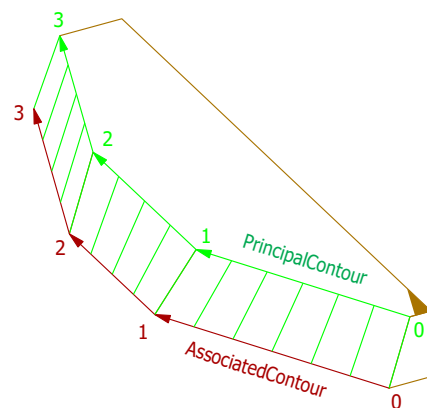
NURBSCurve

A NURBSCurve, also called as spline, is defined with:
ControlPoints
Knots
Degree

ControlPoints	List of points			
	Attributes of one points	Coordinates	X	Double
			Y	Double
			Z	Double
		Weight	W	Double
Knots	List of values			Double
Degree	Degree of curve			Integer

Example

P0 = Endpoint of previous segment
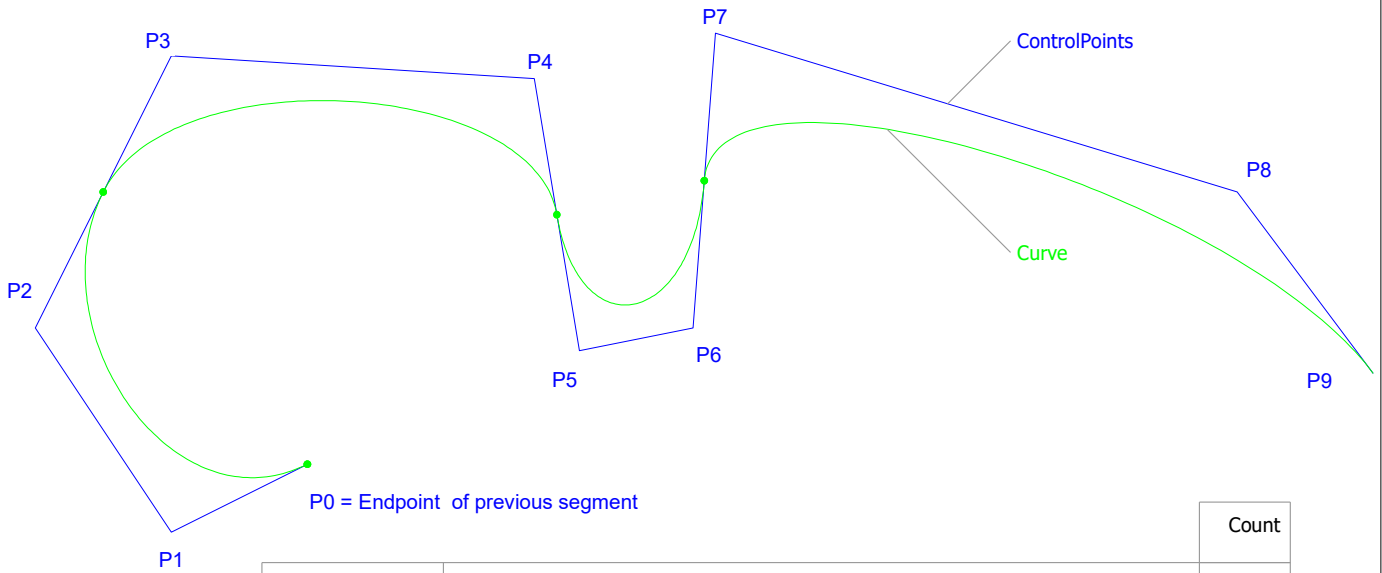
														Count
ControlPoints	P0	P1	P2	P3	P4	P5	P6	P7	P8	P9				10
Knots	0.0	0.0	0.0	1.0	1.0	2.0	2.0	3.0	3.0	4.0	4.0	4.0		12
Degree	3													

NURBSPatch

A NURBSPatch is defined with:
ControlPoints
KnotsU
KnotsU
DegreeU
DegreeV
CountU
CountV

ControlPoints	List of points U and V			
	Attributes of one points	Coordinates	X	Double
			Y	Double
			Z	Double
		Weight	W	Double
KnotsU	List of values			Double
KnotsV	List of values			Integer
DegreeU	Degree of curve U			Integer
DegreeV	Degree of curve U			Integer
CountU	Count of ControlPoints U			Integer
CountV	Count of ControlPoints V			Integer
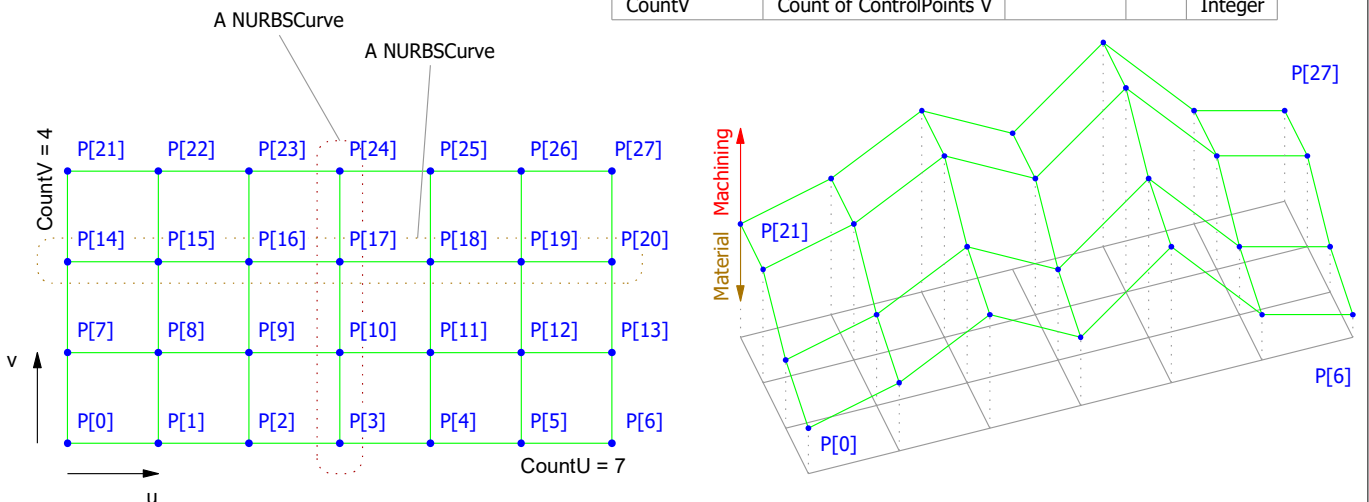
A NURBSCurve

A NURBSCurve

NURBSPatch

A NURBSPatch is defined with:
ControlPoints
KnotsU
KnotsU
DegreeU
DegreeV
CountU
CountV

CountV = 4

v

u

CountU = 7

ContourRecess

Start   Actual segment   End

automatic

?   ?

The processing at the vertexes
has to be specified by the machine

passOverStart

passOverEnd

noPassOver

passOverAll
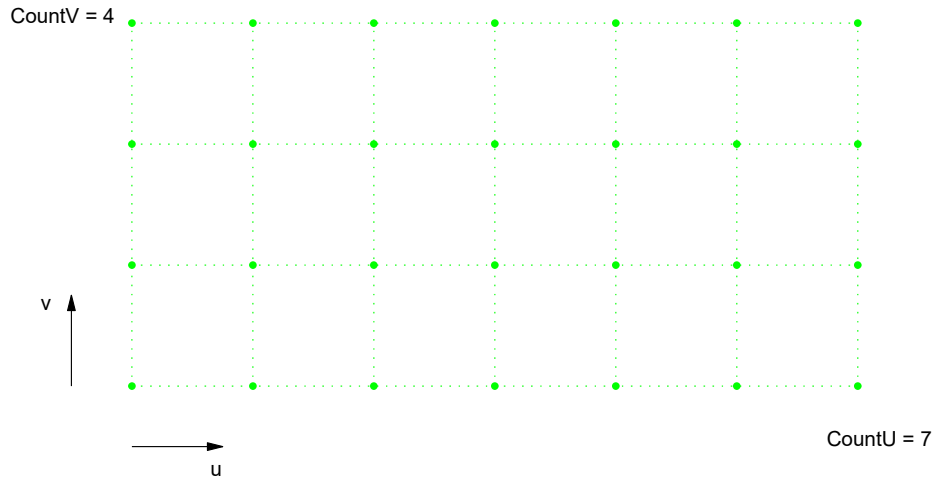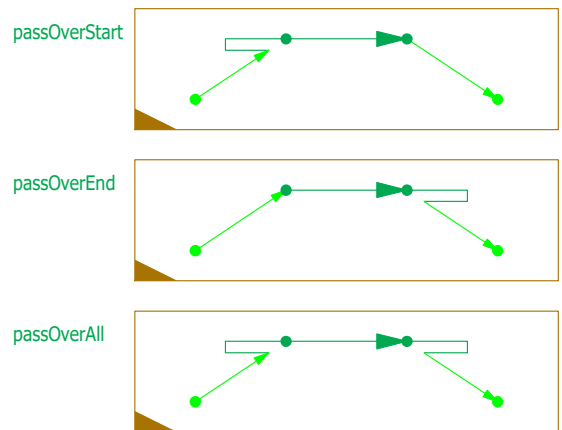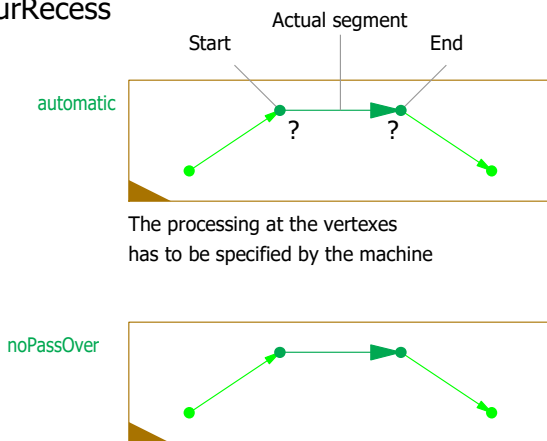
The machineside decides, how the RECESS is worked out. Examples:

Aperture

Outline
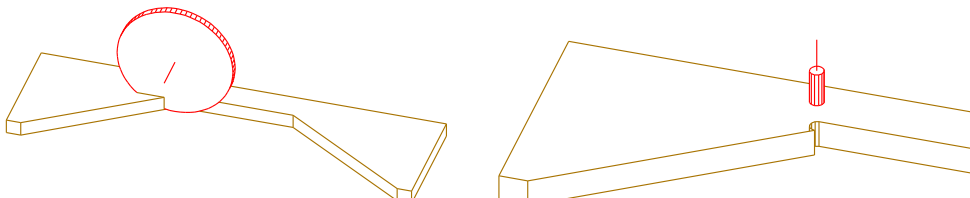
Aperture

Aperture

CounterSink

Startpoint

CounterSink = no

Tool
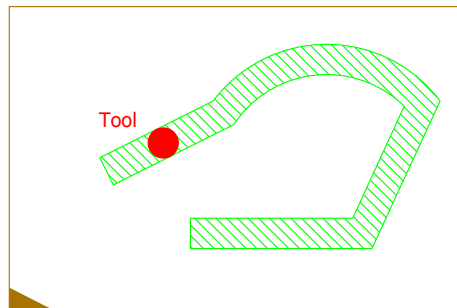
CounterSink = yes

Contour -> CrampContourType -> CrampAngleRefType

enumeration value = **segment**

XVector   enumeration value = **part**

enumeration value = **grain**

Listing in the BTLX-File

Project

Loop over the rawparts
- possibly a rawpart
  - part
  - possibly further parts
  - possibly further processings
- possibly further rawparts

part
- processing
- possibly further processings

Loop over the parts
- part
- possibly further parts

Loop over the composites
- possibly a MODULE
  - part
  - possibly further parts
  - possibly further processings
- possibly further MODULEs

- possibly a LAYER
  - possibly MODULEs
  - possibly further parts
  - possibly further processings
- possibly further LAYERs

- possibly a ELEMENT
  - possibly LAYERs
  - possibly further parts
  - possibly further processings
- possibly further ELEMENTs

- possibly a ELEMENTCHARGE
  - possibly ELEMENTs
  - possibly further parts
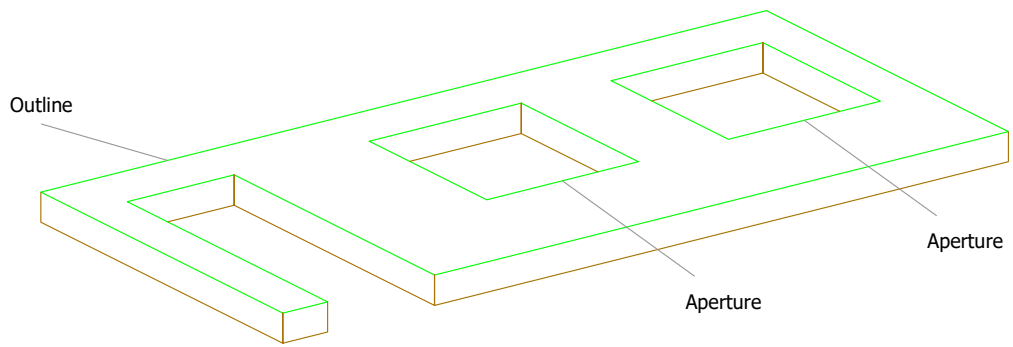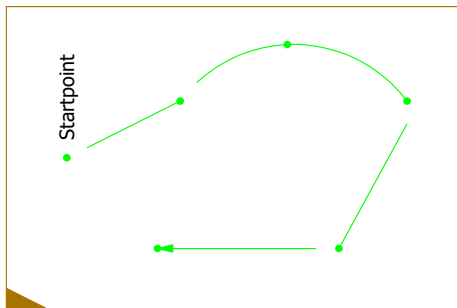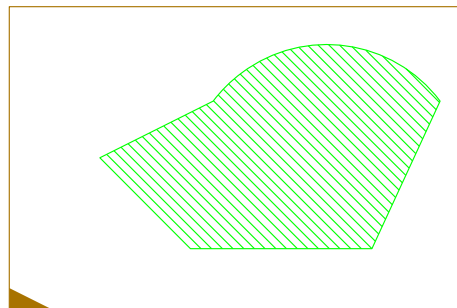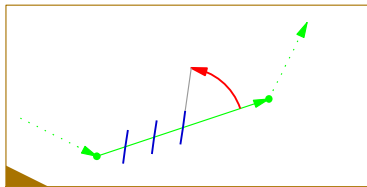 - possibly further processings
- possibly further ELEMENTCHARGEs

Hierarchical ordering

Composite ELEMENTCHARGE
- Composite ELEMENT
  - Composite LAYER
    - Composite MODULE
      - part
      - possibly further parts
      - possibly further processings
    - possibly further MODULEs
    - possibly further parts
    - possibly further processings
  - possibly further LAYERs
  - possibly further MODULEs
  - possibly further parts
  - possibly further processings
- possibly further ELEMENTs
- possibly further LAYERs
- possibly further MODULEs
- possibly further parts
- possibly further processings

Example for a composite

UID 2

UID 16

UID 18

UID 20

UID 3 UID 4 UID 5 UID 6 UID 7 UID 8 UID 9 UID 10 UID 11 UID 12 UID 13

UID 15

UID 17

UID 19

UID 1

ELEMENT
UID 301

ELEMENT
UID 302

ELEMENTCHARGE
UID 401

UID 21		
UID 22	UID 23	UID 24
UID 25		

UID 26		
UID 27	UID 28	UID 29
UID 30		

UID 41	
UID 42	UID 43
UID 44	

UID 45	
UID 46	UID 47
UID 48	

LAYER
UID 201

LAYER
UID 202

LAYER
UID 203

MODULE
UID 101
UID 102
UID 103

LAYER
UID 204

LAYER
UID 205

LAYER
UID 206
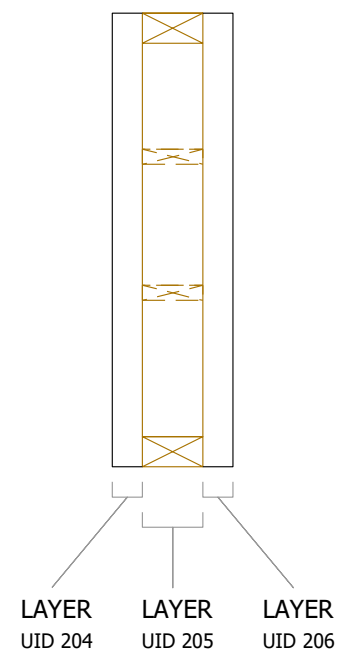
[PART]
  UID: 1,2
  processings ...
[PART]
  UID: 3,4,5,6,7,8,9
  UID: 10,11,12,13
  processings ...
[PART]
  UID: 15,16,17,18
  processings ...

[COMPOSITE]
  TYPE: MODULE
  UID: 101
  contains UID 5,6,15,16
  processings ...
[COMPOSITE]
  TYPE: MODULE
  UID: 102
  contains UID 7,8,17,18
  processings ...
[COMPOSITE]
  TYPE: MODULE
  UID: 103
  contains UID 11,12,19,20
  processings ...

[COMPOSITE]
  TYPE: ELEMENT
 UID: 301
  contains UID 201,202,203
  processings ...
[COMPOSITE]
  TYPE: ELEMENT
  UID: 302
  contains UID 204,205,206
  processings ...

[PART]
  UID: 21,26
  processings ...
[PART]
  UID: 22,27
  processings ...
[PART]
  UID: 23,28
  processings ...
[PART]
  UID: 24,29
  processings ...
[PART]
  UID: 25,30
  processings ...

[COMPOSITE]
  TYPE: ELEMENTCHARGE
  UID: 401
  contains UID 301,302
  contains UID 1,2
  processings ...

[COMPOSITE]
  TYPE: LAYER
  UID: 201
  contains UID 21,22,23,24,25
  processings ...
[COMPOSITE]
  TYPE: LAYER
  UID: 202
  contains UID 101,102
  contains UID 3,4,9
  processings ...
[COMPOSITE]
  TYPE: LAYER
  UID: 203
  contains UID 26,27,28,29,30
  processings ...

[PART]
  UID: 41,45
  processings ...
[PART]
  UID: 42,46
  processings ...
[PART]
  UID: 43,47
  processings ...
[PART]
  UID: 44,48
  processings ...

[COMPOSITE]
  TYPE: LAYER
  UID: 204
  contains UID 41,42,43,44
  processings ...
[COMPOSITE]
  TYPE: LAYER
  UID: 205
  contains UID 103
  contains UID 10,13
  processings ...
[COMPOSITE]
  TYPE: LAYER
  UID: 206
  contains UID 45,46,47,48
  processings ...

End of example for a composite

Example ELEMENT with LAYERs   Example LAYERs

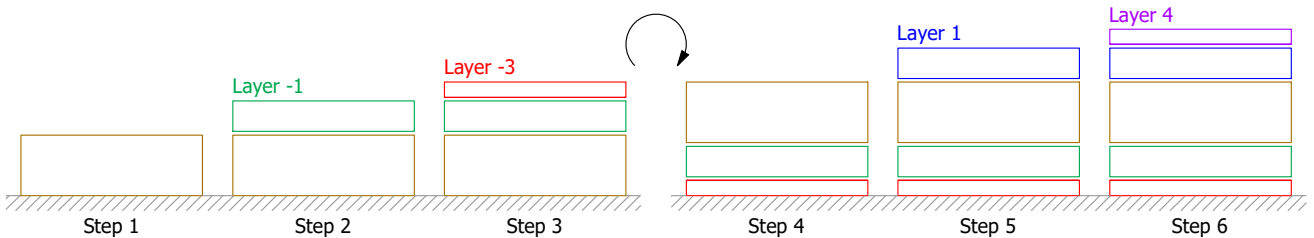
Layer 4   Layer 1   Layer 0   Layer -1   Layer -3
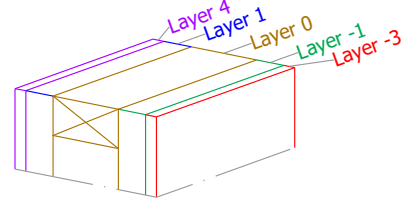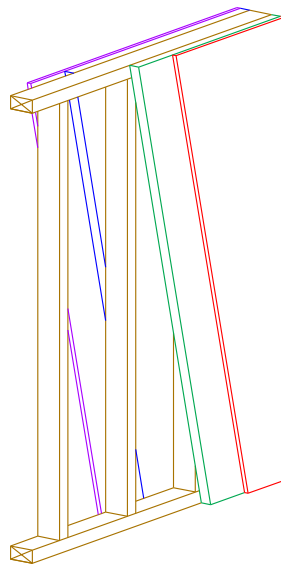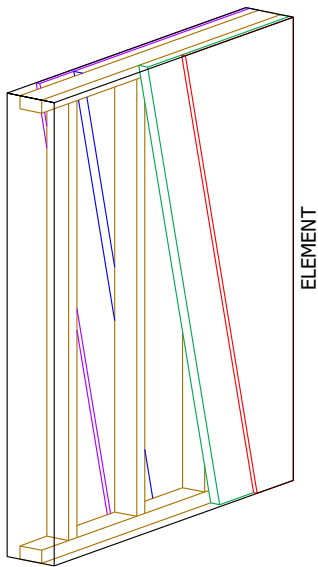
Each ELEMENT must have a LAYER 0.
The LAYER numbers must be unique.
In the [COMPOSITE]s with "TYPE: ELEMENT" the
Attribute "REFERENCESIDE:" must be set.
LAYER with number = 0: On center of ELEMENT
Positive LAYER numbers: On REFERENCESIDE of ELEMENT
Negative LAYER numbers: On opposite REFERENCESIDE of ELEMENT

Layer 0   Layer -1   Layer -3
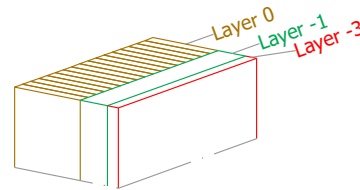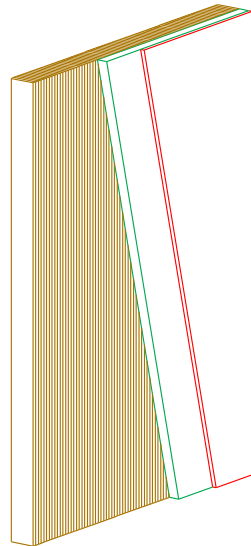
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Example productions steps on machine

The machine decides the order of production and the count of steps.
LAYER 0 defines the start situation.

Step 1   Step 2   Step 3   Step 4   Step 5   Step 6

or

Step 1   Step 2   Step 3   Step 4   Step 5   Step 6