SMARTElectrode

Training

Agenda

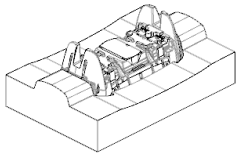
Workflow

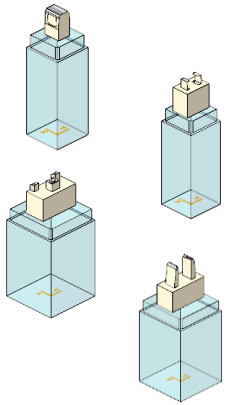
User Interface

- Assembly Mode
- Part Mode

Training

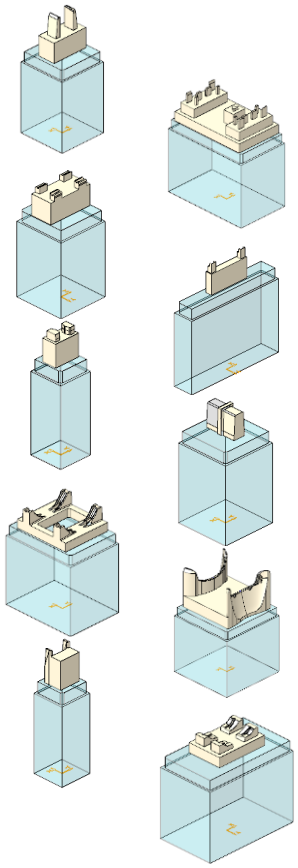
- Assembly Creation
- Preparation
- Set Zero
- Electrode 1
- Electrode 2
- Electrode 3
- Electrode 4





Agenda

- Training
  - Electrode 5
  - Electrode 6
  - Electrode 7
  - Electrode 8
  - Electrode 9
  - Electrode 10
  - Electrode 11
  - Electrode 12
  - Electrode 13
  - Electrode 14



Agenda

- More User Interfaces
  - Check Electrodes
  - Holder
  - Drawings
  - Manufacturing
  - Output
  - Burnsheet
- Configuration
- Best Practices
  - Modeling
  - Design Changes
  - Regeneration Behavior in Creo

YouTube-Playlist

Workflow in SMARTElectrode

Creation…

…of assembly and zero (Operation)

Creation…

…of electrodes

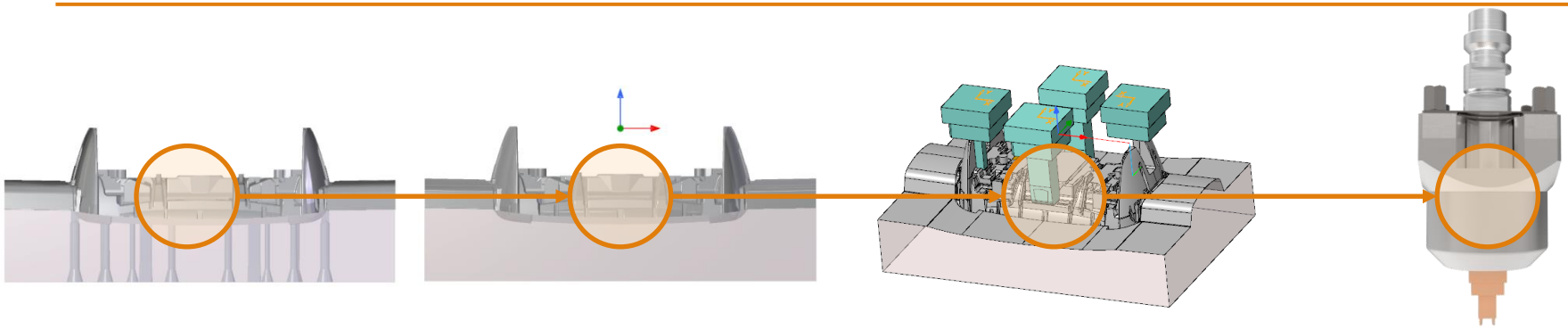
Add…

…all technology parameters

Output…

…of all necessary data and formats

Workflow in SMARTElectrode



Start

- Workpiece (prt)
- Workpieces (asm)

Assembly

- Simplify Geometry
- Set Origin(s)

Electrodes

- Create Geometry
- Set Technology
- Holder
  CMM

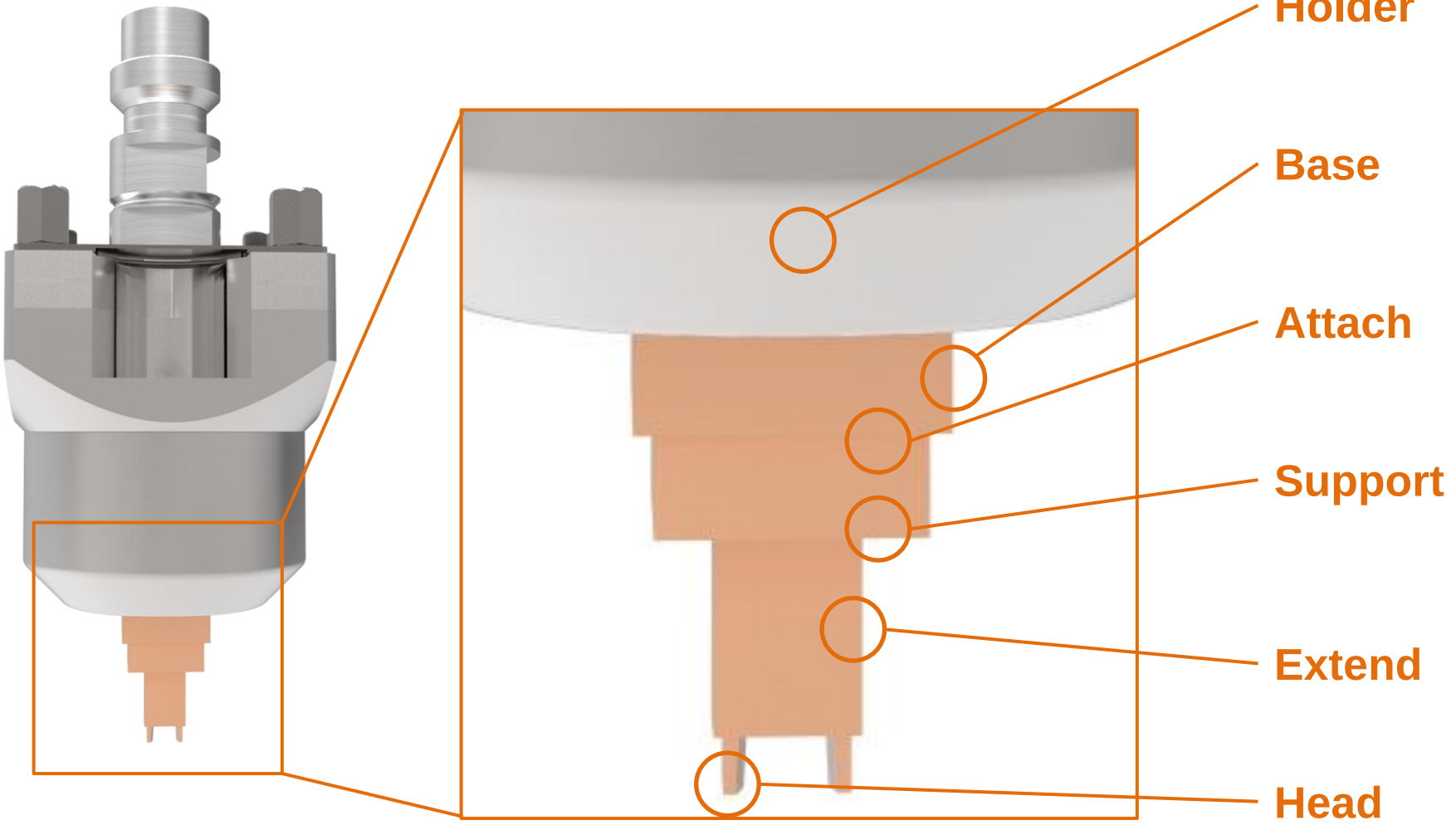
Output

- Drawings
- 3d Output
- EDM Output

Workflow Electrode Creation

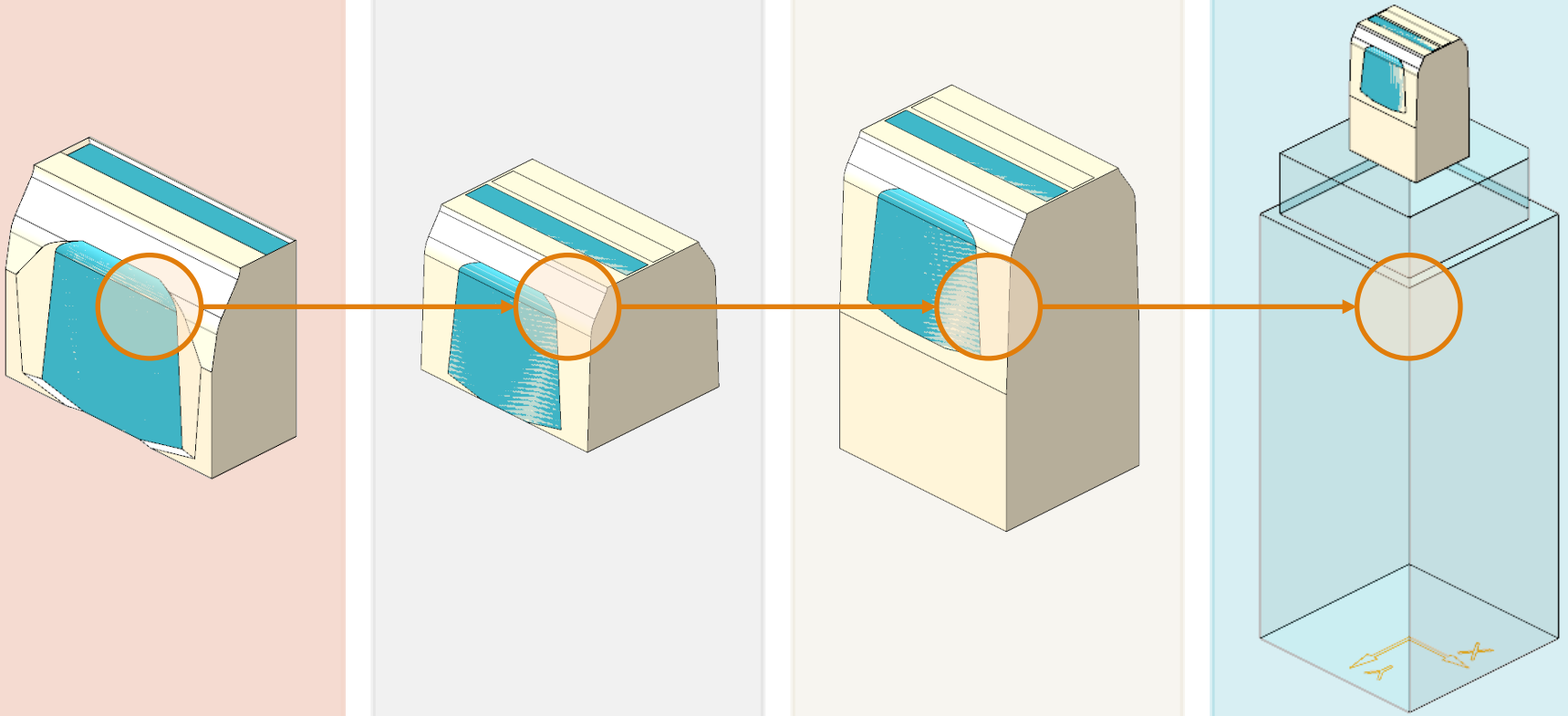
Note

Creation from top to base!



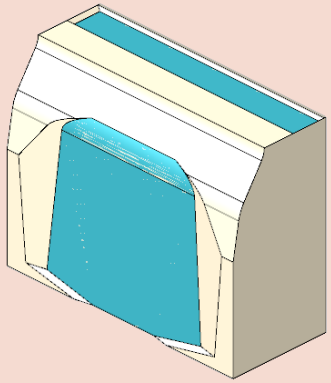
Workflow Electrode Creation

Get Data	Detailing	Attach	Base



Workflow Electrode Creation

Get Data



Get selected geometry from Workpiece using:

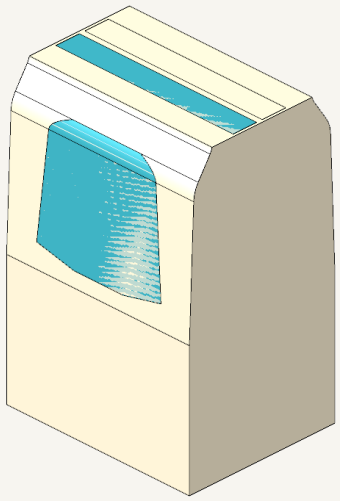
- **Solid + Cutout**
- **CopyGeometry of surfaces**

Get geometry from Electrodes:

- **Mirror**
- **Merge**
- **Split up**

Workflow Electrode Creation

Attach

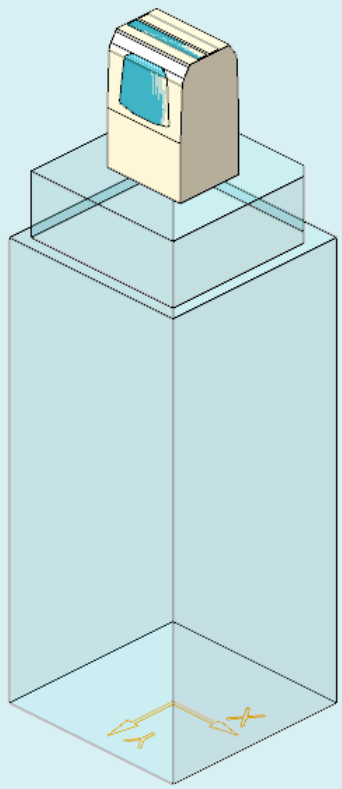


On Attach material between head and FREE_FACE is inserted. The following options are available:

- **straight connection**
- **connection with support geometry**
- **user modeled connection**

Workflow Electrode Creation

Base



Adding the base completes the design ot the electrode

- **Position**
  (centered at the beginning)
- **Blank**
  (SE sets appropriate size)
- **Technology parameters**

Agenda

Comparison and compatibility with SE 7.0

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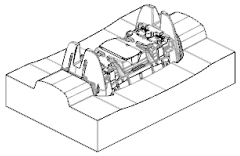
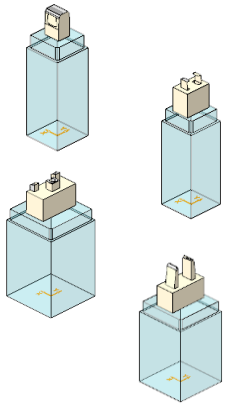
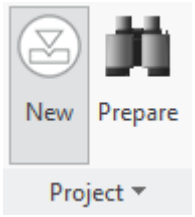
- Electrode 4





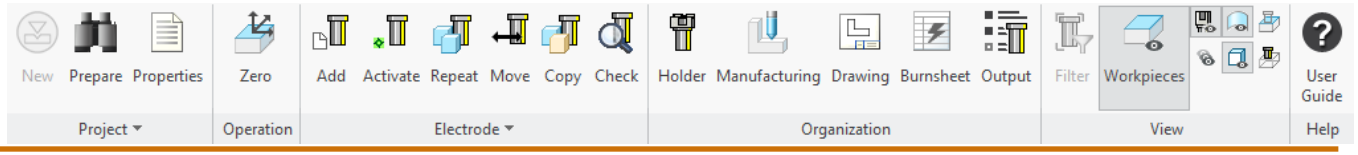
User Interface

Empty Session



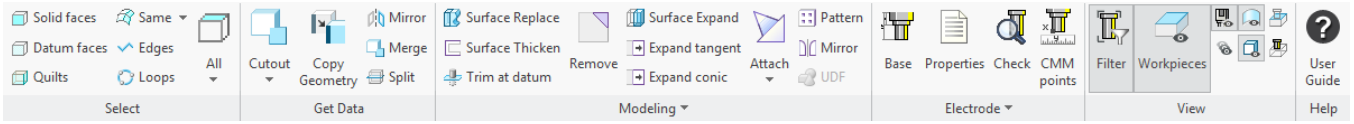
Process Level

Active Assembly

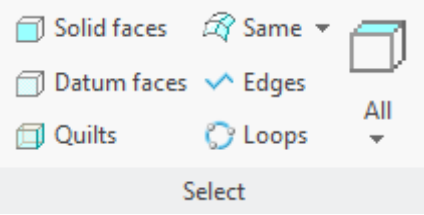


Design Sub-menu

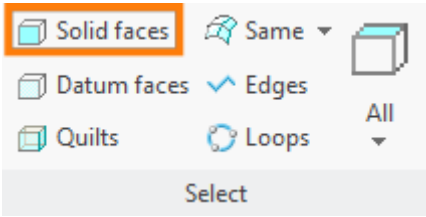
Active Electrode Component



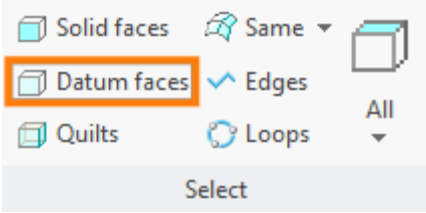
Ribbon UI – Group ‚Select‘



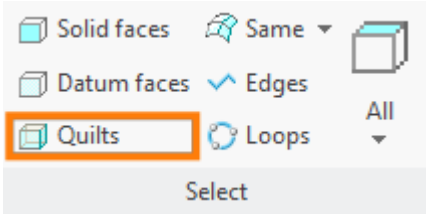
The selection commands can be used to extract or detail electrode geometry.



- **Solid faces**

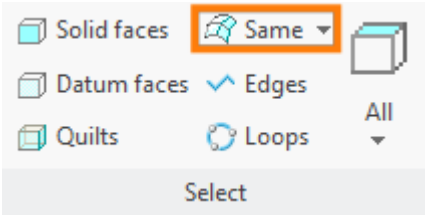


- **Datum surfaces**

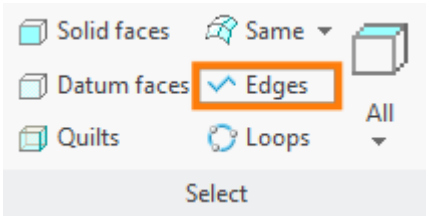


- **Quilts**

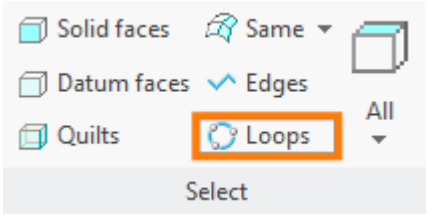
Ribbon UI – Group ‚Select‘



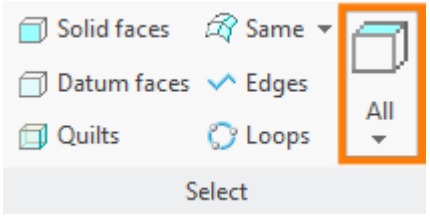
- **Special selection filters for rounds, similar surfaces and areas with same color**



- **Boundary edges (one-sided edges)**



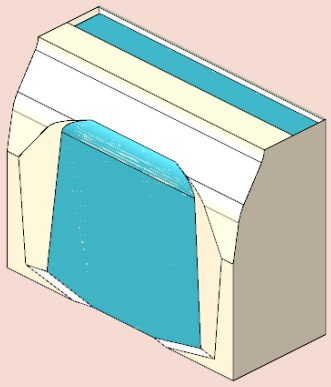
- **Complete boundary loops of quilts**

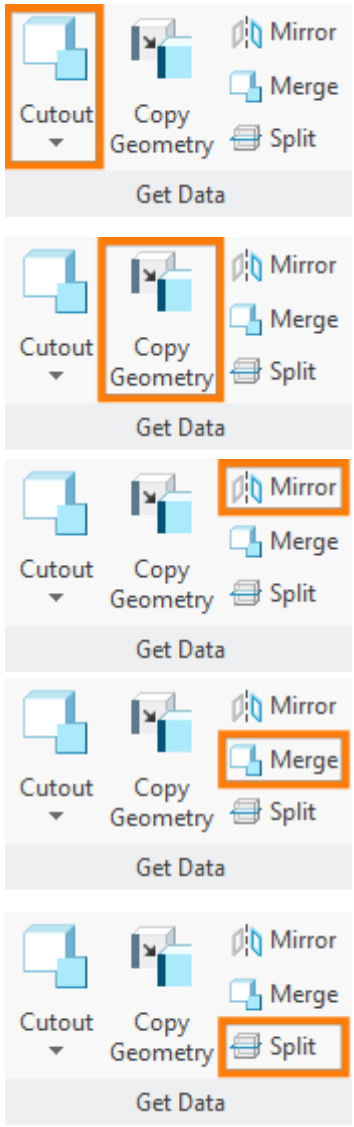


- **Top surfaces that are not attached**

Ribbon UI – Group ‚Get Data‘

Get Data





Get selected geometry from workpiece using:

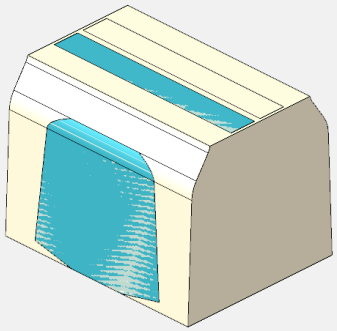
- **Solid + Cutout**
- **CopyGeom of surfaces**

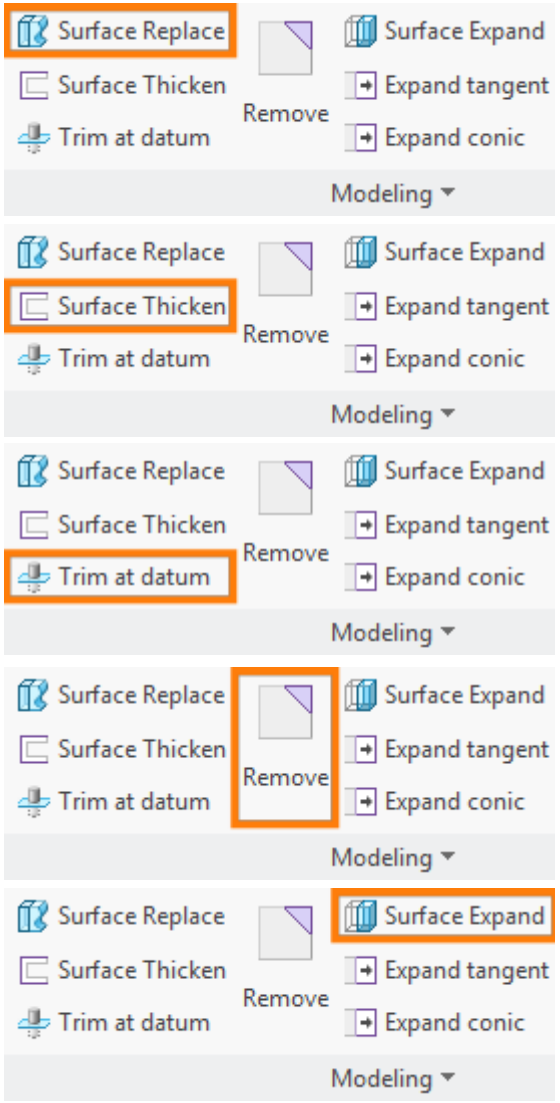
Get geometry from electrodes:

- **Mirror**
- **Merge**
- **Split up**

Ribbon UI – Group ‚Modeling‘

Detailing

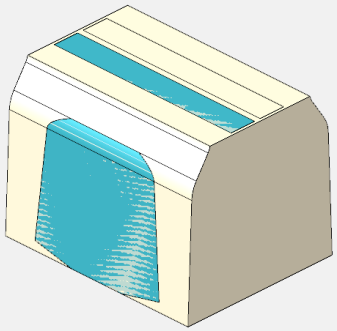


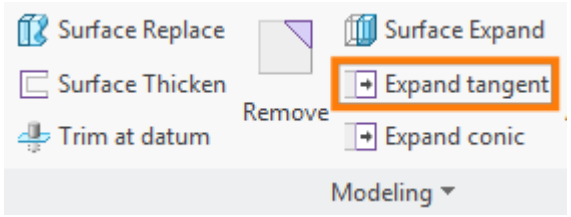


- **Replace surface through surface**
- **Thicken surface**
- **Trim at datum**
- **Remove**
- **Expand surface**

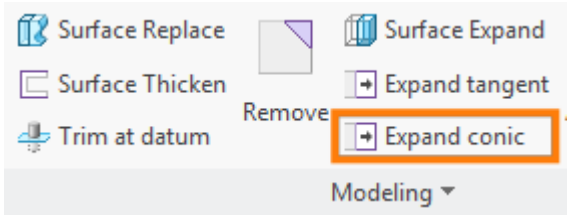
Workflow Electrode Creation

Detailing

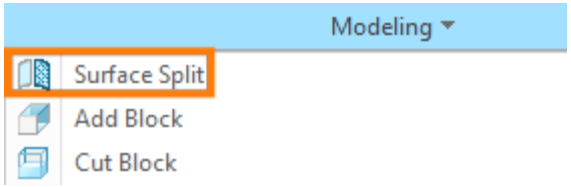




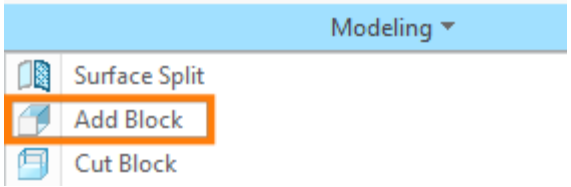
- **Expand tangent**



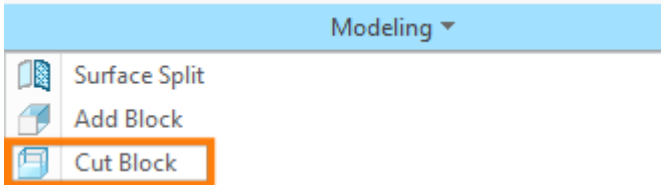
- **Expand conic**



- **Surface split**



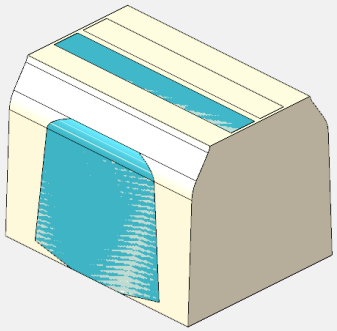
- **Add block**

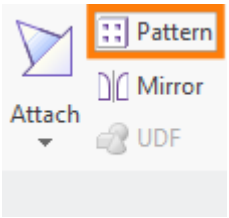


- **Cut block**

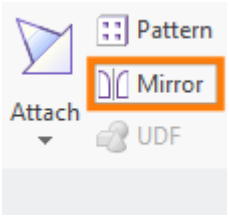
Ribbon UI – Group ‚Modeling‘

Detailing





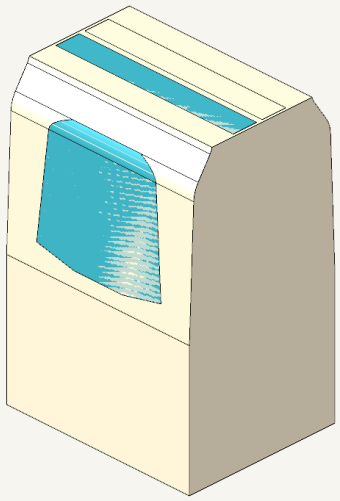
- **Create geometry pattern**

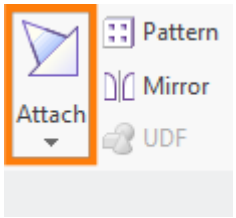


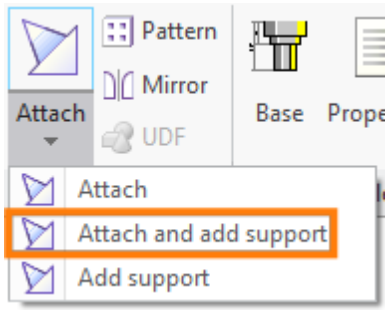
- **Mirror electrode geometry**

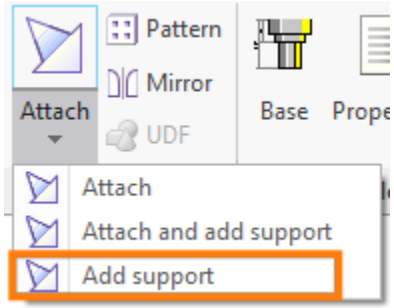
Ribbon UI – ‚Attach‘

Attach







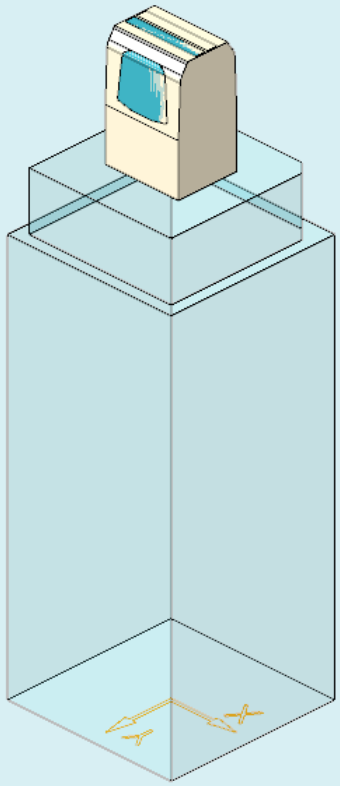


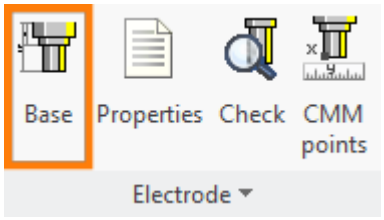
Attach fills gap between solid and later base.

- **Attach to FREE_FACE**
- **Attach and add support geometry**
- **Add support geometry for whole solid**

Ribbon UI – Group ‚Electrode‘

Base

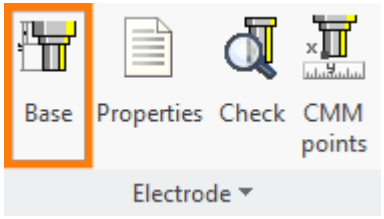




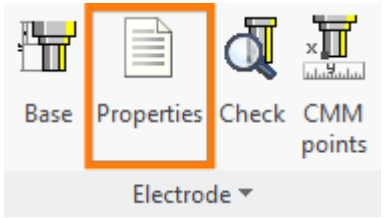
Set data of electrode

- **Add or change base**

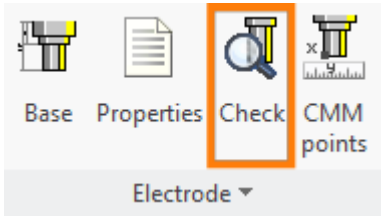
Ribbon UI – Group ‚Electrode‘



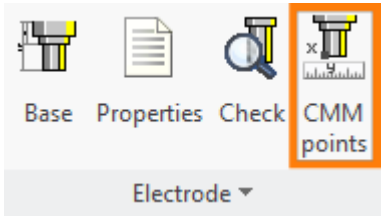
- **Add or change base**



- **Edit electrode parameter**

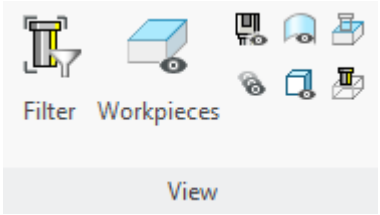


- **Check active electrode**



- **Add CMM points**

Ribbon UI – Group ‚View‘



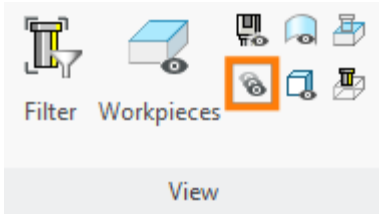
The commands in 'View' control the visibility of objects and elements. These commands are available at any time.

- **Show active electrode**
  (automatically on activation of component)

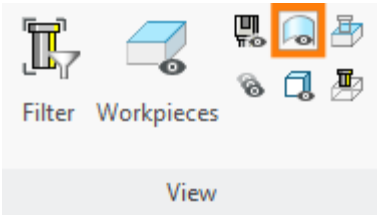
- **Show/hide workpieces**

- **Show/hide holders**

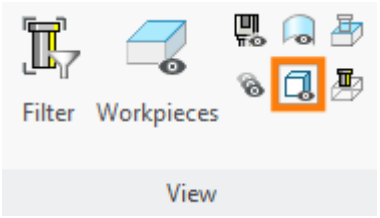
Ribbon UI – Group ‚View‘



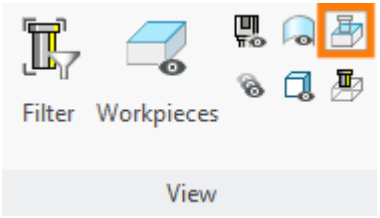
- **Show all**
  Show all objects – also objects hidden by user.



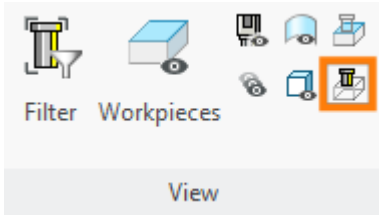
- **Show/hide datum surfaces/quilts**



- **Show/hide of solids**



- **Activate/disable wirfeframe style for electrodes**



- **Activate/disable wirfeframe style for workpieces**

Agenda

Comparison and compatibility with SE 7.0

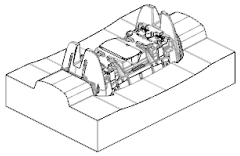
Workflow

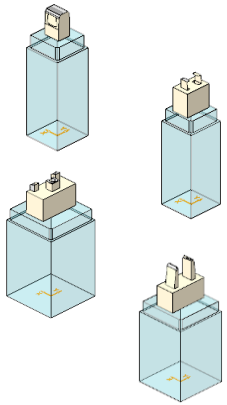
User Interface

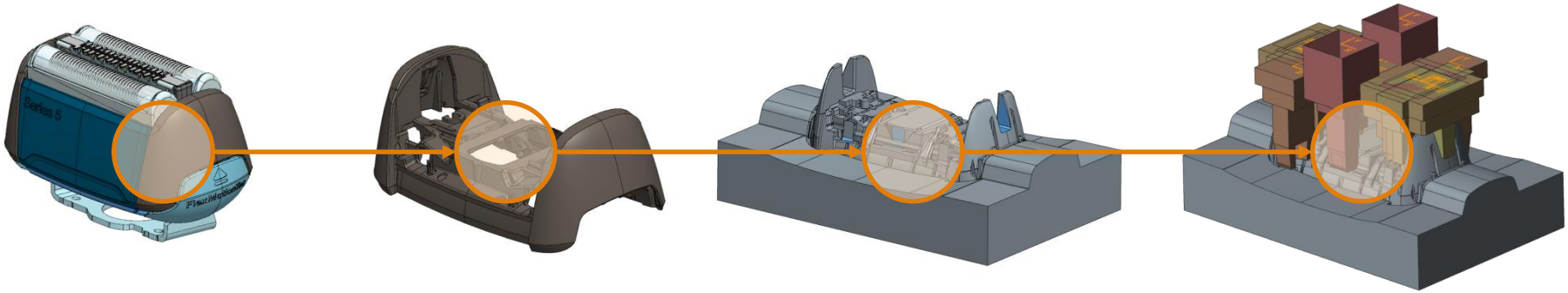
- Assembly Mode
- Part Mode

Training

- Assembly Creation
- Preparation
- Set Zero
- Electrode 1
- Electrode 2
- Electrode 3
- Electrode 4







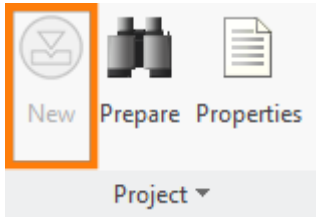
Usage of model

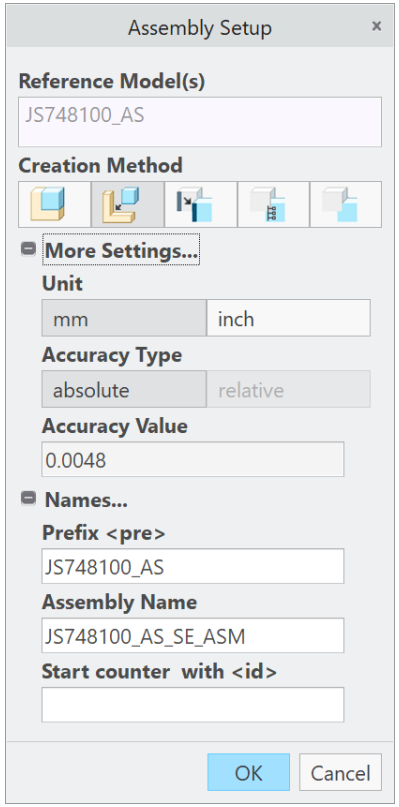
js748100_as

and

default configuration

Creation Main Assembly



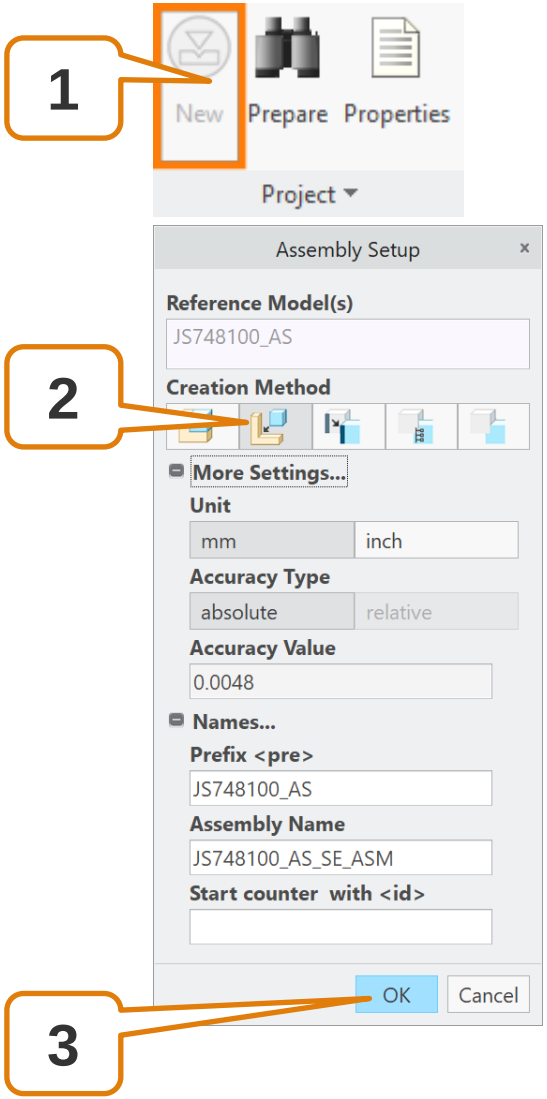


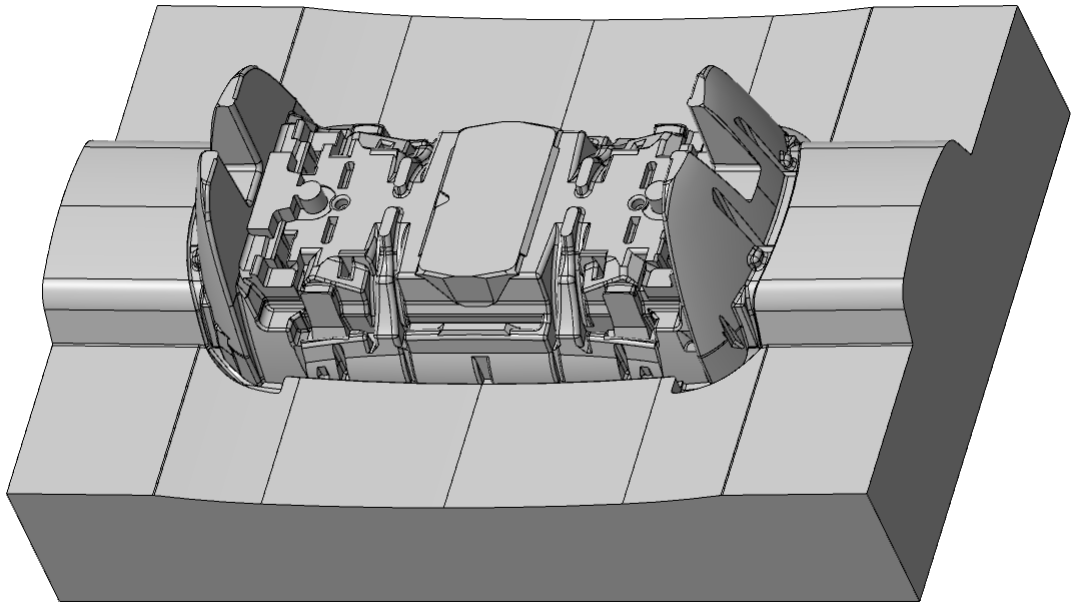
- **Main Assembly**
  - Workpieces (Cores)
  - Operation (Zero)
  - Electrodes
- **Select workpieces**
- **Reference Method**
  - Use current assembly
  - Use original models
  - Create reference model
    - Inheritance
    - Merge
    - Copy solid faces and solidify

Note

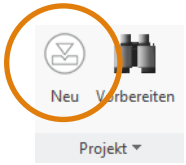
When using a reference model, zero offsets are corrected.

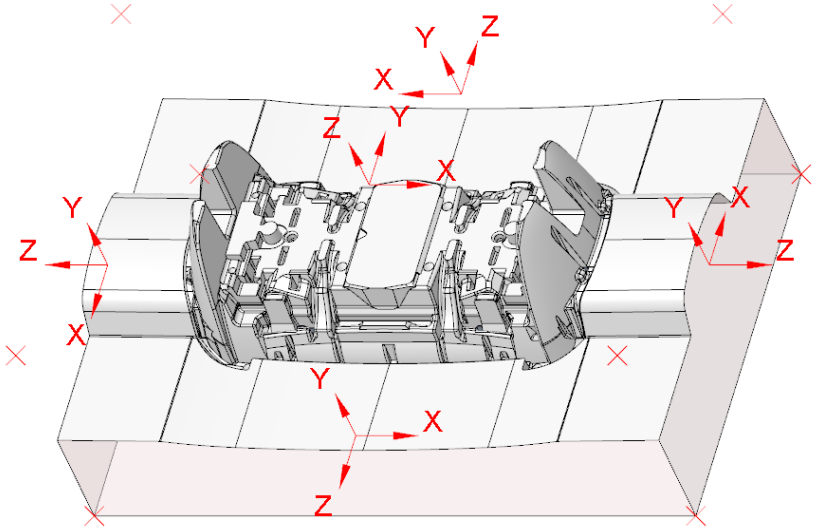
Creation Main Assembly





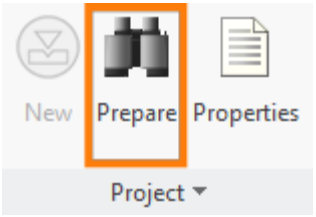
Creation Main Assembly

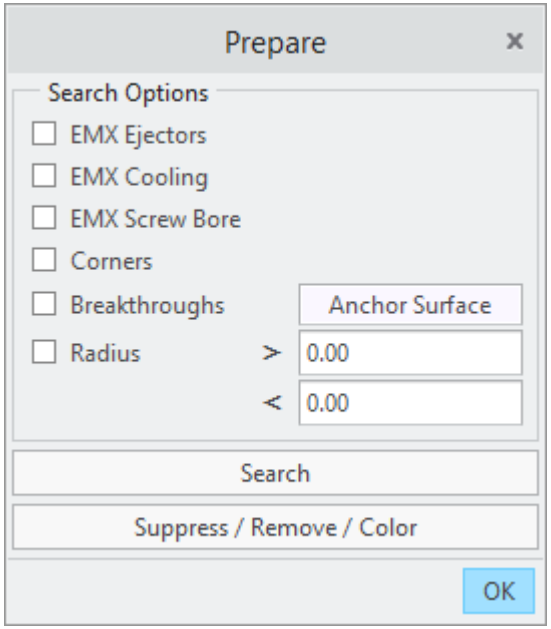




- **Datum points / Coordinate systems**
  A group of datum points and coordinates systems is created automatically.
  Datum points are placed in the corners of the outline and used for automatic dimensions of workpiece outline later.
  Coordinate systems are used to indicate center of workpiece outline and can be used as zero point.
- **Redefine**
  Another click on #Assembly opens UI for redefinition.

Preparation





Simplification of geometry

- in reference models
- to simplify electrode extraction

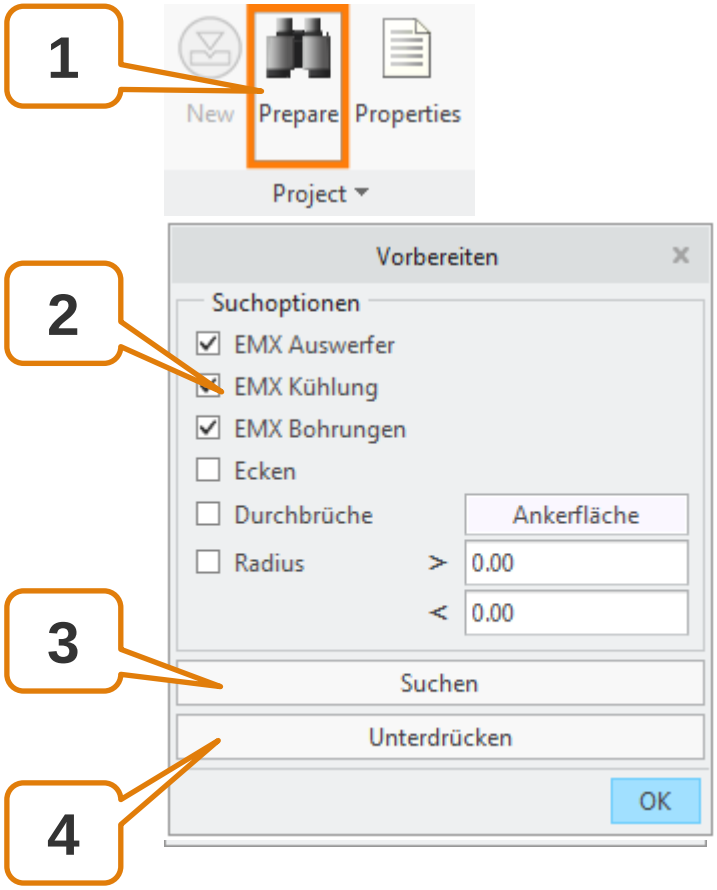
Suppress or remove

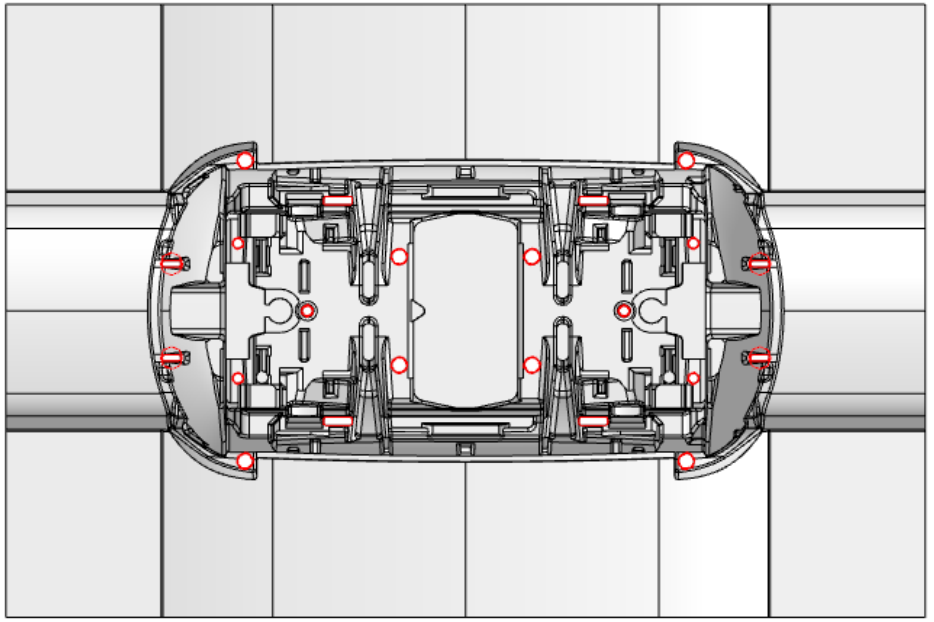
- Features from EMX
  - Ejectors
  - Cooling
  - Bores
- Breakthroughs
  in Importd parts

Search & Color

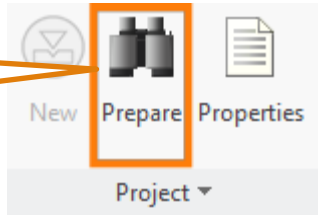
- Surfaces with sharp-edged transitions
  (convex edges)
- Rounds within minimum and maximum radius value

Preparation – Features from EMX

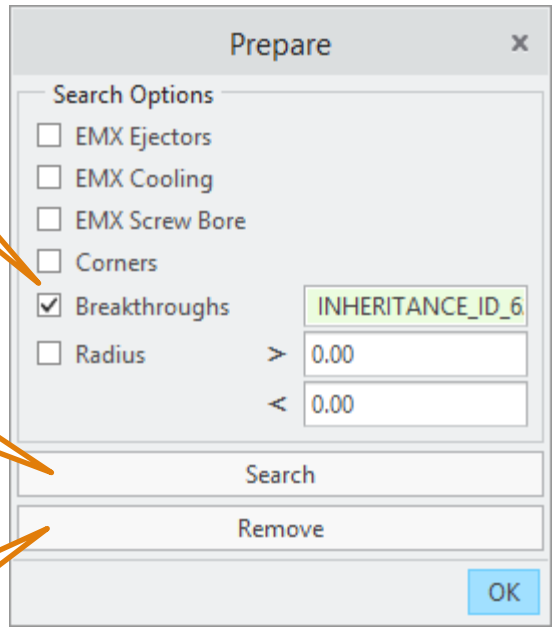




Preparation – Import



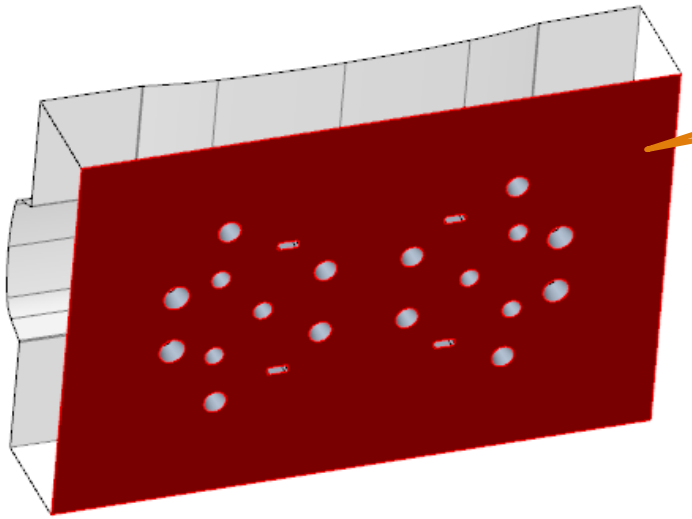
1



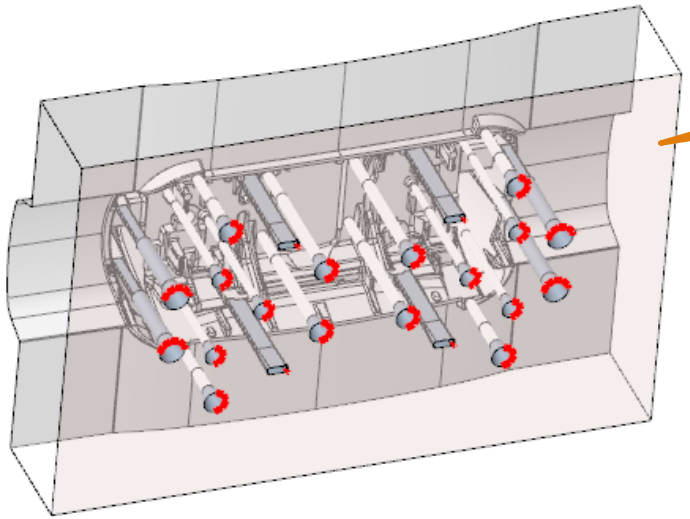
2

4

6

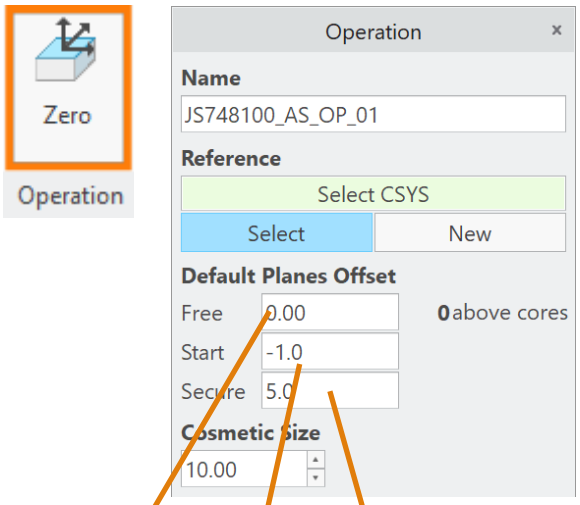


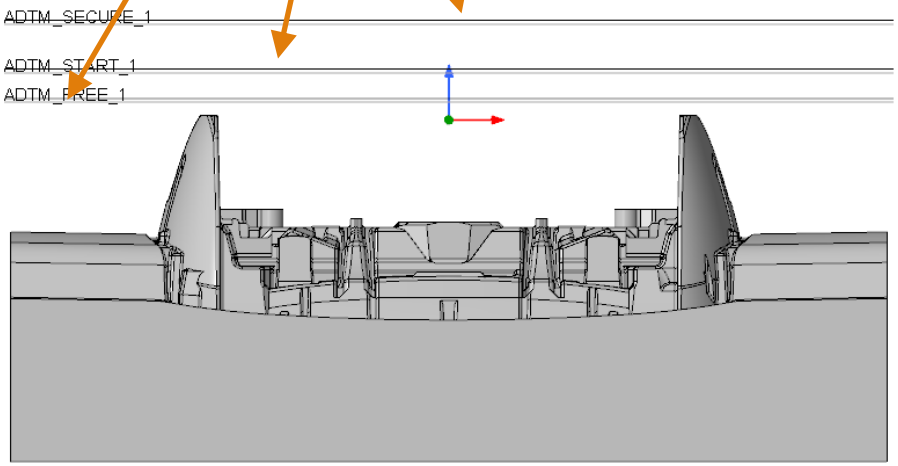
3



5

Creation of Zero





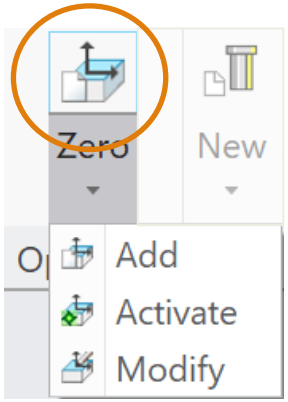
Operation

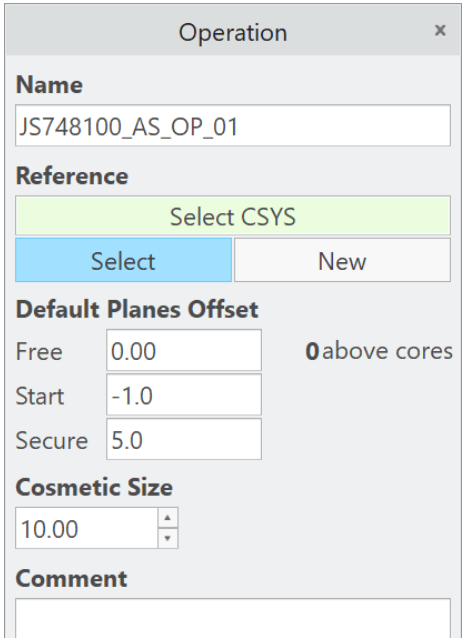
- Defines reference CSYS for Electrodes
- Multiple zeros per assembly
- Definition can be changed at any time

Retraction Planes

- Free face / Z-reference
- Start plane (Default)
- Secure plane (Default)

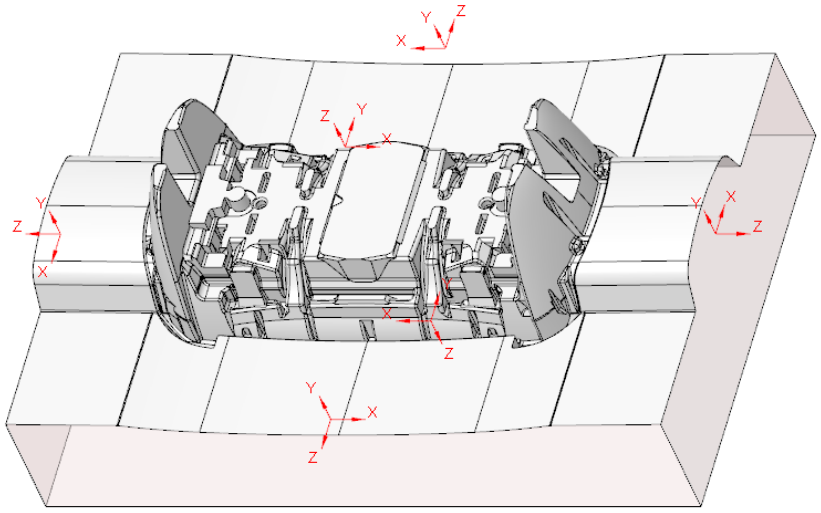
Creation of Operation Zero



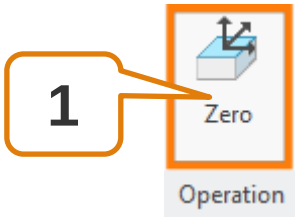


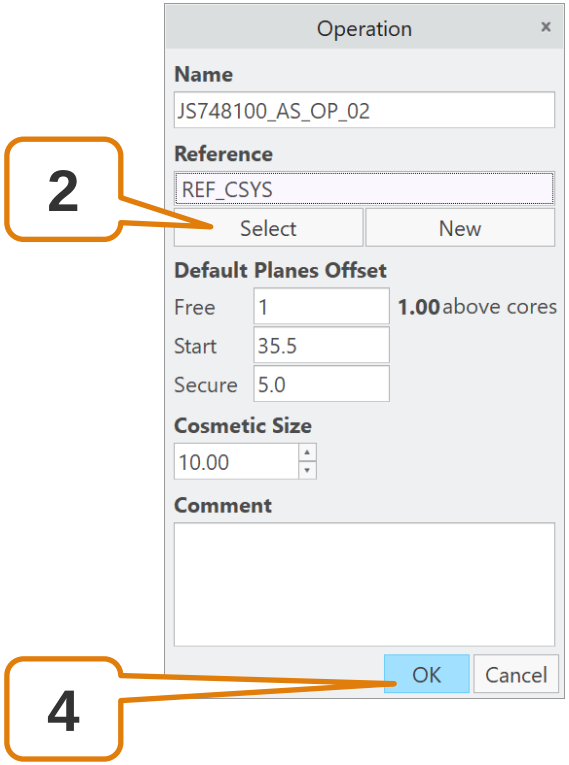
Csys selection

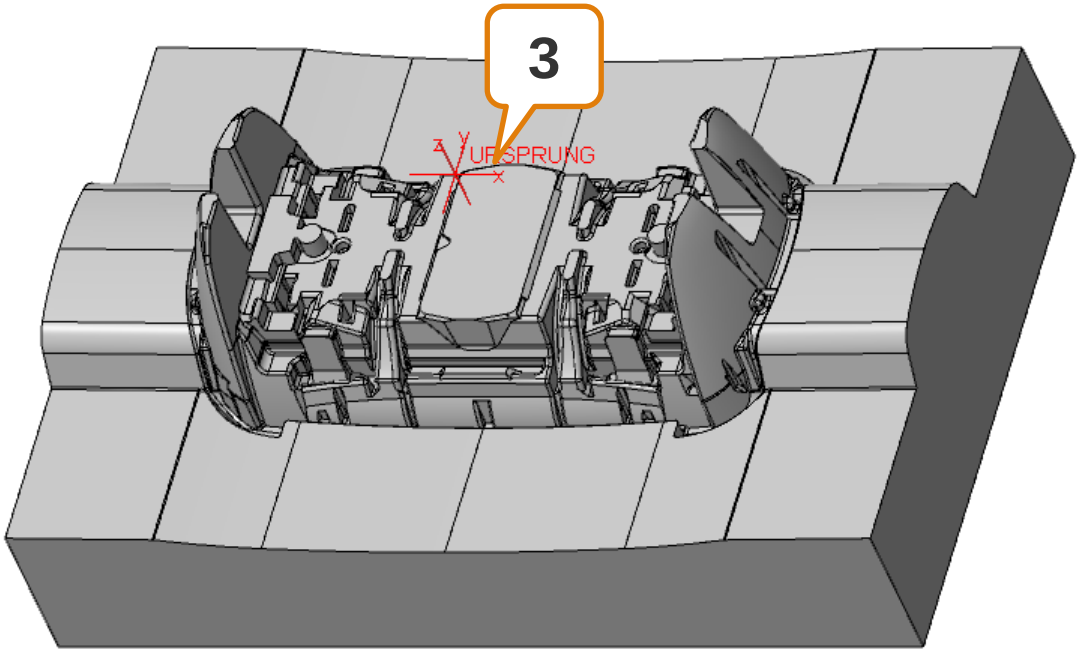
- Existing csys
- Prepared csys on outline centers
- Creation on-the-fly
- Csys can be updated in UI



Selection of Zero







Agenda

Comparison and compatibility with SE 7.0

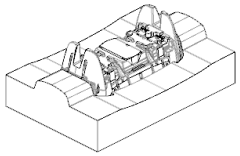
Workflow

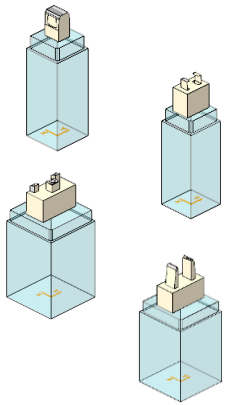
User Interface

- Assembly Mode
- Part Mode

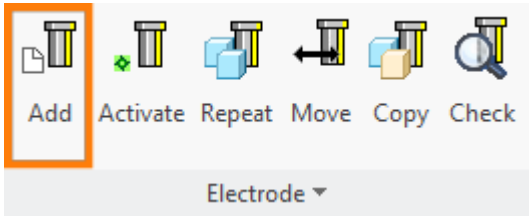
Training

- Assembly Creation
- Preparation
- Set Zero
- **Electrode 1**
- Electrode 2
- Electrode 3
- Electrode 4





New Electrode



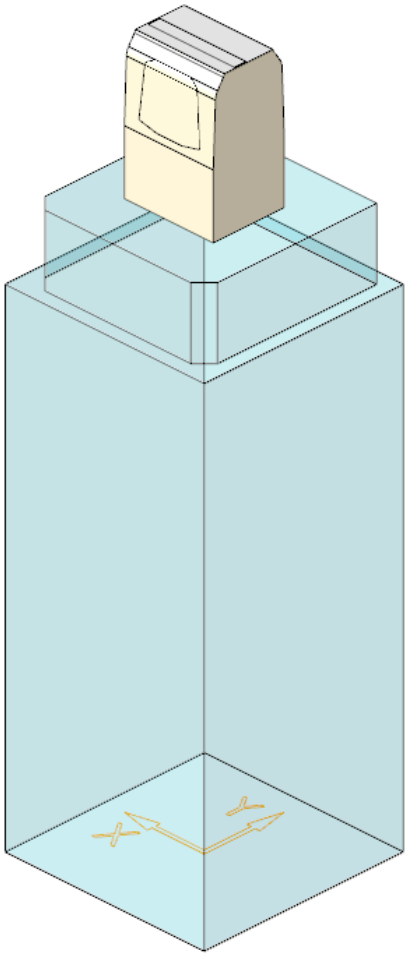
A new Electrode is ...

- **A*new part* copied from default template**
- **Assembled on ‚Default‘ in assembly**
- **Named by name format**
  (counter is updated automatically, gaps are closed)
- **Contains a copy of FREE_FACE**
- **Automatically active to start the construction mode**

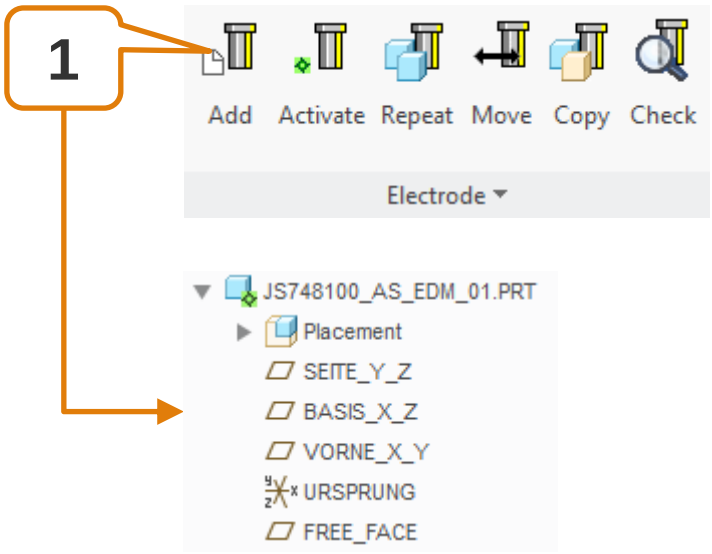
Electrode 1

Topics…

- **Add new electrode**
- **Copy burn-faces**
- **Detailing**
- **Mirror geometry**
- **Attach to FREE_FACE**
- **Add base**
- **Assemble electrode again**

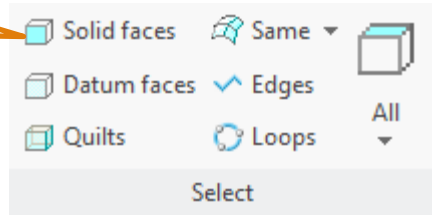


Electrode 1 – Add new Electrode

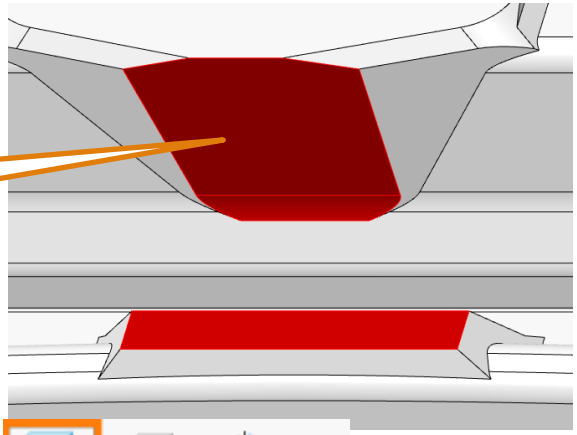


Electrode 1 – Get Data

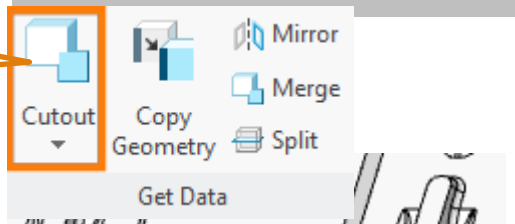
1

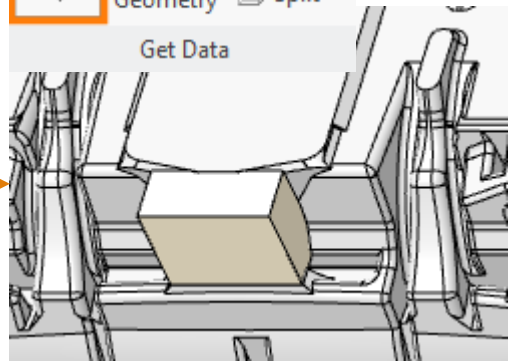


2

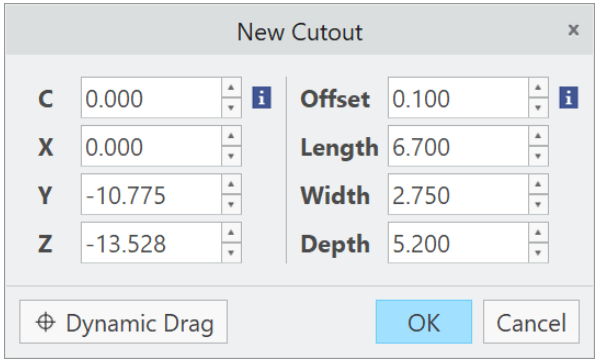


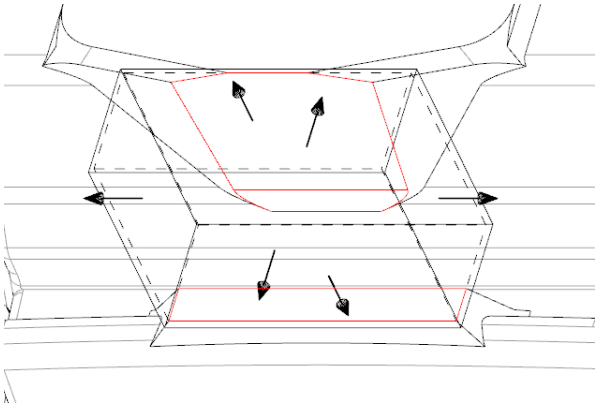
3





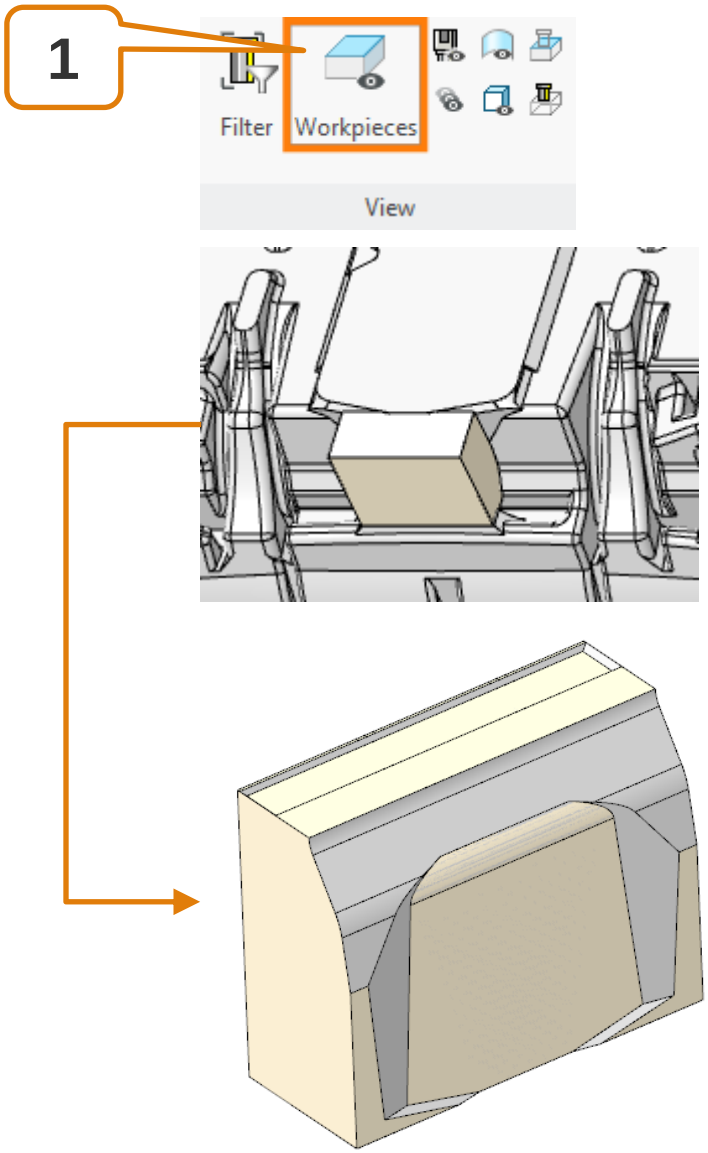
Create new cutout



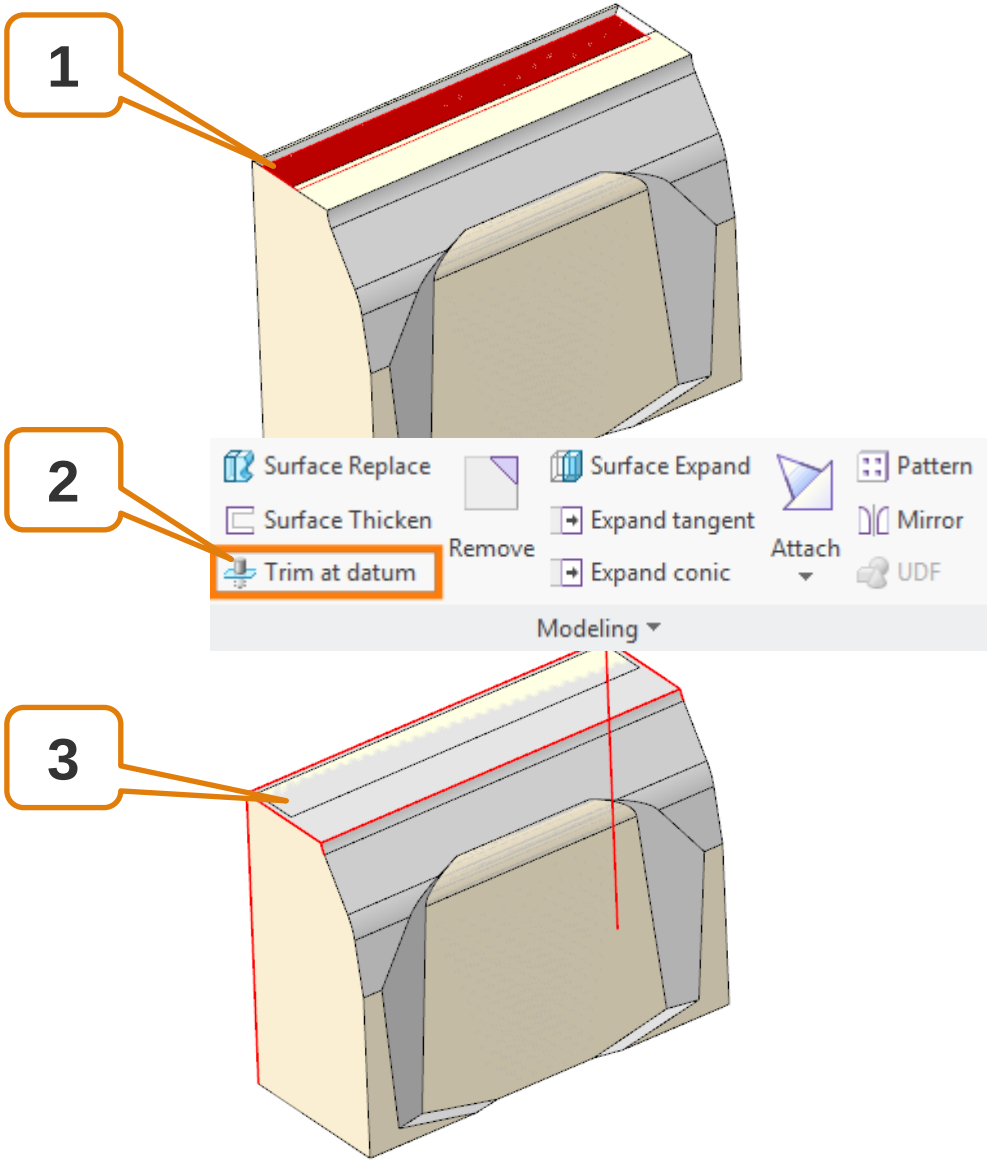


- Outlines of selected surfaces and offseted solid are displayed
- Align solid with contour by adjusting angle
- Dynamic adjustment available
- Solid is created by dimensions **without** referencing a particular surface, therefore feature doesn‘t break if a surface disappears.

Electrode 1 – Set View

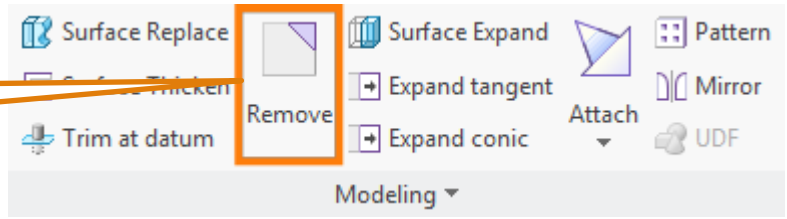


Electrode 1 – Detailing

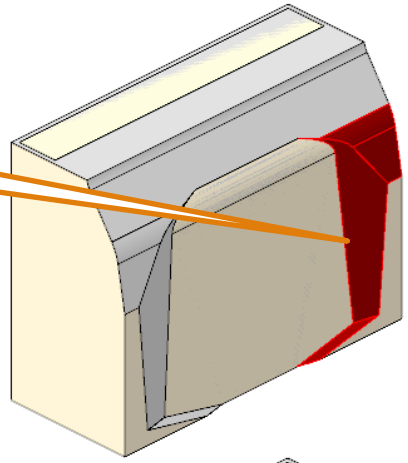


Electrode 1 – Detailing

1



2



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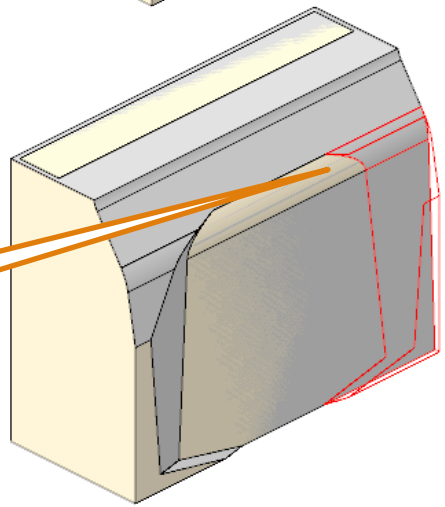
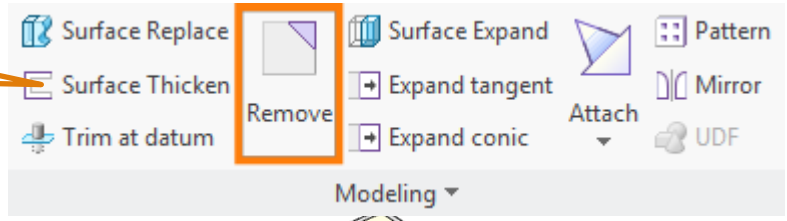
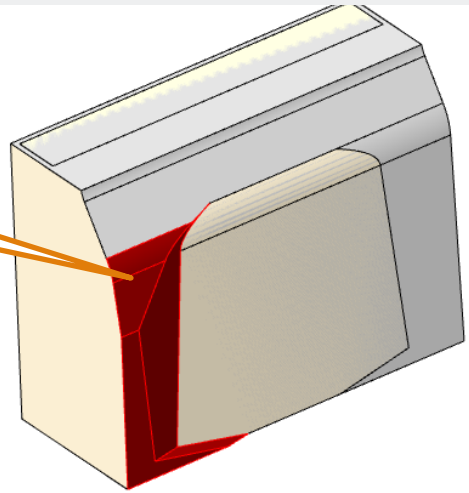


Electrode 1 – Detailing

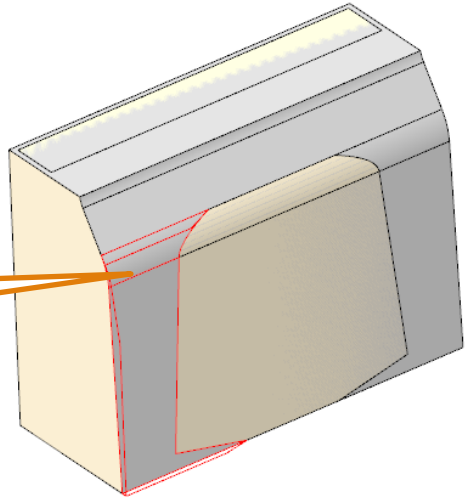
1



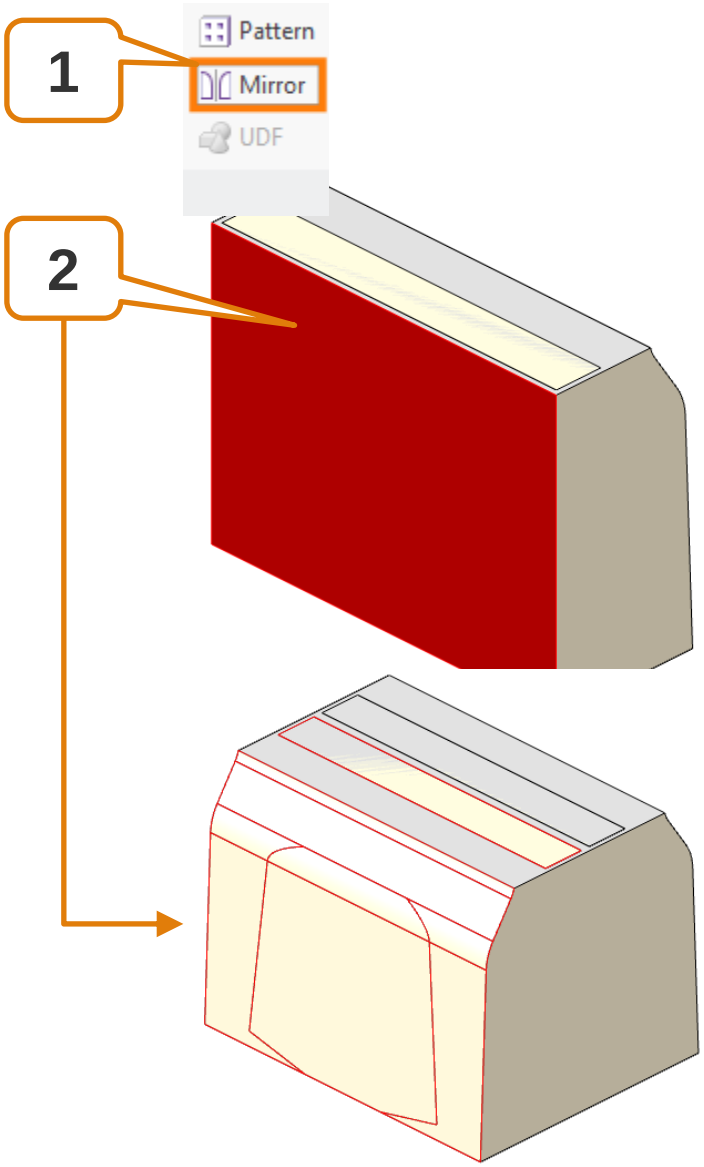
2



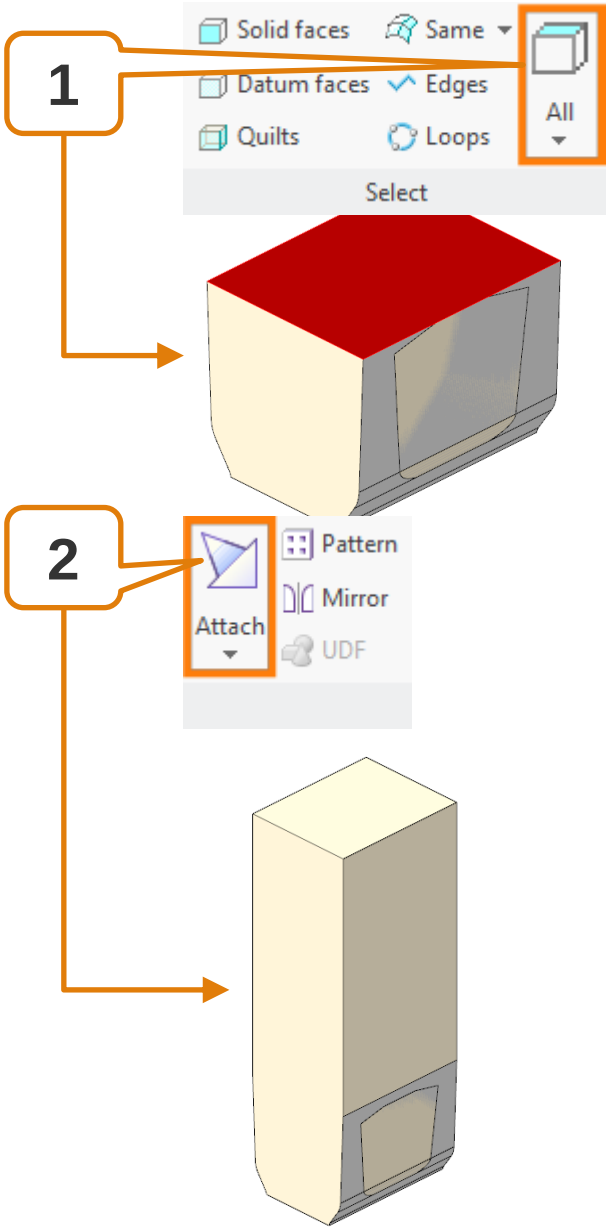
3



Electrode 1 – Mirror



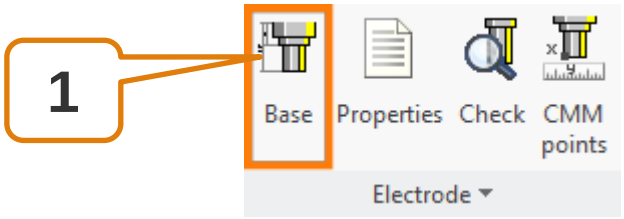
Electrode 1 – Attach

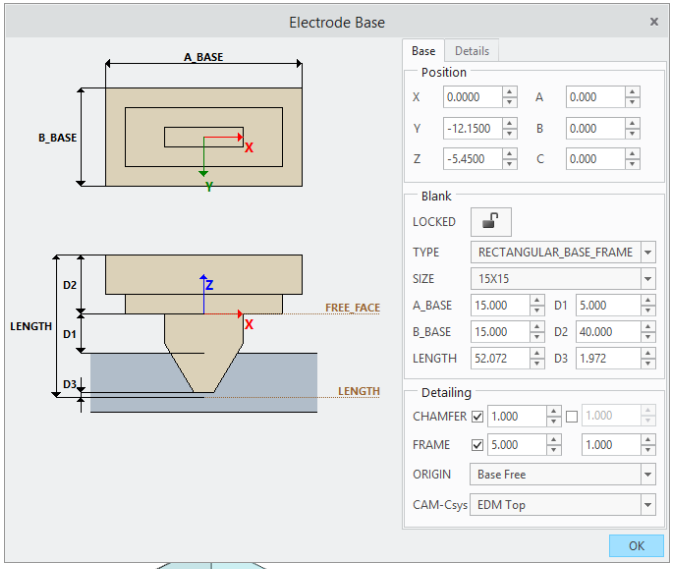


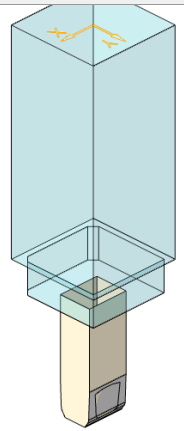
Attach to FREE_FACE

- **(1) Filter ‚All Tops ‘**
  - Selects all faces that are **not** attached to FREE_FACE
- **(2) Command ‚Attach‘**
  - Expands solid
  - Connects solid with FREE_FACE

Electrode 1 - Add Base

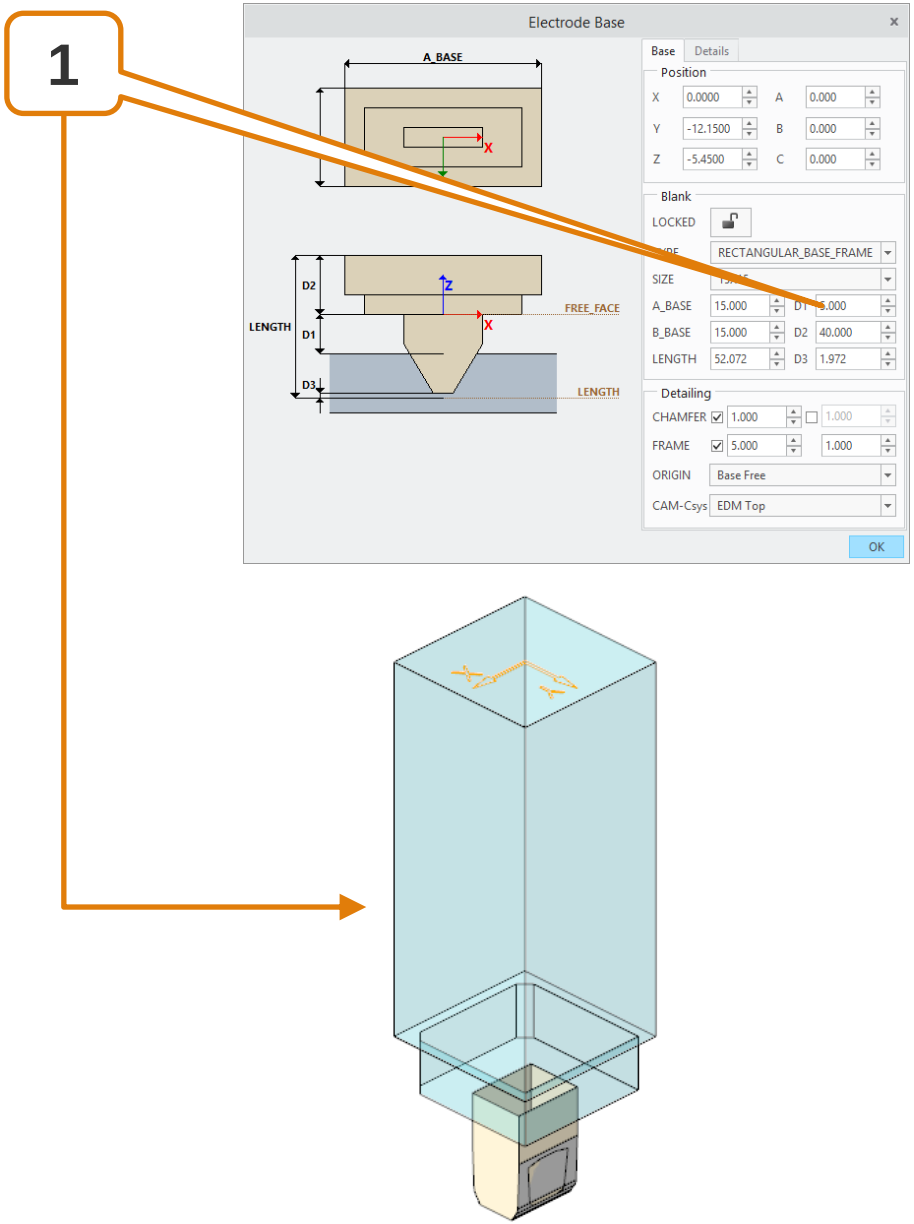






- **Add Base**
  - Position of base
  - Type and section
  - Blank size
  - EDM origin (csys)
- **Automatic selection of**
  - Supplier
  - Type
  - Size from list

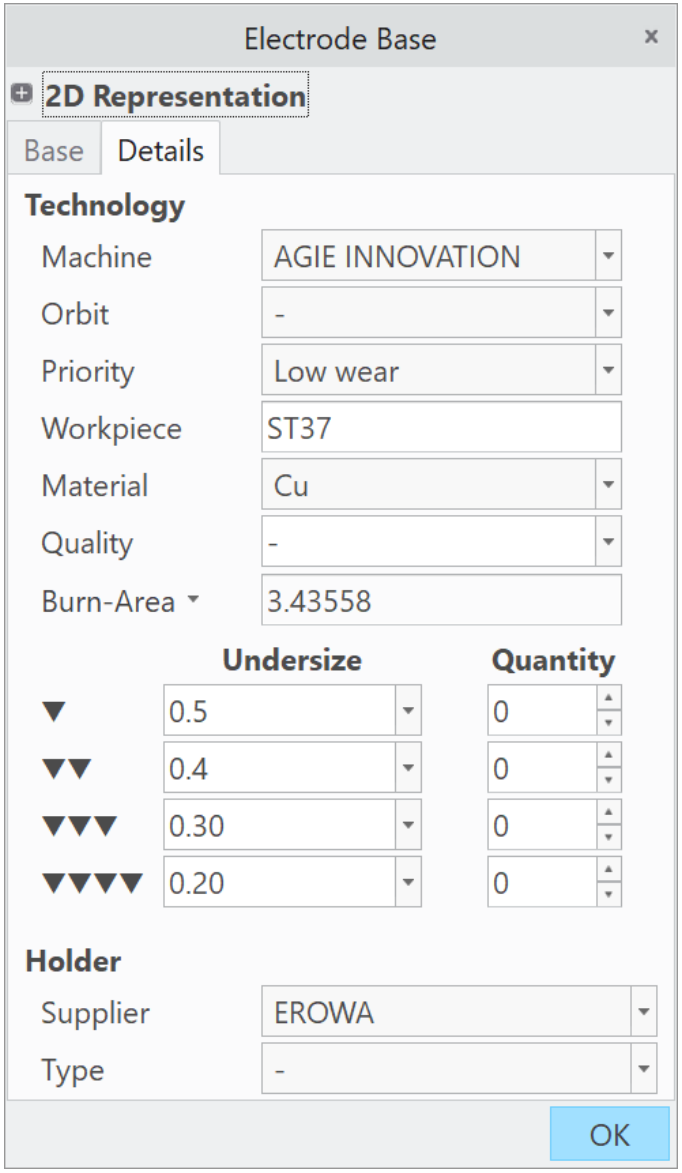
Electrode 1 – Adjust Base



Adjust Base

- **Dimensions**
  - Length A_BASE
  - Width B_BASE
  - Blank height
  - Base height D2
- **Frontal distance to workpiece D1**
- **Oversize from EDM top to blank height D3**

Electrode 1 - Adjust Base

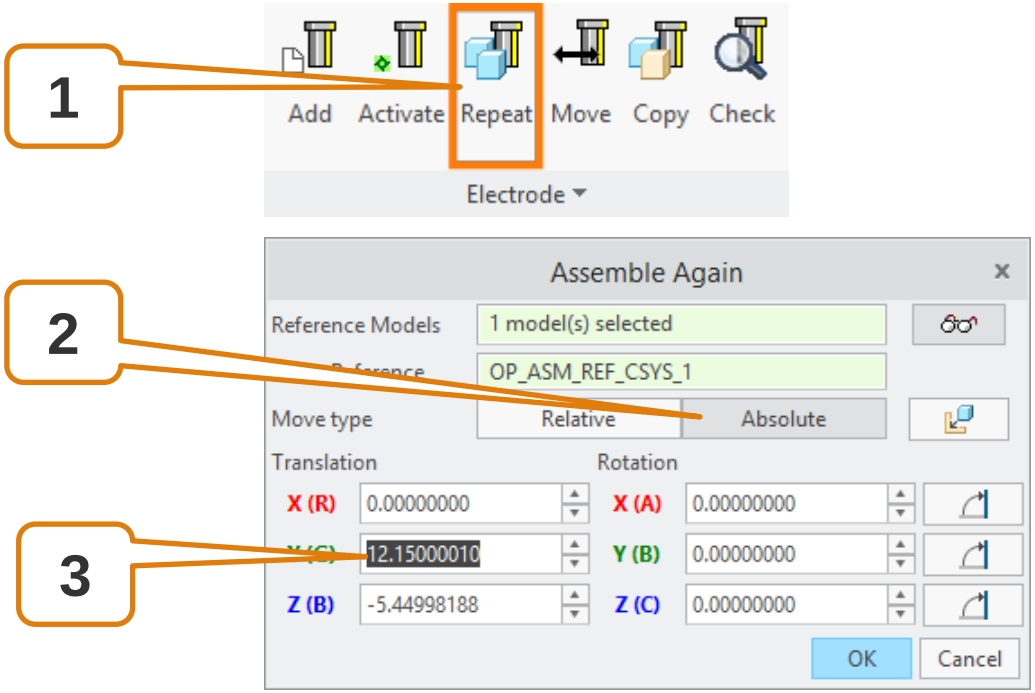


Technology data on 2nd page

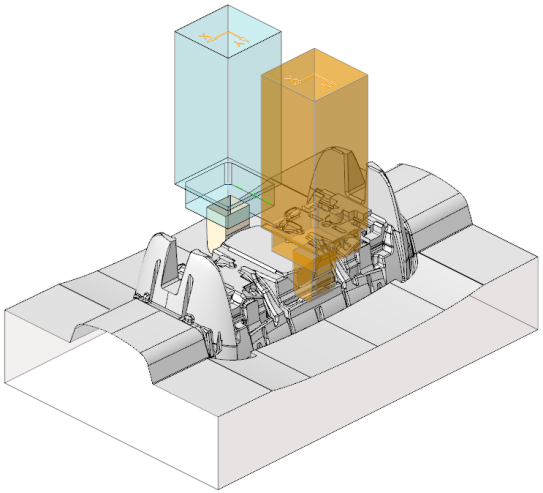
- **Control**
- **Orbit**
- **Undersize/burngap**
- **Holder**

- **Close with *OK***
- **Press *Ctrl+A* to acitvate main assembly**

Electrode 1 – Assemble Again

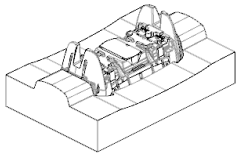


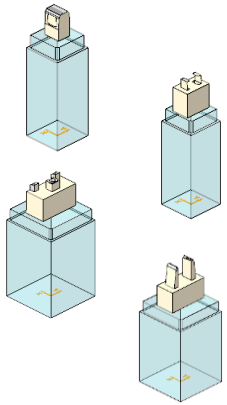
- Select electrode
- Select ‚Assemble again‘
- Switch to ‚absolute‘ movement
- Change sign at Y-position
- Confirm with OK



Agenda

- Comparison and compatibility with SE 7.0
- Workflow
- User Interface
  - Assembly Mode
  - Part Mode
- Training
  - Assembly Creation
  - Preparation
  - Set Zero
  - Electrode 1
  - **Electrode 2**
  - Electrode 3
  - Electrode 4

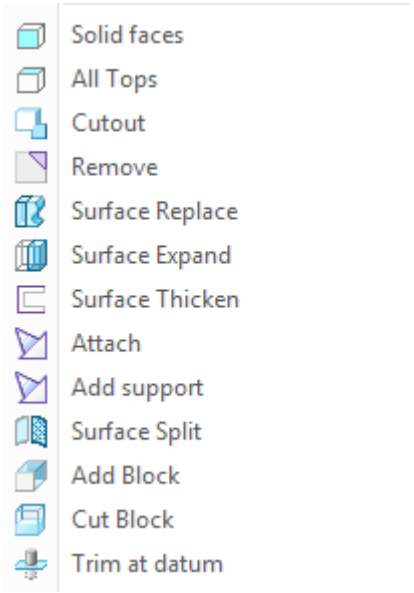


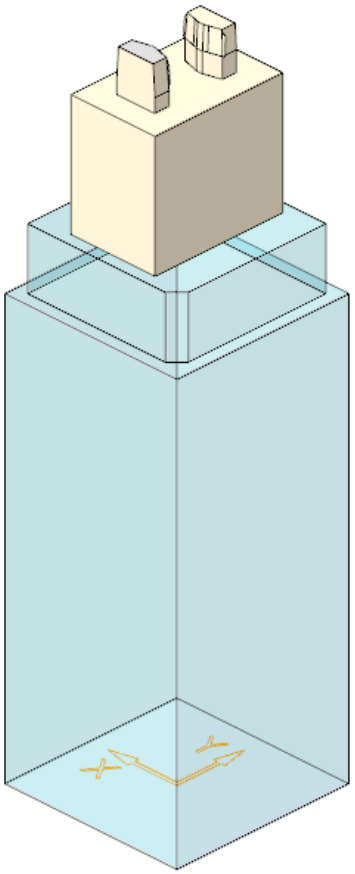


Electrode 2

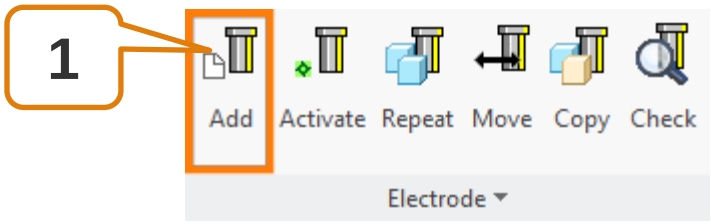
Topics…

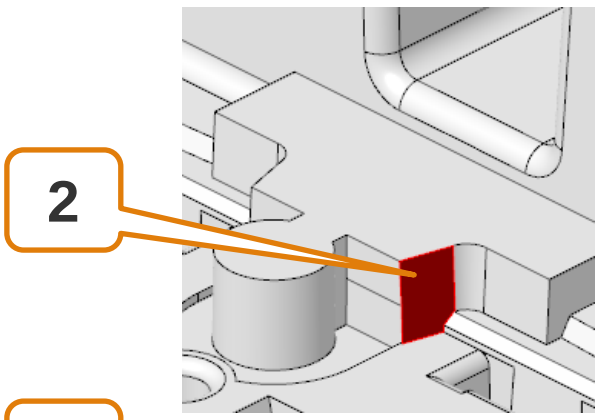
- **Usage of context menu**
  (right mouse button)

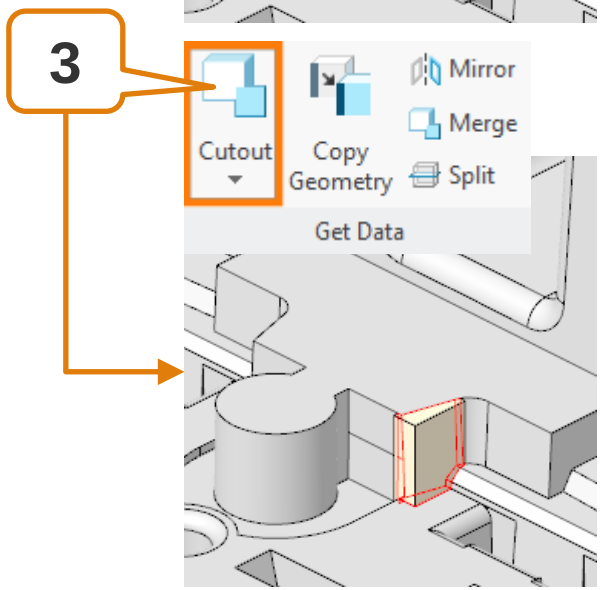




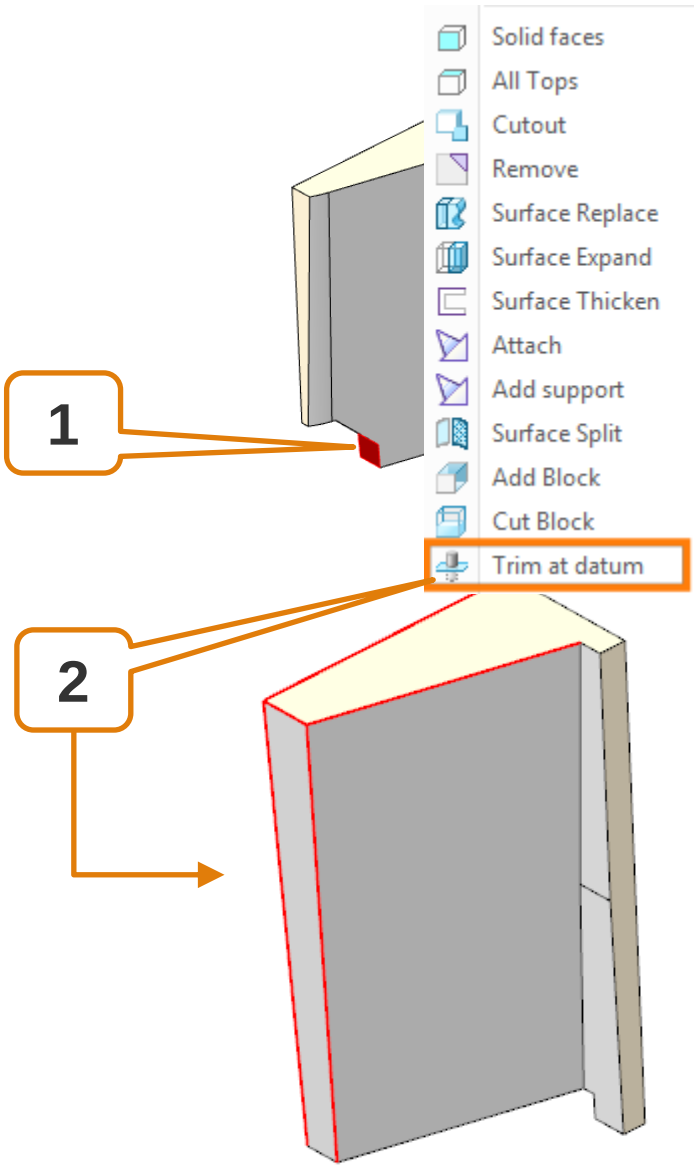
Electrode 2 – Get Data

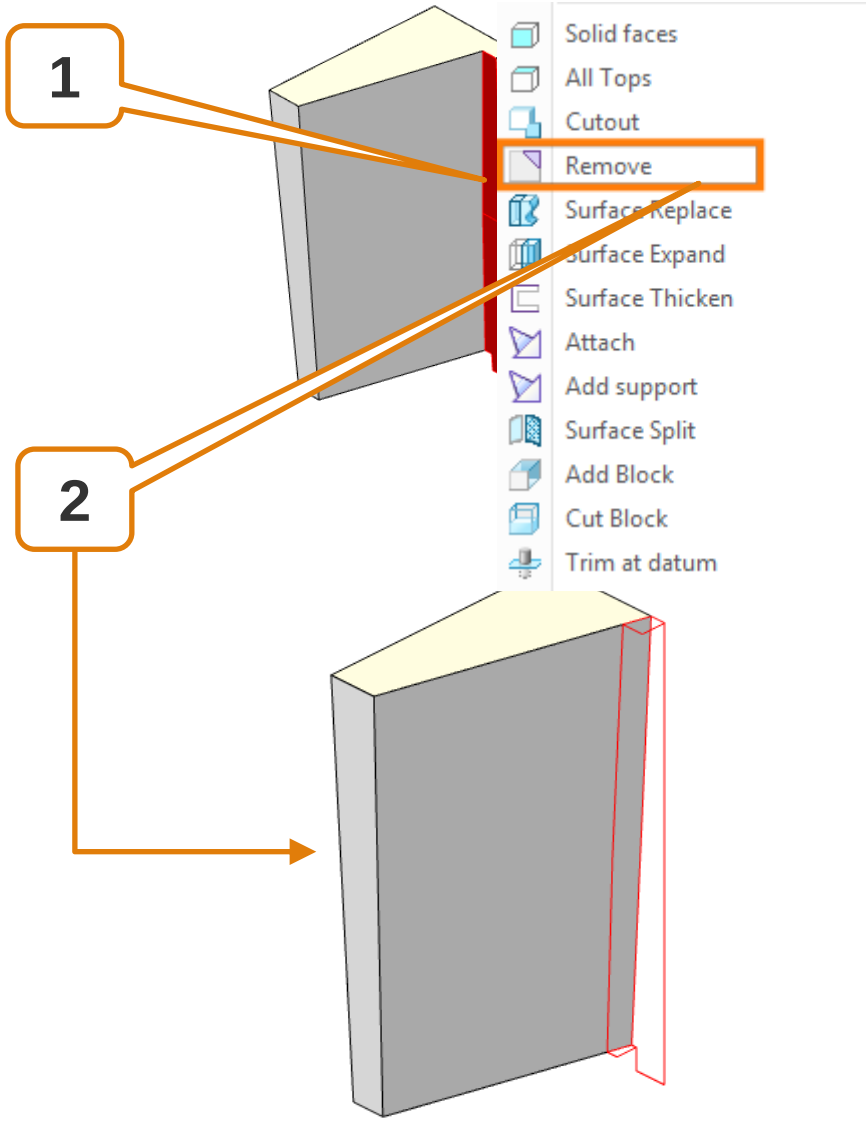




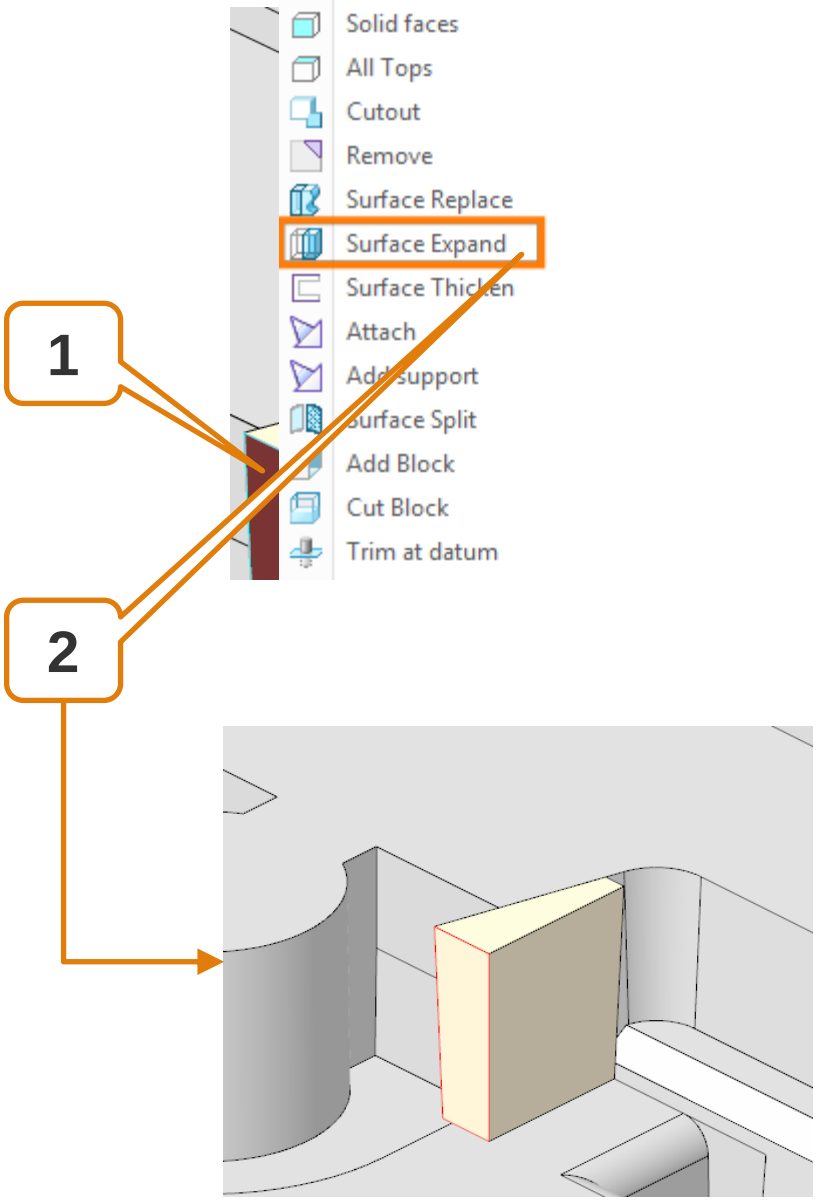


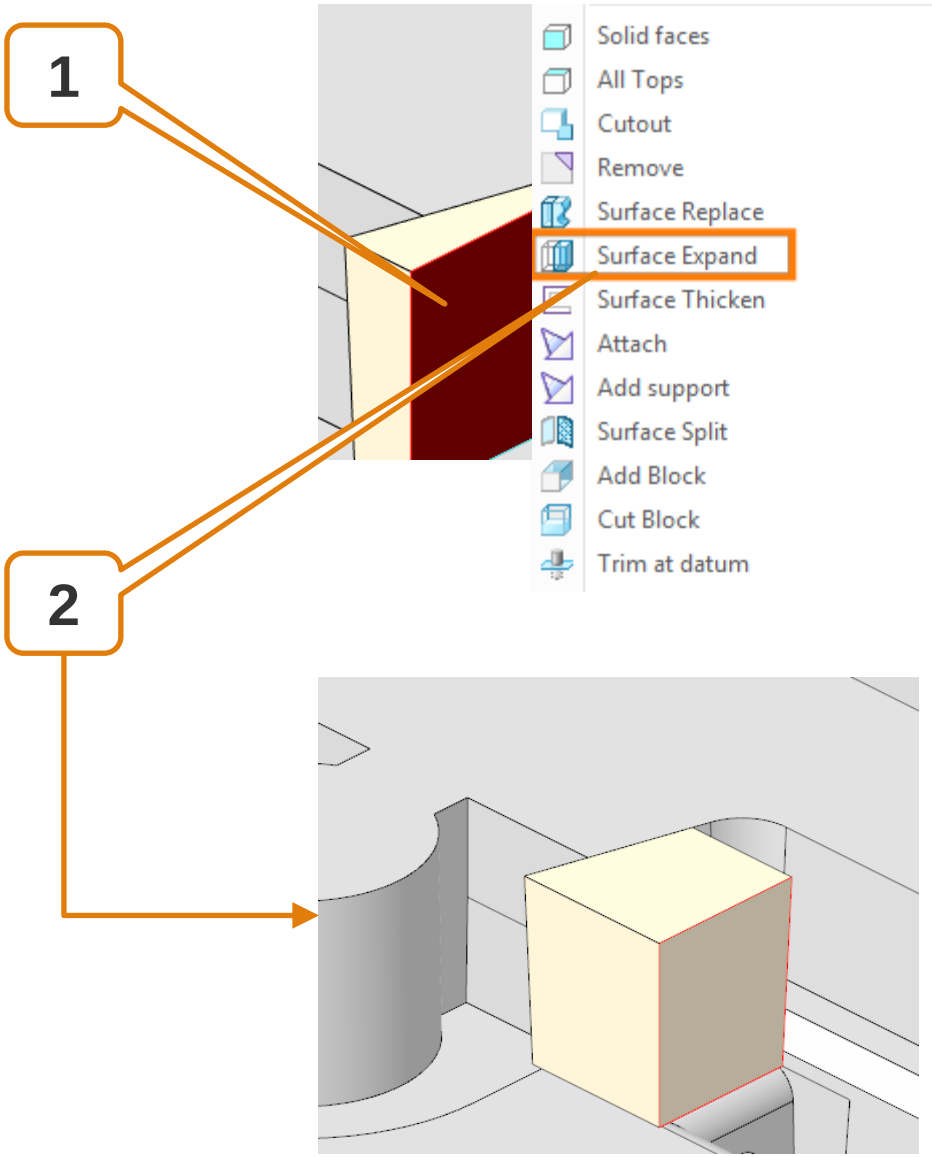
Electrode 2 – Detailing



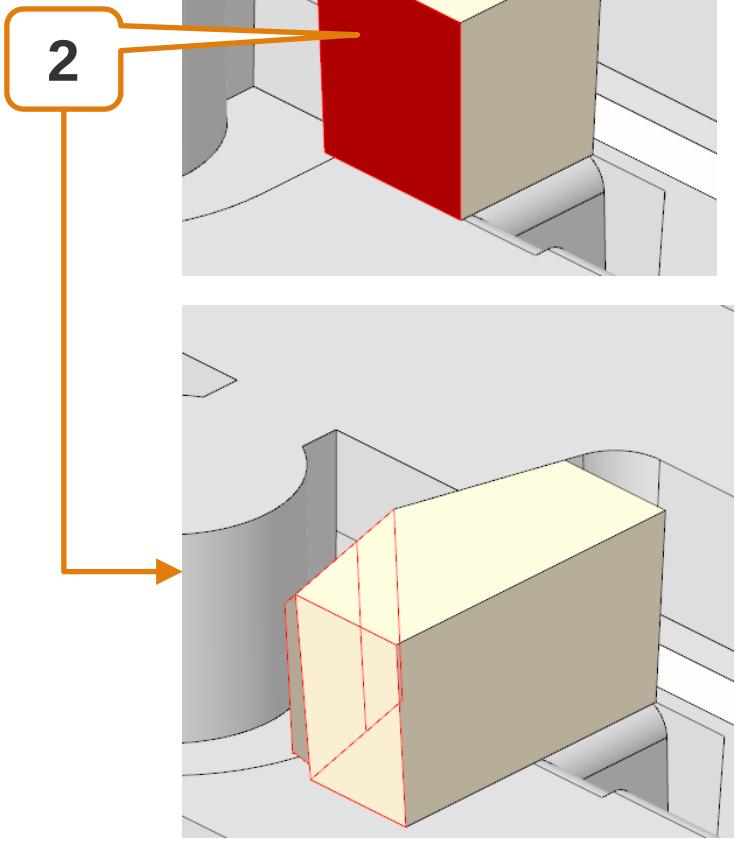


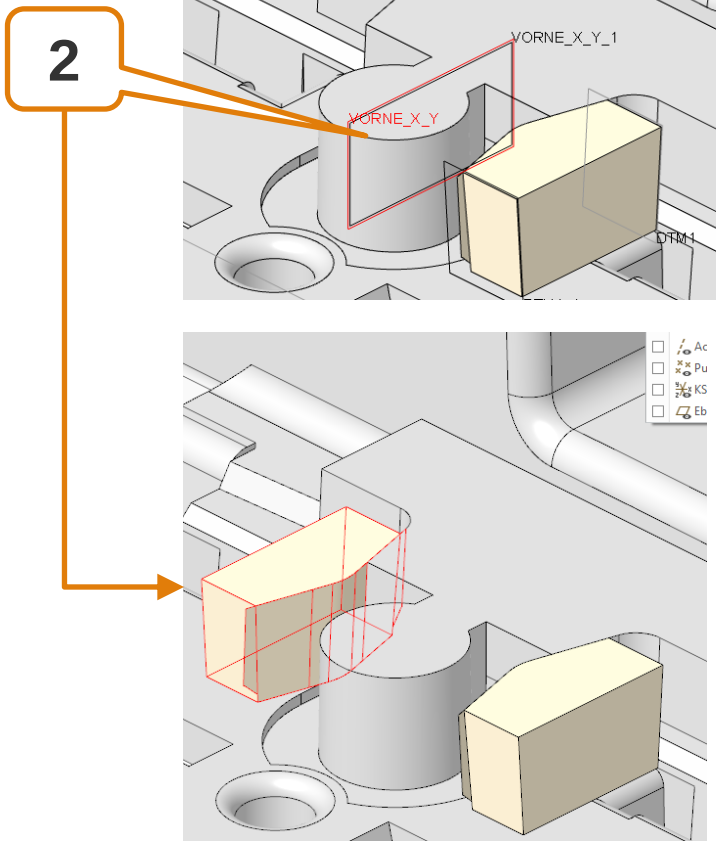
Electrode 2 – Detailing





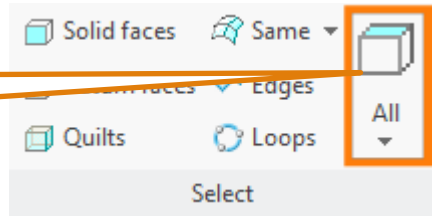
Electrode 2 – Detailing

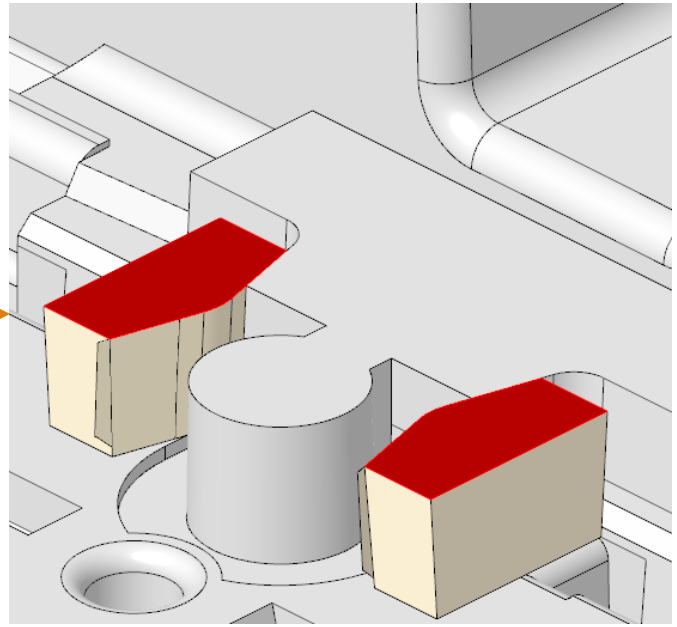




Electrode 2 – Attach

1





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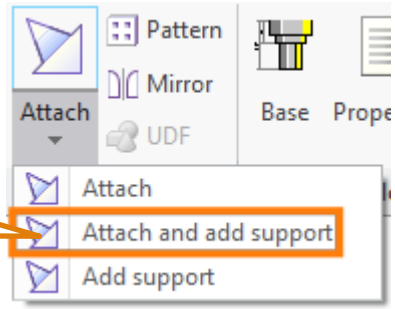
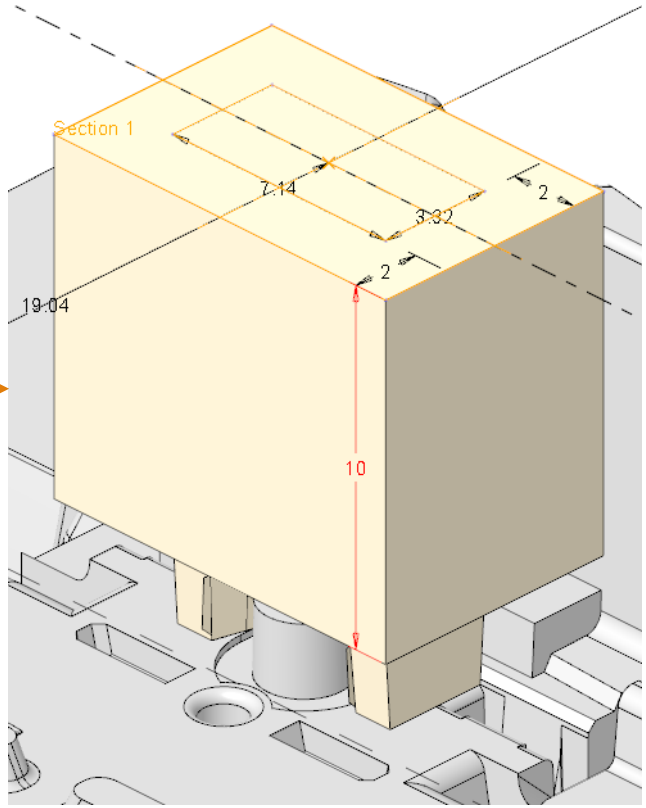
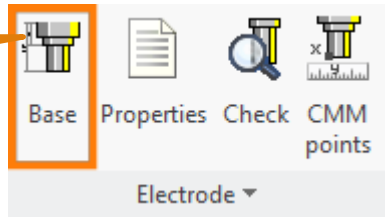
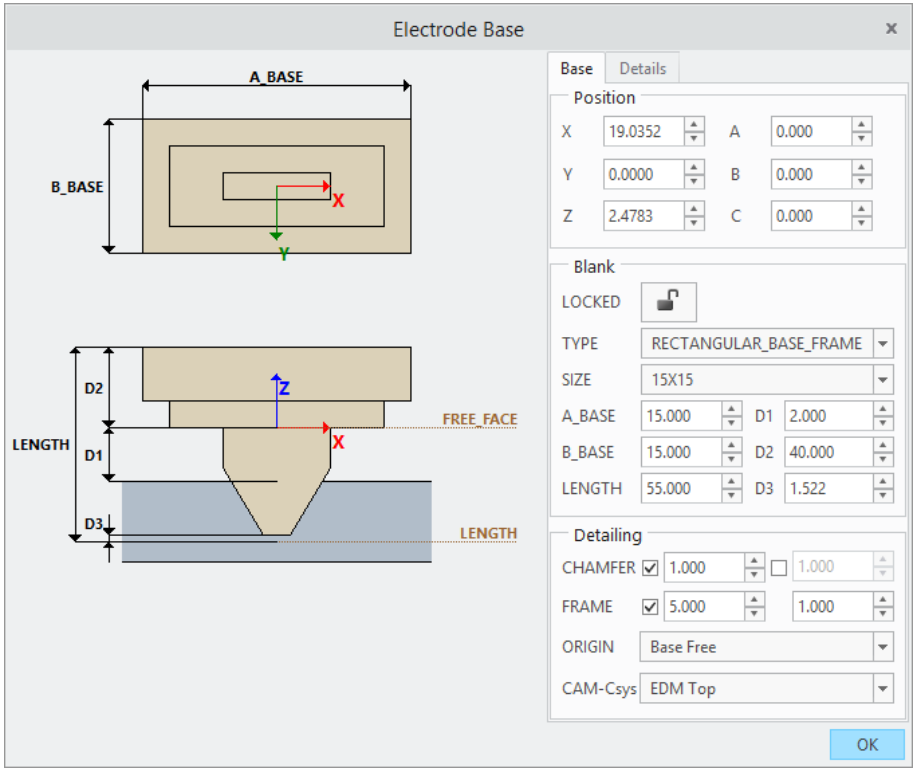


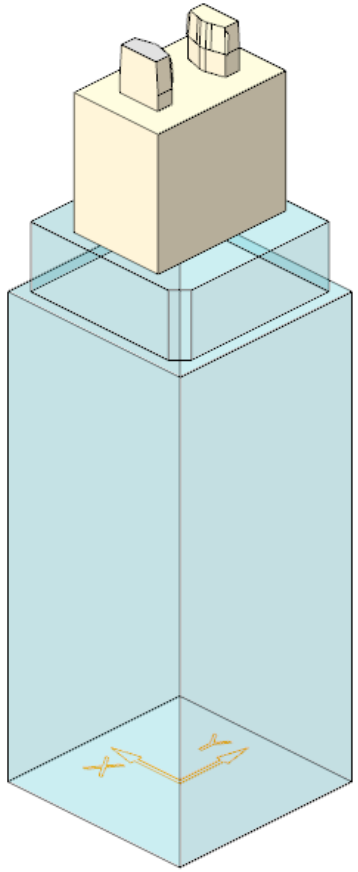


Electrode 2 – Add Base

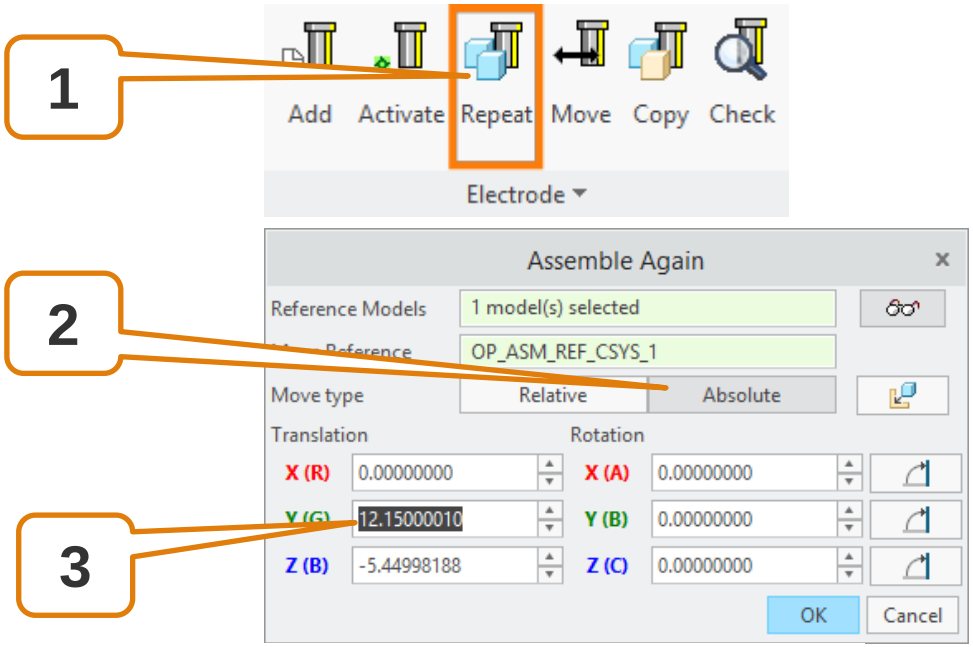
1

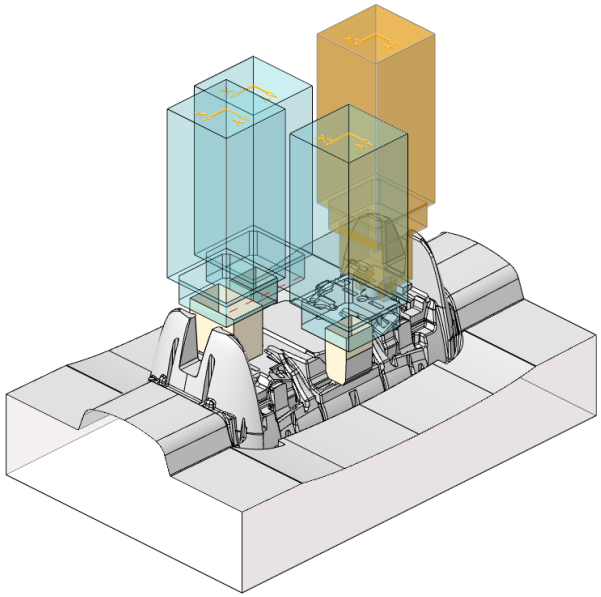






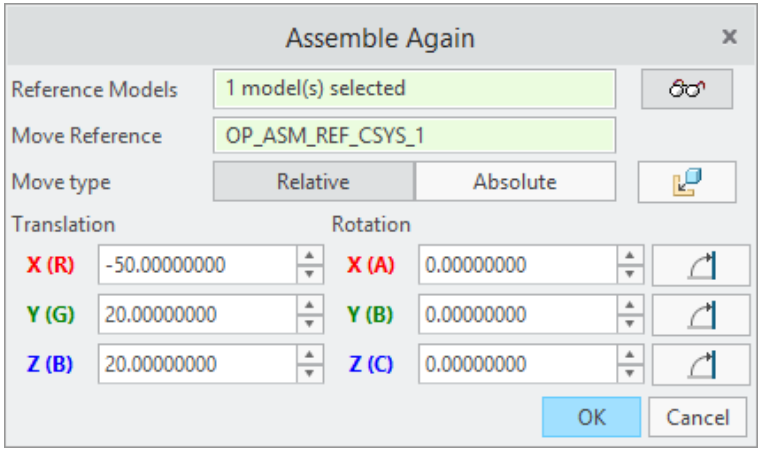
Electrode 2 – Assemble Again

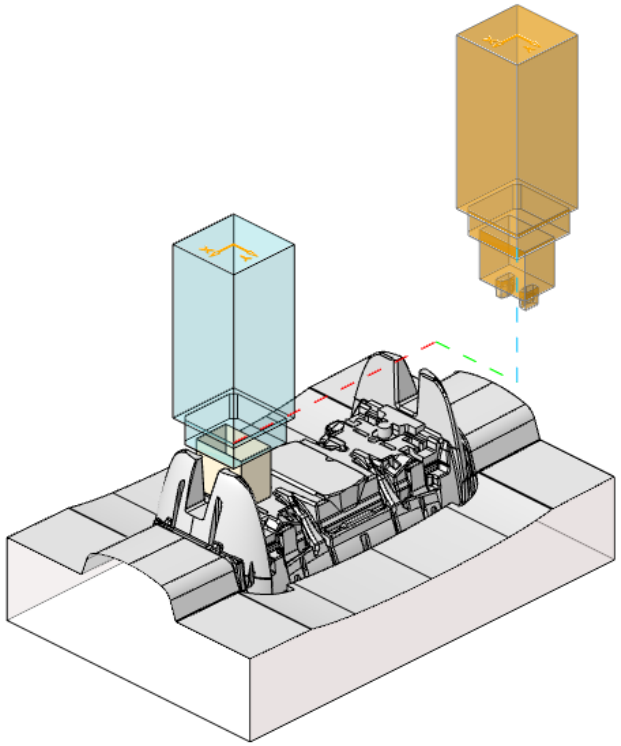




- Select electrode
- Select ‚Assemble again‘
- Switch to ‚absolute‘ movement
- Change sign at X-position
- Confirm with OK

Description - Assemble Again

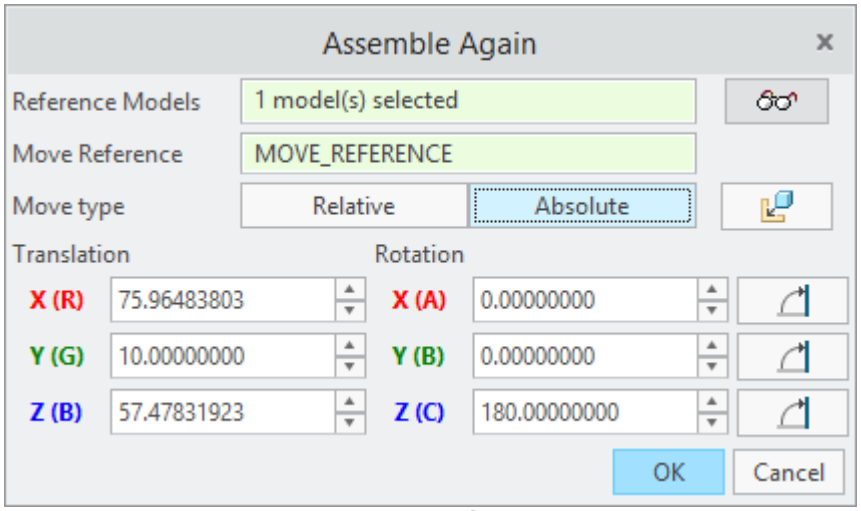


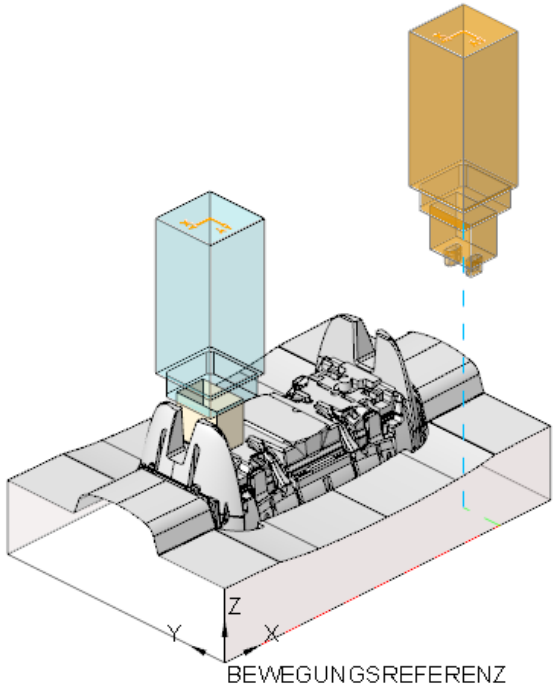


Relative Movement

Movement regarding current position of the Electrode

Description - Assemble Again

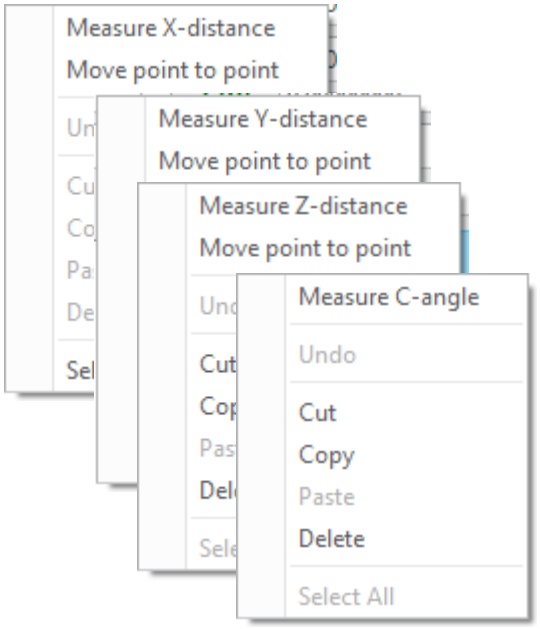




Absolute Movement

- Movement with respect to selectable zero
- Operation zero pre-selected

Description - Assemble Again



Measurement

- **Move by X / Y / Z distance**
- **Move from point to point**
- **Align surface of base with other surface → set C-angle**

Agenda

- Comparison and compatibility with SE 7.0
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  - Assembly Mode
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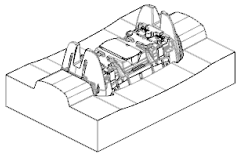
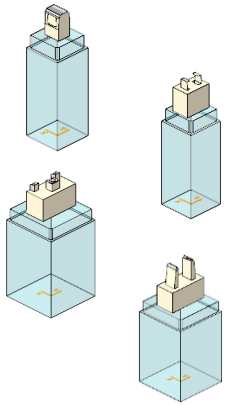
  - Preparation
  - Set Zero
  - Electrode 1
  - Electrode 2
  - **Electrode 3**
  - Electrode 4

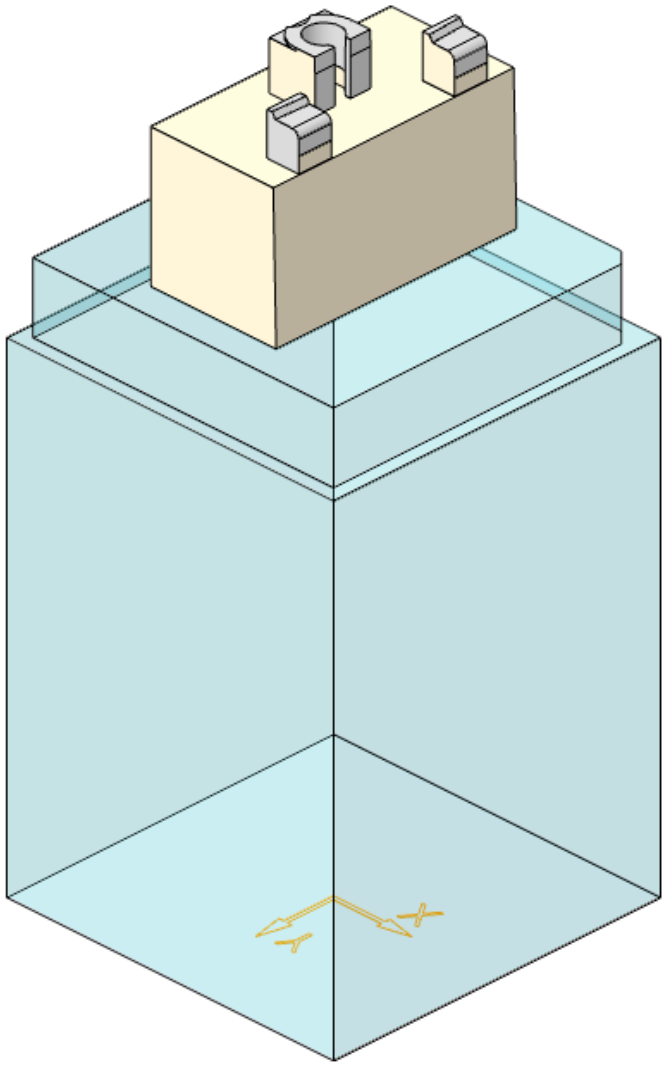




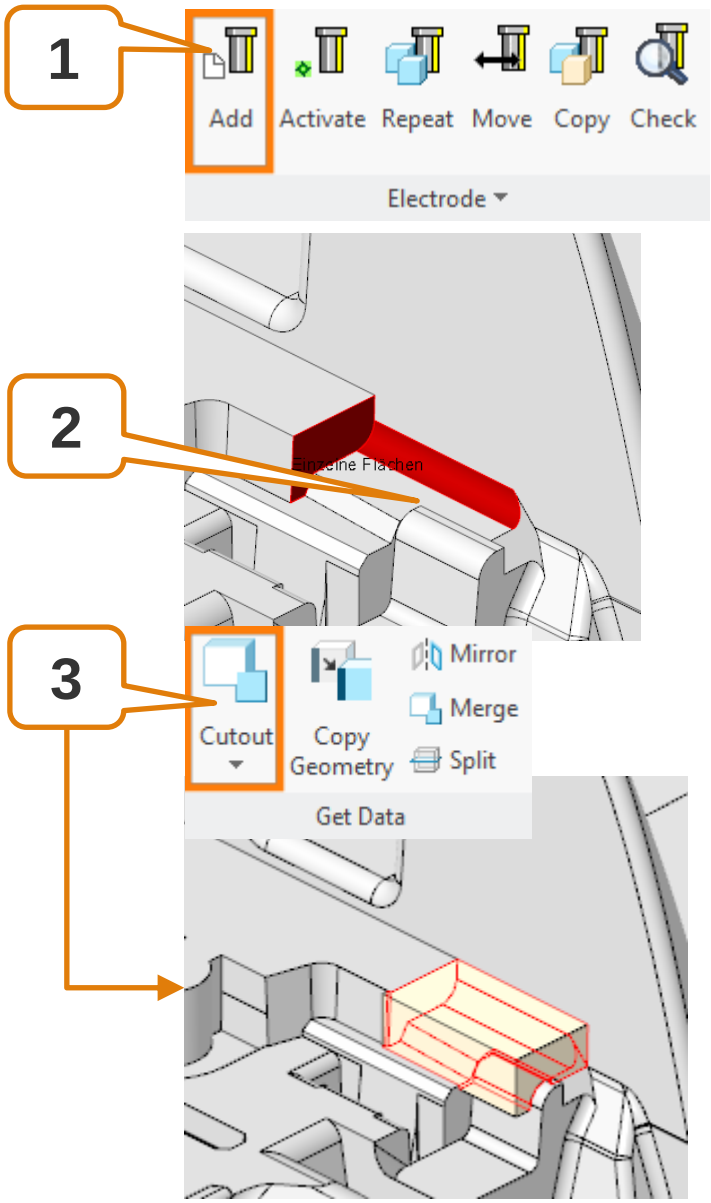
Electrode 3

Topics…

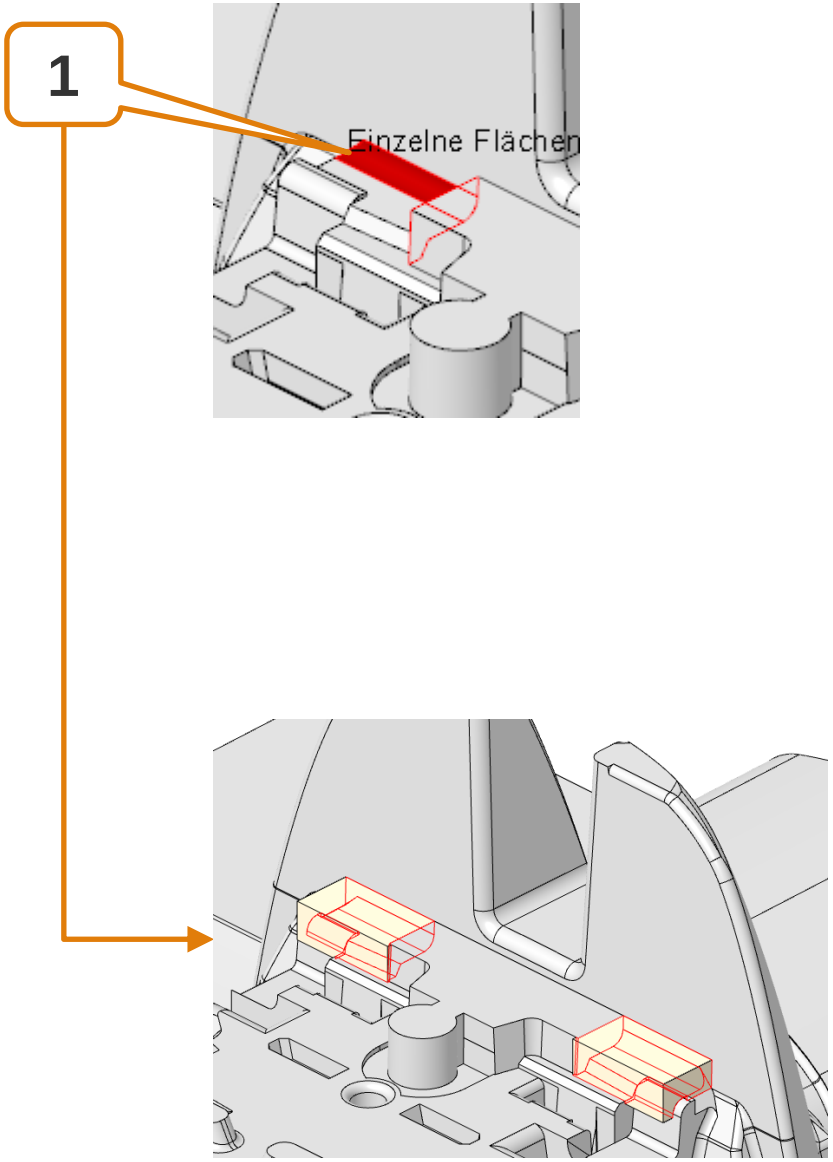
- **Several cutous**
- **Replace with external reference**



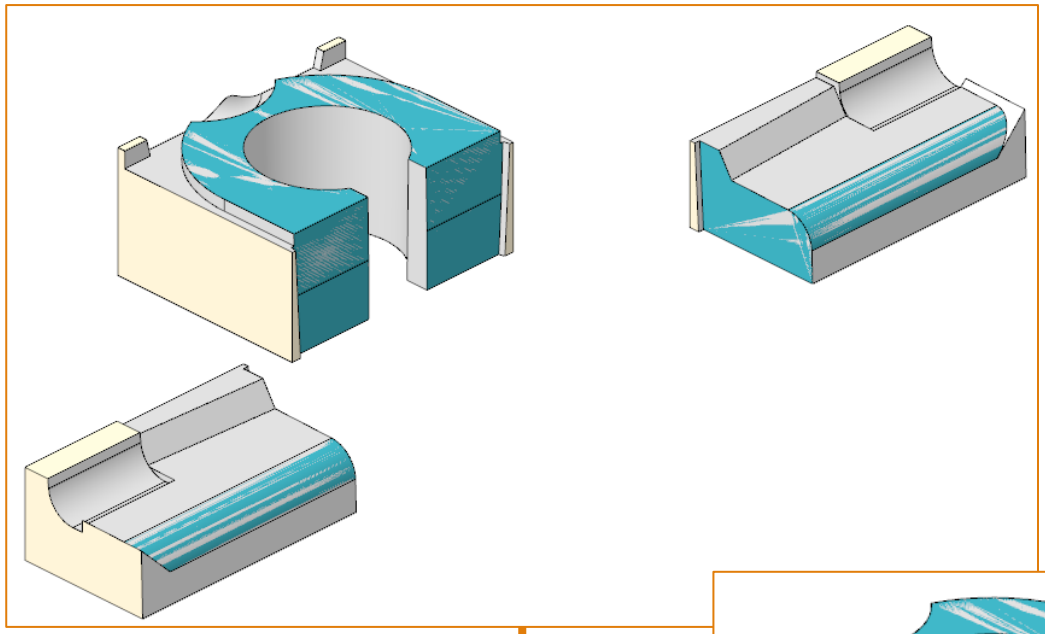
Electrode 3 – Get Data

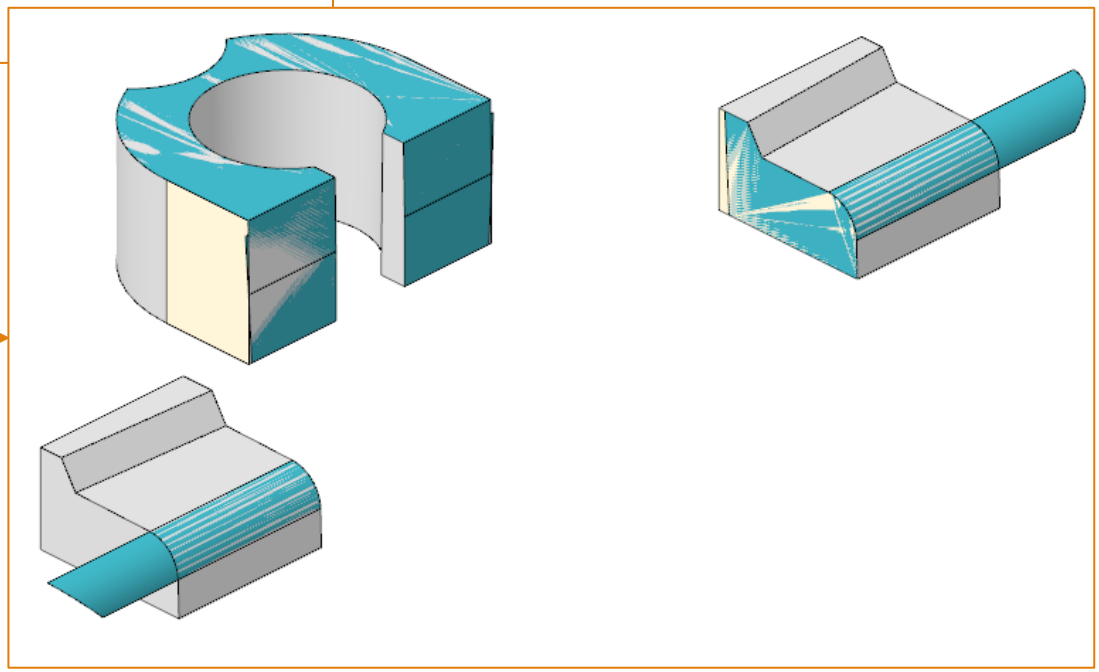


Electrode 3 – Get Data

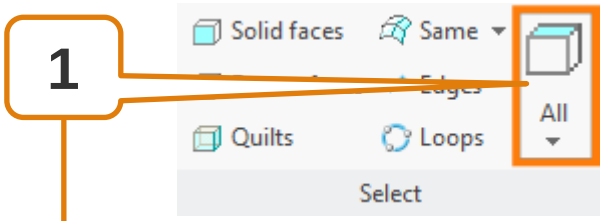


Electrode 3 – Detailing





Electrode 3 – Attach with support



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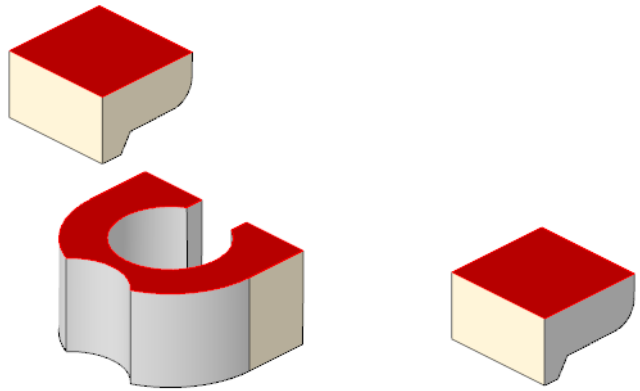

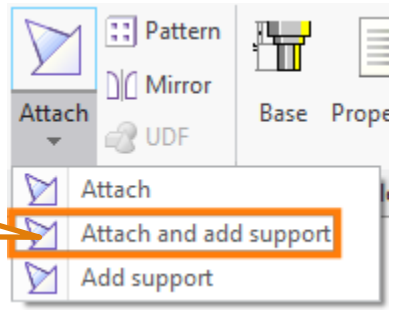

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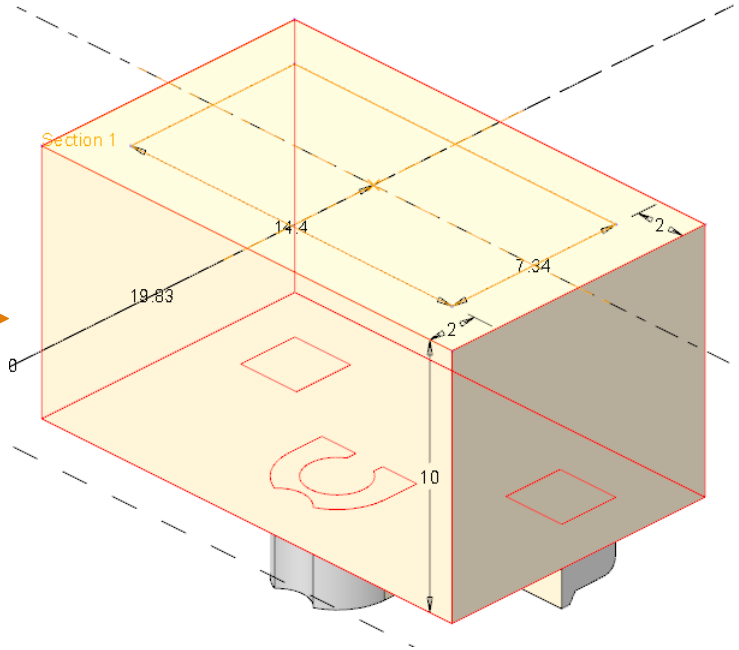
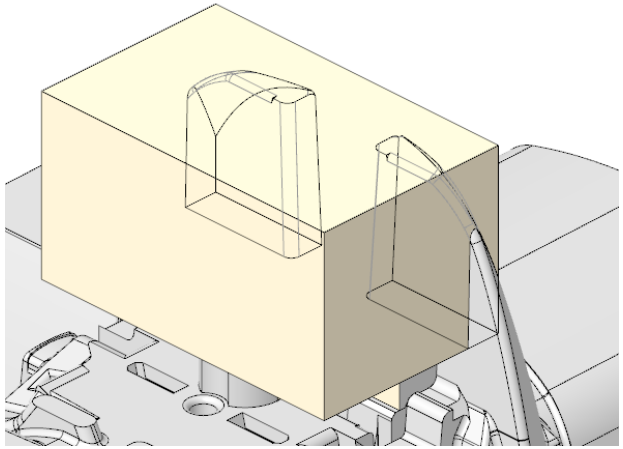
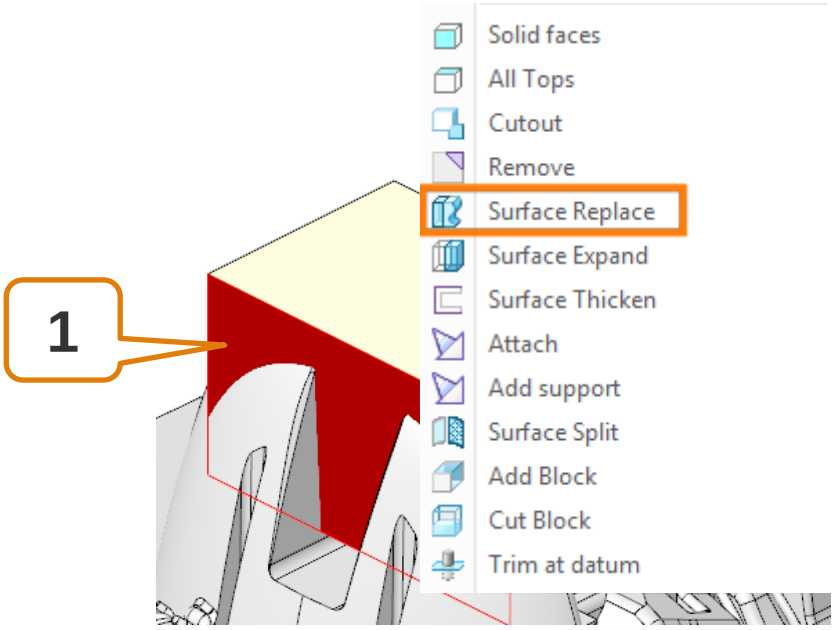
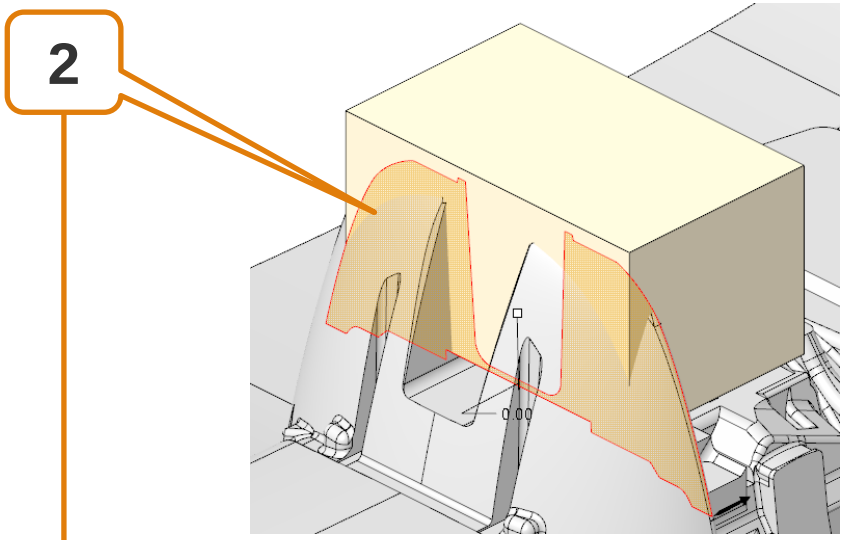
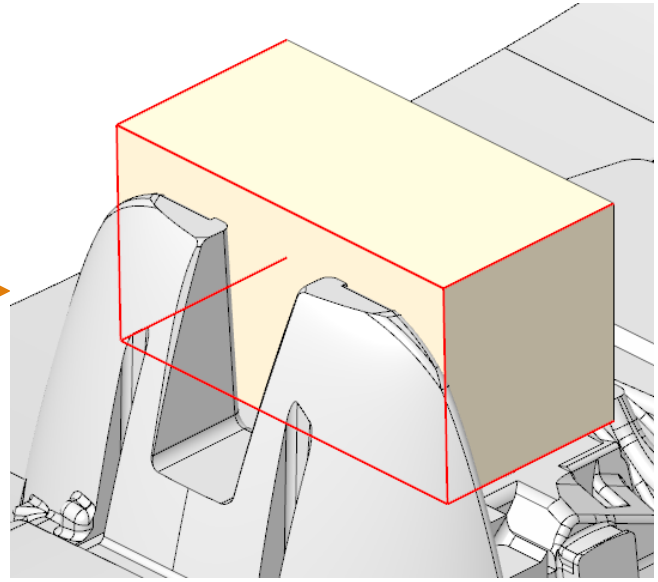


Electrode 3 – Replace at external reference

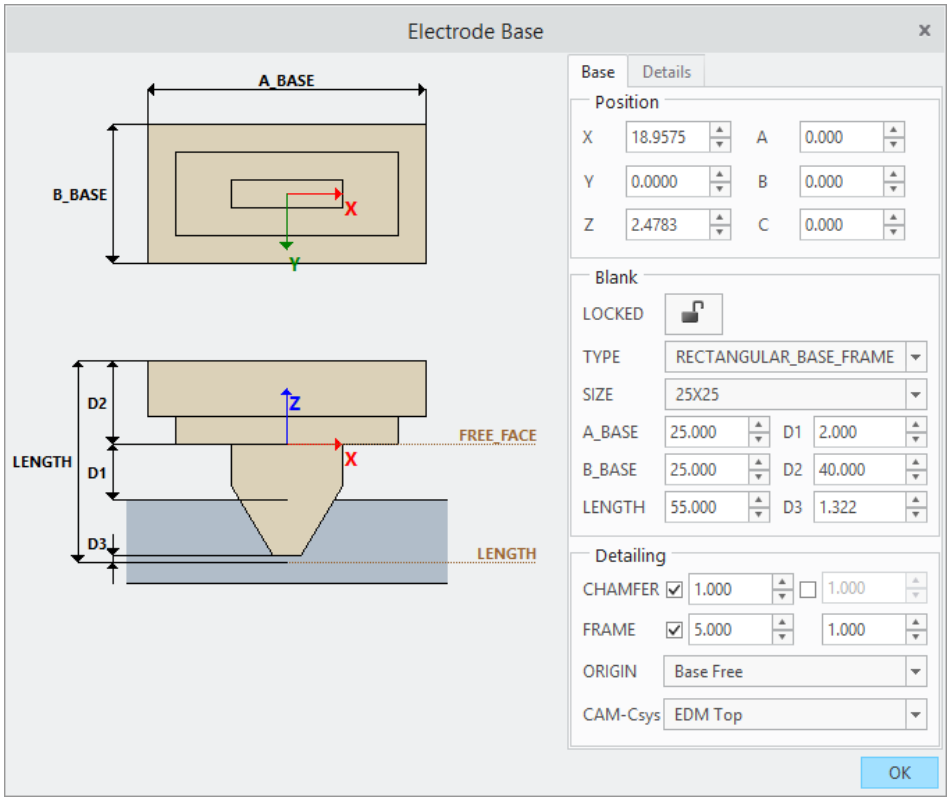


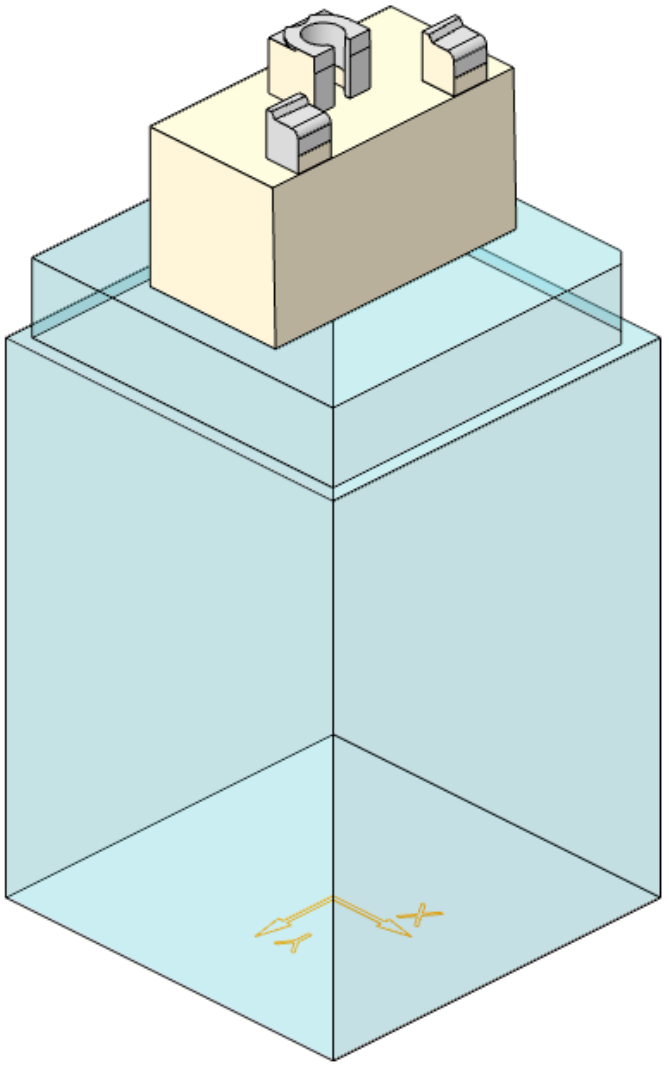






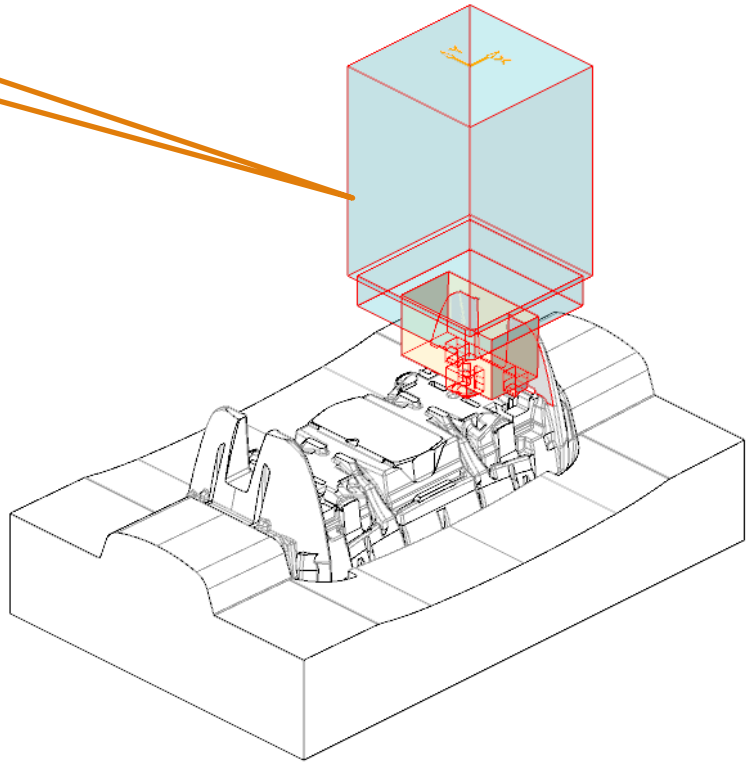
Electrode 3 – Finish





Electrode 3 – Assemble Again

1



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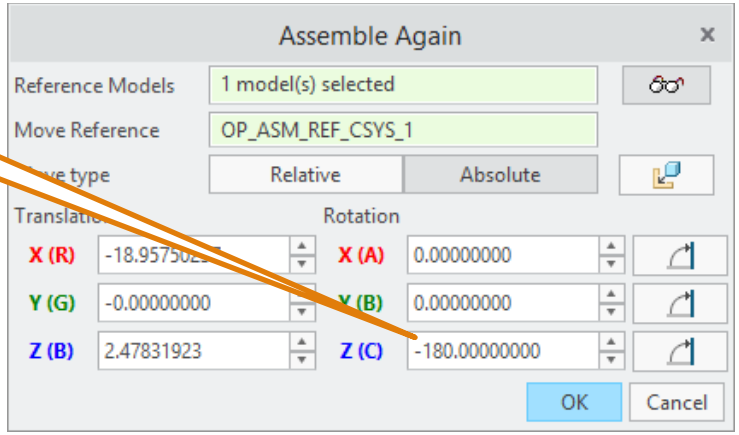

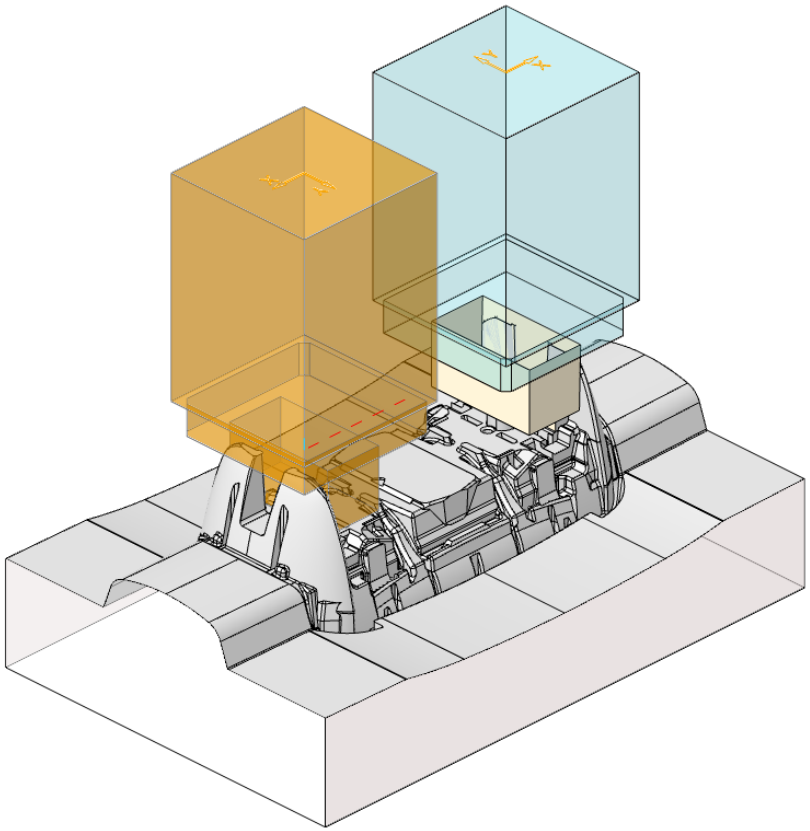

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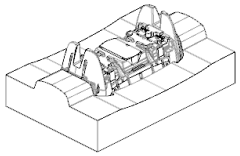
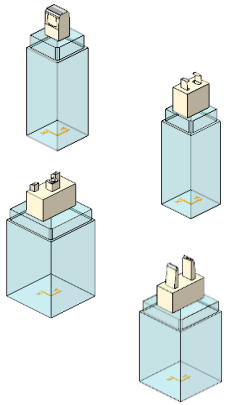
  - **Electrode 4**

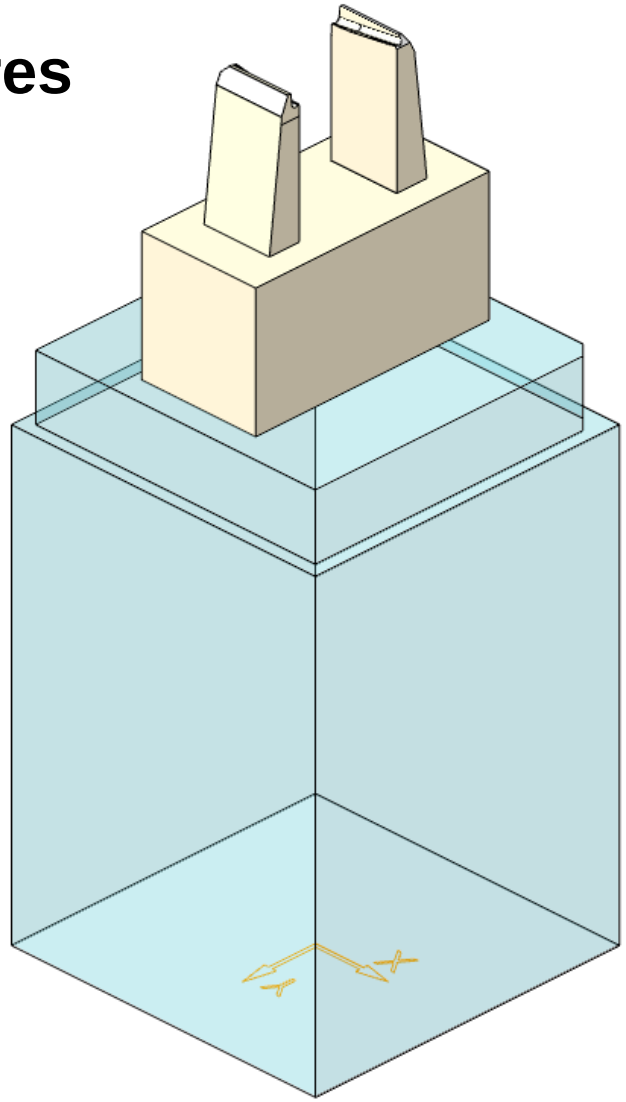




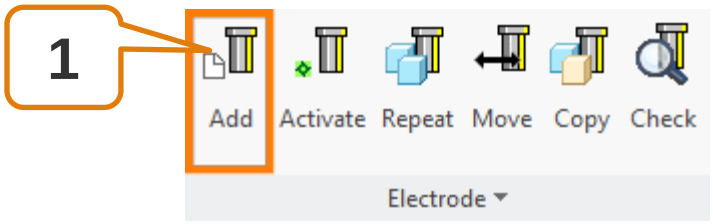
Electrode 4

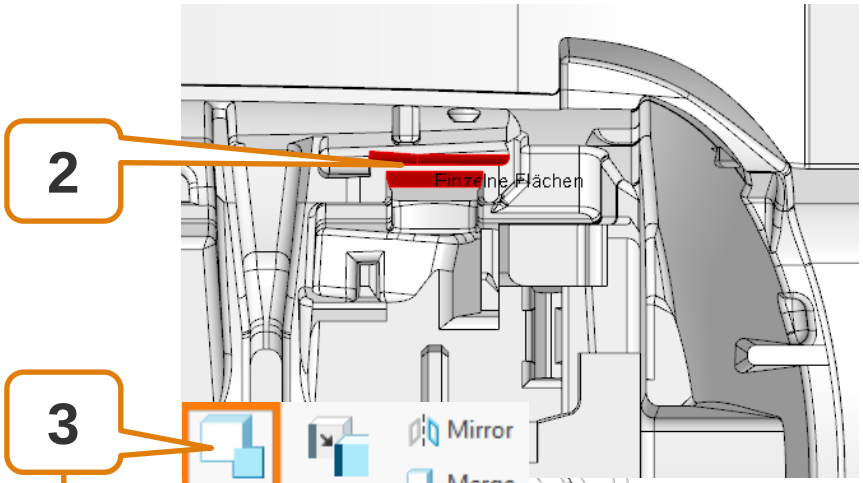
Topics…

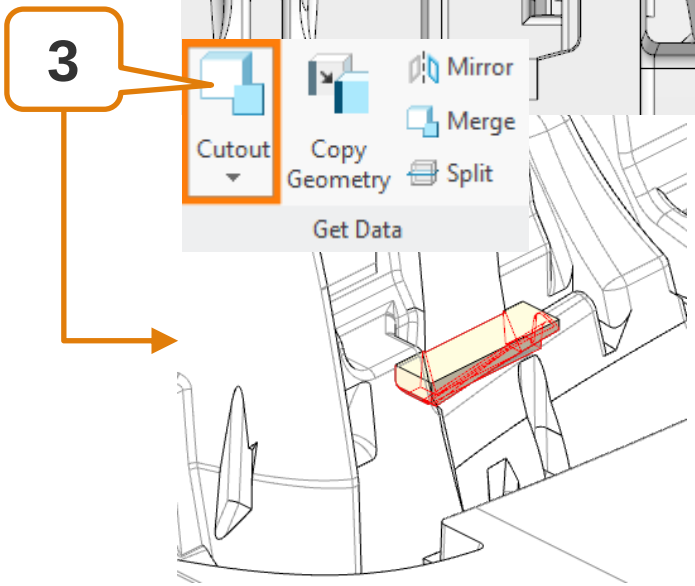
- **Mix SE commands and Creo features**
- **Command ‚Cut Block ‘**
- **Create geometry pattern**



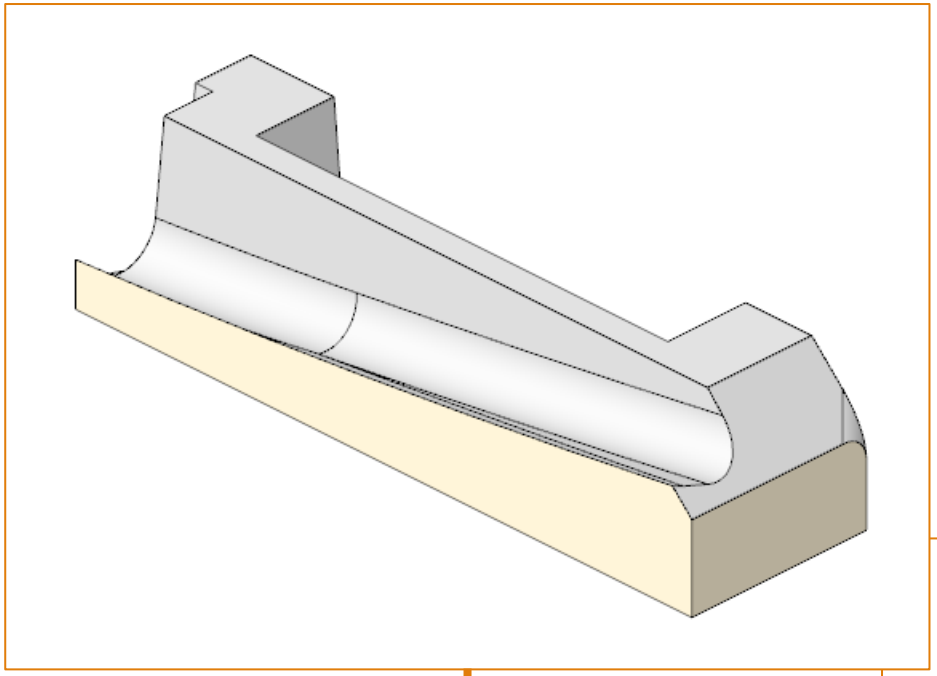
Electrode 4 – Get Data

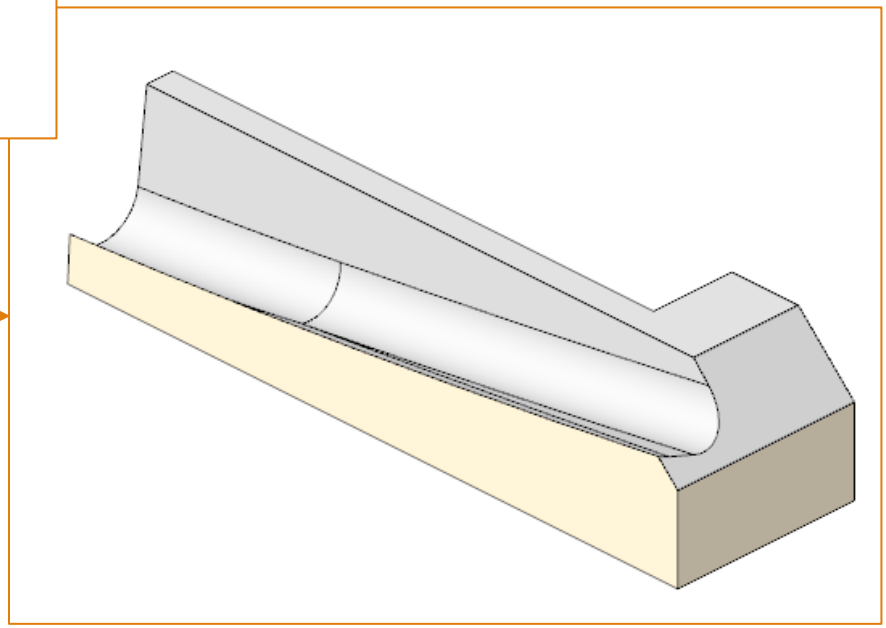




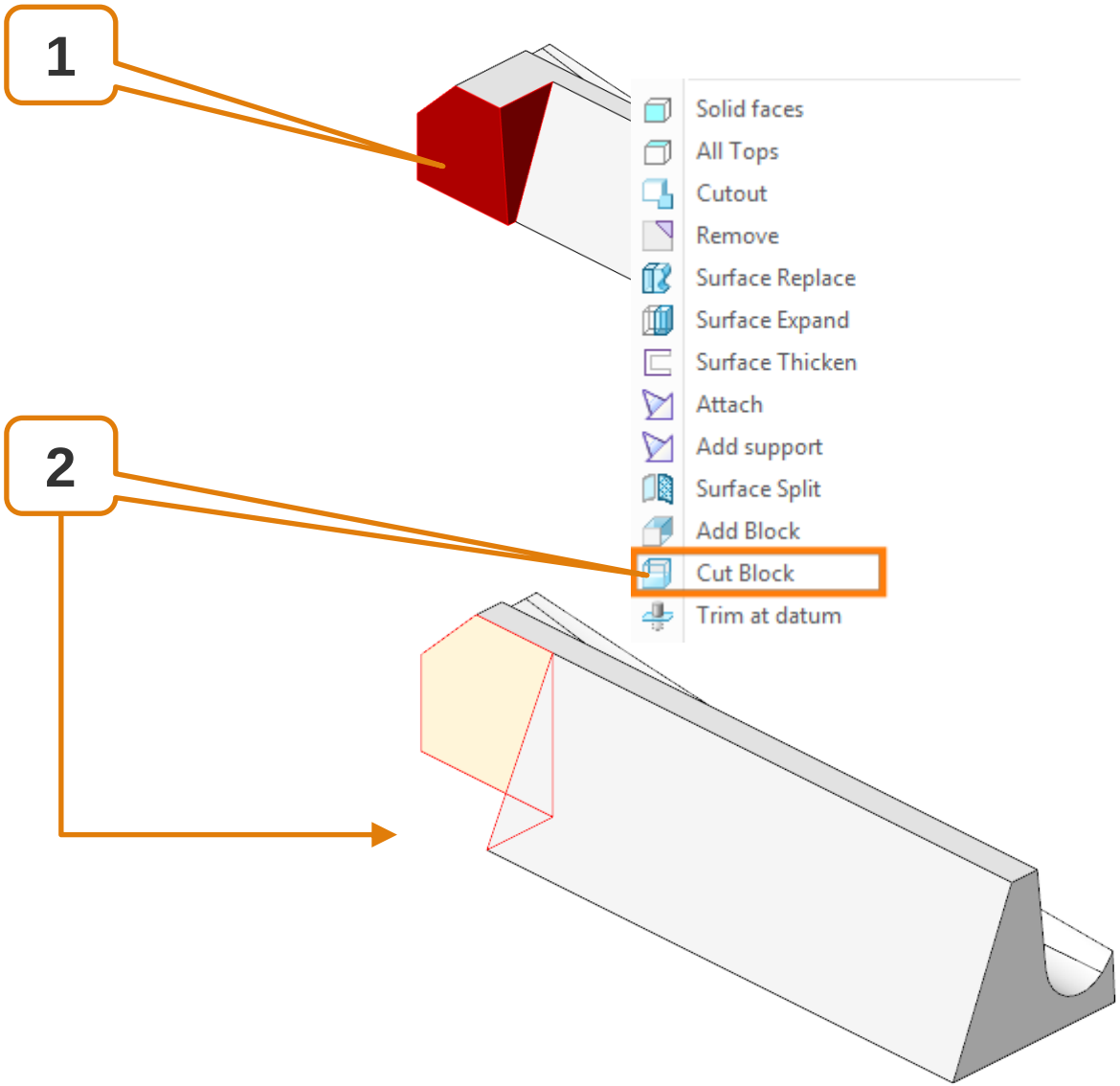


Electrode 4 – Detailing



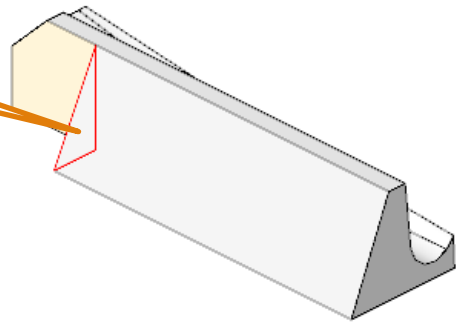


Electrode 4 – Detailing



Electrode 4 – Detailing

1



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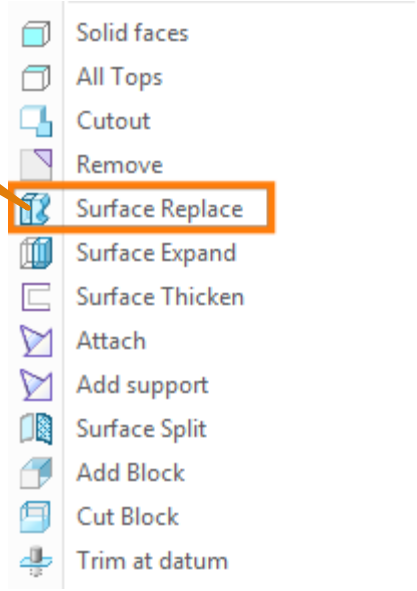

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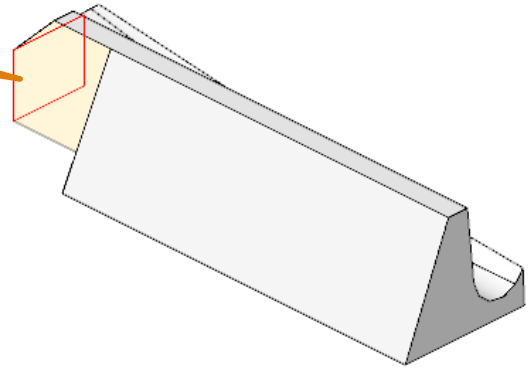
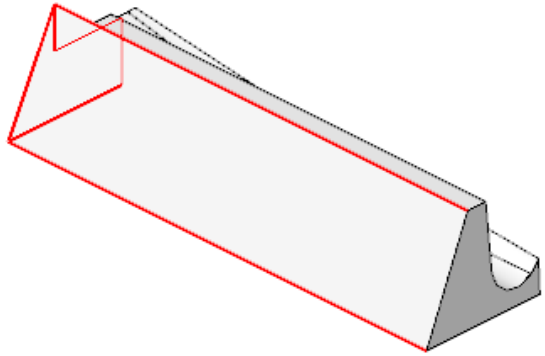
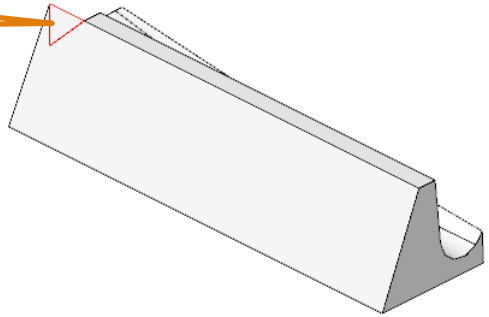


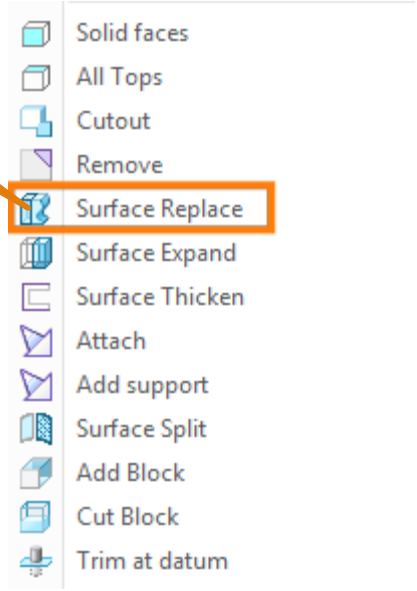


Electrode 4 – Detailing

1



2



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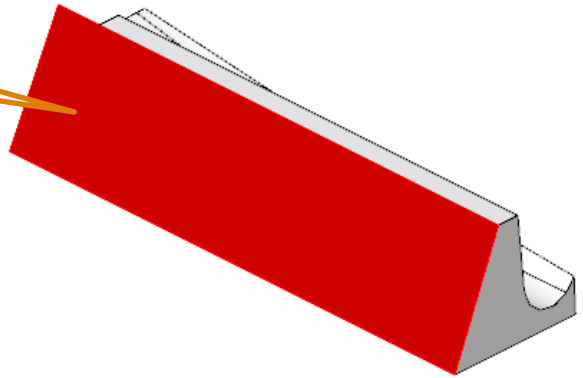
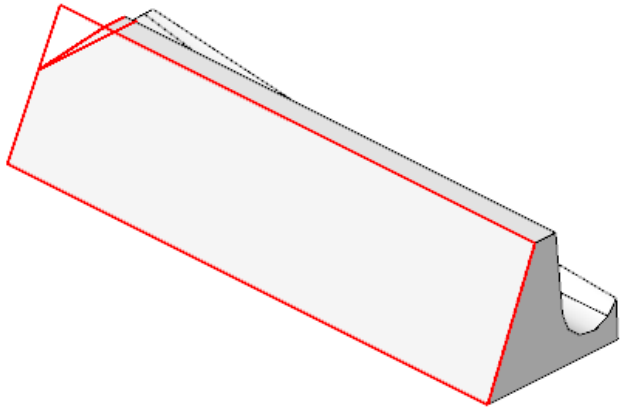
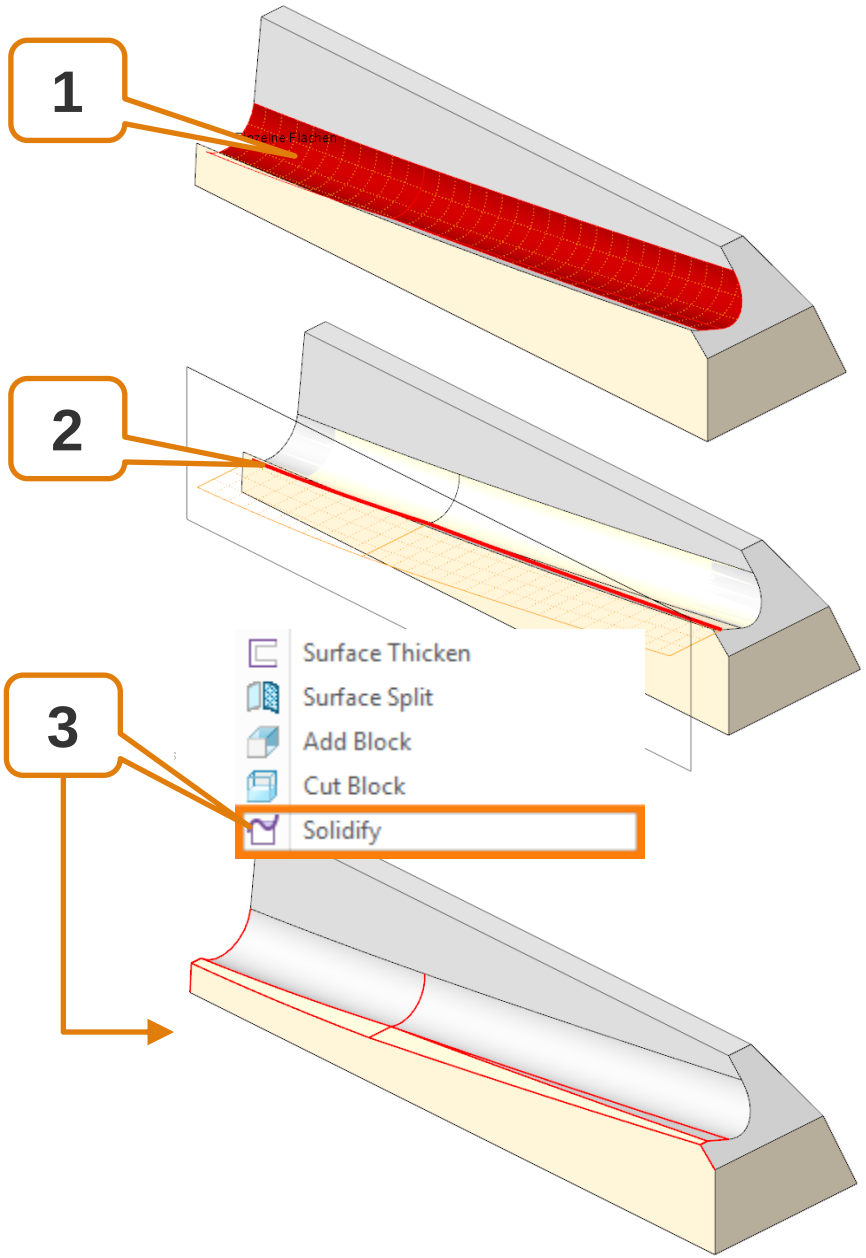


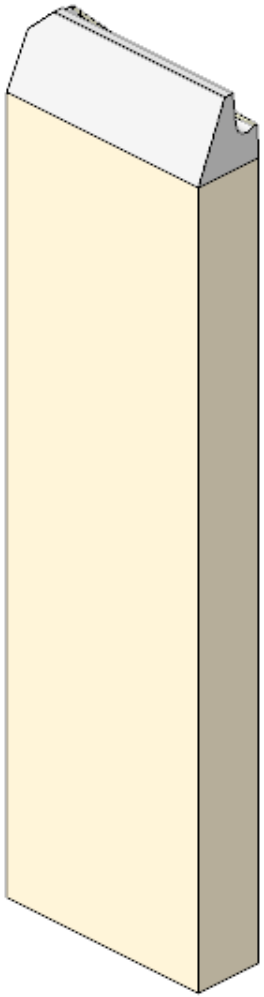


Electrode 4 – Surface Modeling



- Copy surfaces
- Extend quilt at contour
- Replace with quilt (solidify)

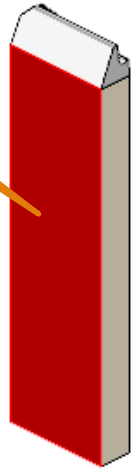
Electrode 4 – Detailing



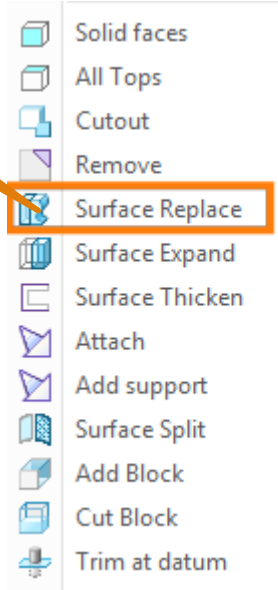
- **Attach solid**

Electrode 4 – Detailing

1



2



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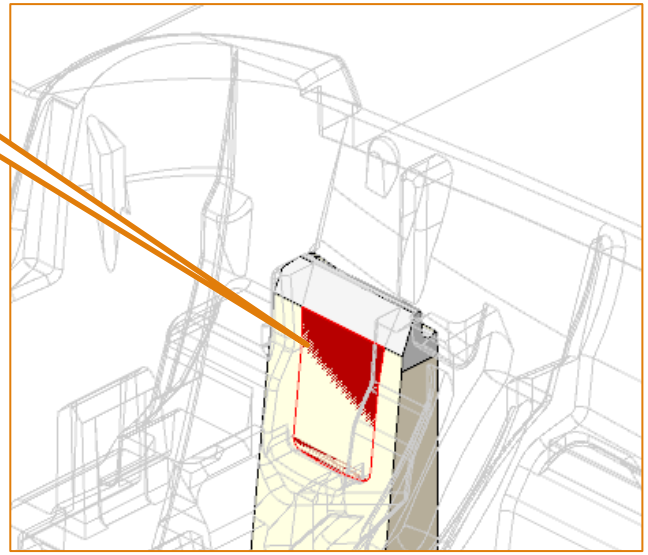
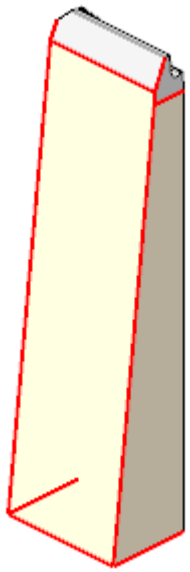
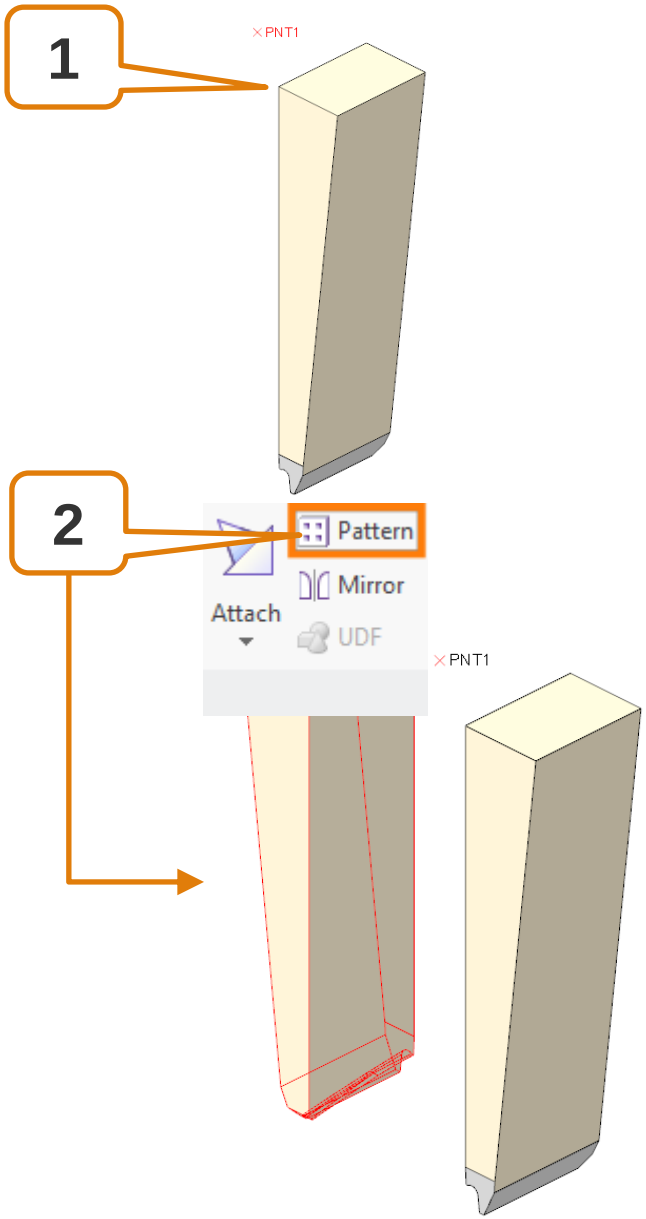




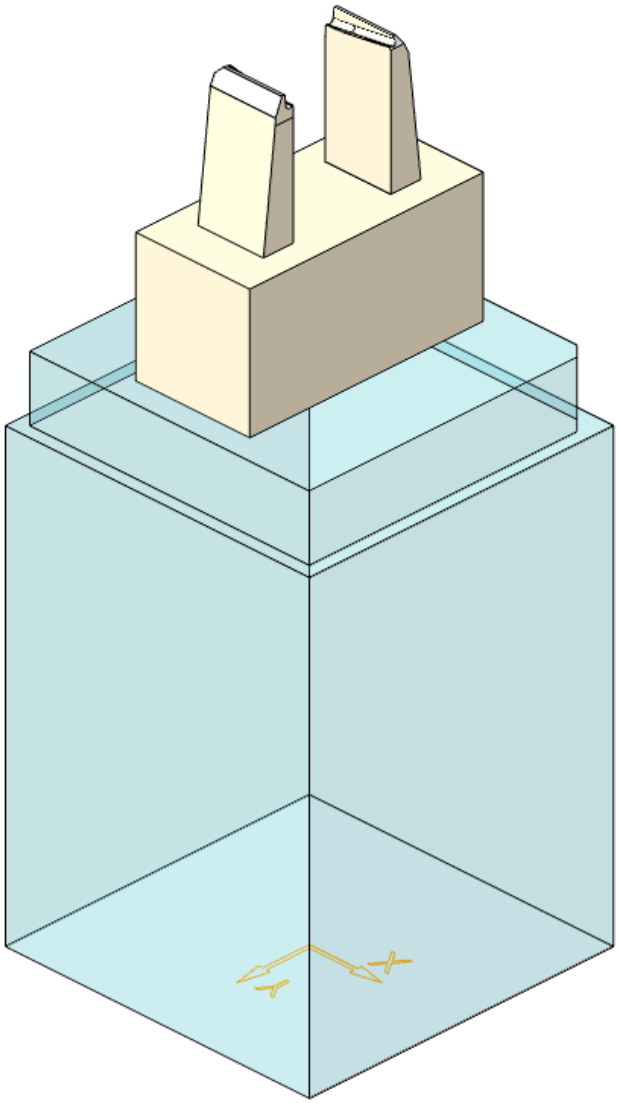
Electrode 4 – Geometriemuster



- **Prepare axis**

- **Create rotated geometry pattern around axis with 180°**

Electrode 4 - Finish

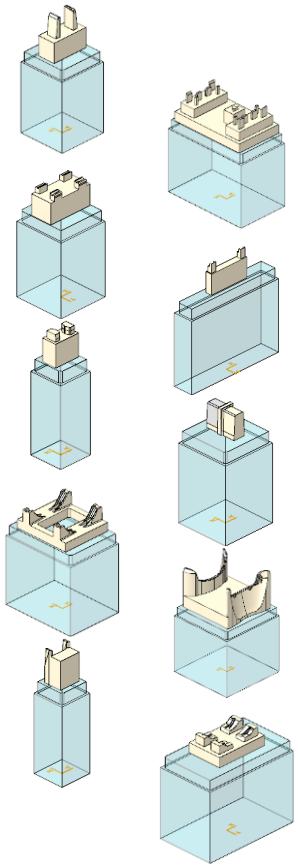


- **Add Base**

Agenda

Training

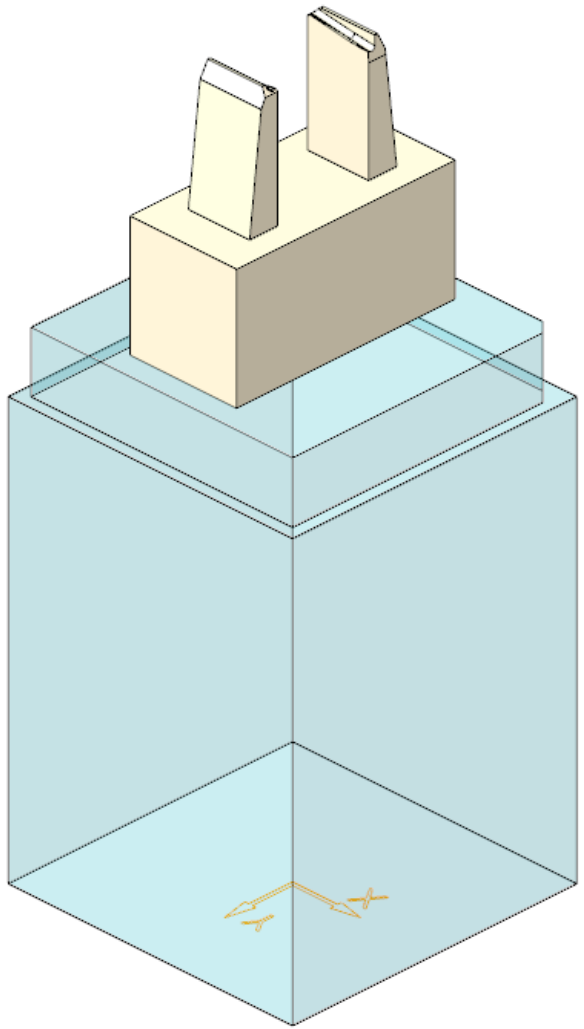
- **Electrode 5**
- Electrode 6
- Electrode 7
- Electrode 8
- Electrode 9
- Electrode 10
- Electrode 11
- Electrode 12
- Electrode 13
- Electrode 14



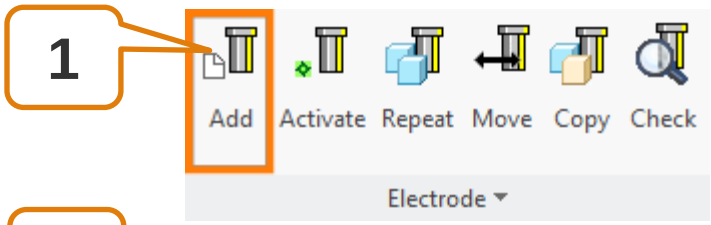
Electrode 5

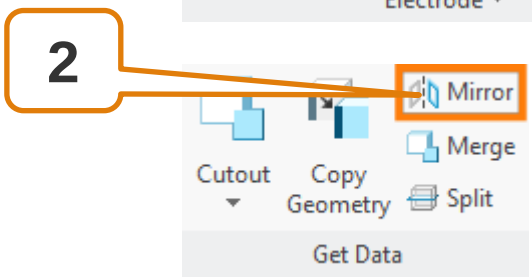
Topics…

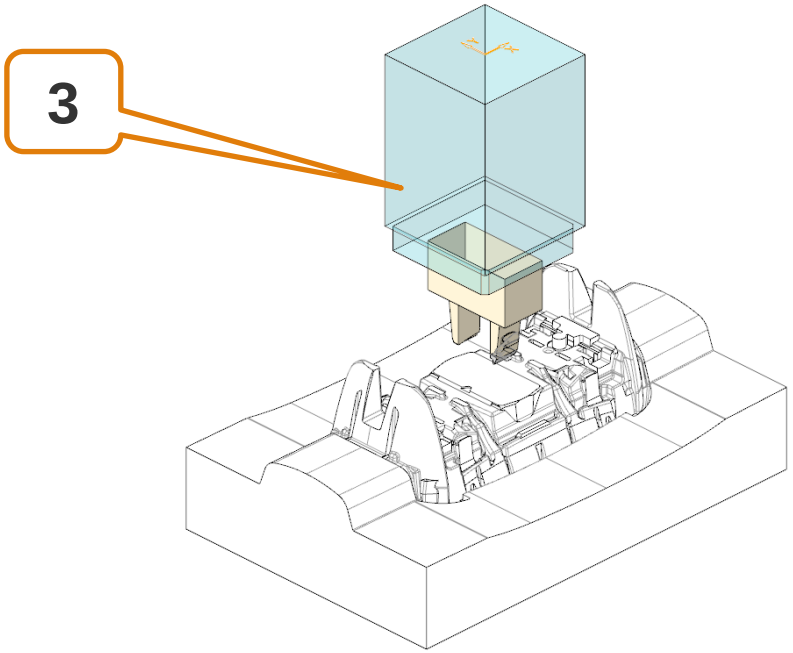
- **Mirror electrode geometry**
- **Assemble again several electrodes**

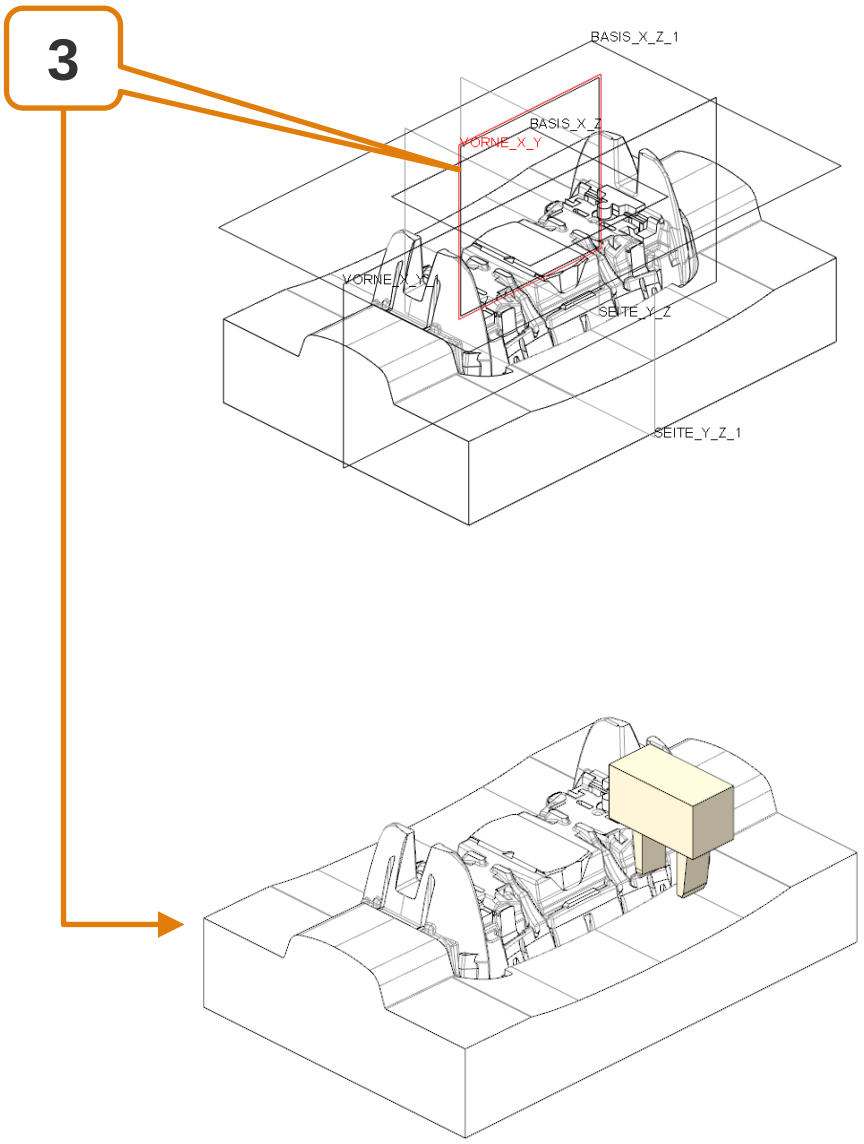


Electrode 5 – Electrode Mirror

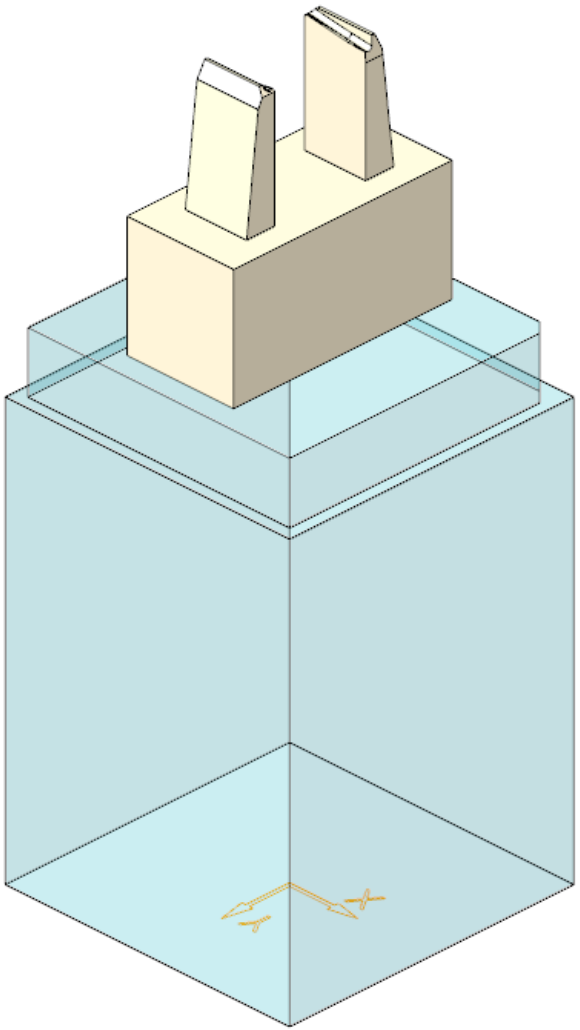








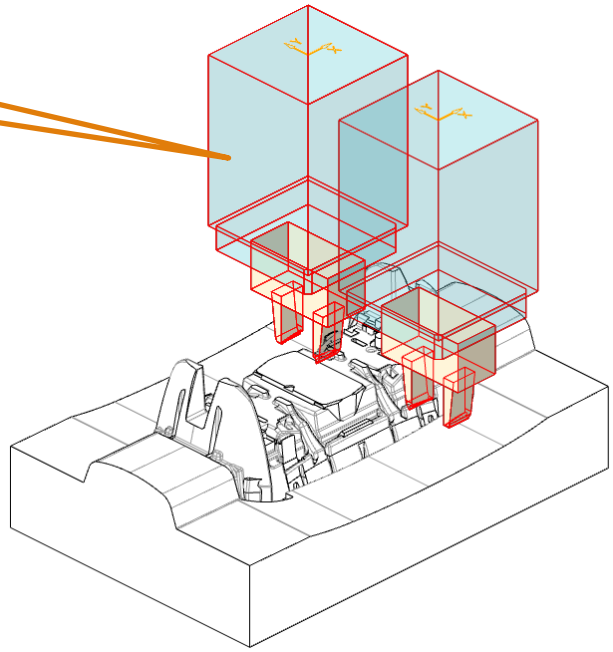
Electrode 5 - Base



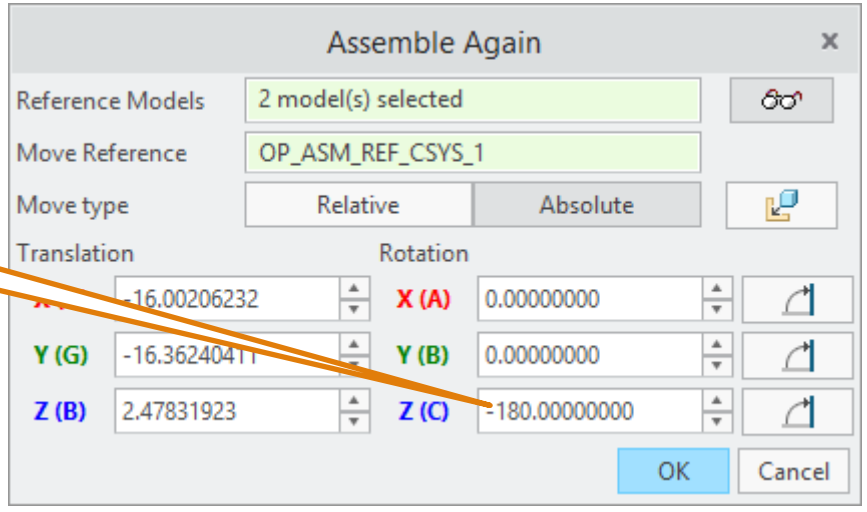
- **Add Base**

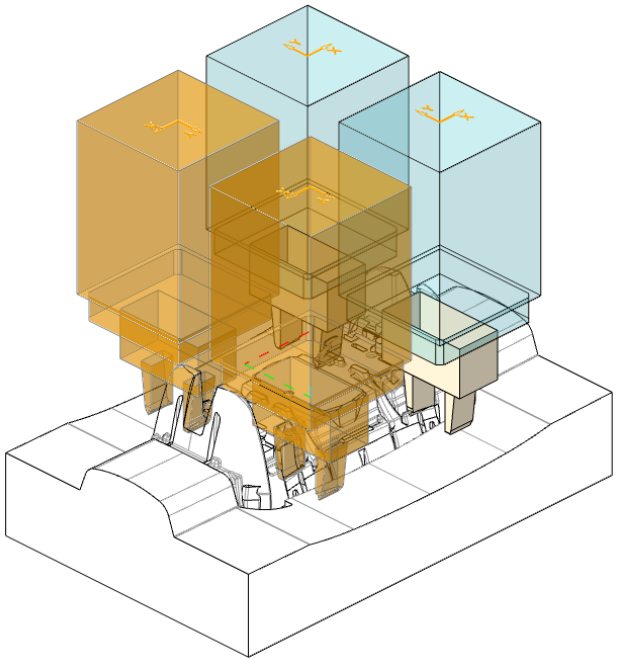
Electrode 4 & 5 – Assemble Again

1

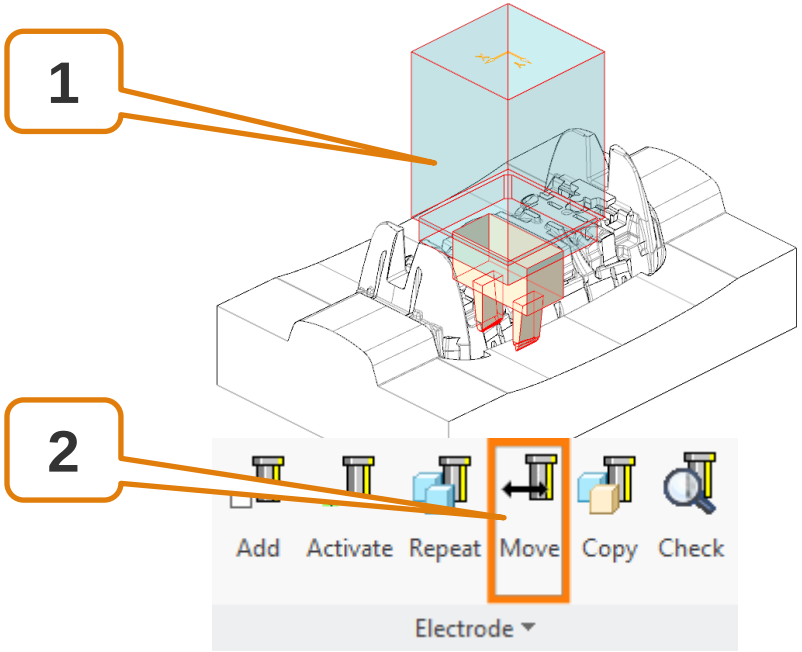


2

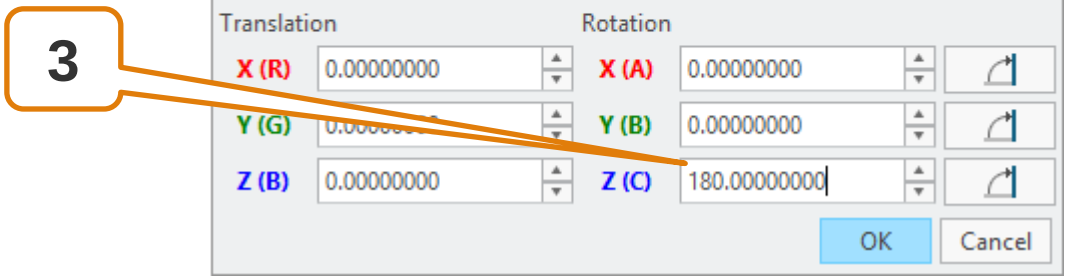




Electrode 4 & 5 – Move



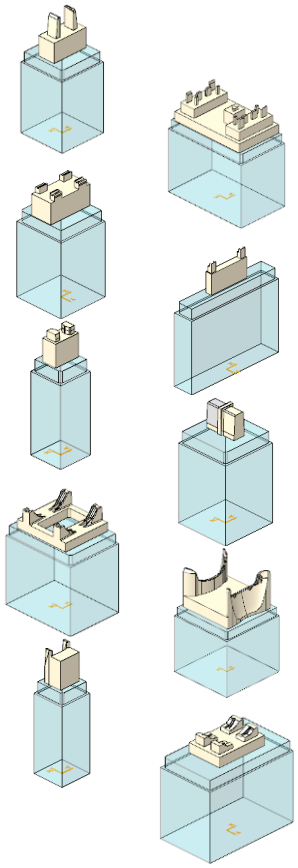
- **Same areas erode after first rotation.**
- **Rotate around EDM origin to use mirrored geometry.**
- **Move electrodes 4 and 5 in succession**



Agenda

Training

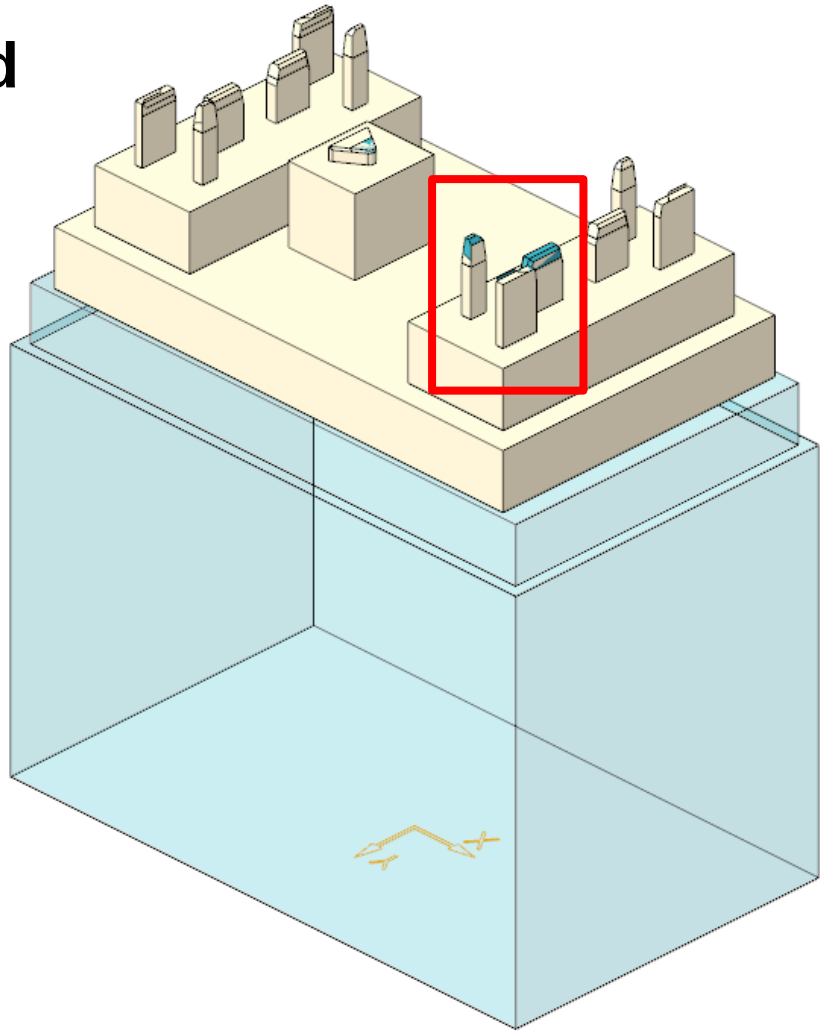
- Electrode 5
- **Electrode 6**
- Electrode 7
- Electrode 8
- Electrode 9
- Electrode 10
- Electrode 11
- Electrode 12
- Electrode 13
- Electrode 14



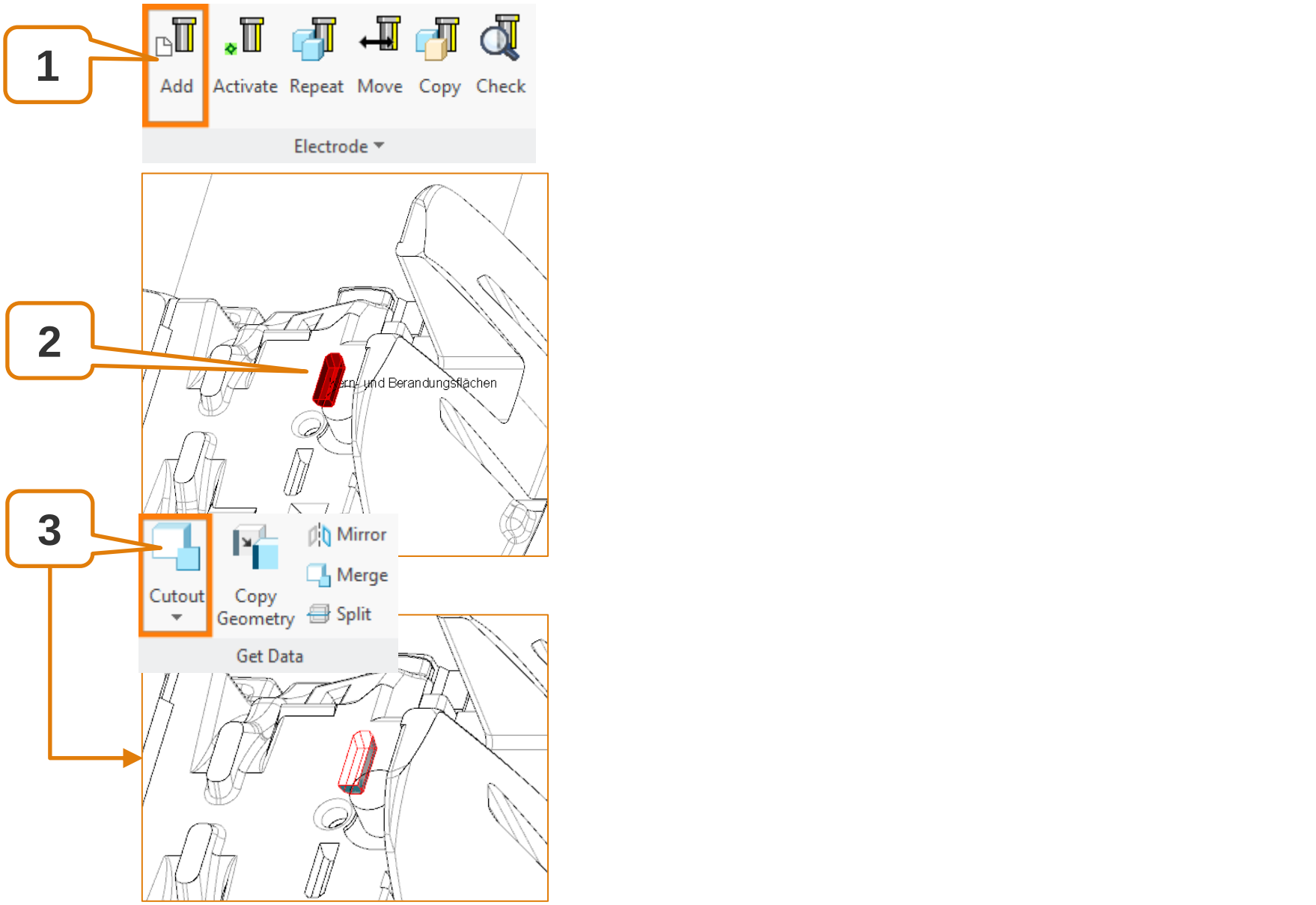
Electrode 6

Topics…

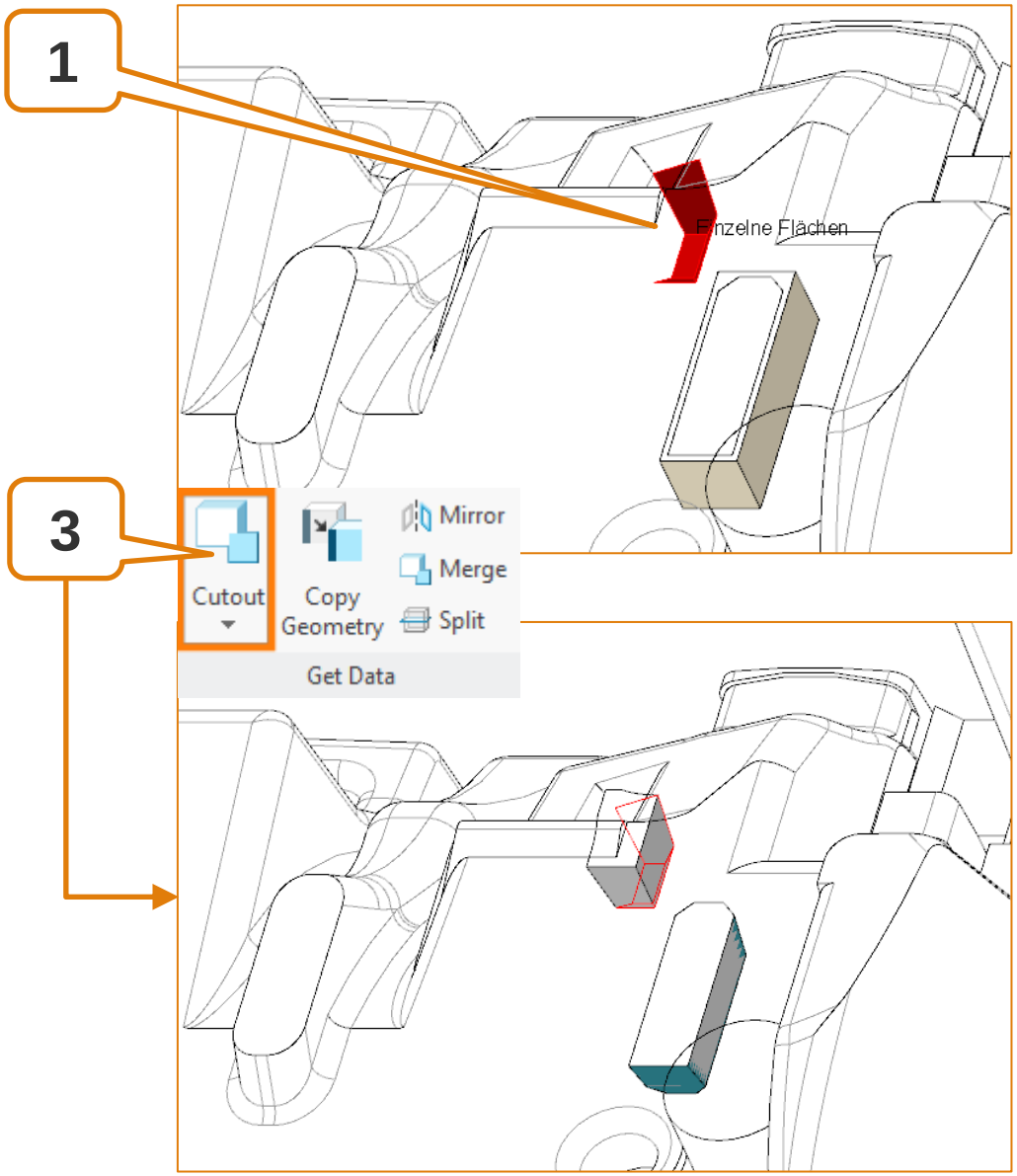
- **Mix solid and surface approach**
- **Mirror several times and add support**



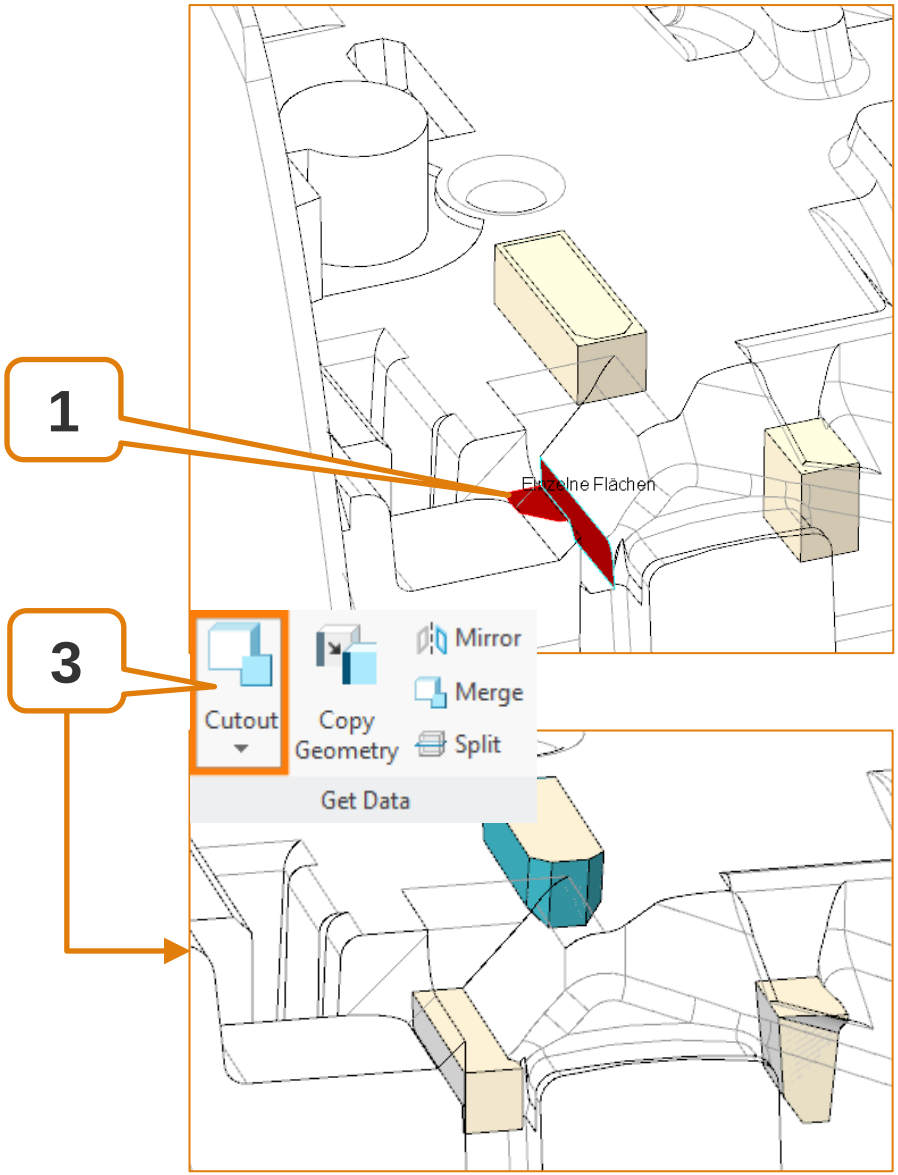
Electrode 6 – 1. Bereich ausschneiden



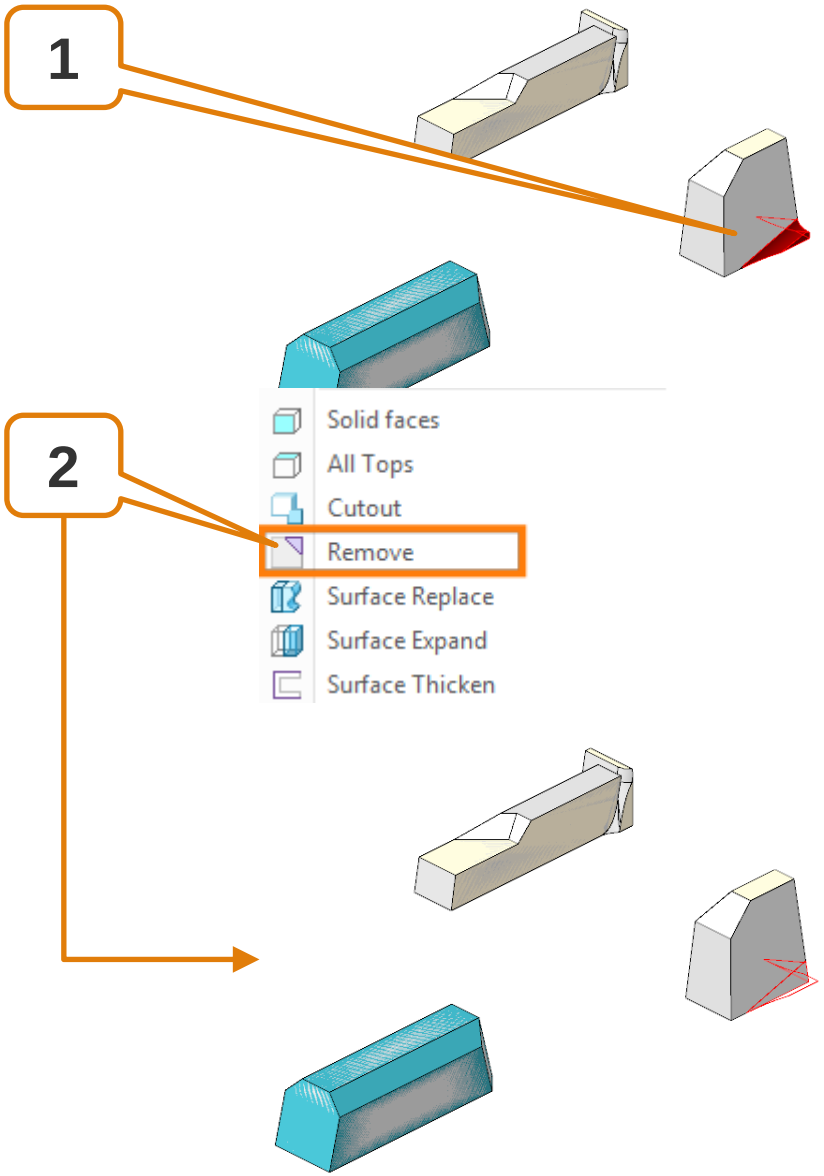
Electrode 6 – 2. Bereich ausschneiden



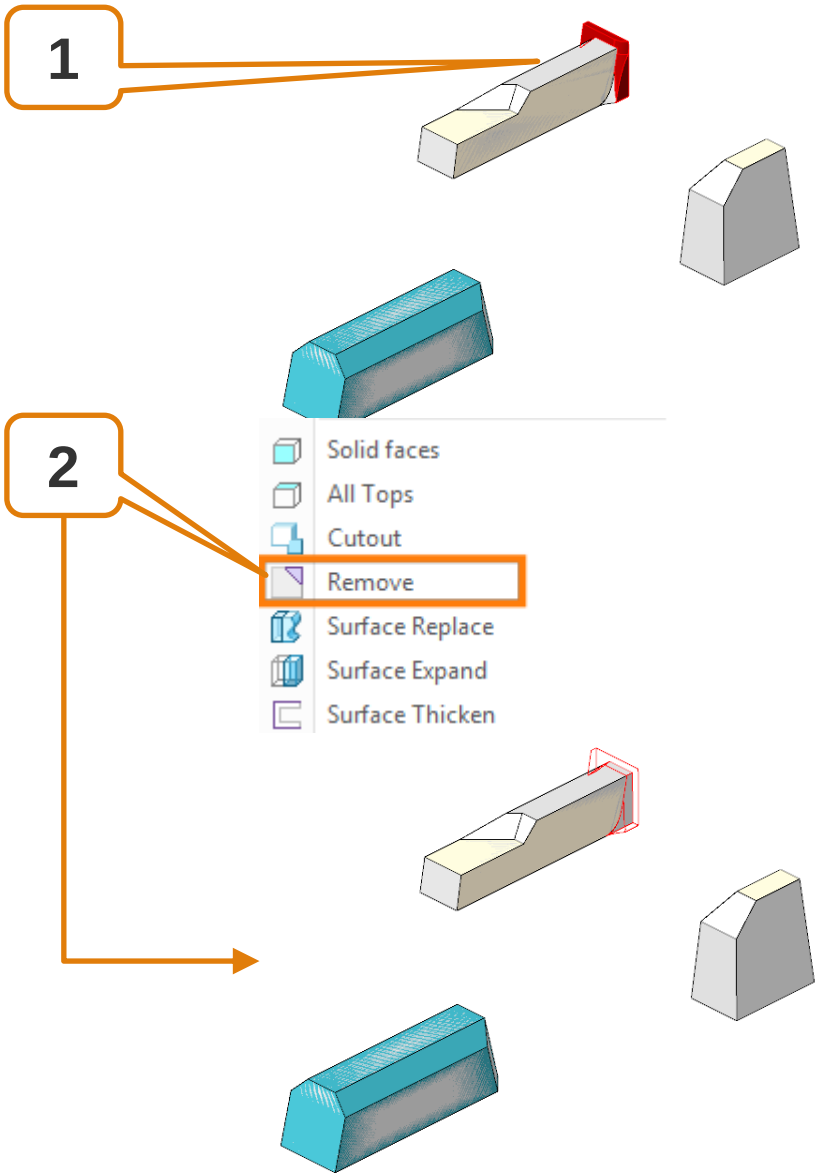
Electrode 6 – 3. Bereich ausschneiden



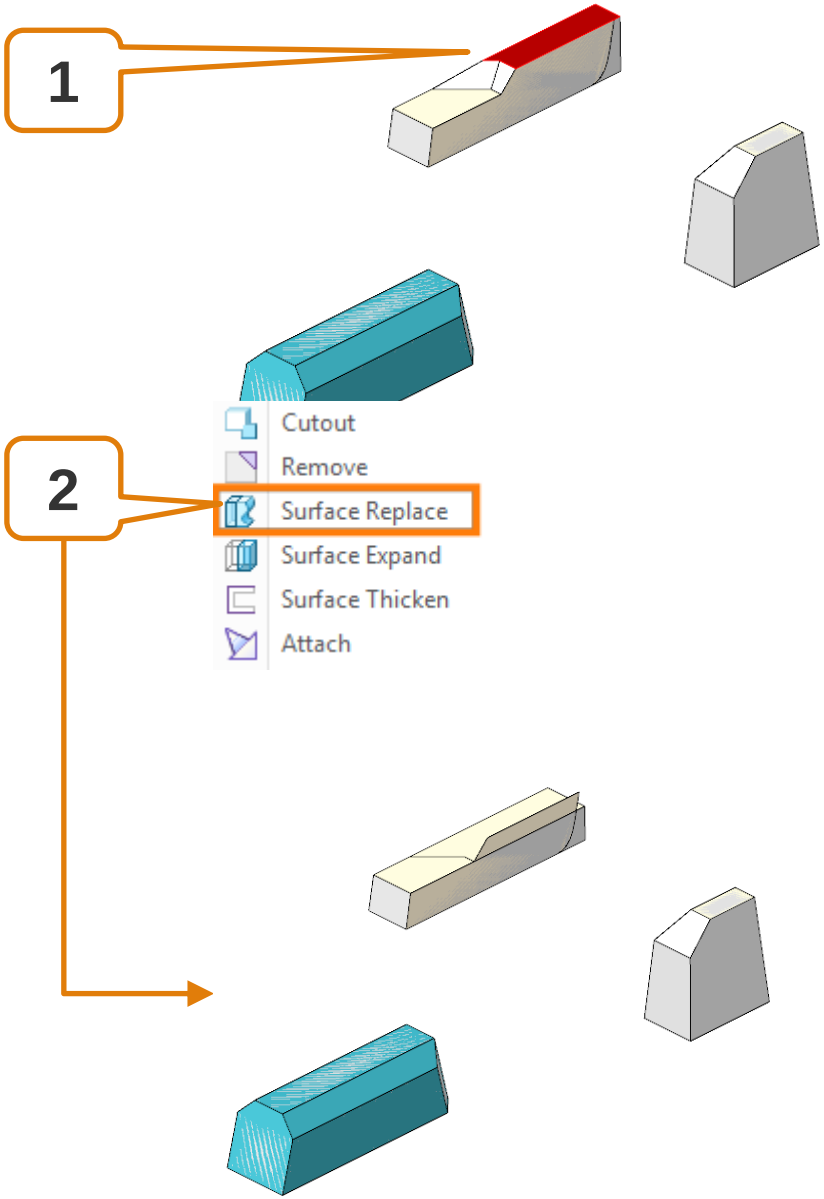
Electrode 6 – Detailing



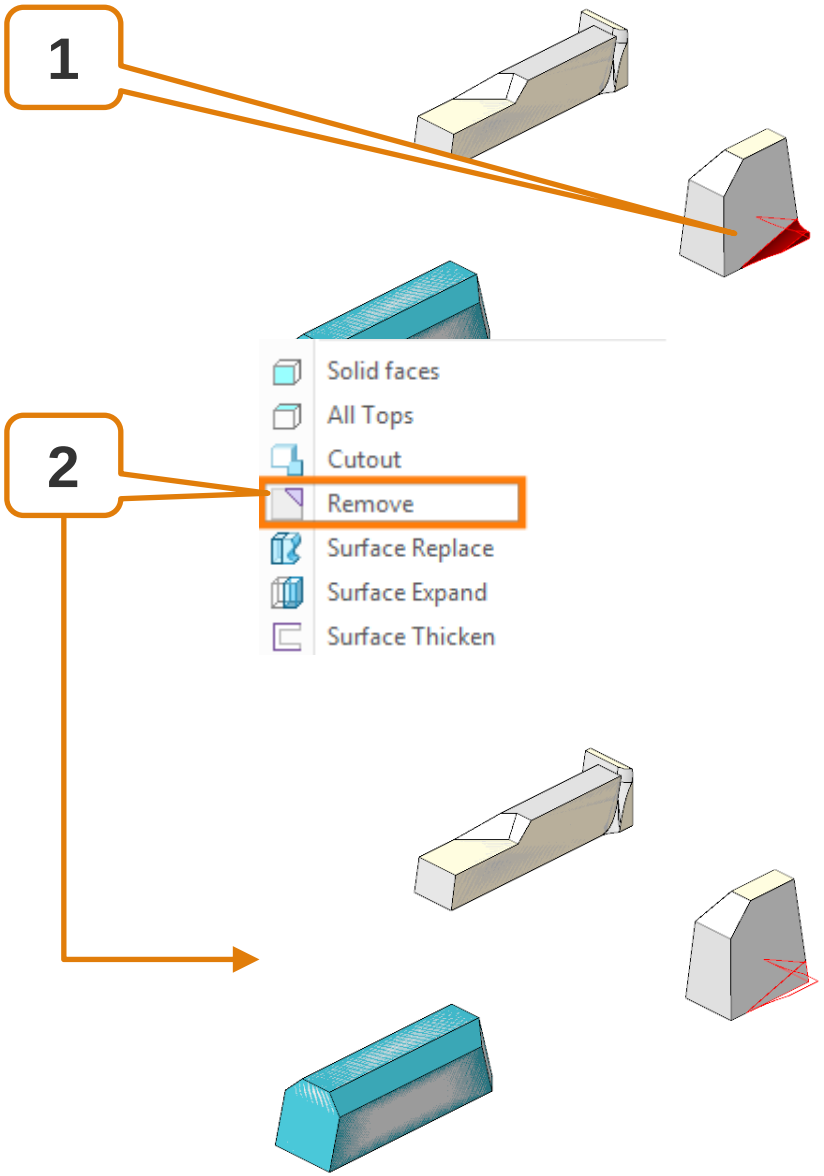
Electrode 6 – Detailing



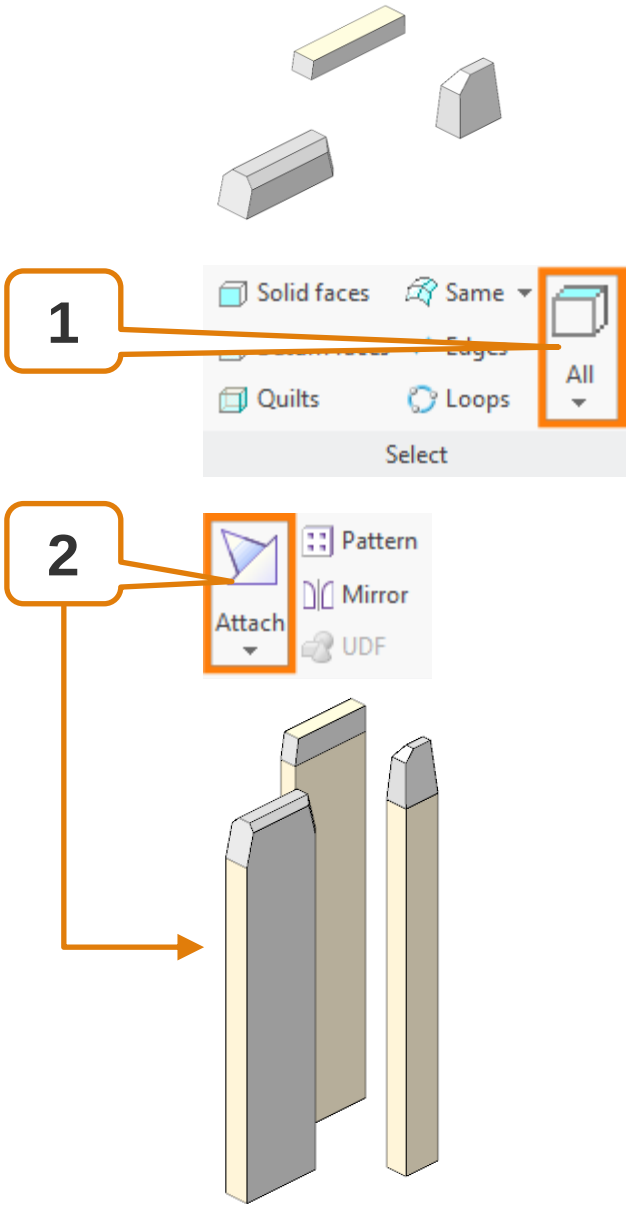
Electrode 6 – Detailing



Electrode 6 – Detailing

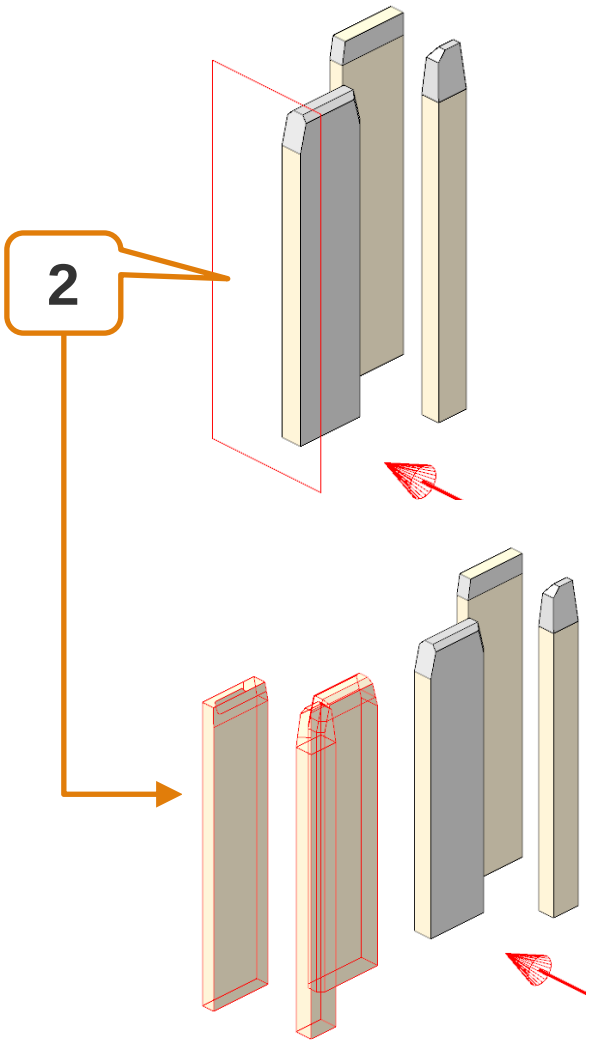


Electrode 6 - Attach

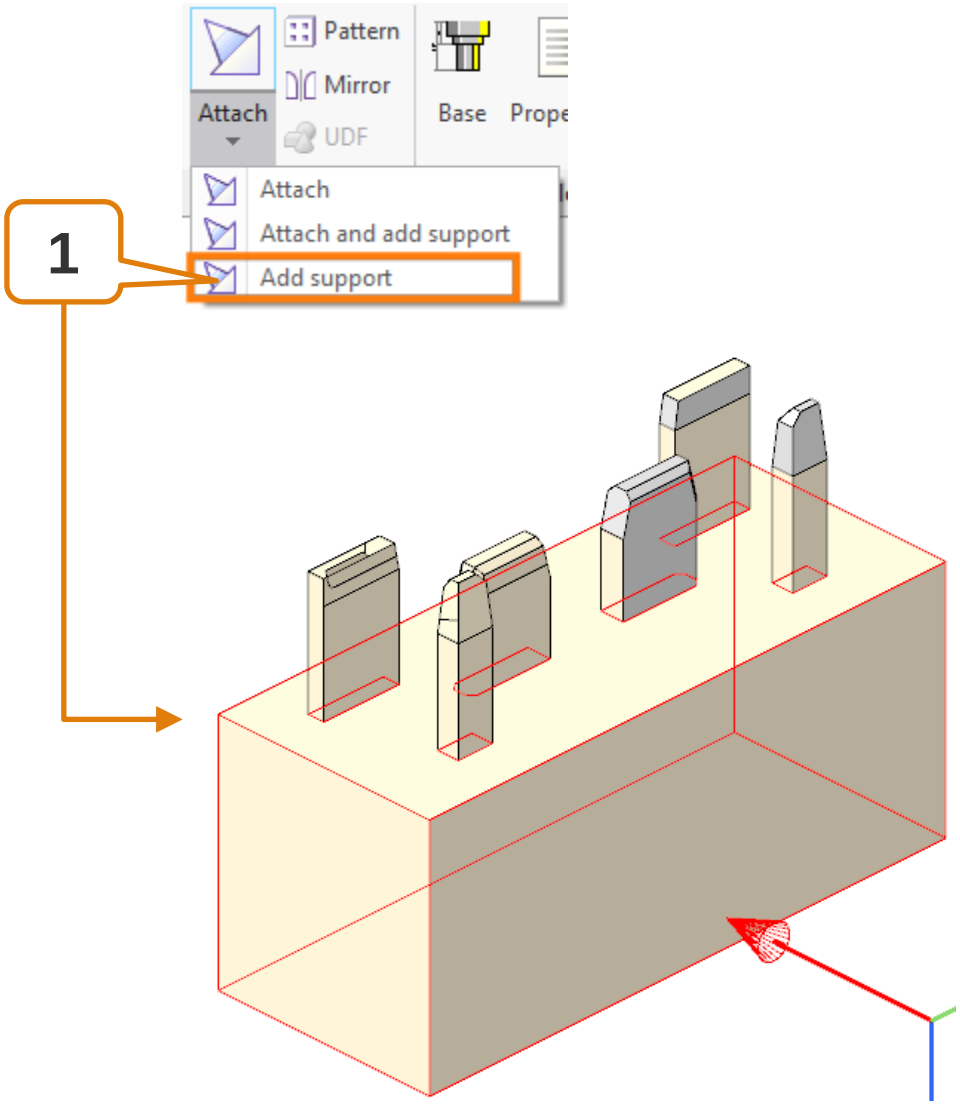


- **Select all top surfaces that are not attached**
- **Attach solid to FREE_FACE**

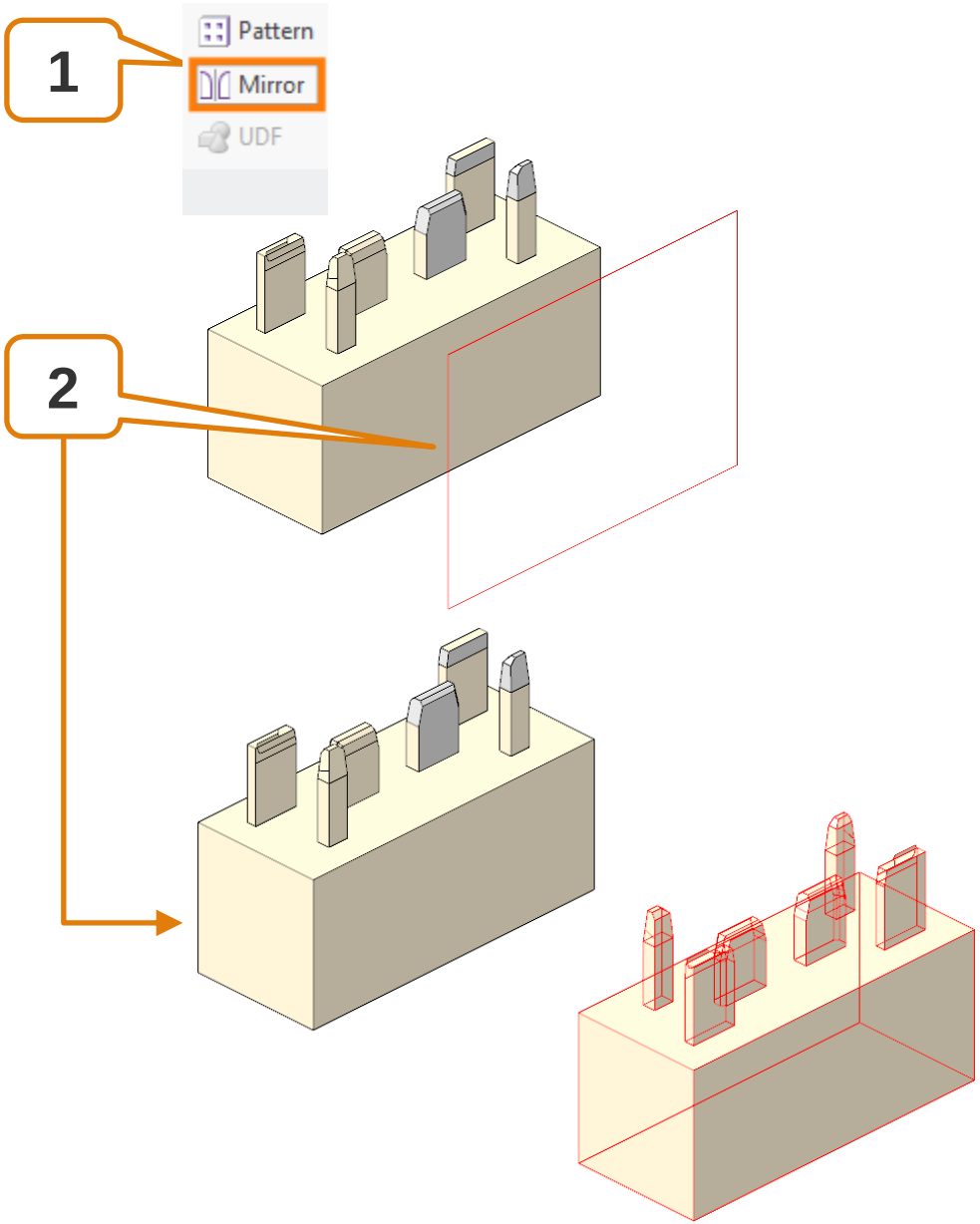
Electrode 6 – Mirror



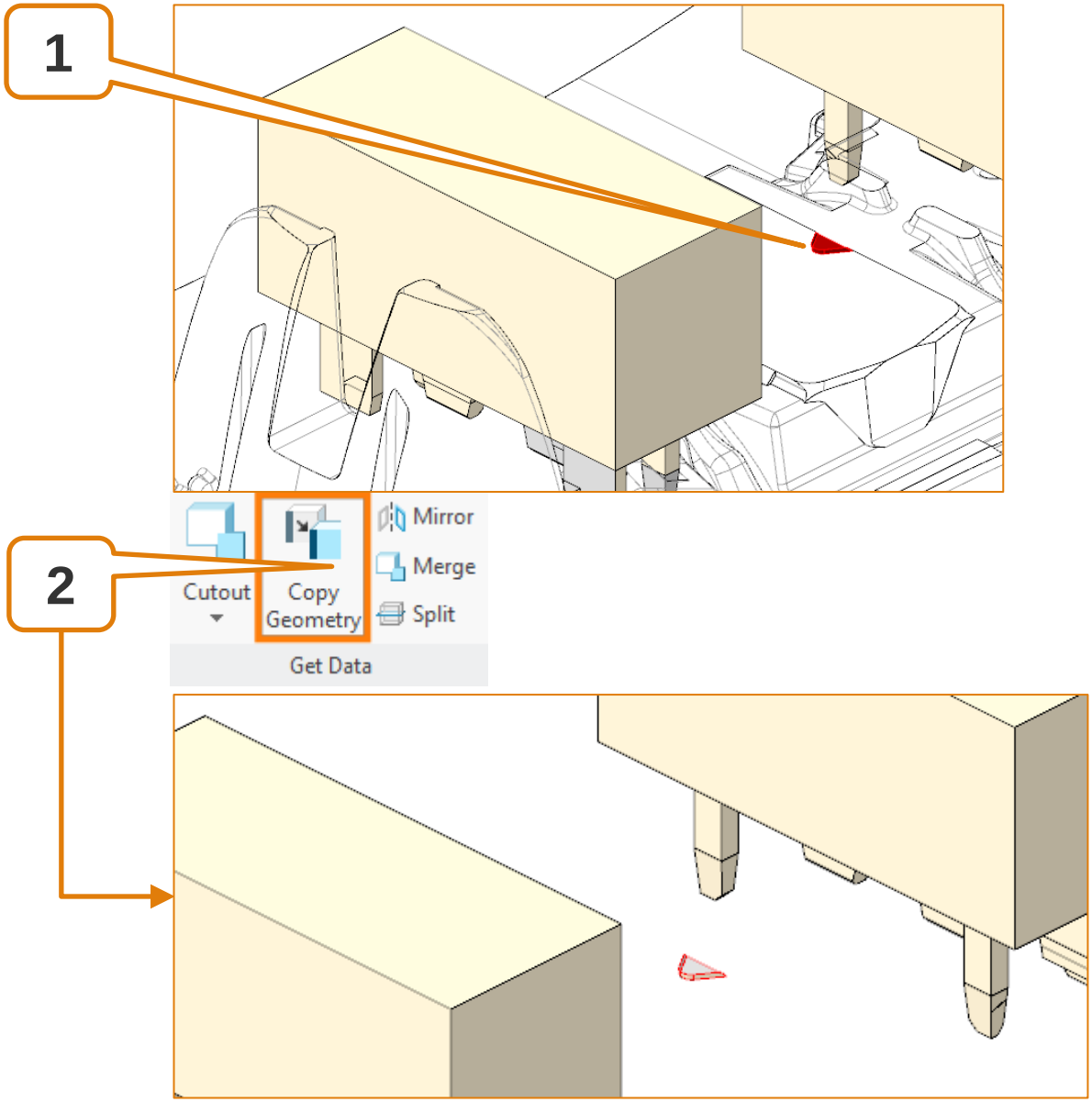
Electrode 6 – Detailing



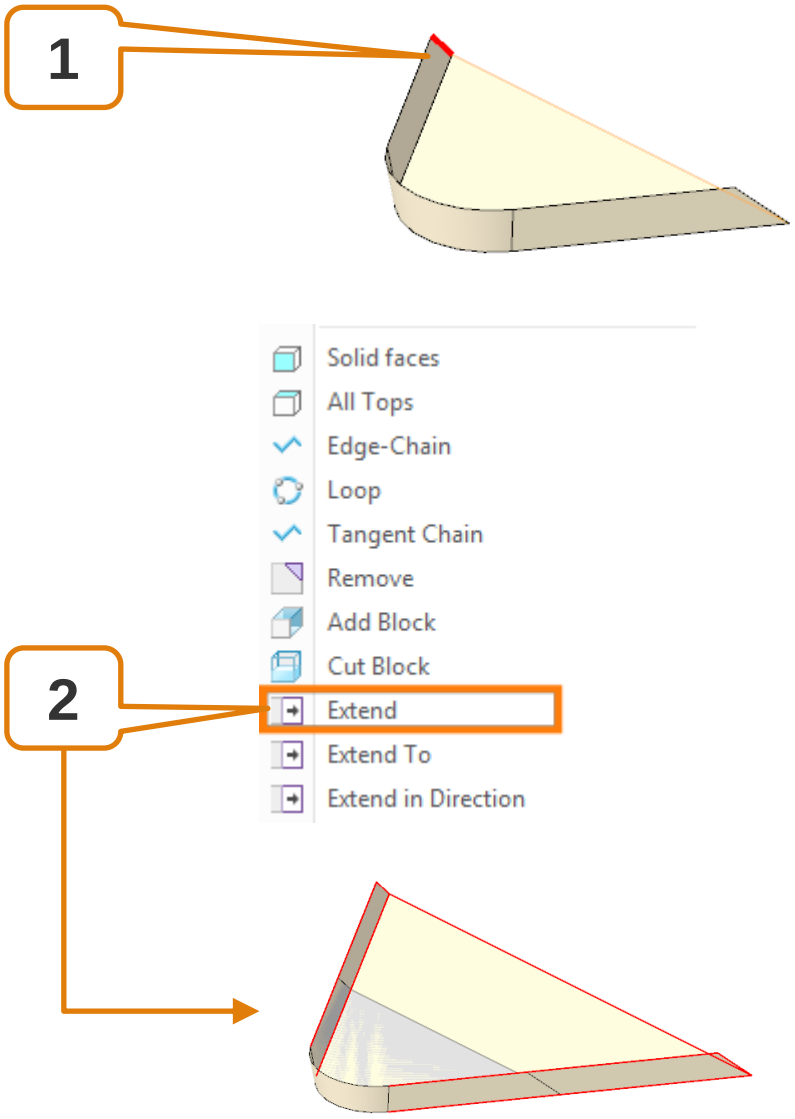
Electrode 6 – Mirror



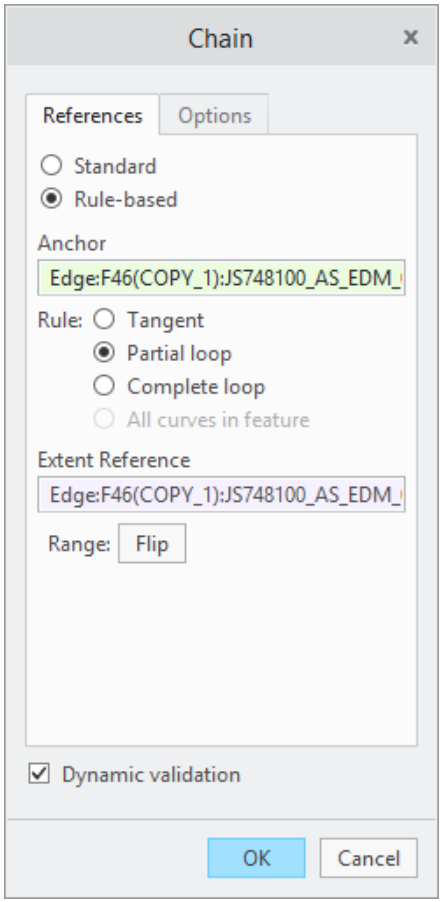
Electrode 6 – Copy 4. Region



Electrode 6 – Detailing

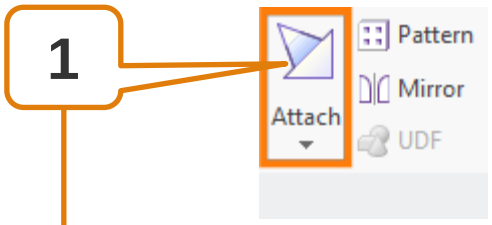


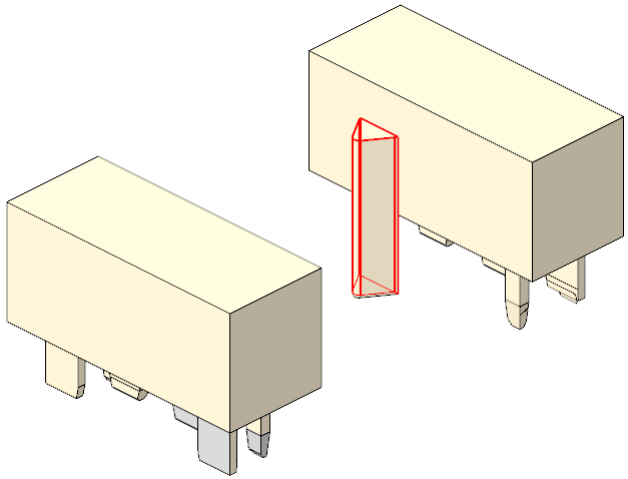
- **Select curve chain**



- **Extend quilt**

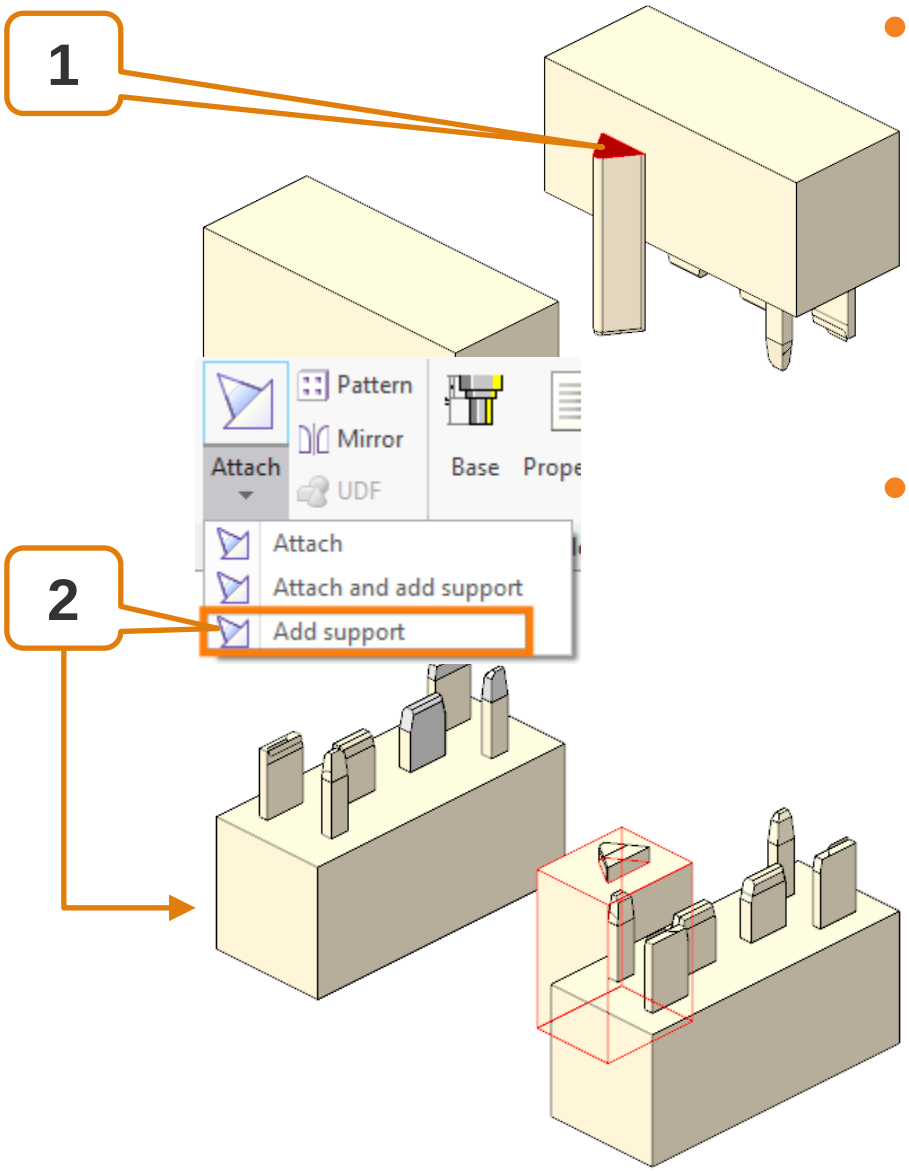
Electrode 6 – Attach





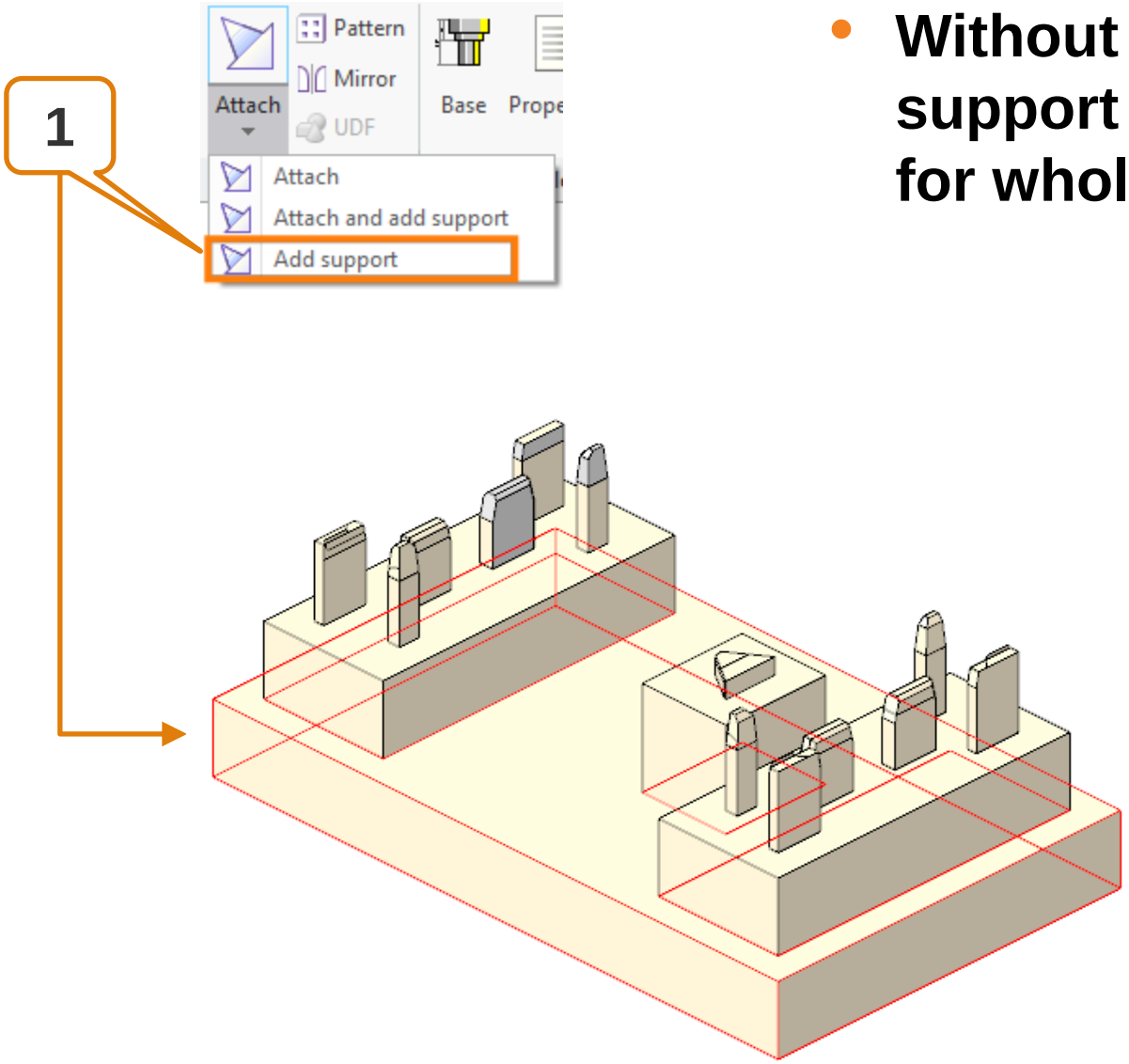
- **Activate ‚Attach‘, because new feature is still selected**

Electrode 6 – Support



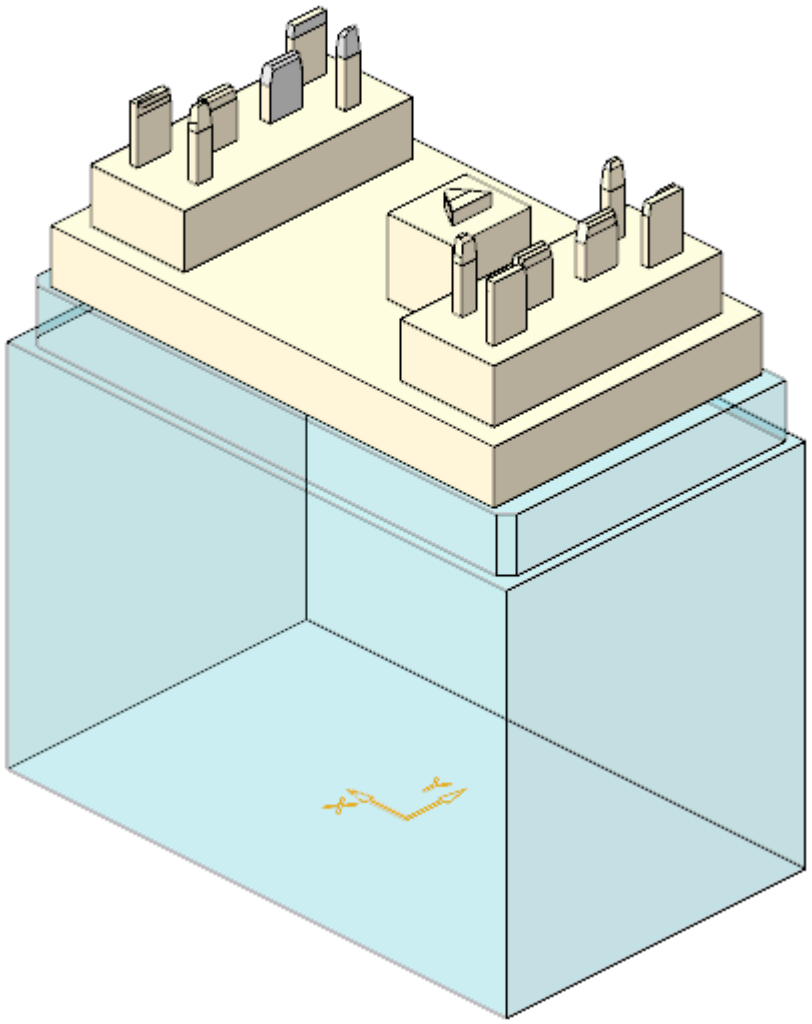
- **Select surface**
- **Create support for selected surface**

Electrode 6 – Support



- **Without any selection, support will be created for whole solid**

Electrode 6 - Base

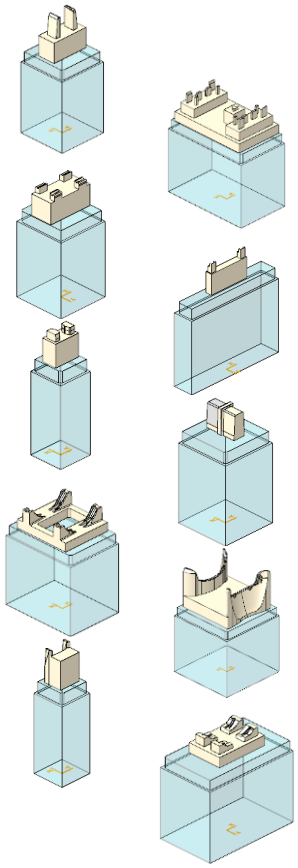


- **Add Base**

Agenda

Training

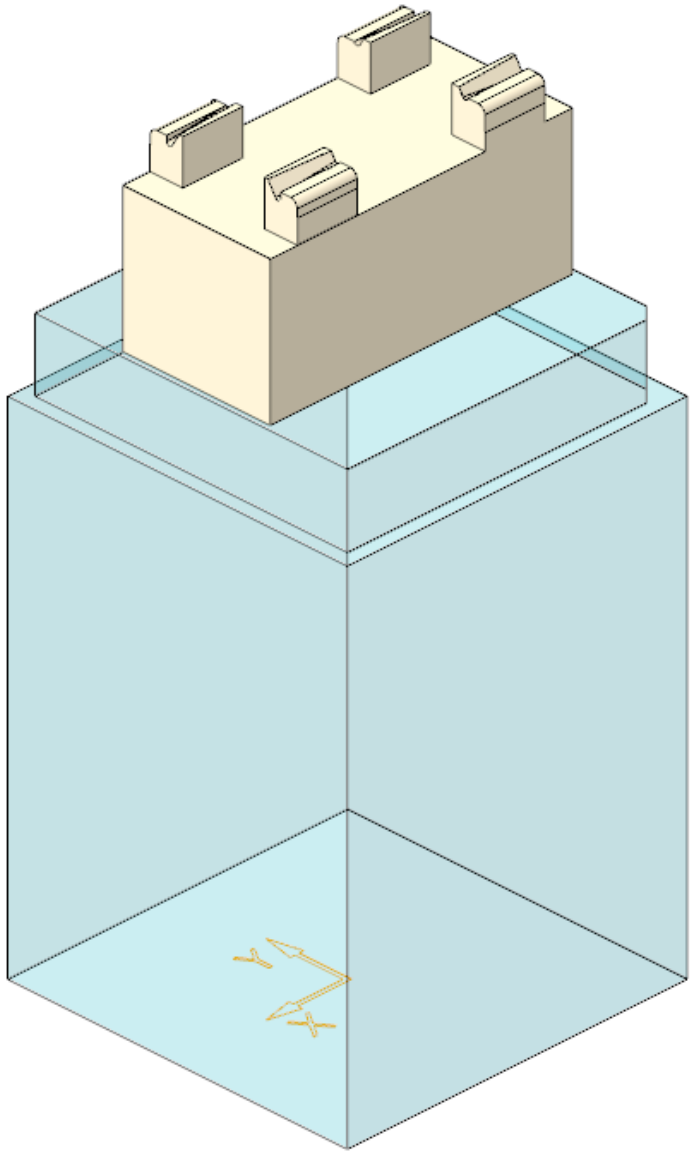
- Electrode 5
- Electrode 6
- **Electrode 7**
- Electrode 8
- Electrode 9
- Electrode 10
- Electrode 11
- Electrode 12
- Electrode 13
- Electrode 14



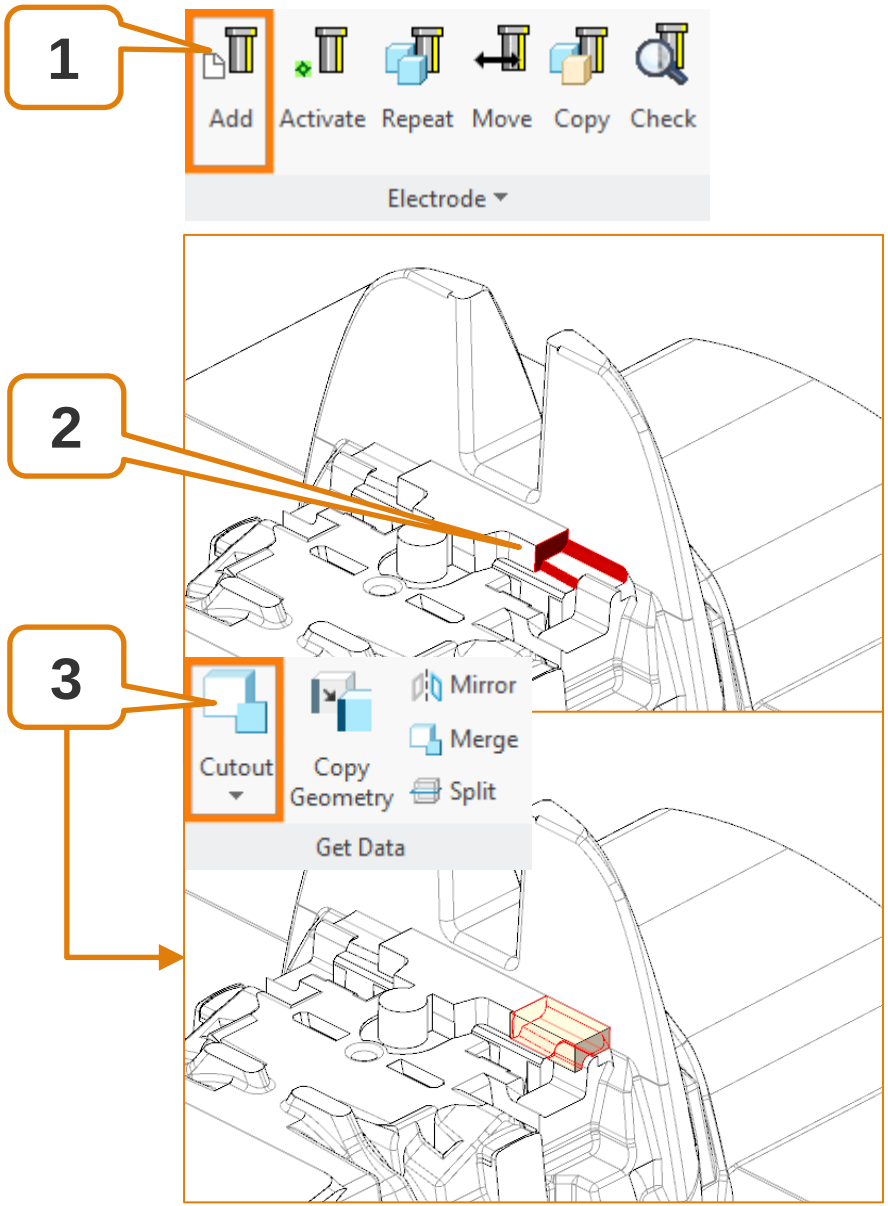
Electrode 7

Topics…

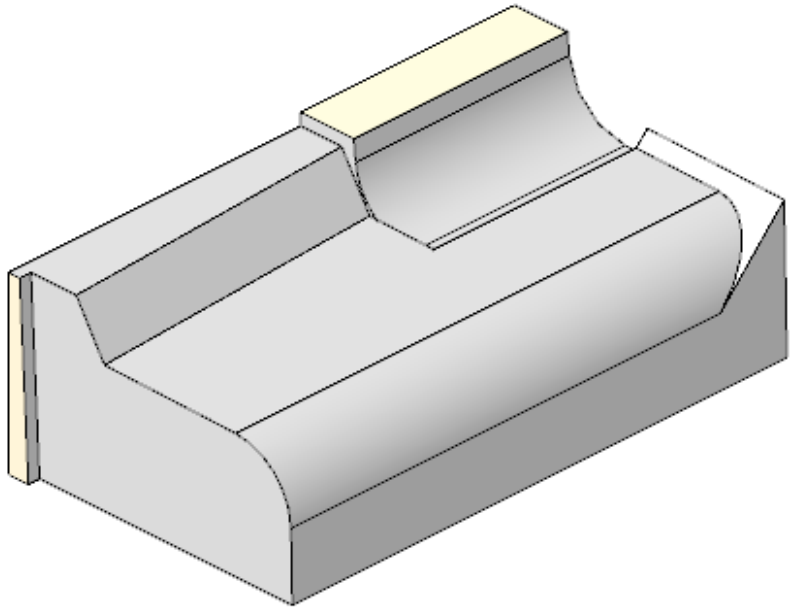
- **Usage of Creo features**

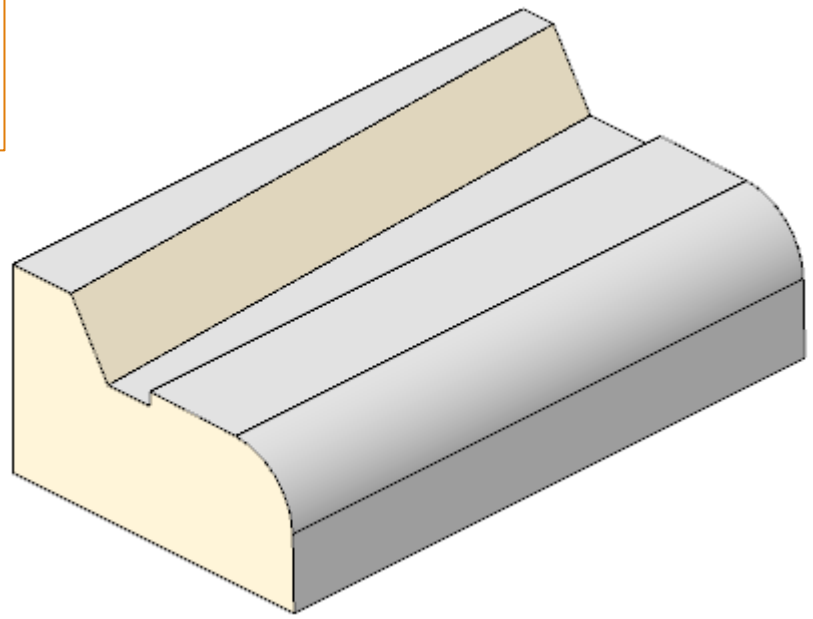


Electrode 7 – Get Data

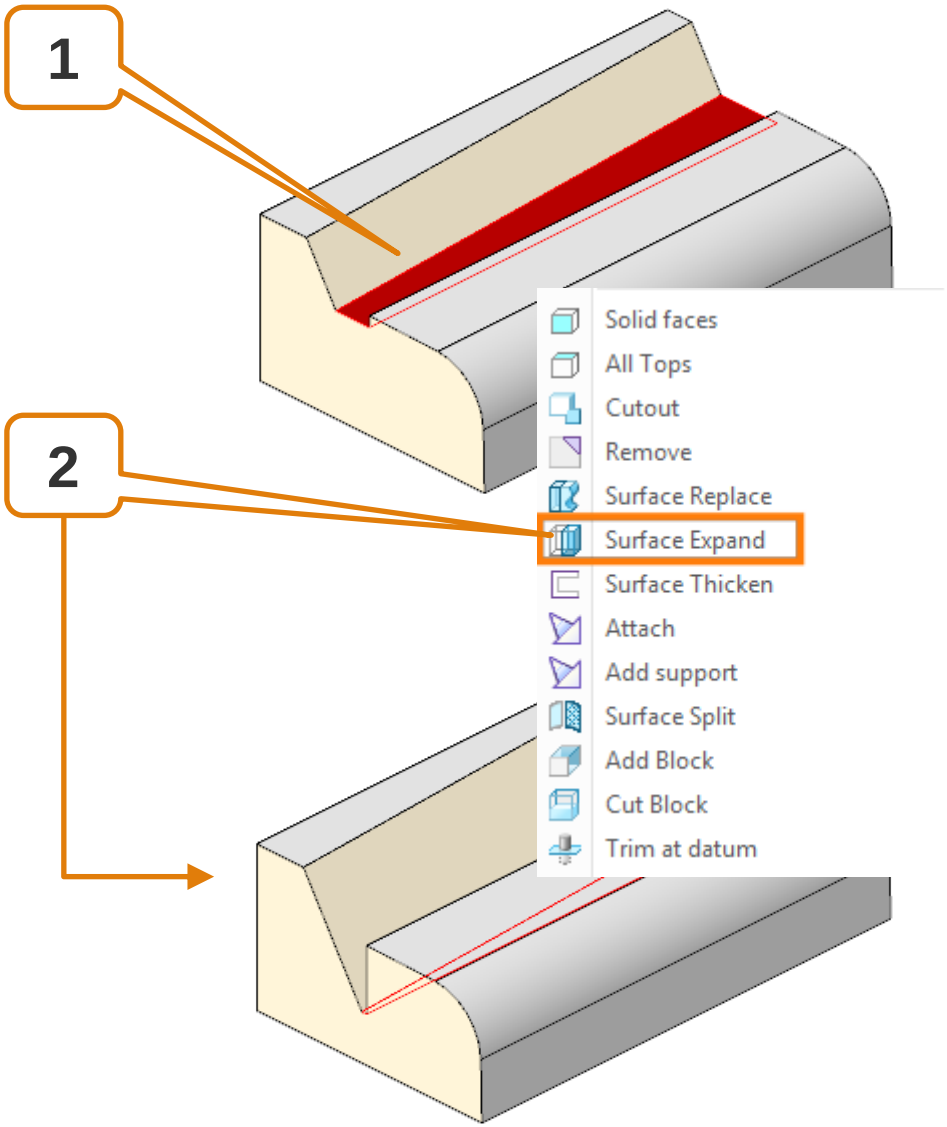


Electrode 7 – Detailing

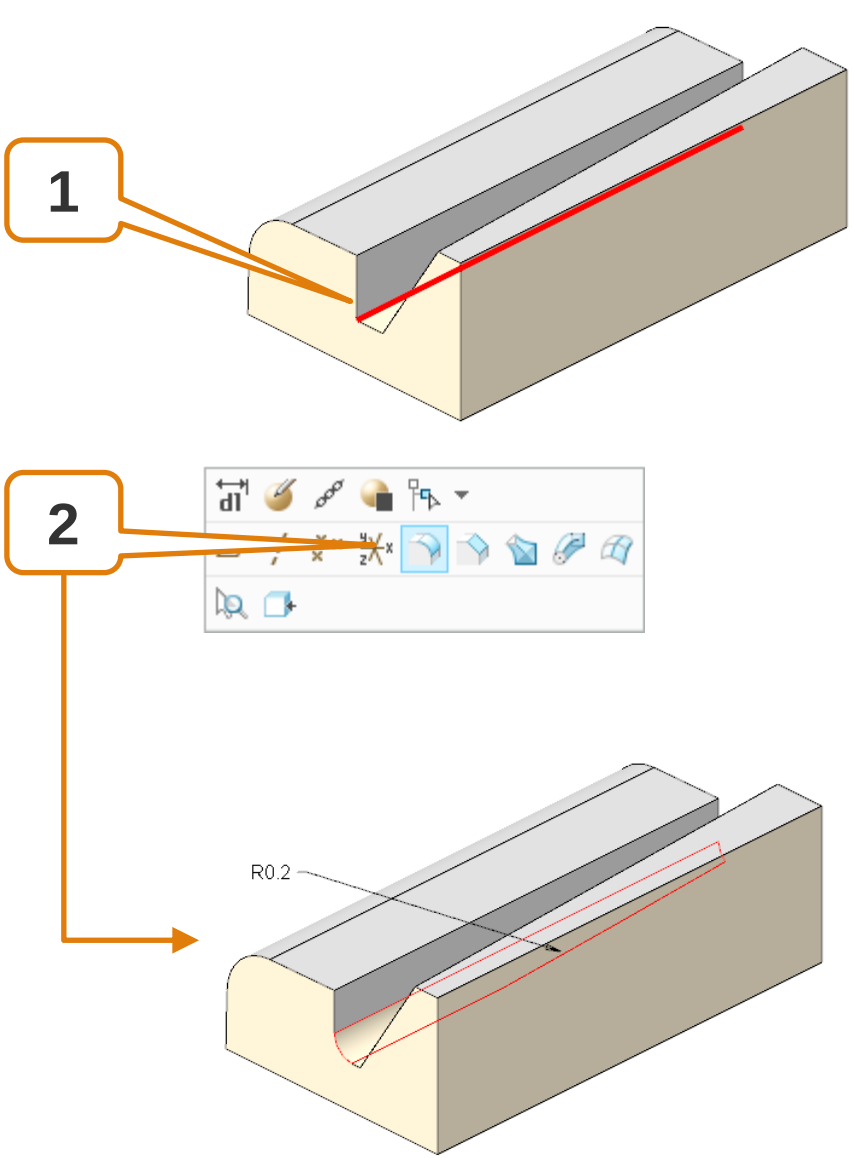


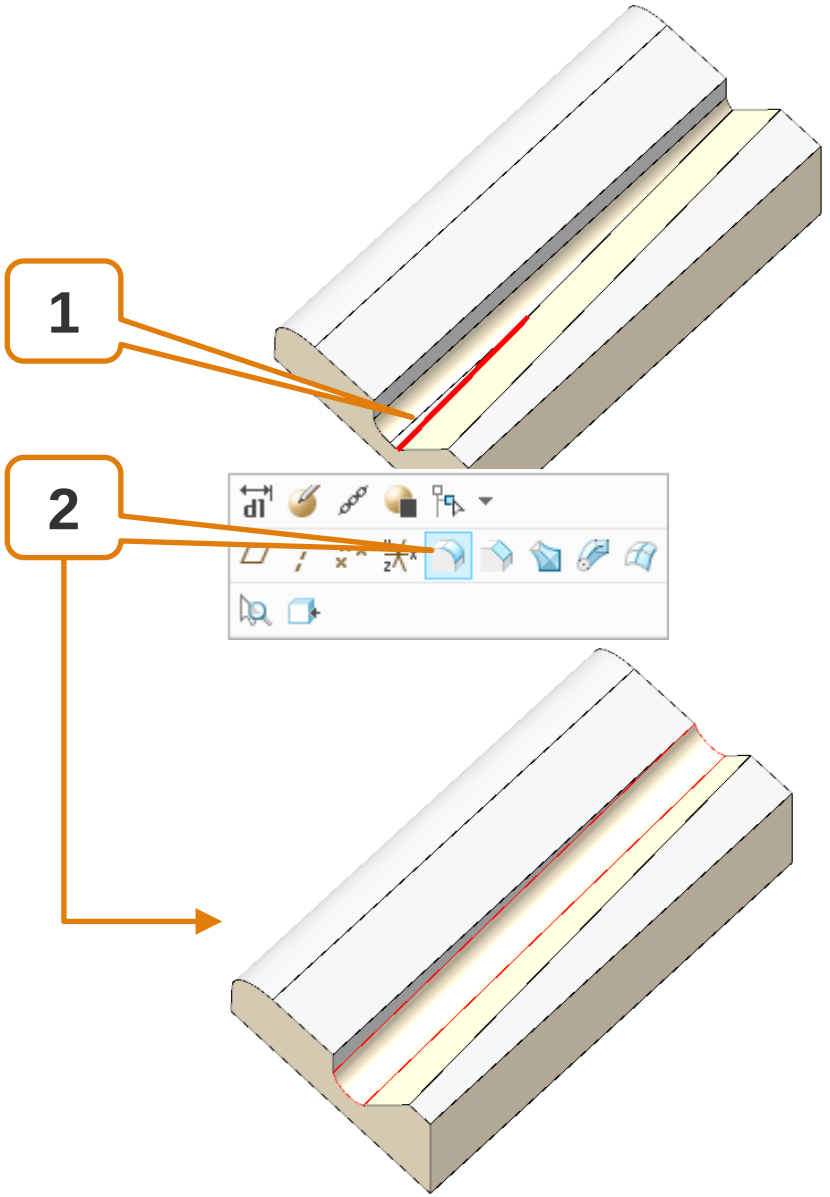


Electrode 7 – Detailing

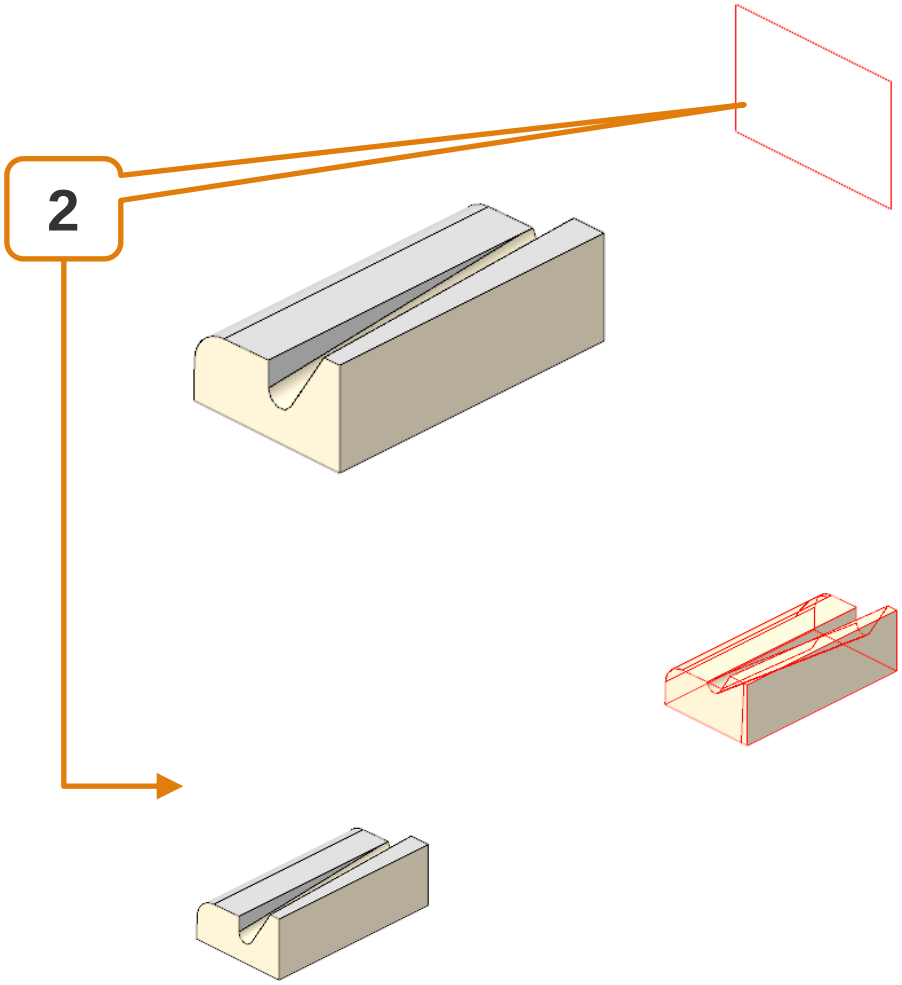


Electrode 7 – Detailing

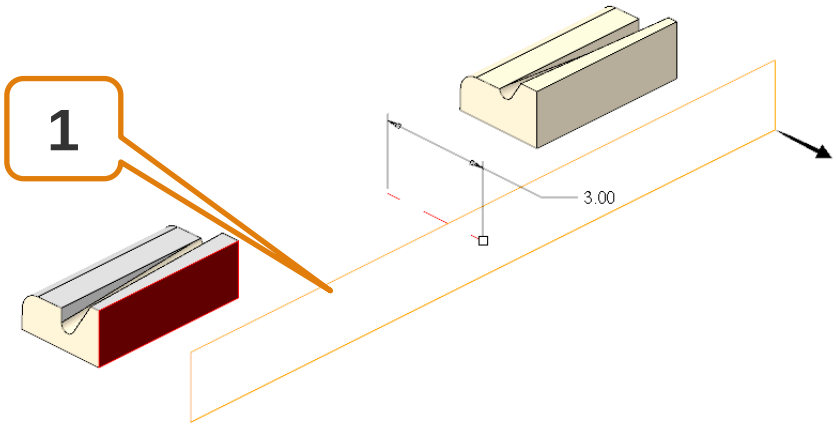


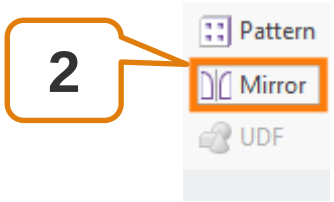


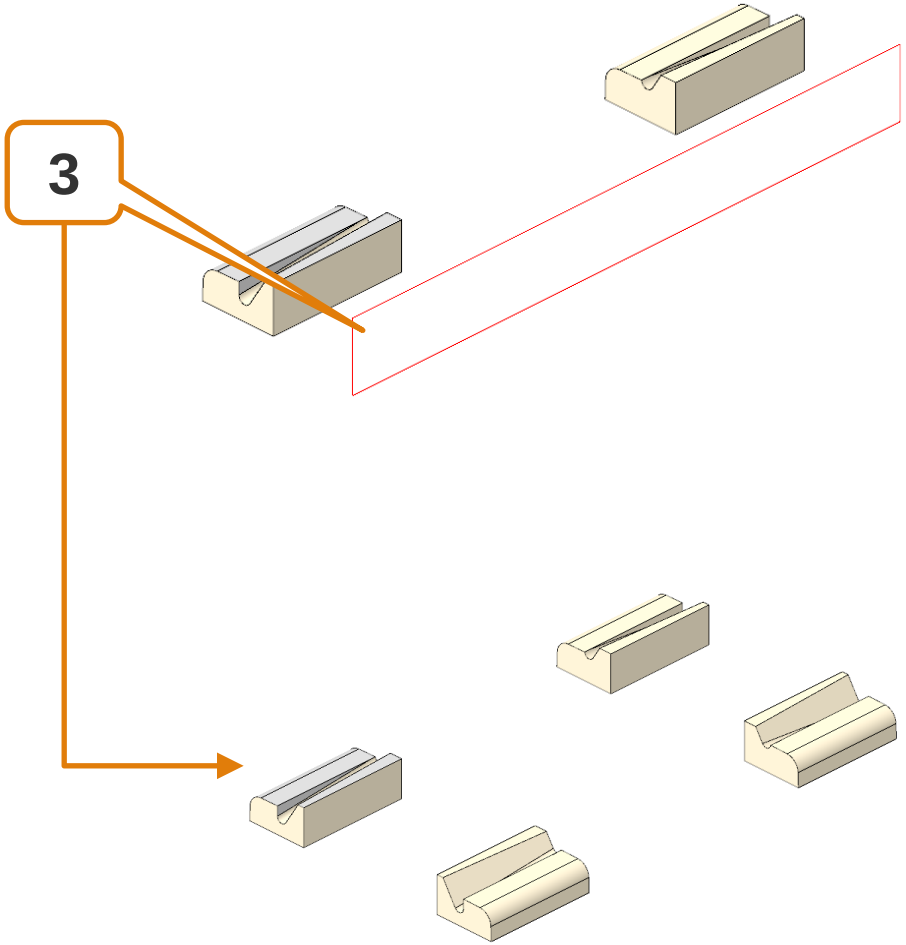
Electrode 7 – Mirror



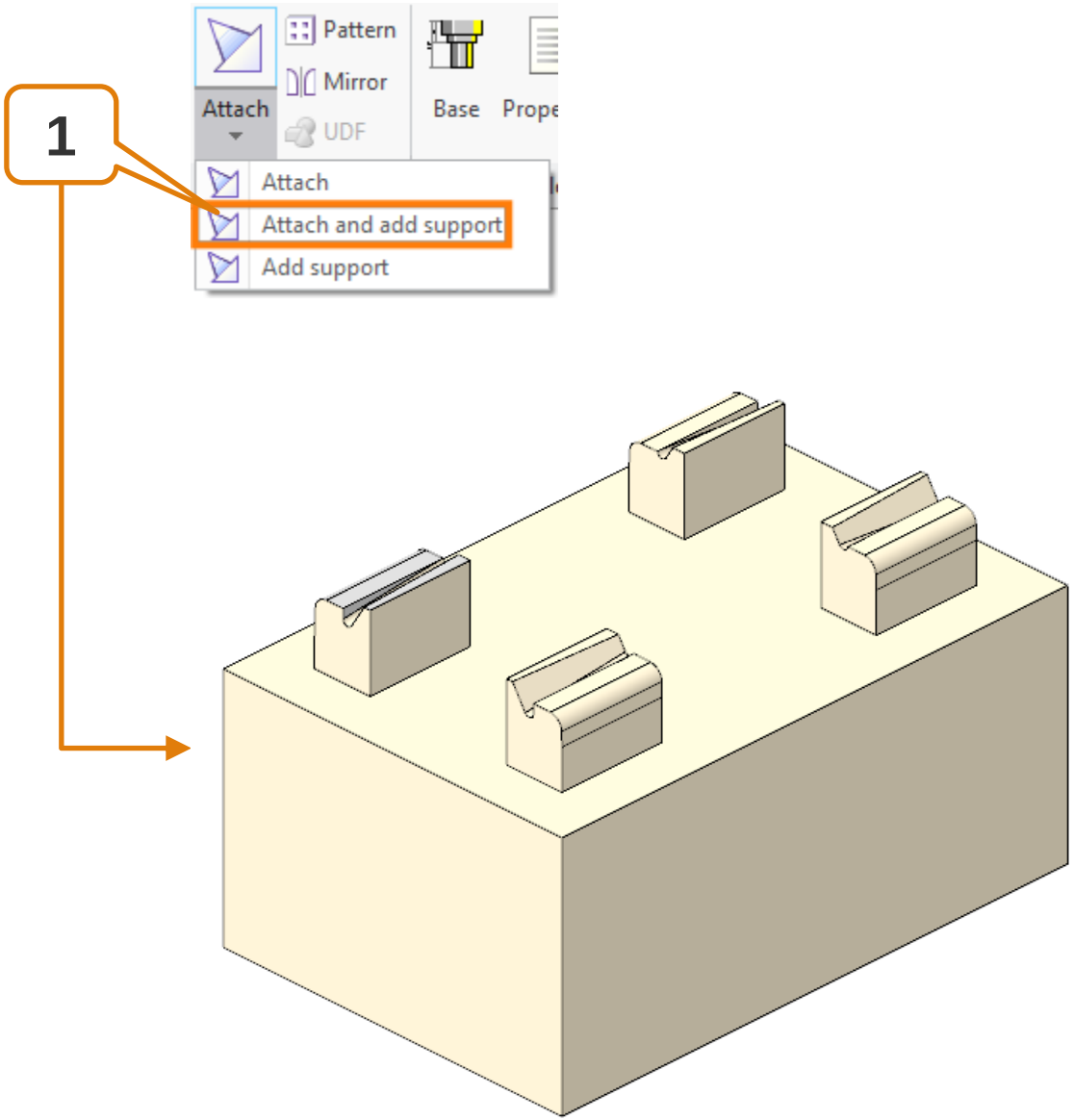
Electrode 7 – Mirror



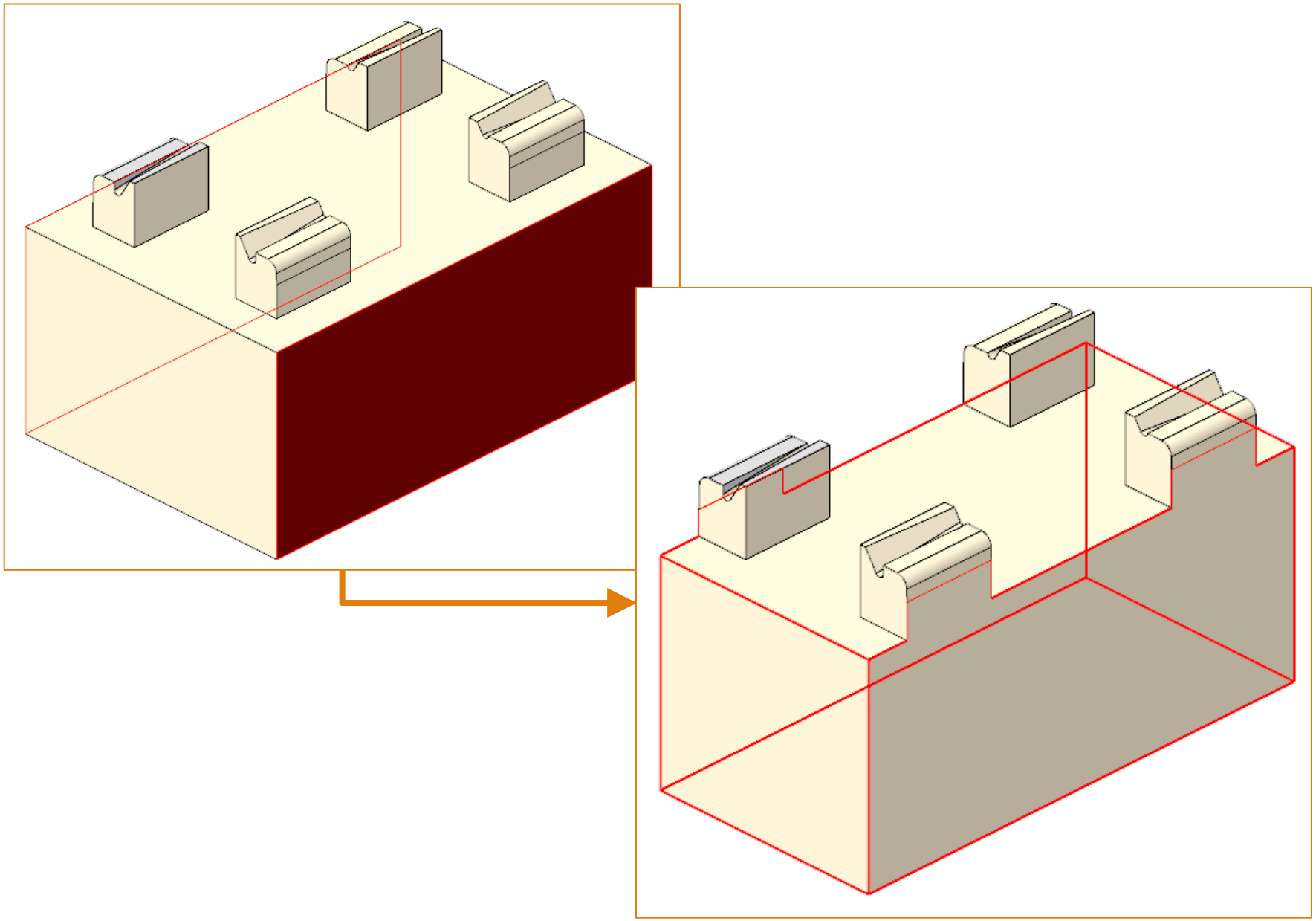




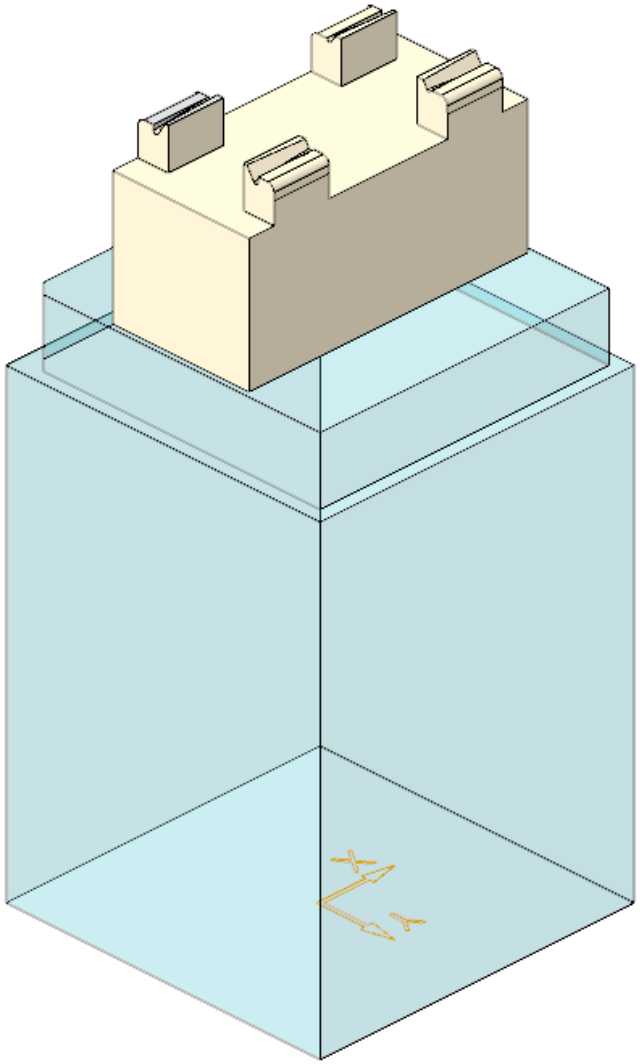
Electrode 7 – Detailing



Electrode 7 – Detailing

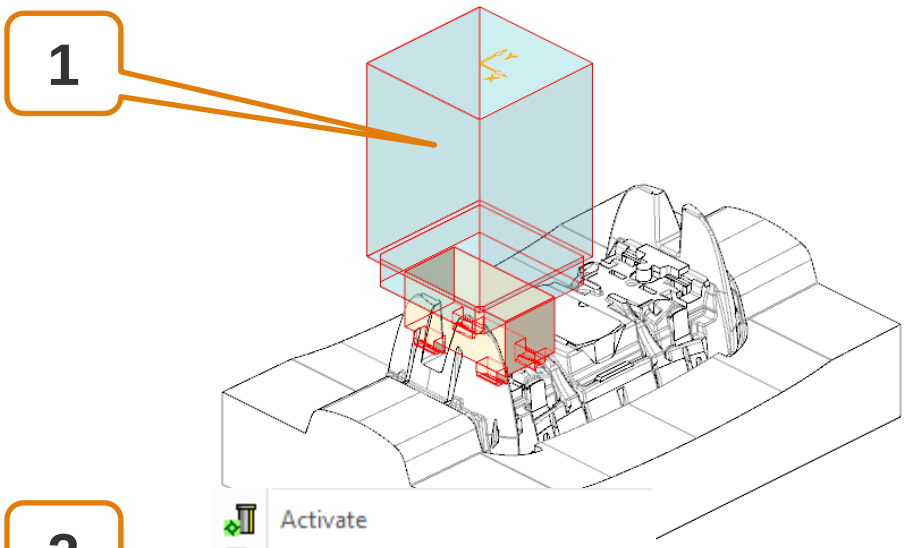


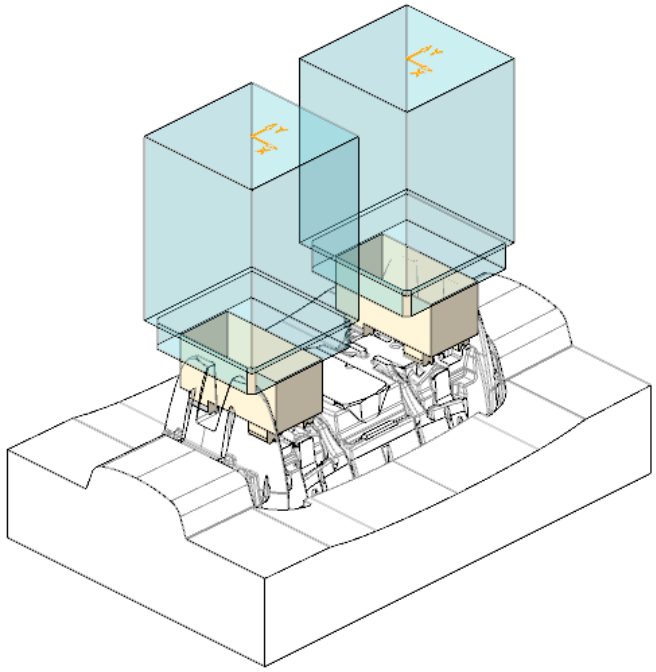
Electrode 7 - Base



- **Add Base**

Electrode 7 – Assemble Again

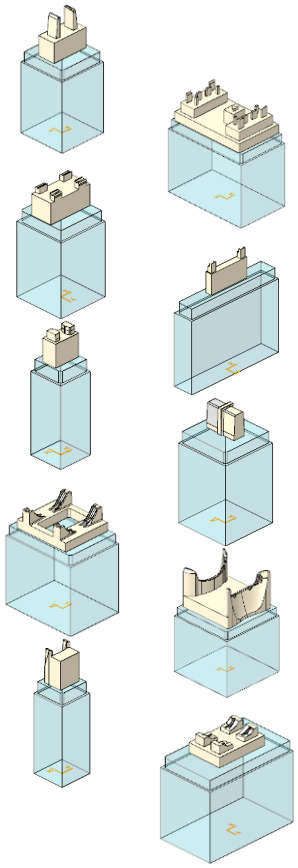




Agenda

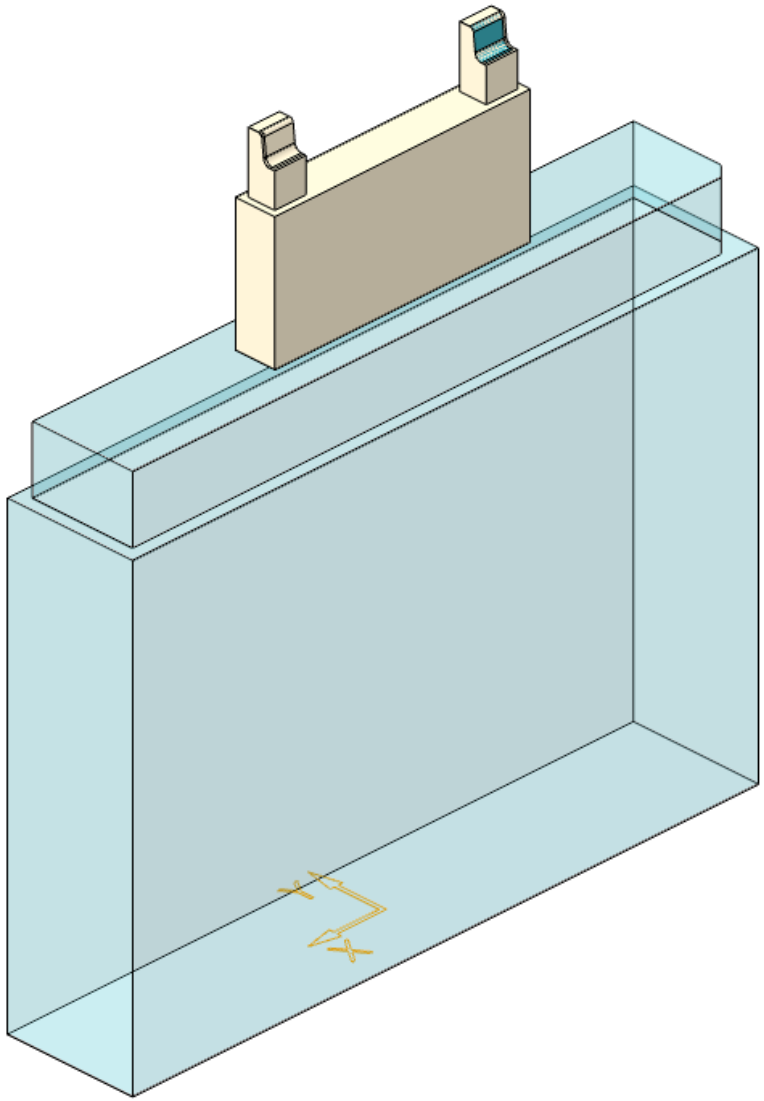
Training

- Electrode 5
- Electrode 6
- Electrode 7
- **Electrode 8**
- Electrode 9
- Electrode 10
- Electrode 11
- Electrode 12
- Electrode 13
- Electrode 14

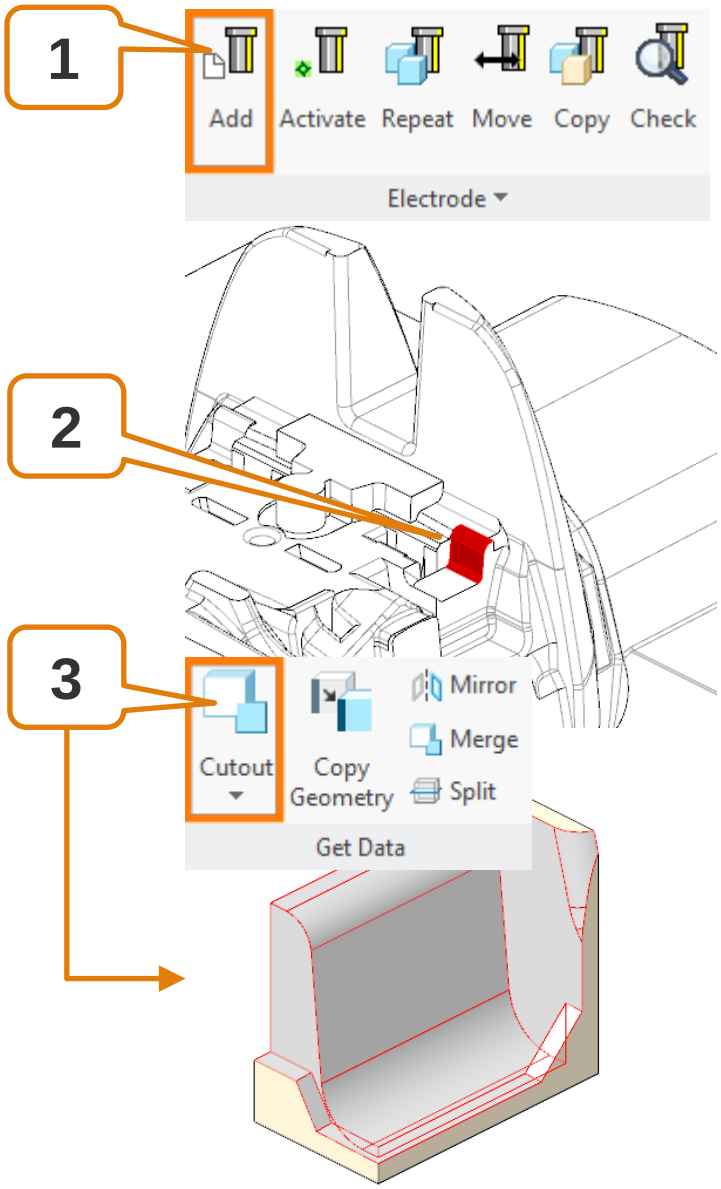


Electrode 8

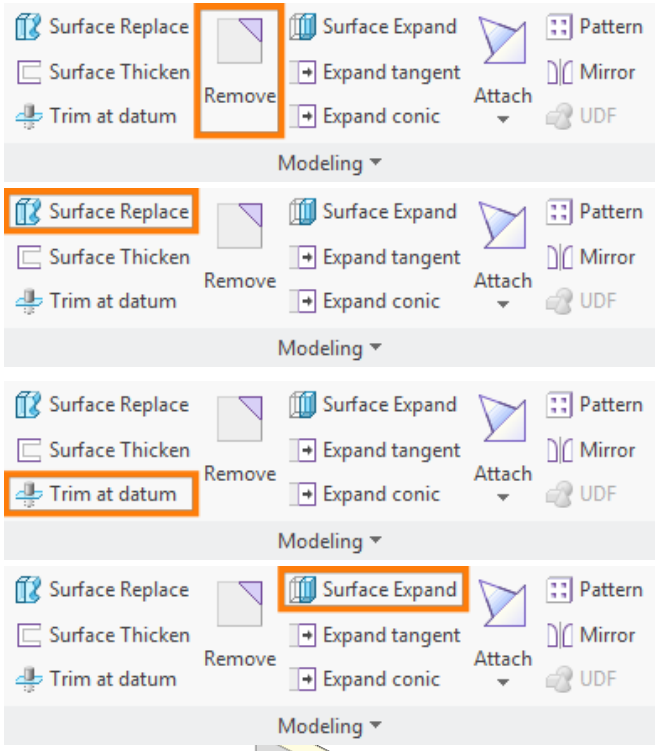
Topics…



Electrode 8 – Get Data

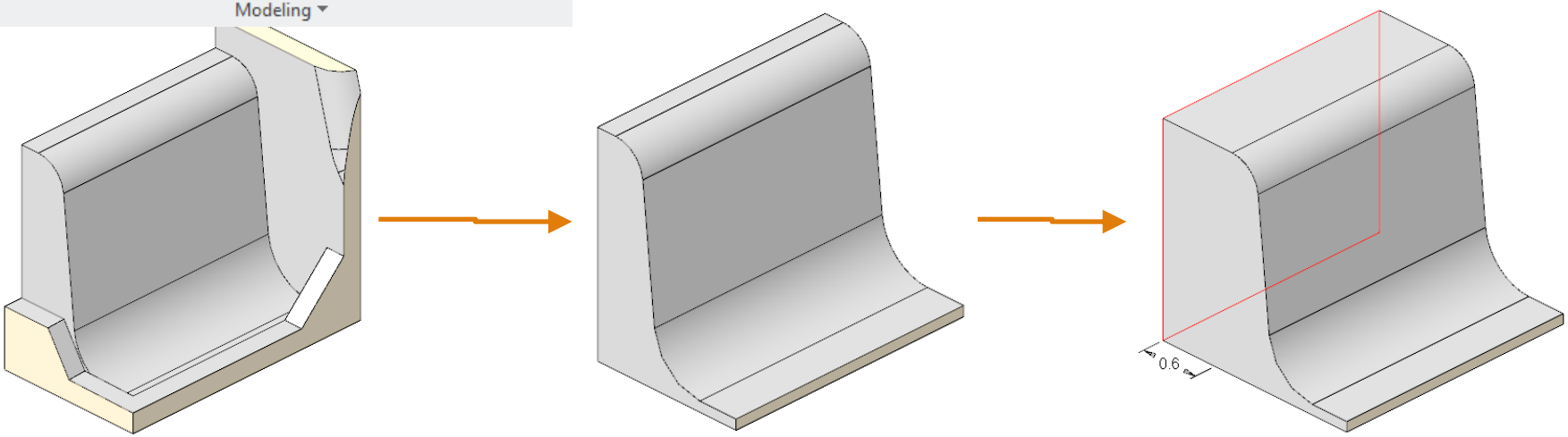


Electrode 8 – Detailing

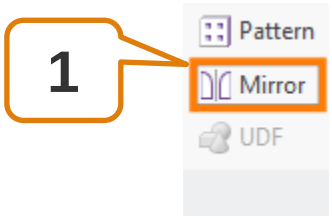


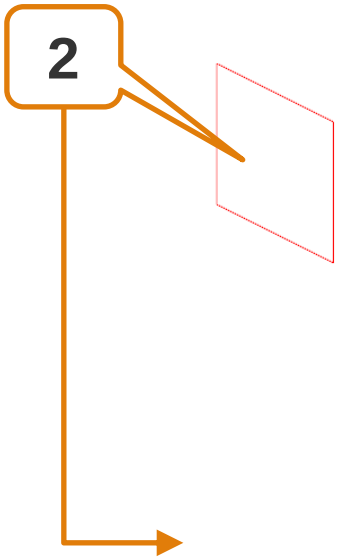
Detailing using…

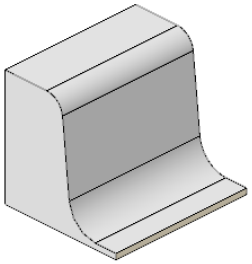
- Remove
- Replace surface
- Trim at datum
- Expand

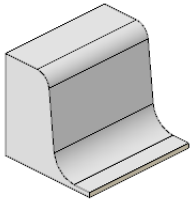


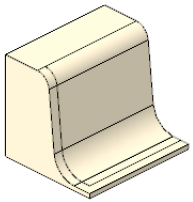
Electrode 8 – Mirror



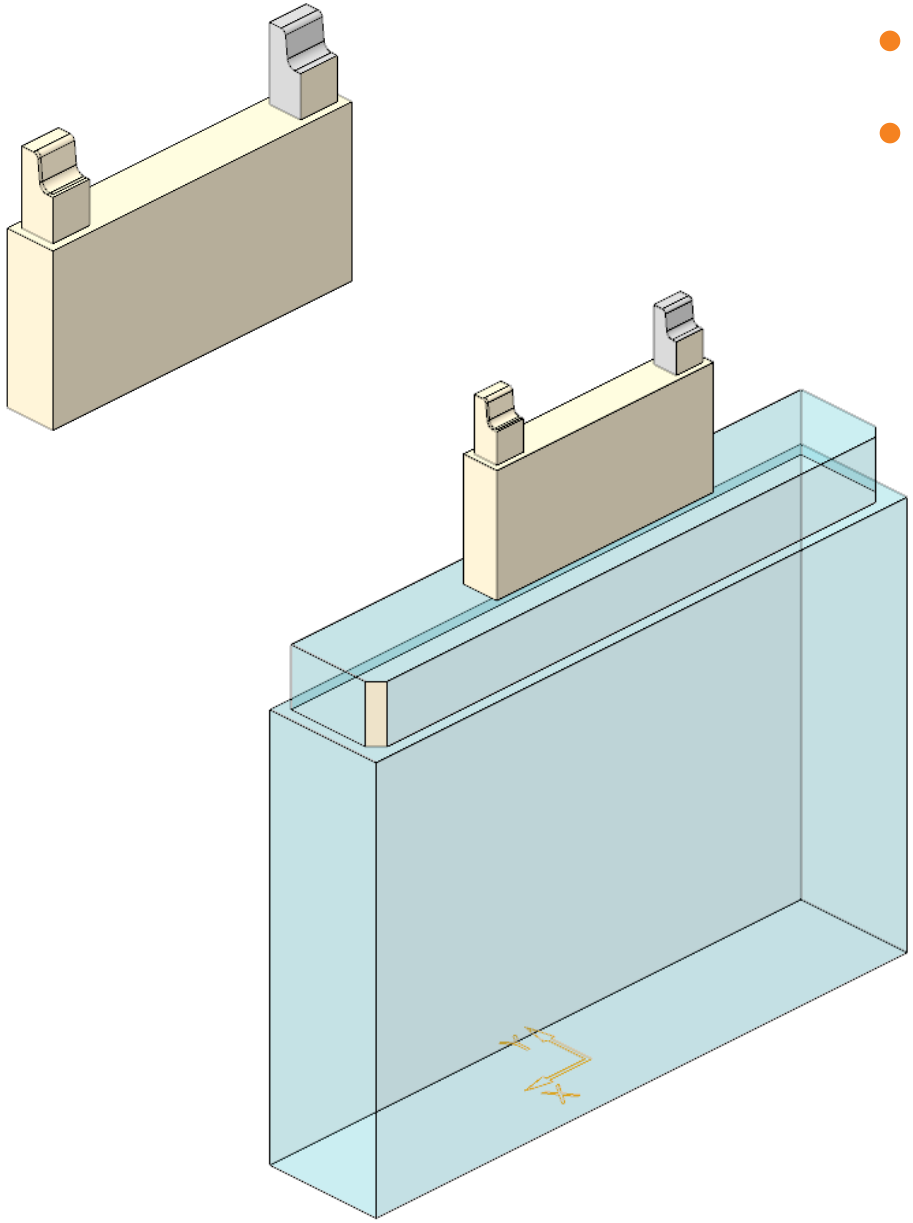






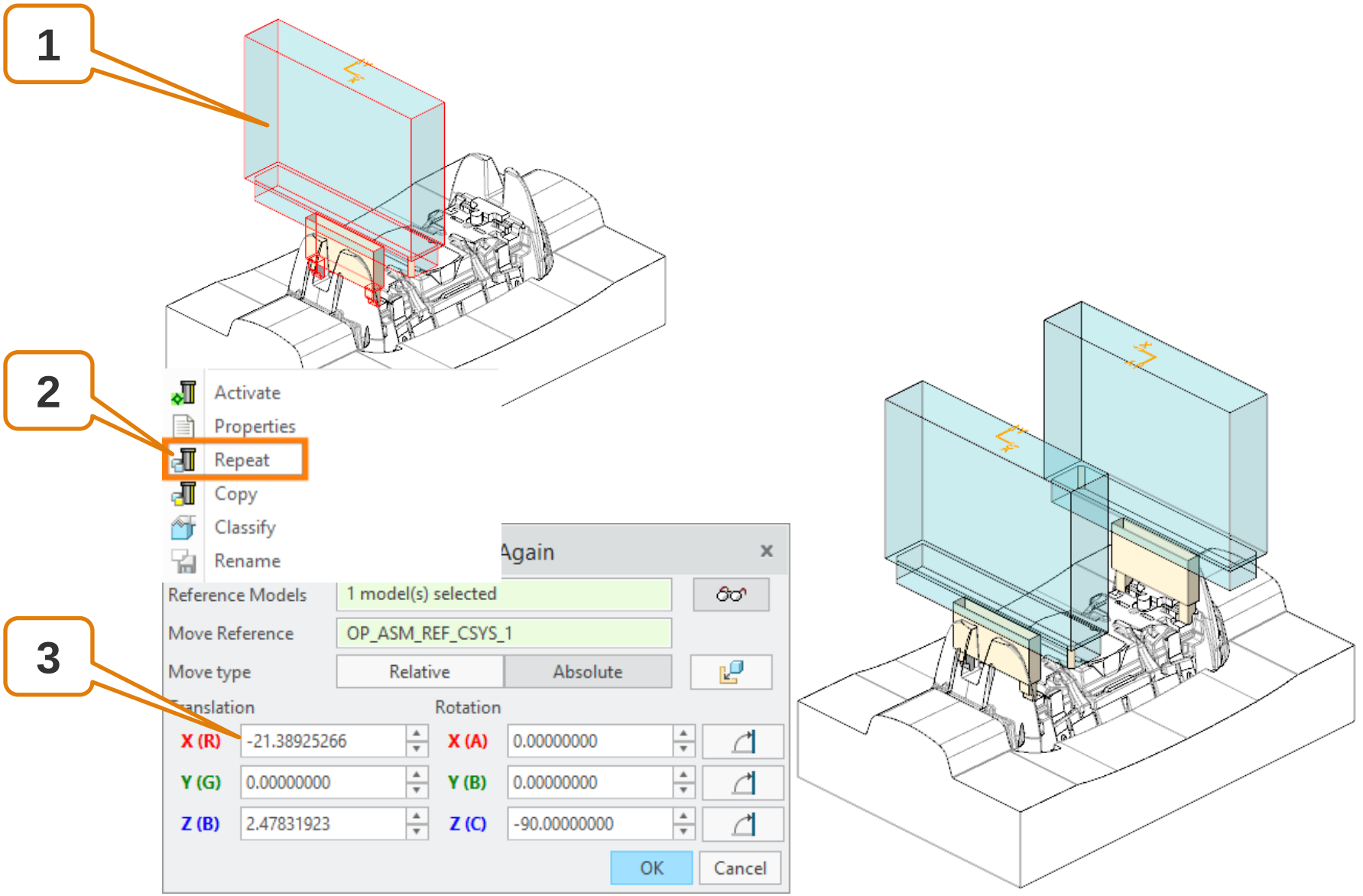


Electrode 8 - Finish



- Create support
- Finish electrode with base

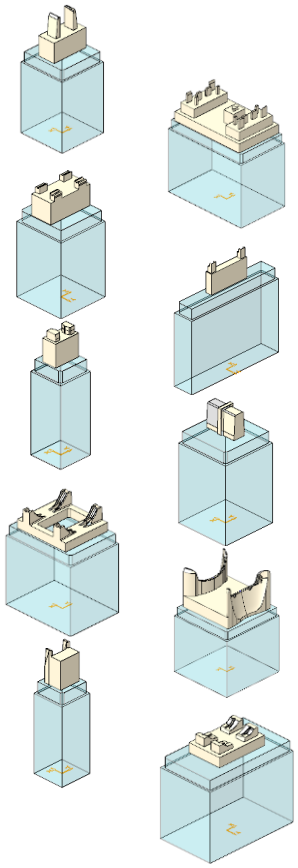
Electrode 8 – Assemble Again



Agenda

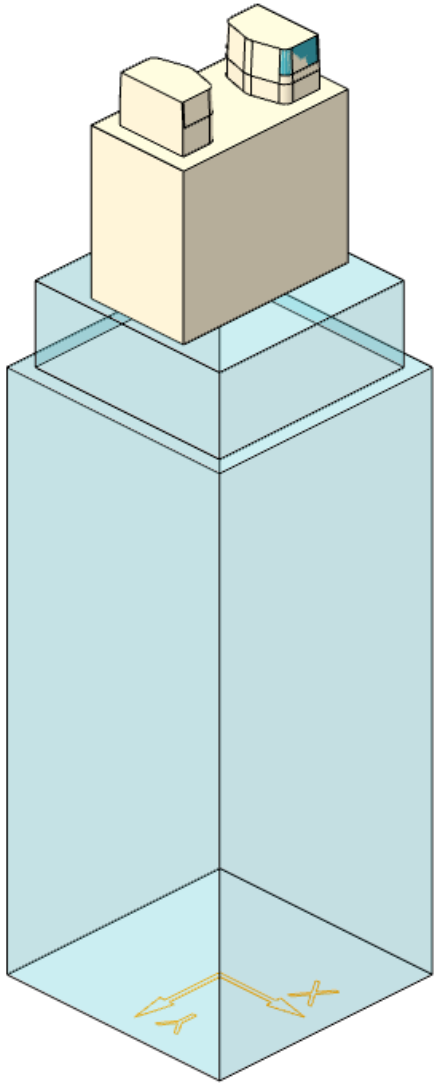
Training

- Electrode 5
- Electrode 6
- Electrode 7
- Electrode 8
- **Electrode 9**
- Electrode 10
- Electrode 11
- Electrode 12
- Electrode 13
- Electrode 14

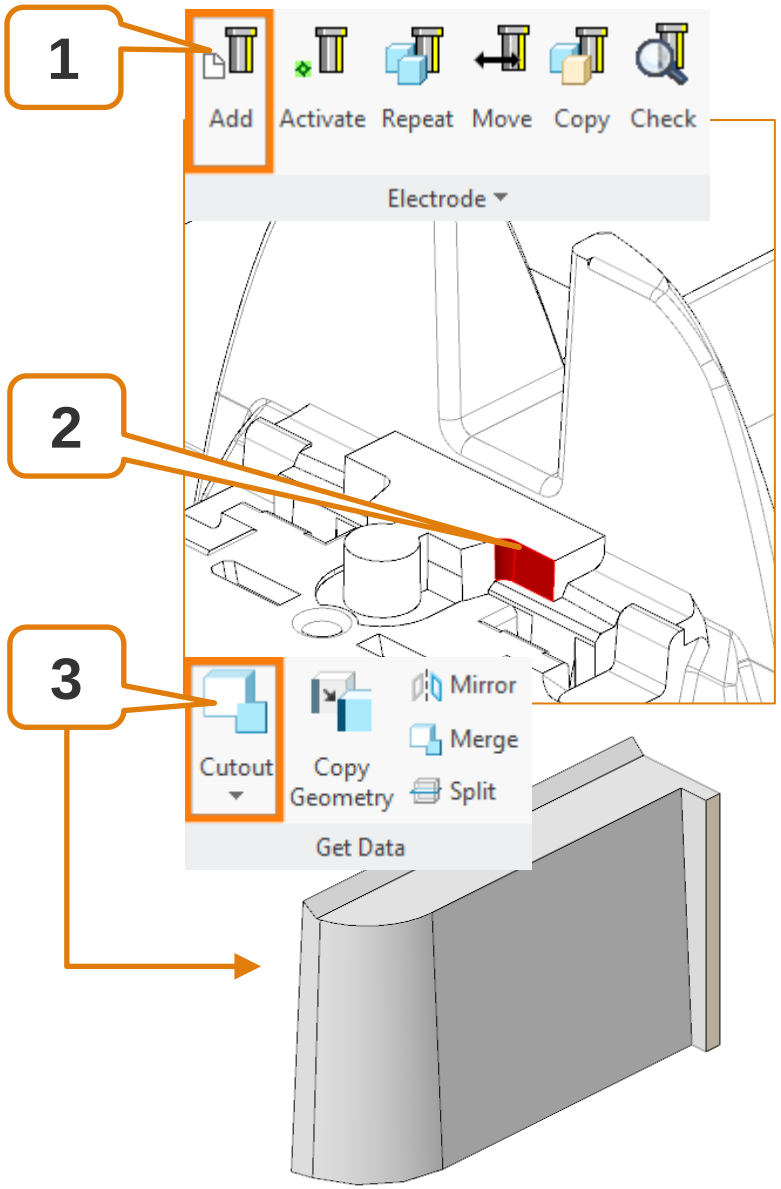


Electrode 9

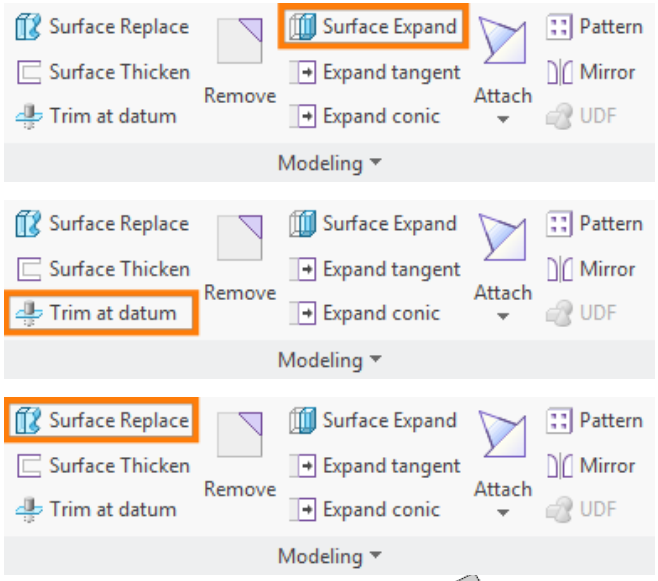
Topics…



Electrode 9 – Get Data

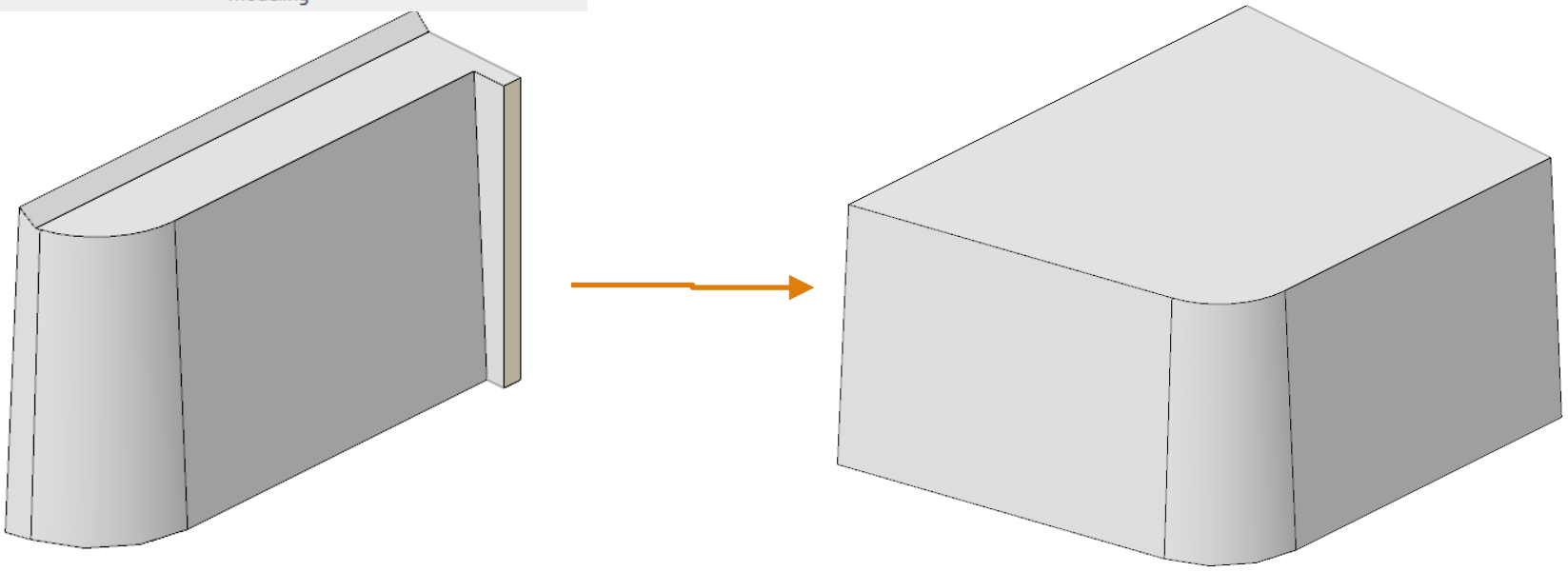


Electrode 9 – Detailing

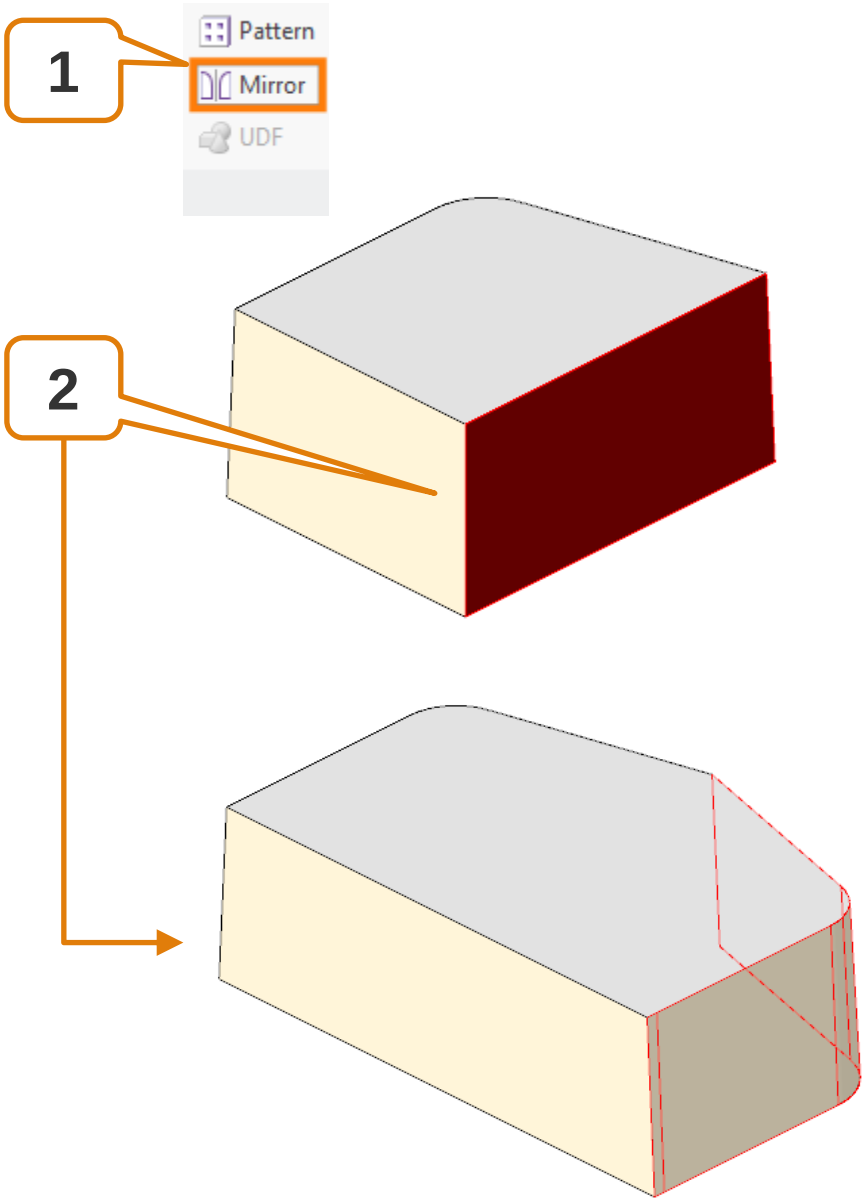


Detailing using…

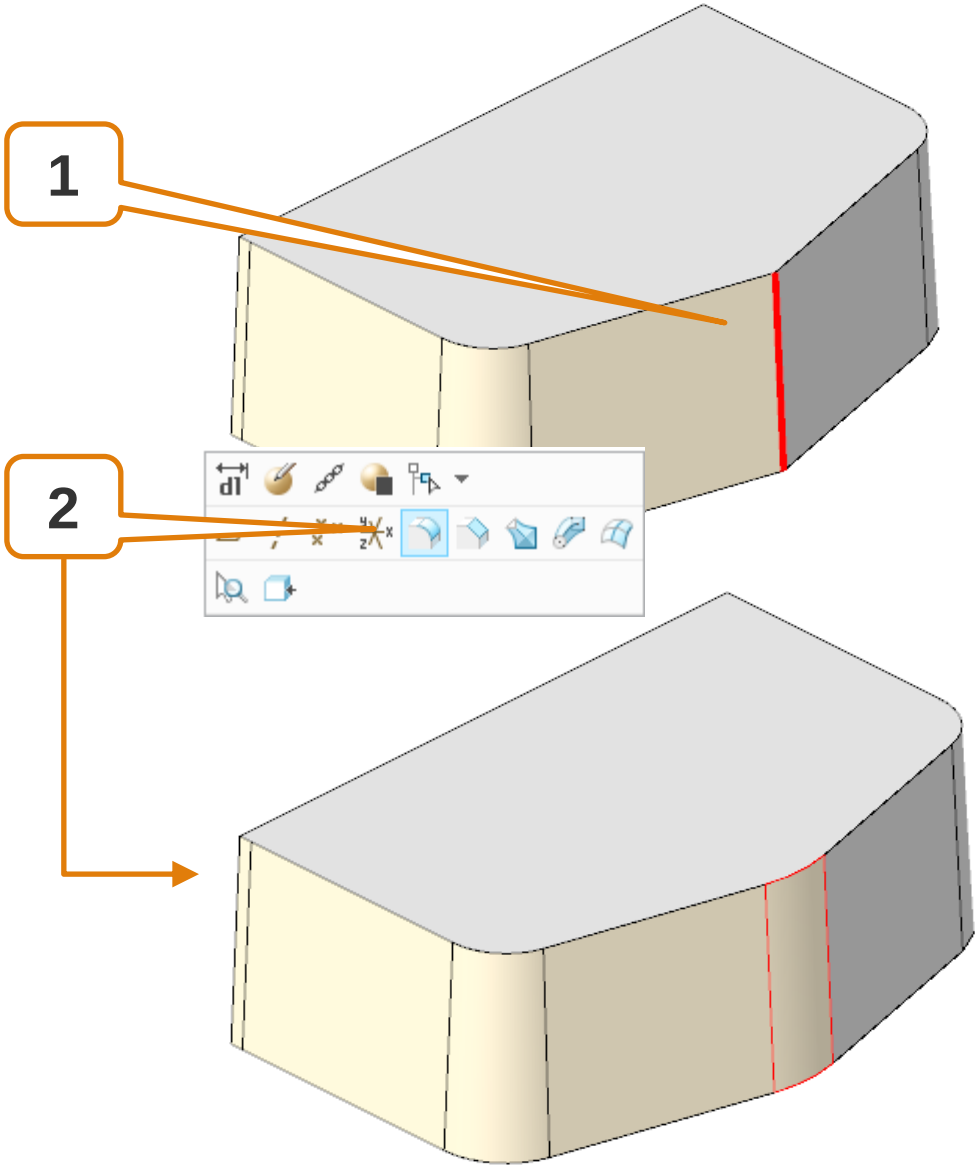
- Expand
- Trim at datum
- Replace surface



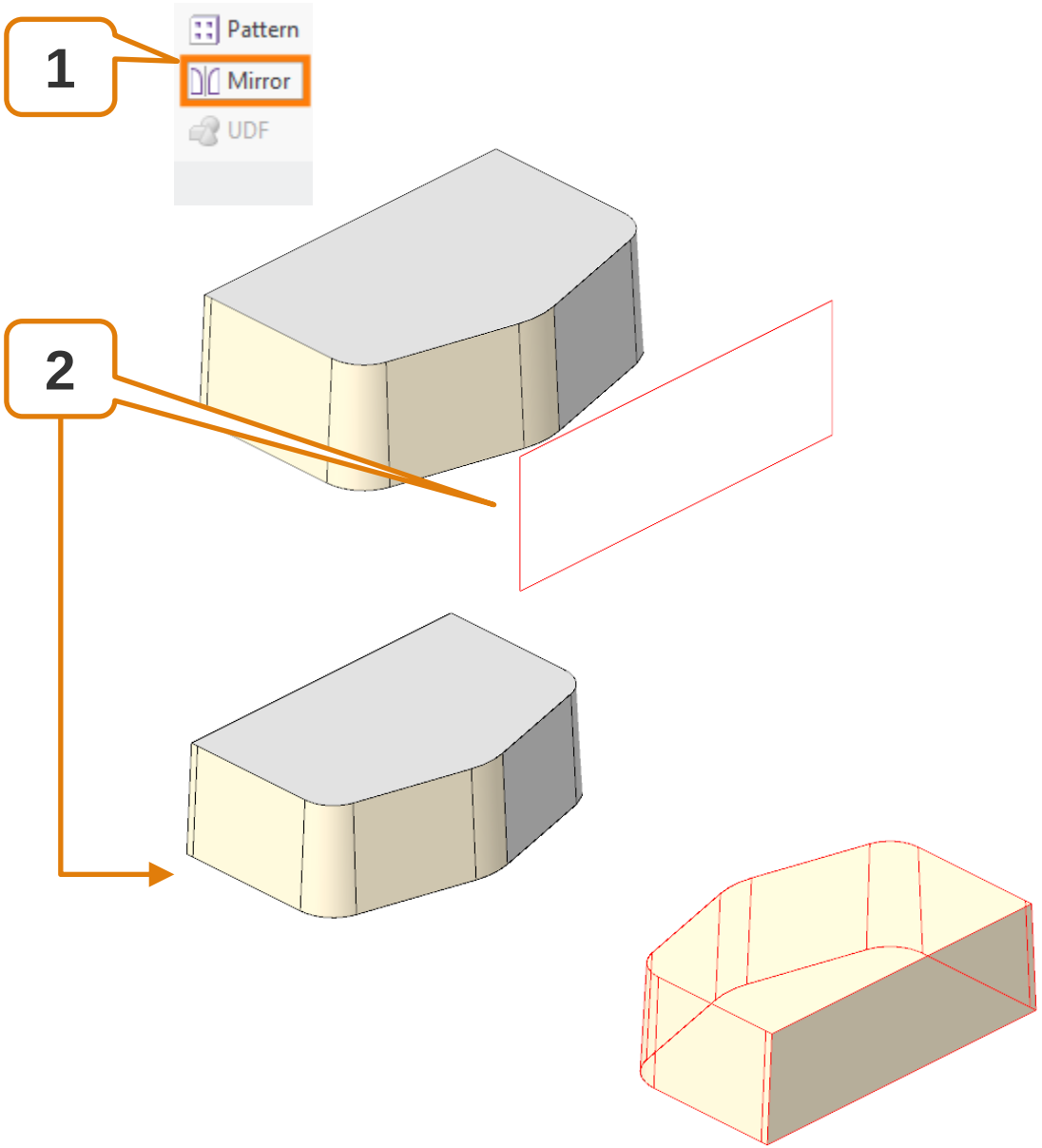
Electrode 9 – Mirror



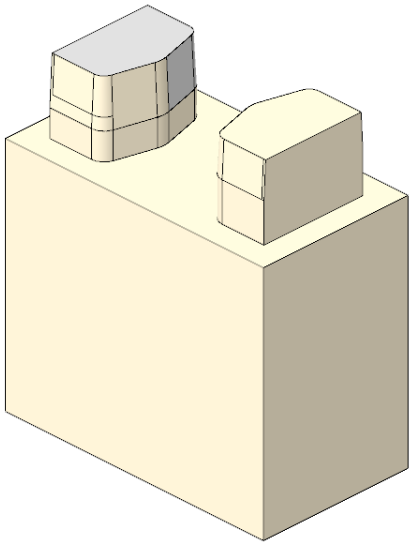
Electrode 9 – Detailing

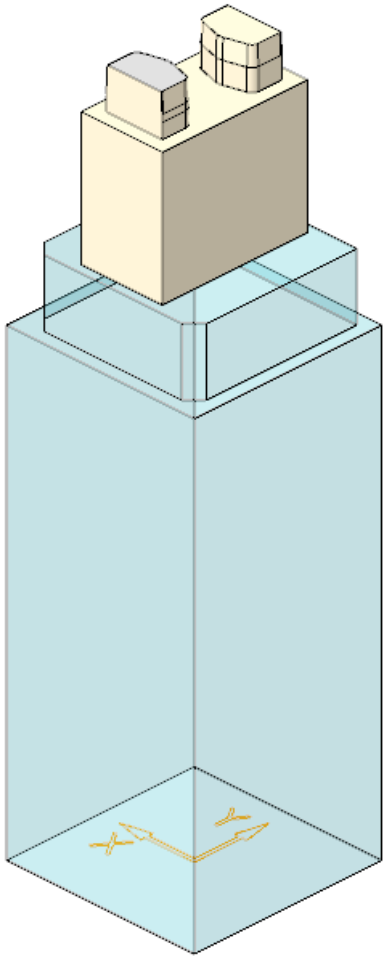


Electrode 9 – Mirror



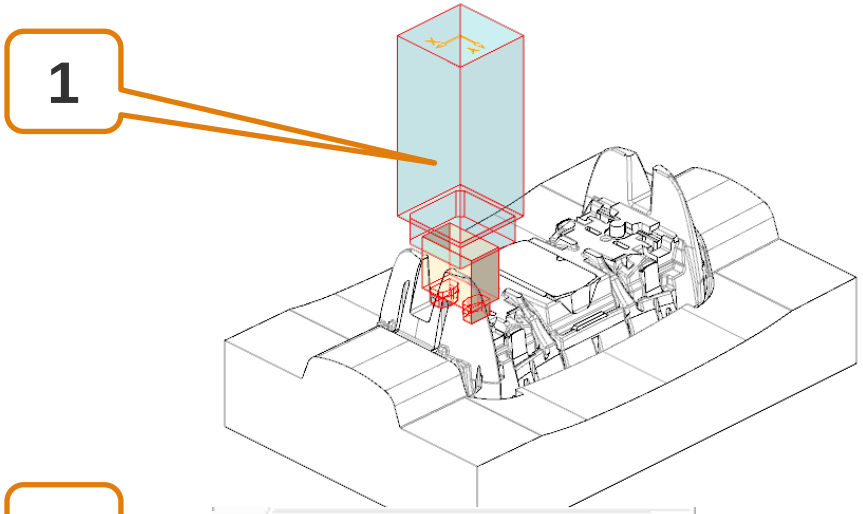
Electrode 9 - Finish

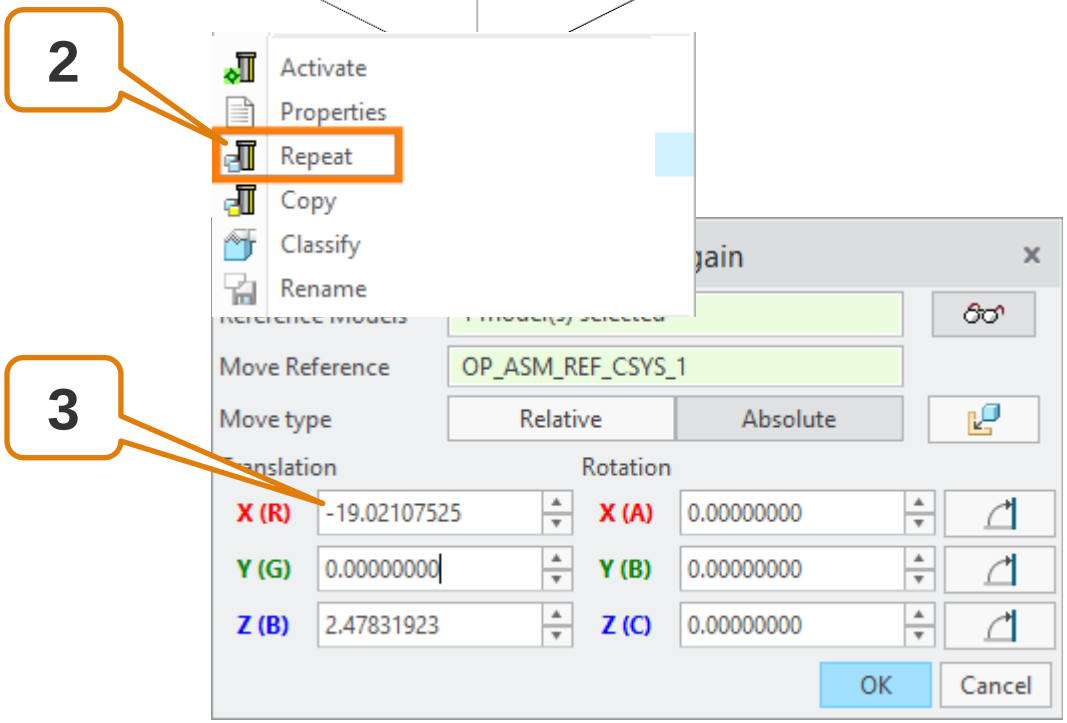


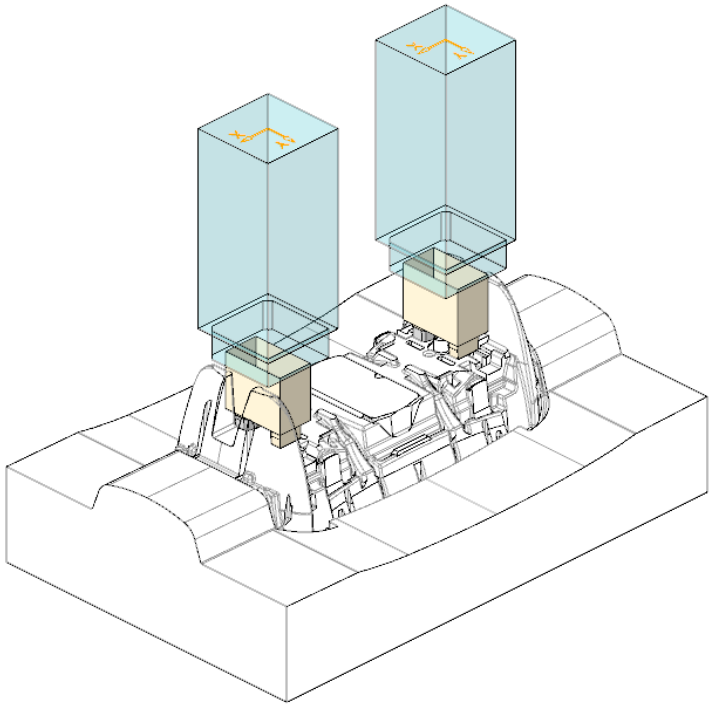


- Create support
- Finish electrode with base

Electrode 9 – Assemble Again



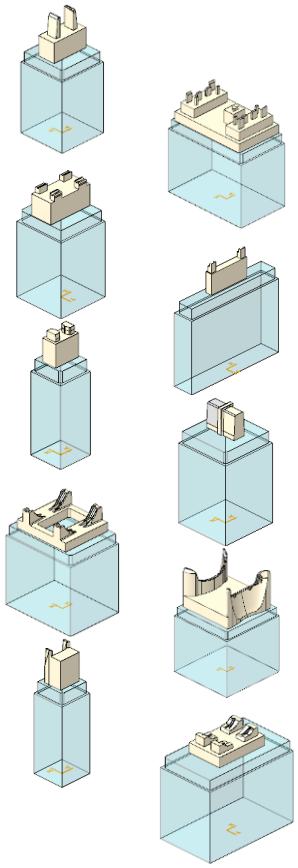




Agenda

Training

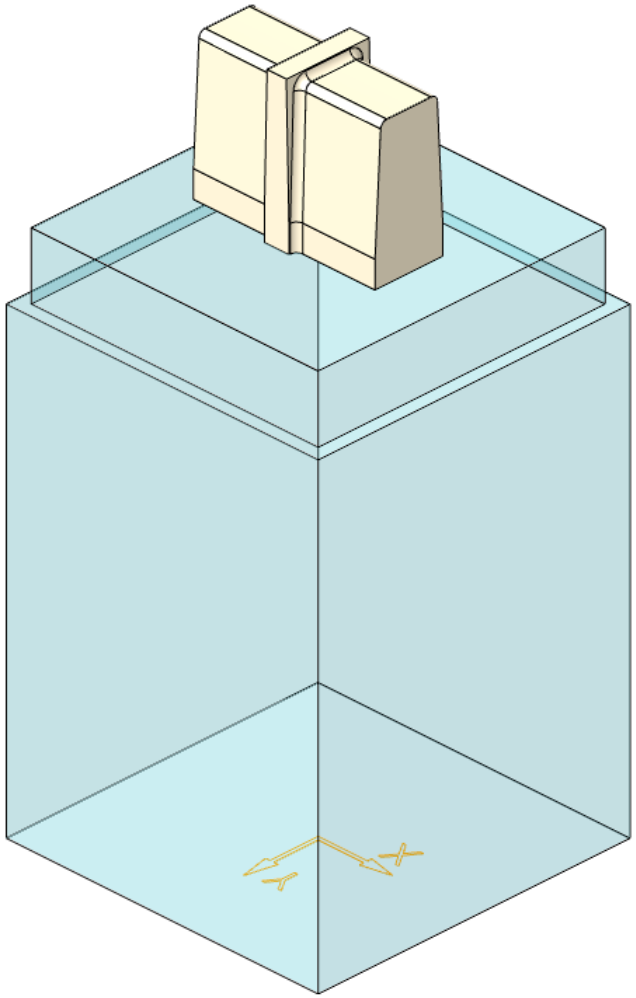
- Electrode 5
- Electrode 6
- Electrode 7
- Electrode 8
- Electrode 9
- **Electrode 10**
- Electrode 11
- Electrode 12
- Electrode 13
- Electrode 14



Electrode 10

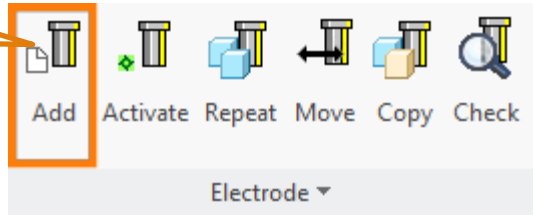
Topics…

- **Command ‚User defined Cutout ‘**

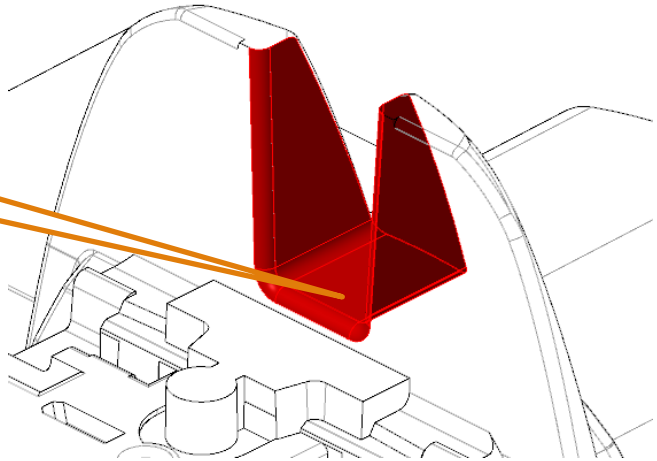


Electrode 10 – Get Data

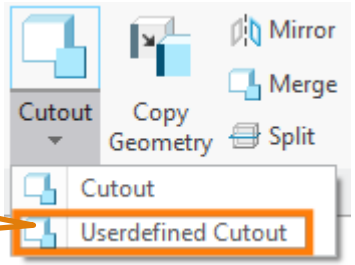
1



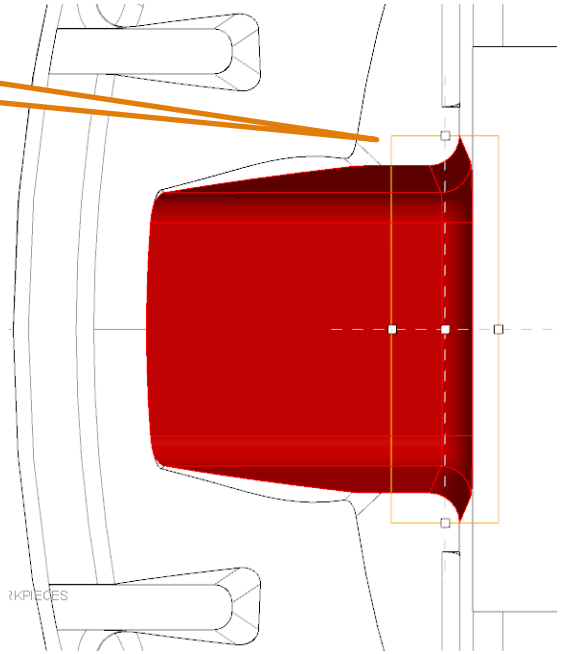
2

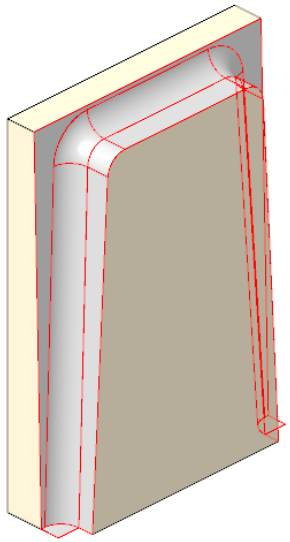


3

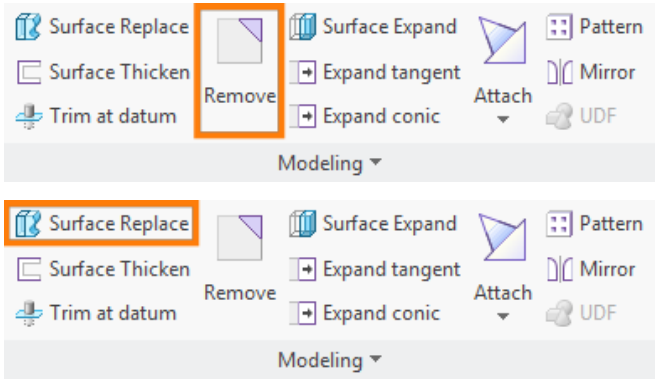


4



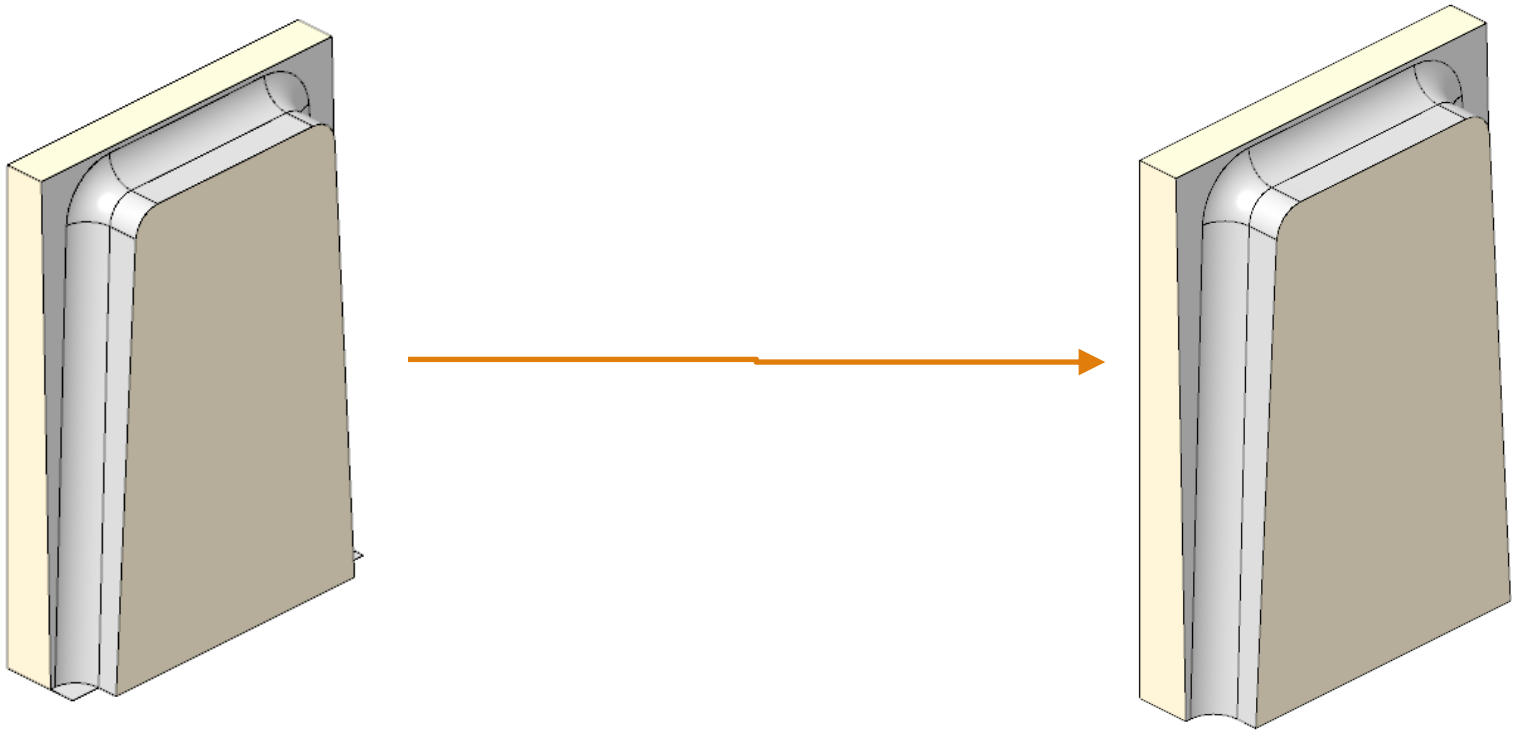


Electrode 10 – Detailing

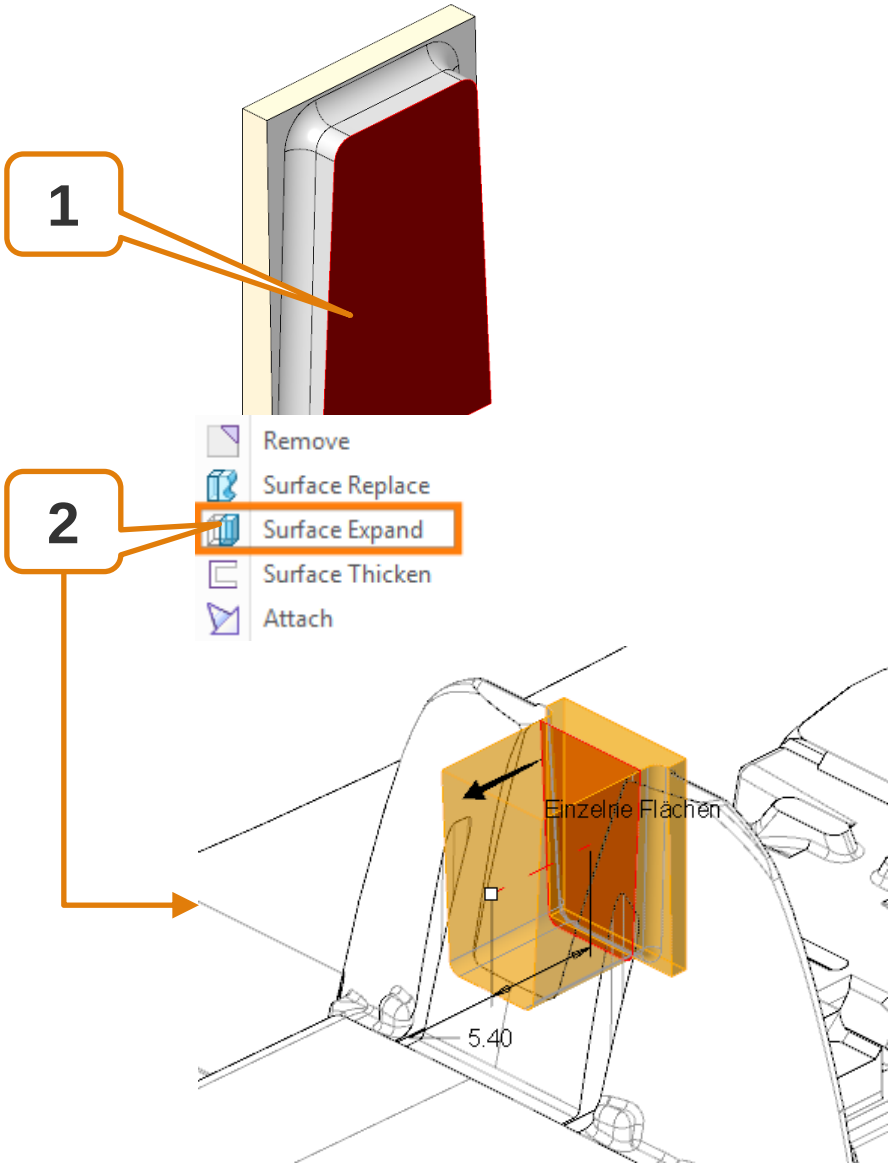


Detailing using…

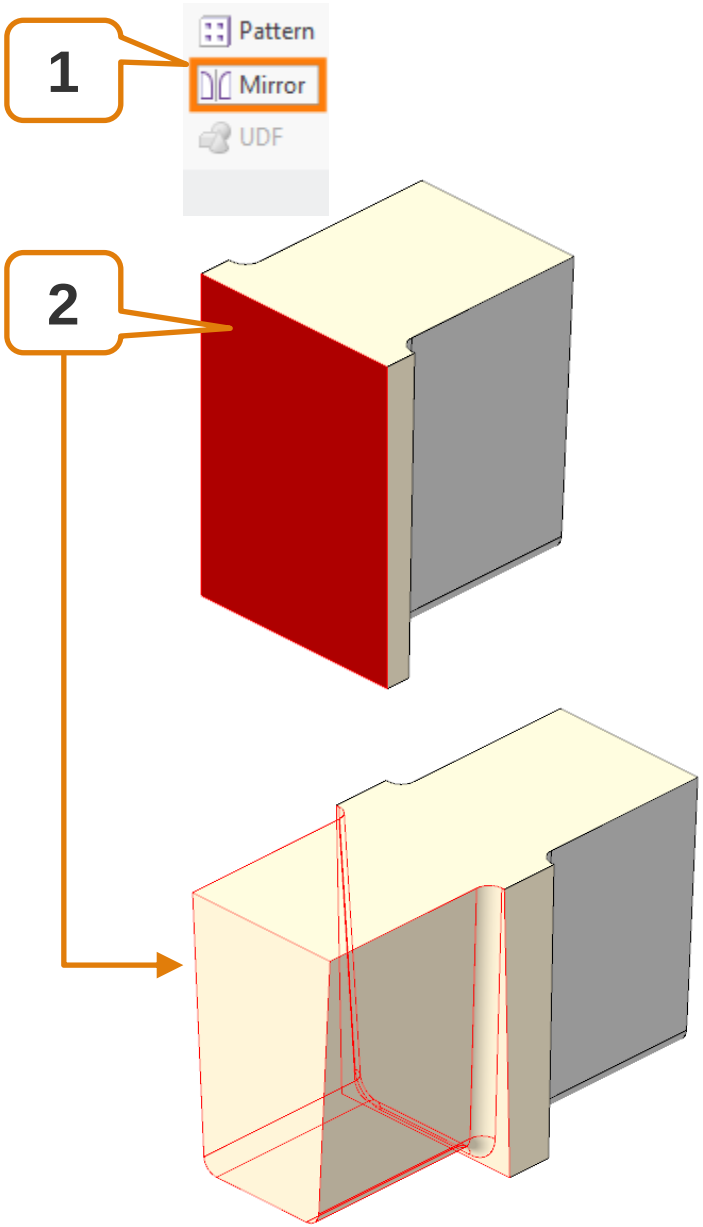
- **Replace surface or**
- **Remove**



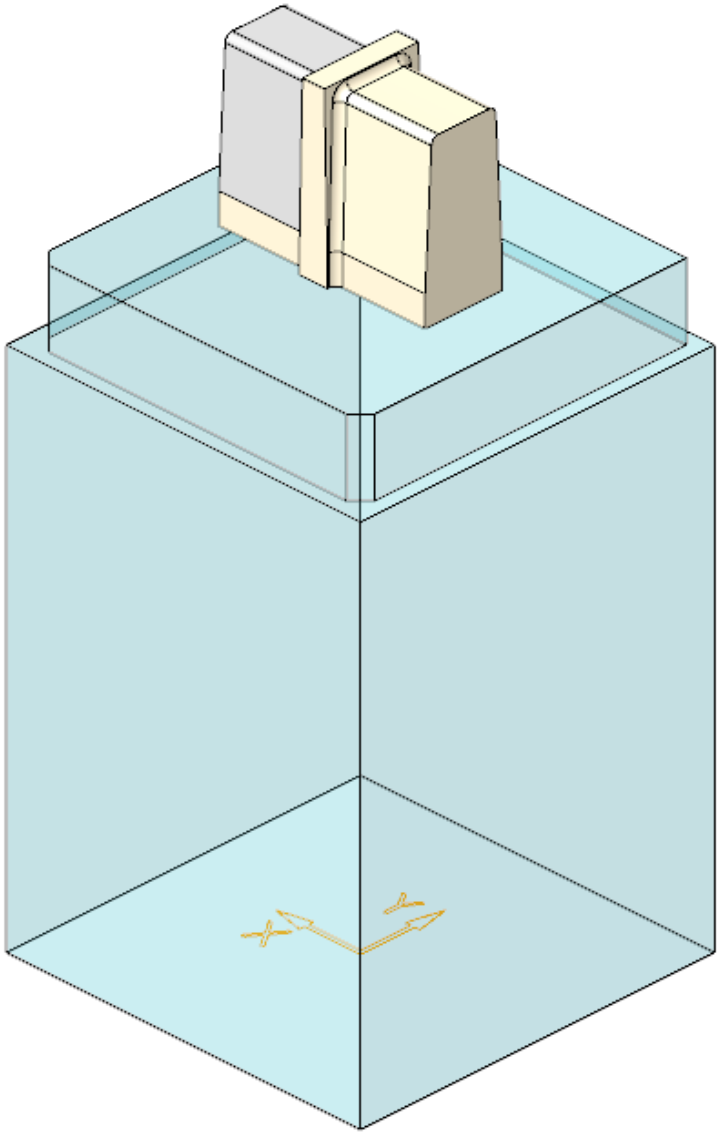
Electrode 10 – Detailing



Electrode 10 – Mirror

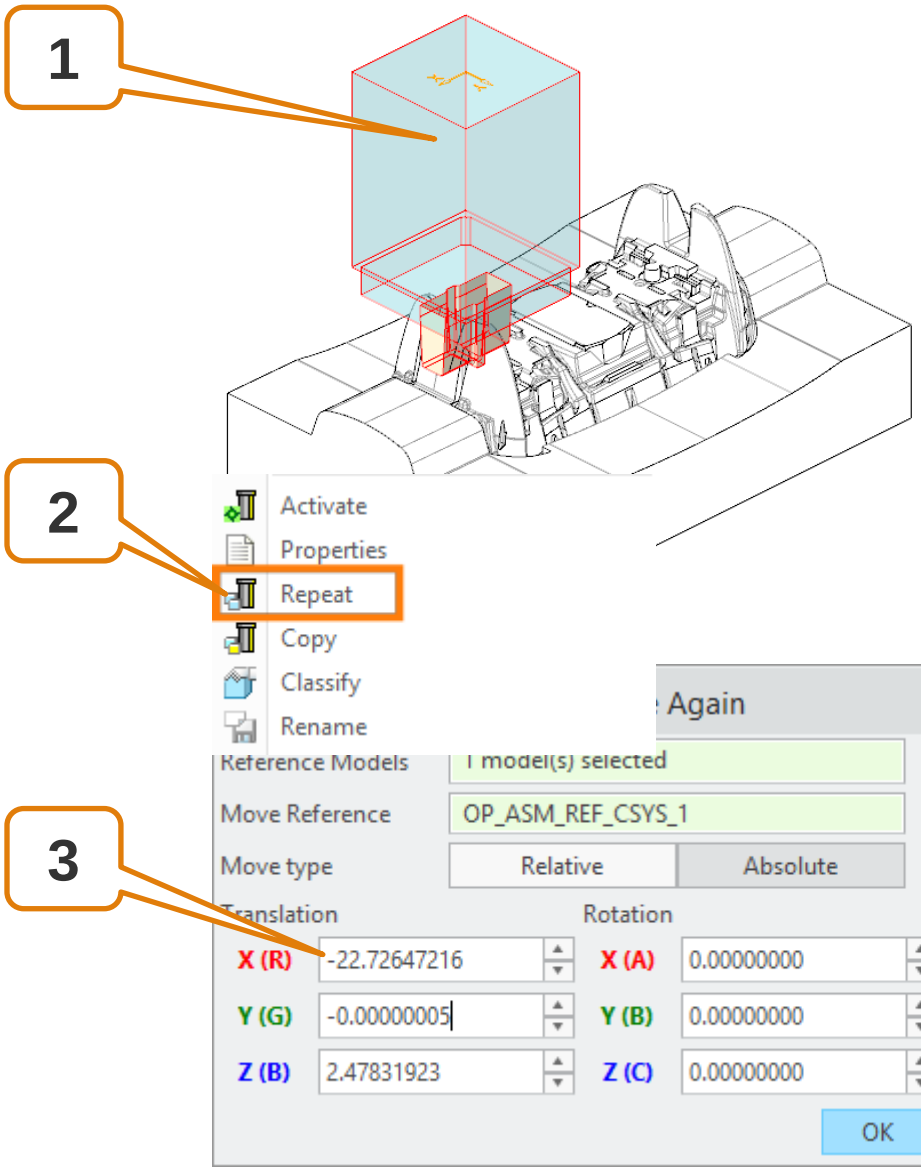


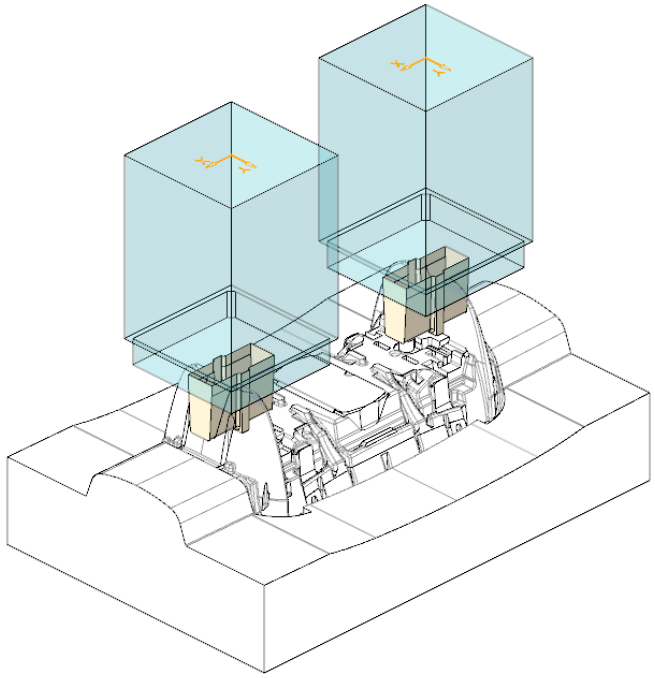
Electrode 10 - Finish



- **Finish electrode with base**

Electrode 10 – Assemble Again

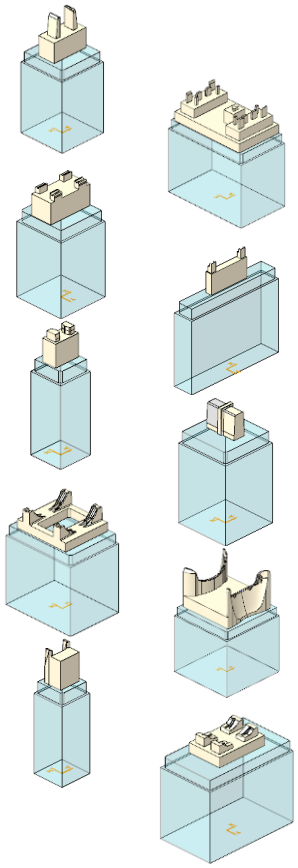




Agenda

Training

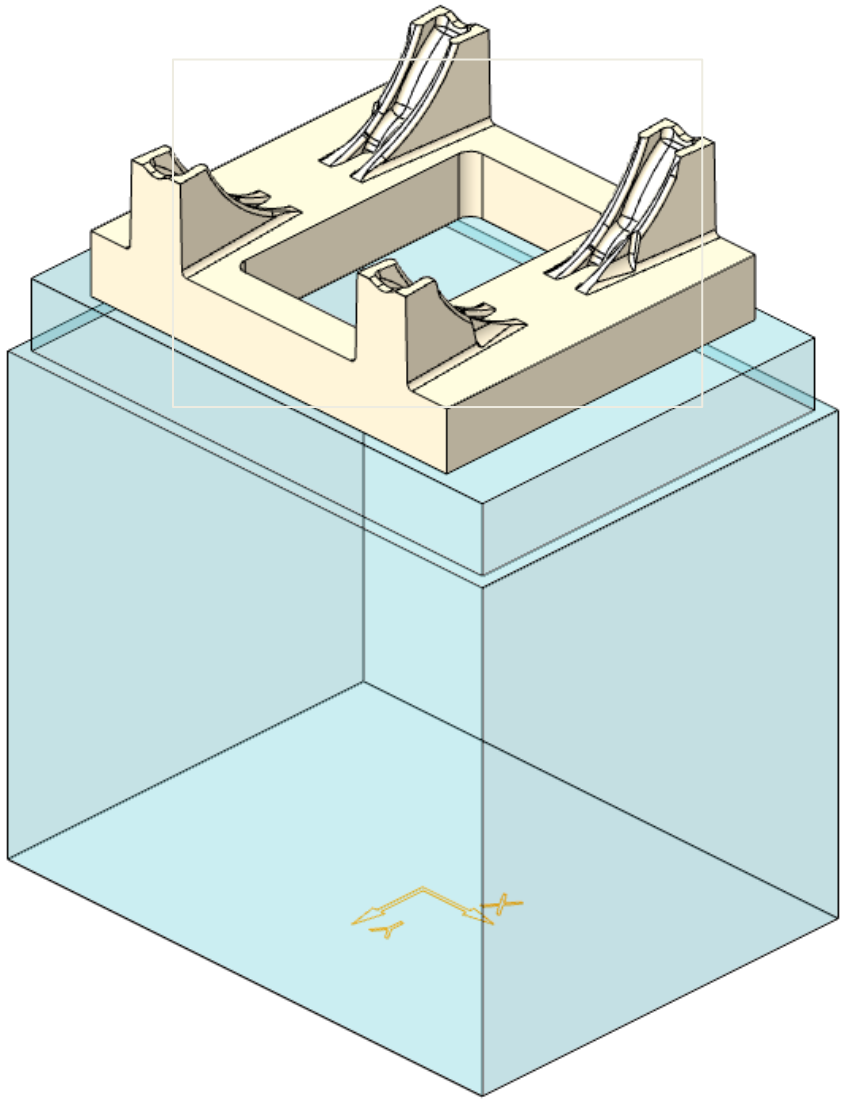
- Electrode 5
- Electrode 6
- Electrode 7
- Electrode 8
- Electrode 9
- Electrode 10
- **Electrode 11**
- Electrode 12
- Electrode 13
- Electrode 14



Electrode 11

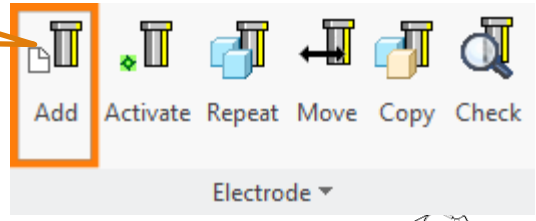
Topics…

- **Cut out with Creo extrude**
- **user defined FREE_FACE**

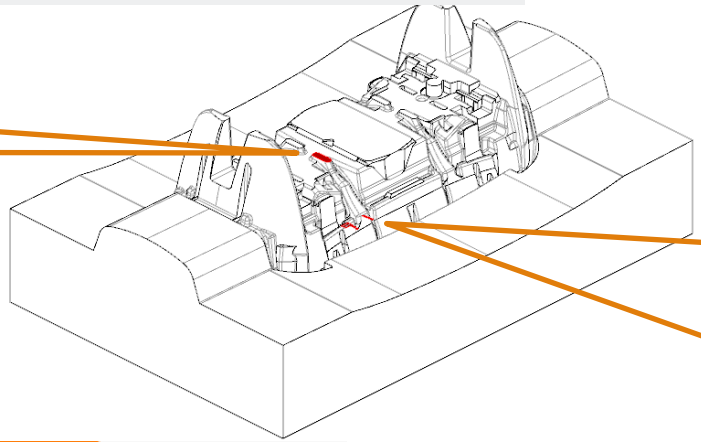


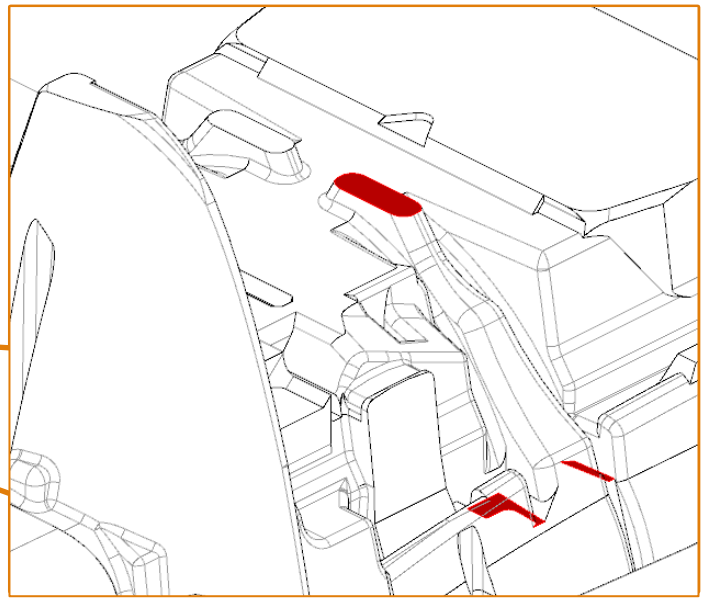
Electrode 11 – Get Data

1

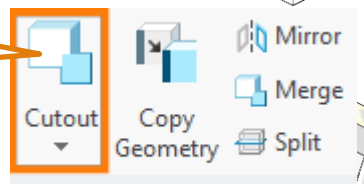


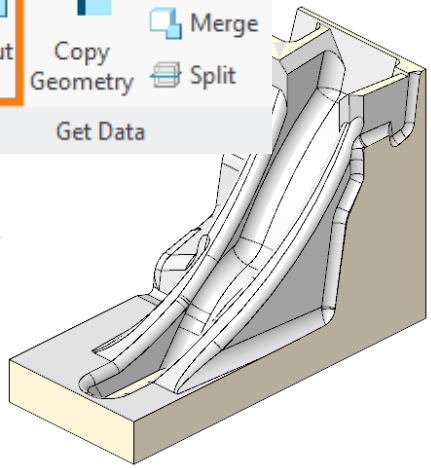
2



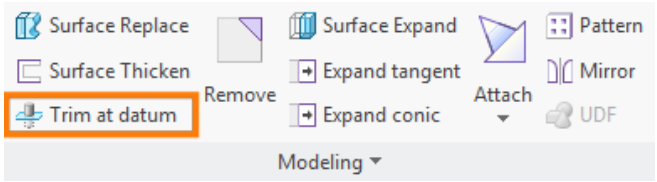


3



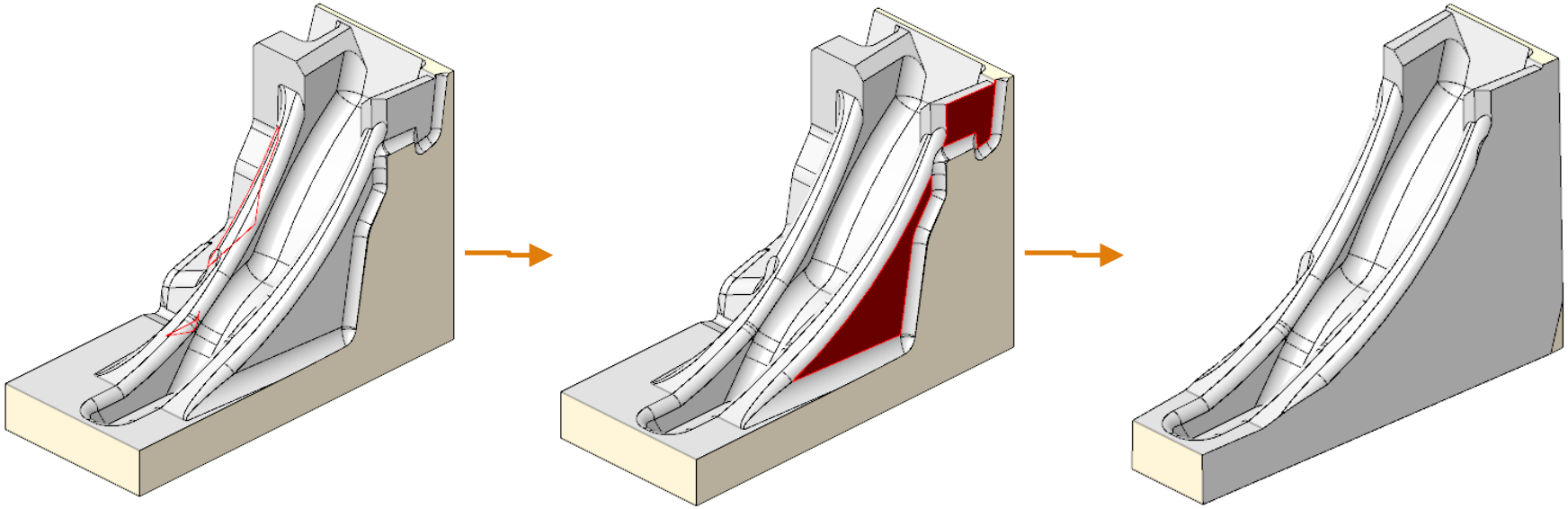


Electrode 11 – Detailing

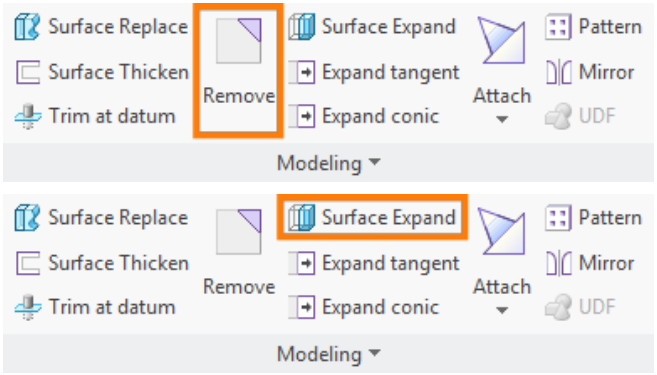


Detailing using…

- **Trim at datum**

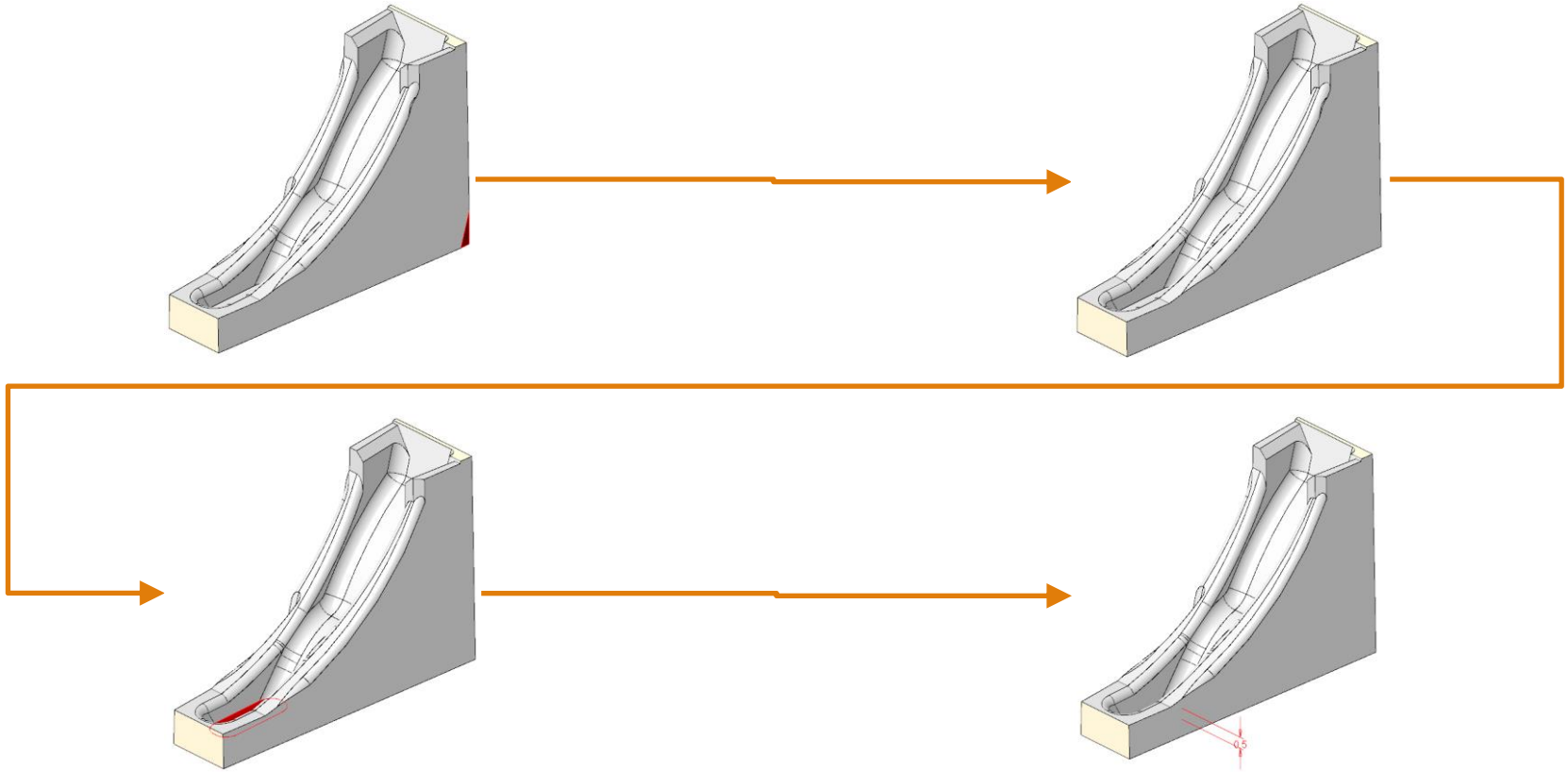


Electrode 11 – Detailing

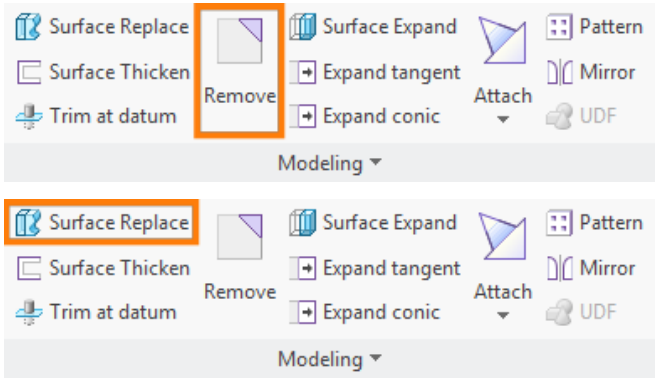


Detailing using…

- **Remove**
- **Fläche Expand**

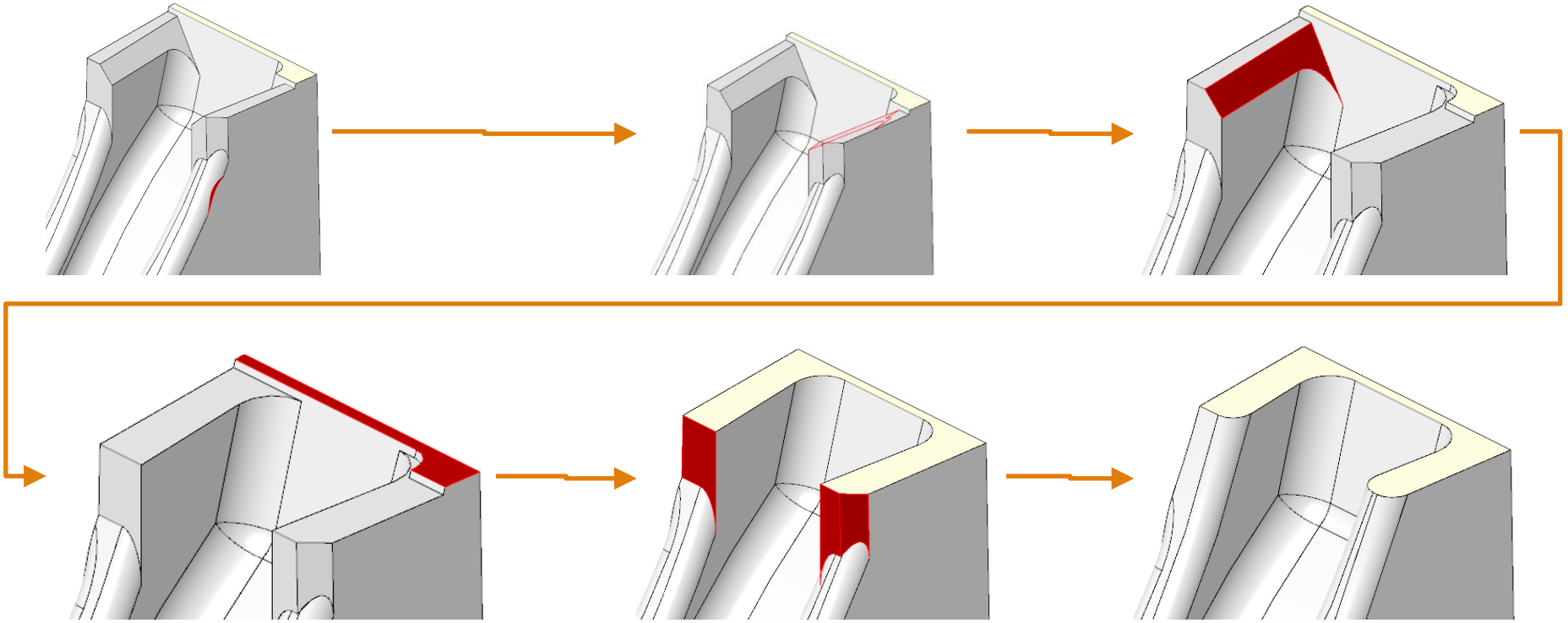


Electrode 11 – Detailing

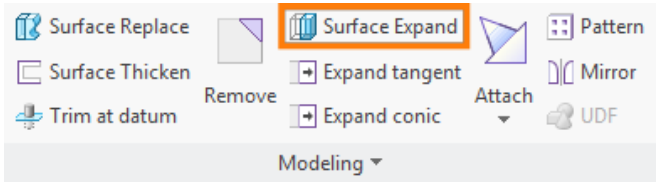


Detailing using…

- **Remove**
- **Replace surface**

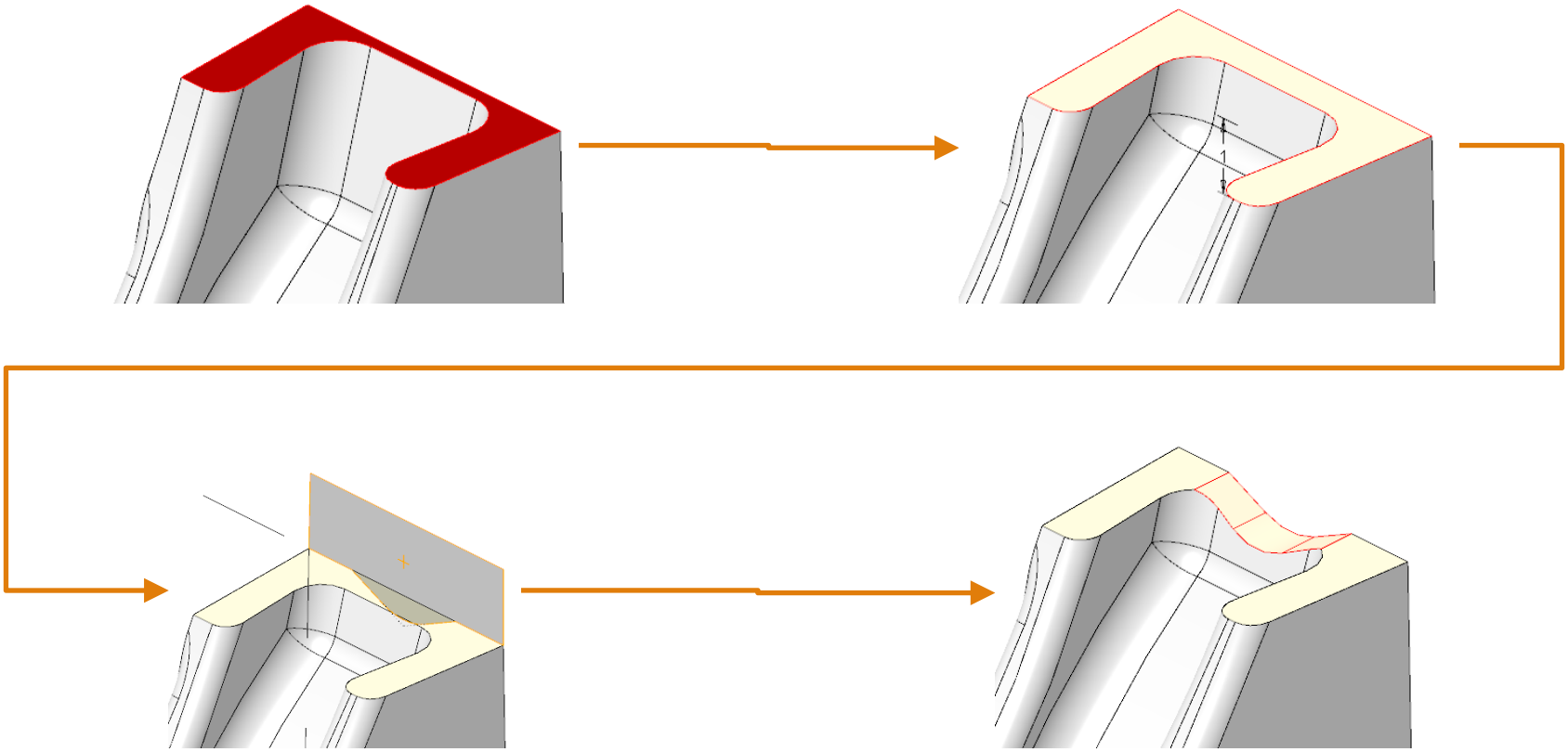


Electrode 11 – Detailing

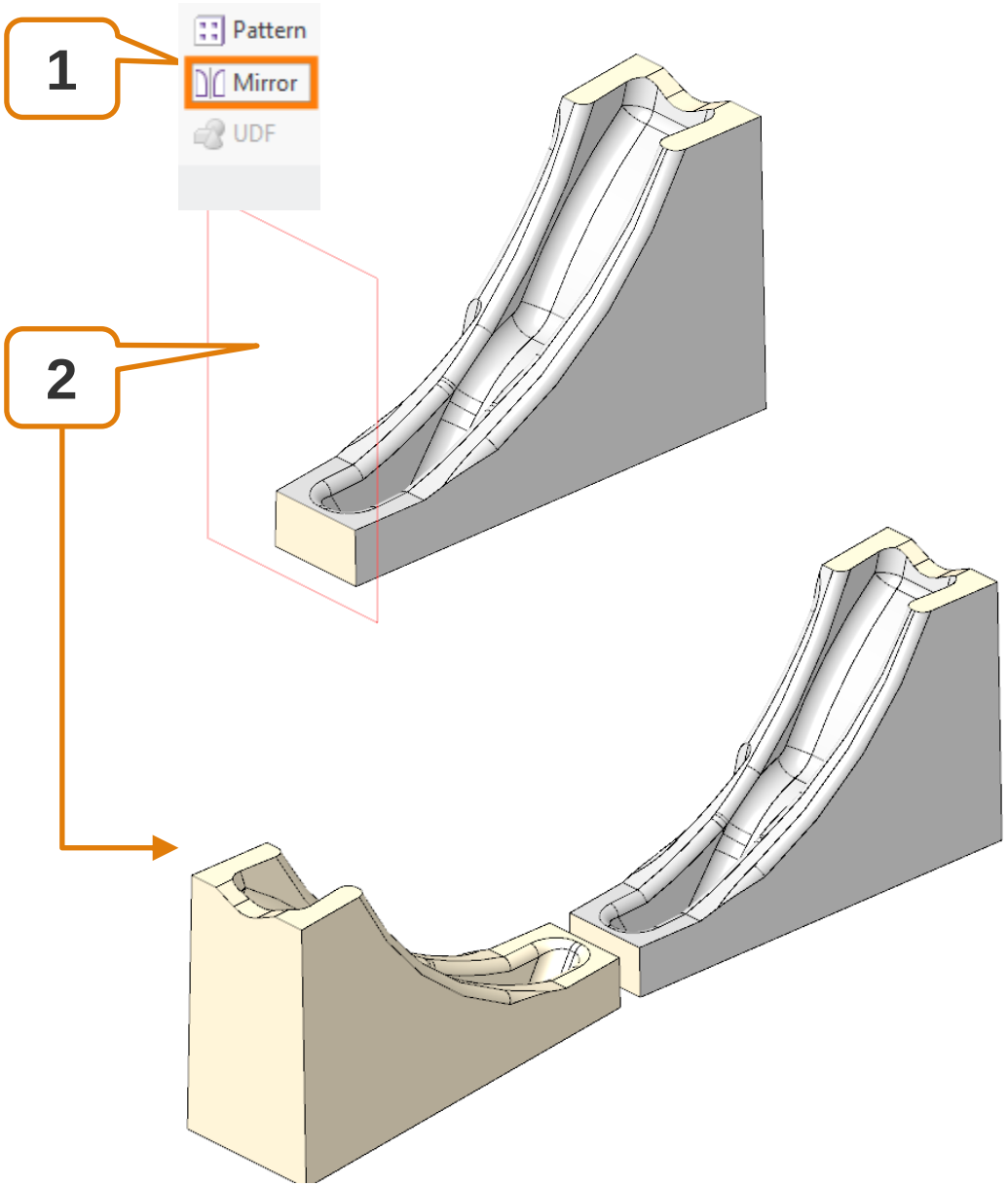


Detailing using…

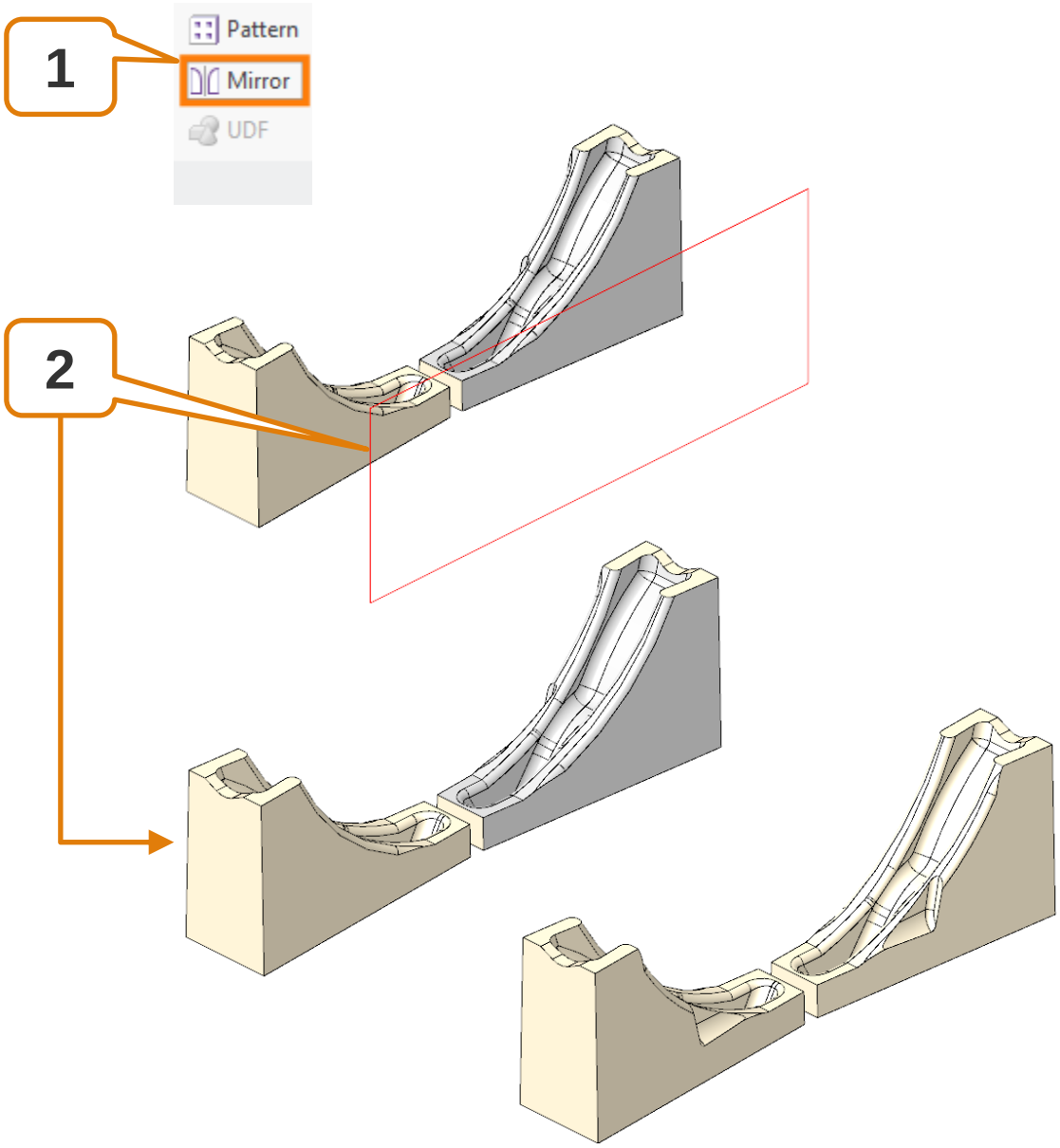
- Fläche Expand
- Extruded cut



Electrode 11 – Mirror



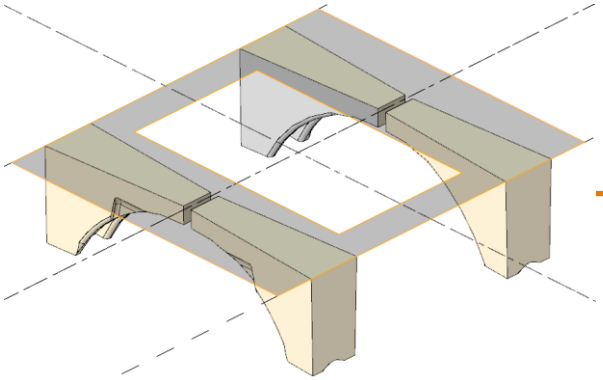
Electrode 11 – Mirror

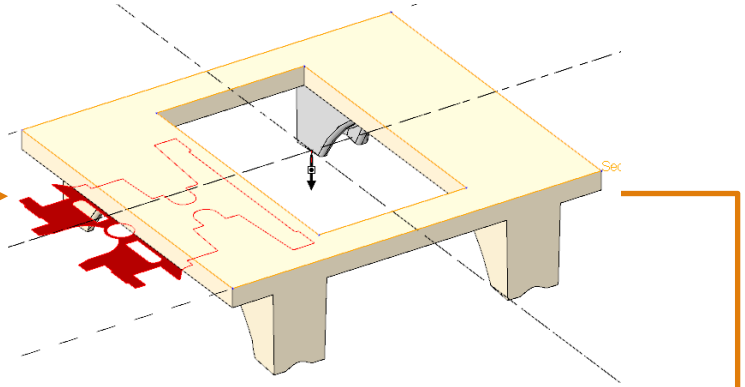


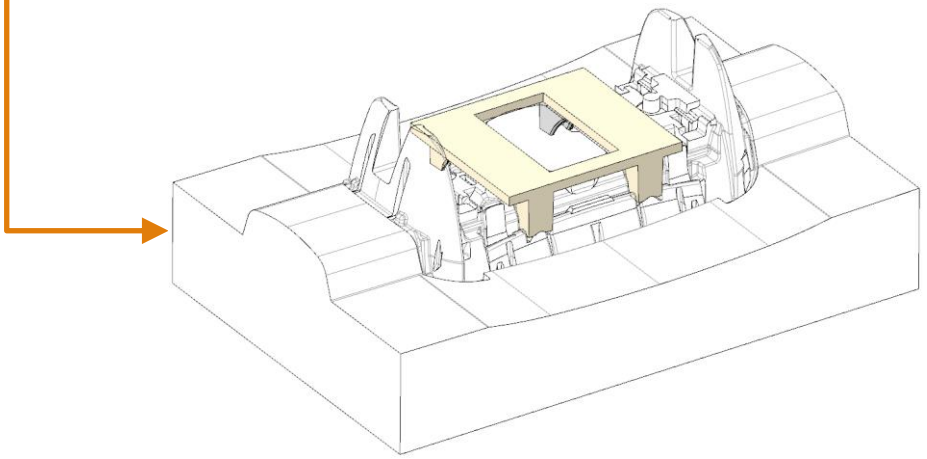
Electrode 11 – Detailing

Detailing using…

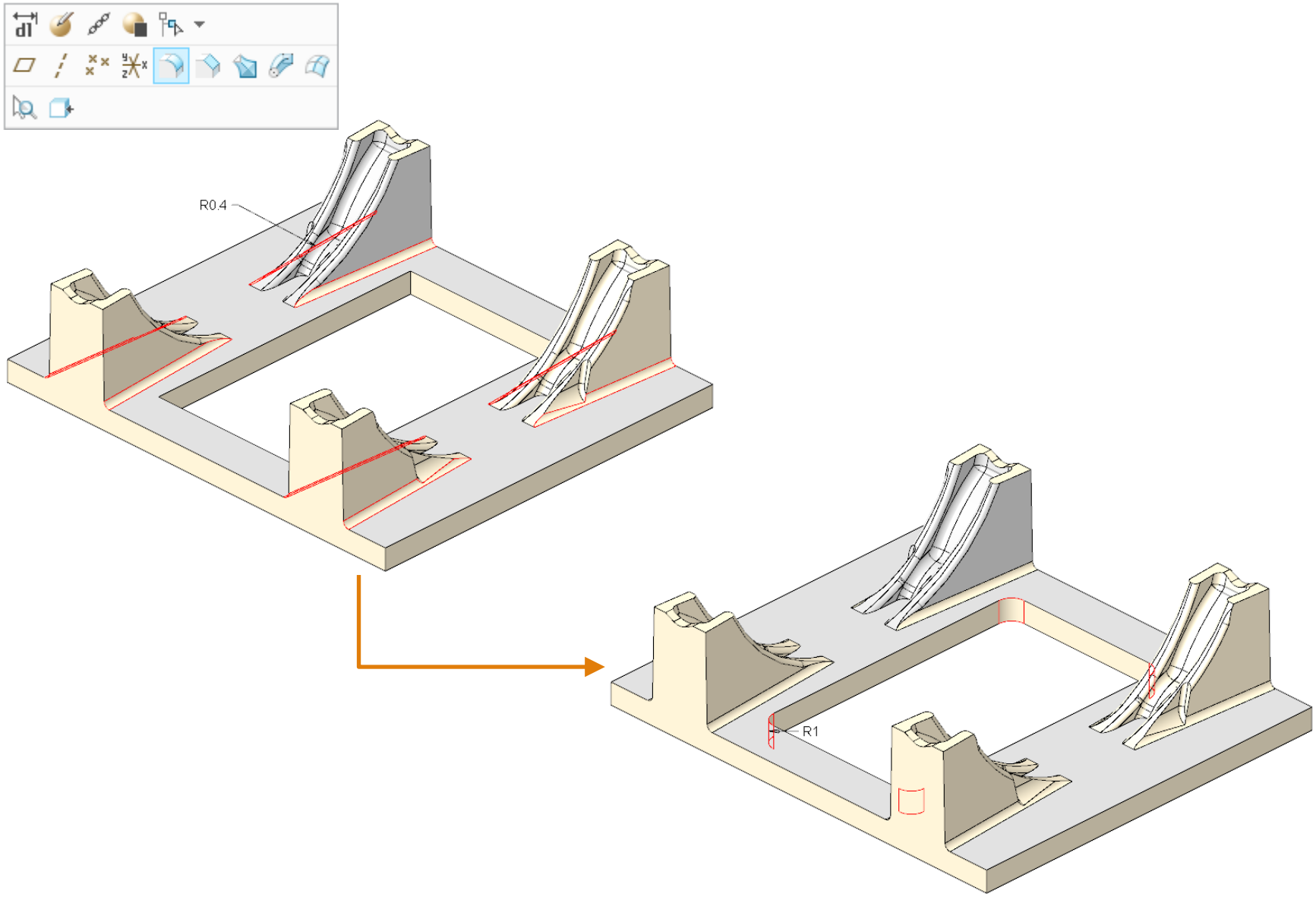
- **Extrude**



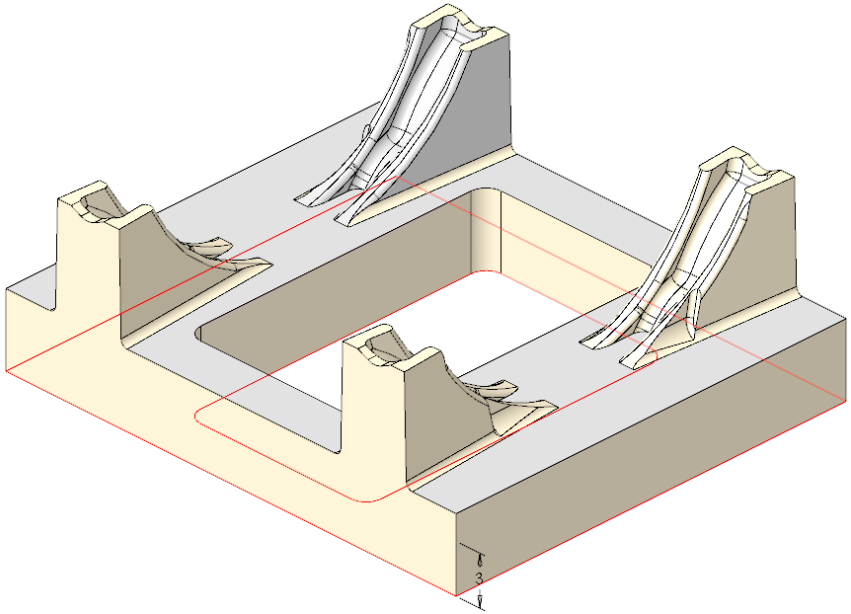




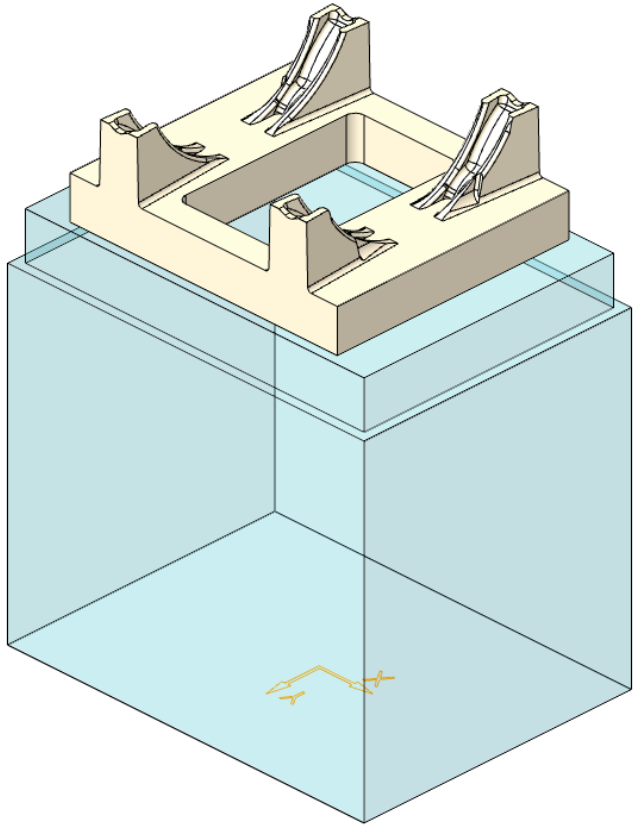
Electrode 11 – Detailing



Electrode 11 - Finish



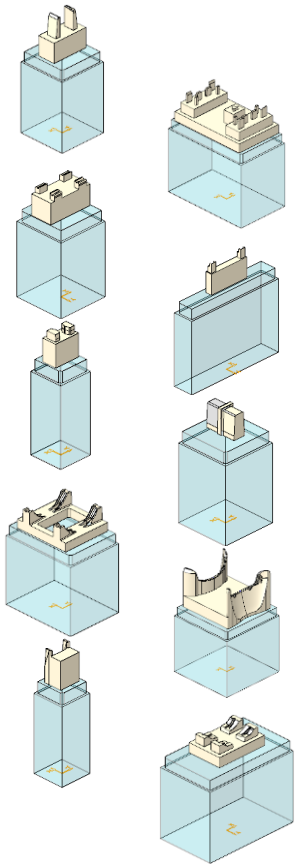
- Select FREE_FACE
- Finish electrode with base



Agenda

Training

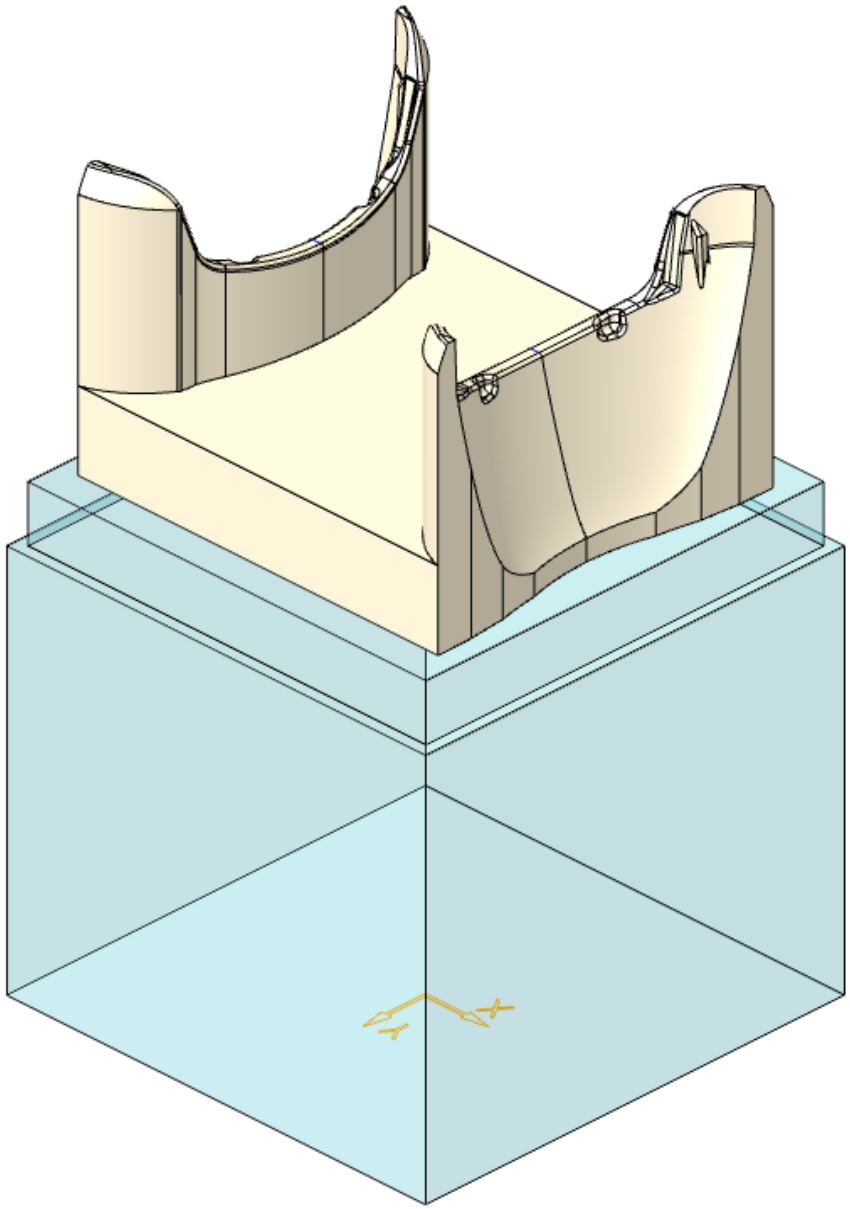
- Electrode 5
- Electrode 6
- Electrode 7
- Electrode 8
- Electrode 9
- Electrode 10
- Electrode 11
- **Electrode 12**
- Electrode 13
- Electrode 14



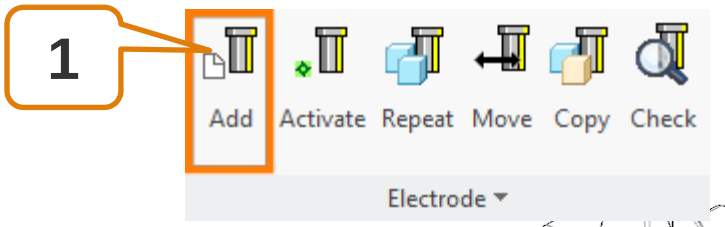
Electrode 12

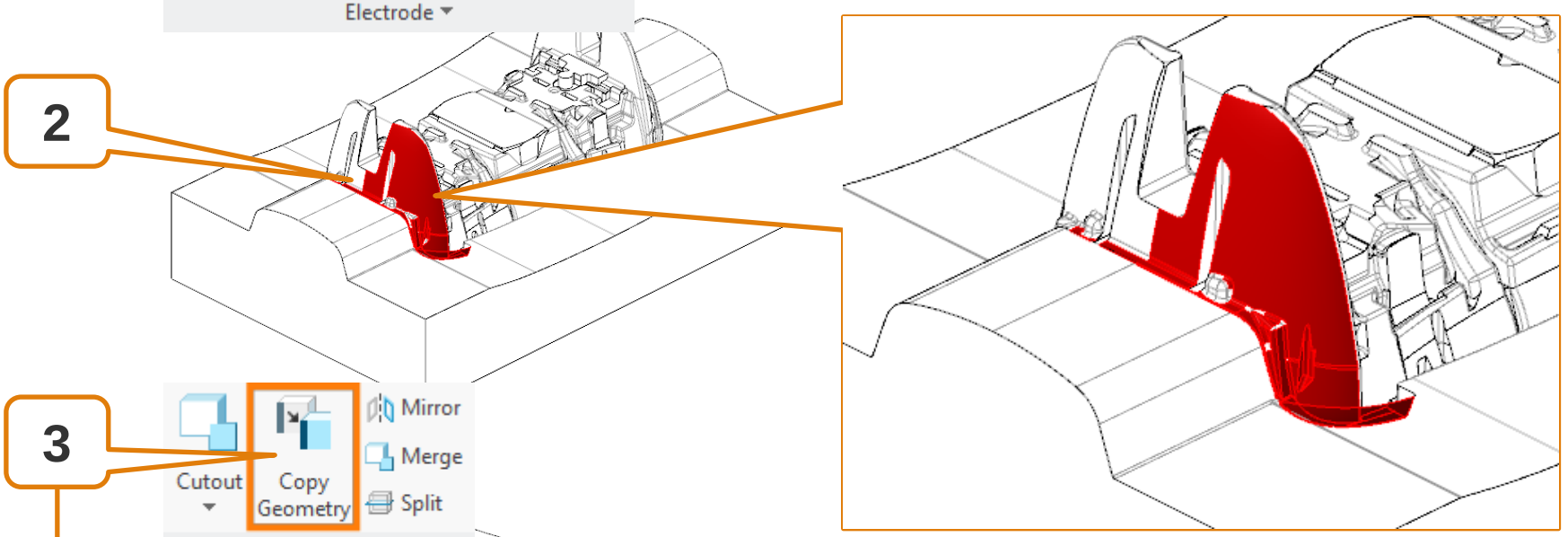
Topics…

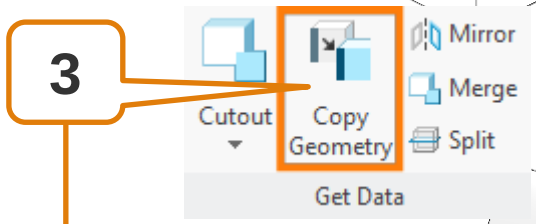
- **Working with surfaces**

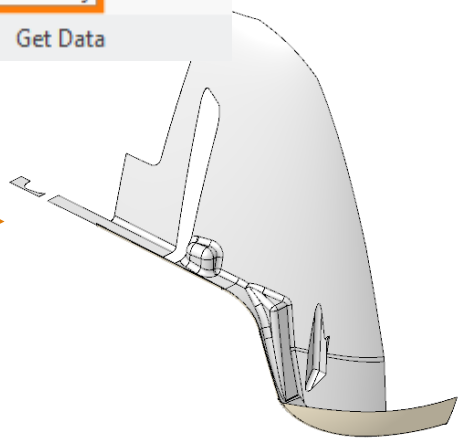


Electrode 12 – Get Data

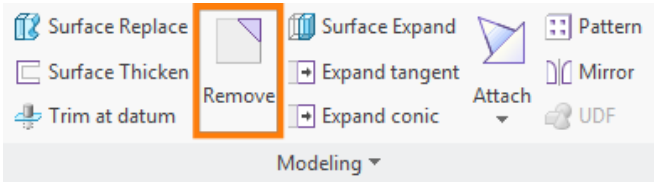






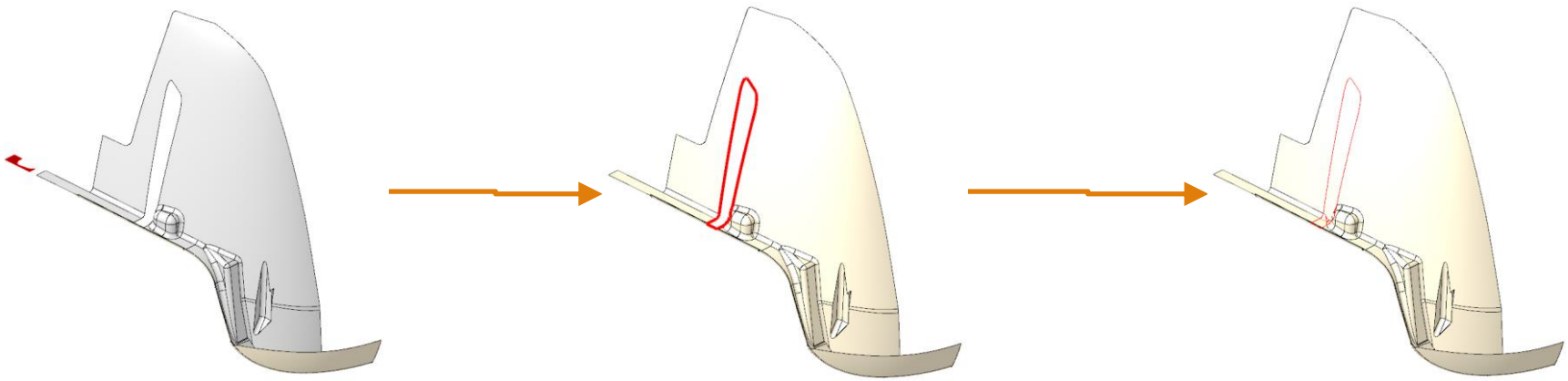


Electrode 12 – Detailing



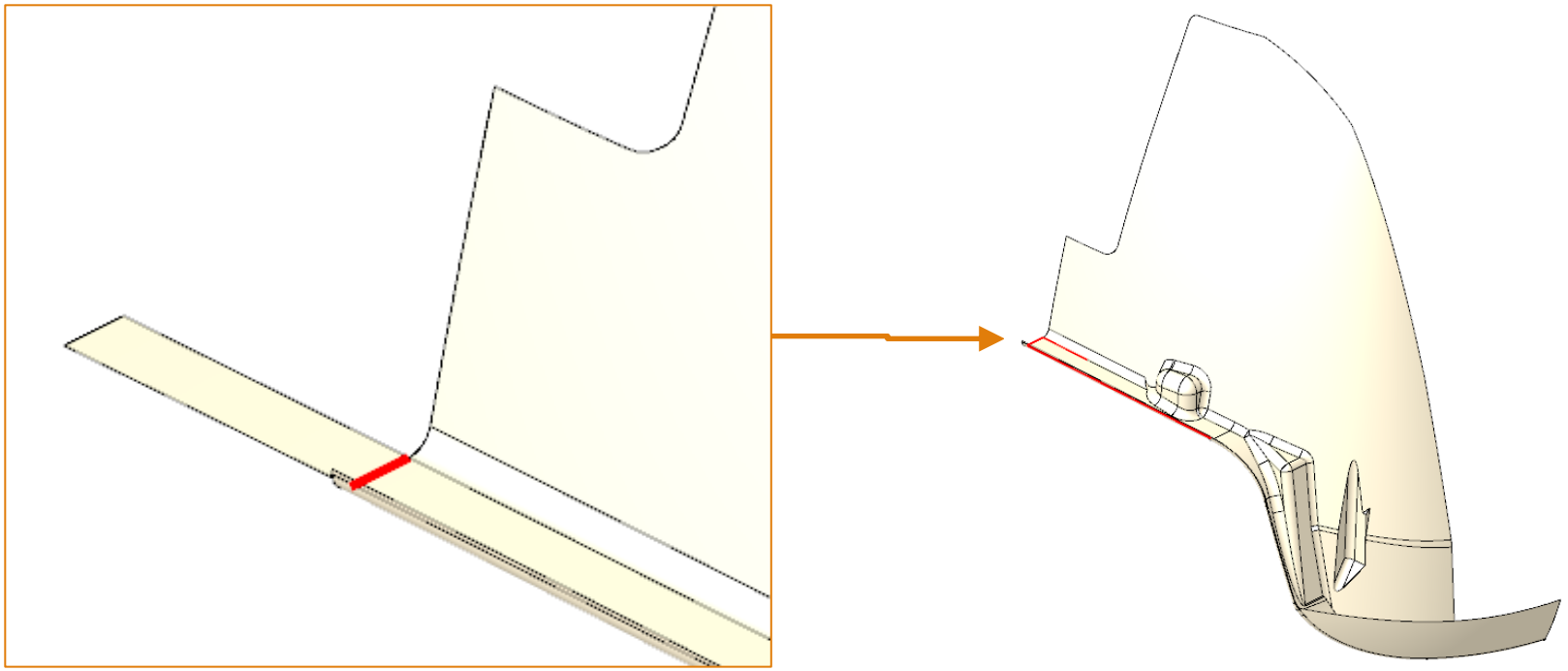
Detailing using…

- Copy surfaces
- Remove patch from quilt
- Remove contour from quilt

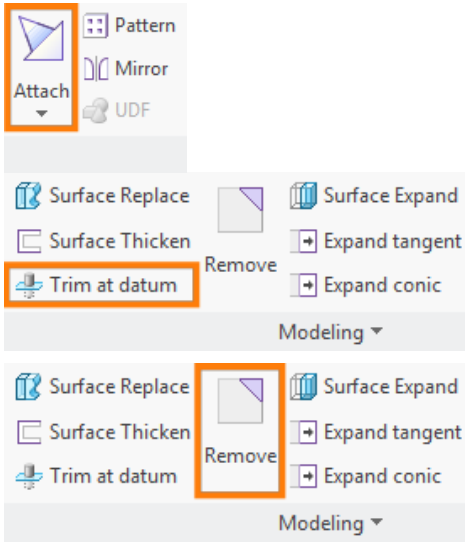


Electrode 12 – Detailing

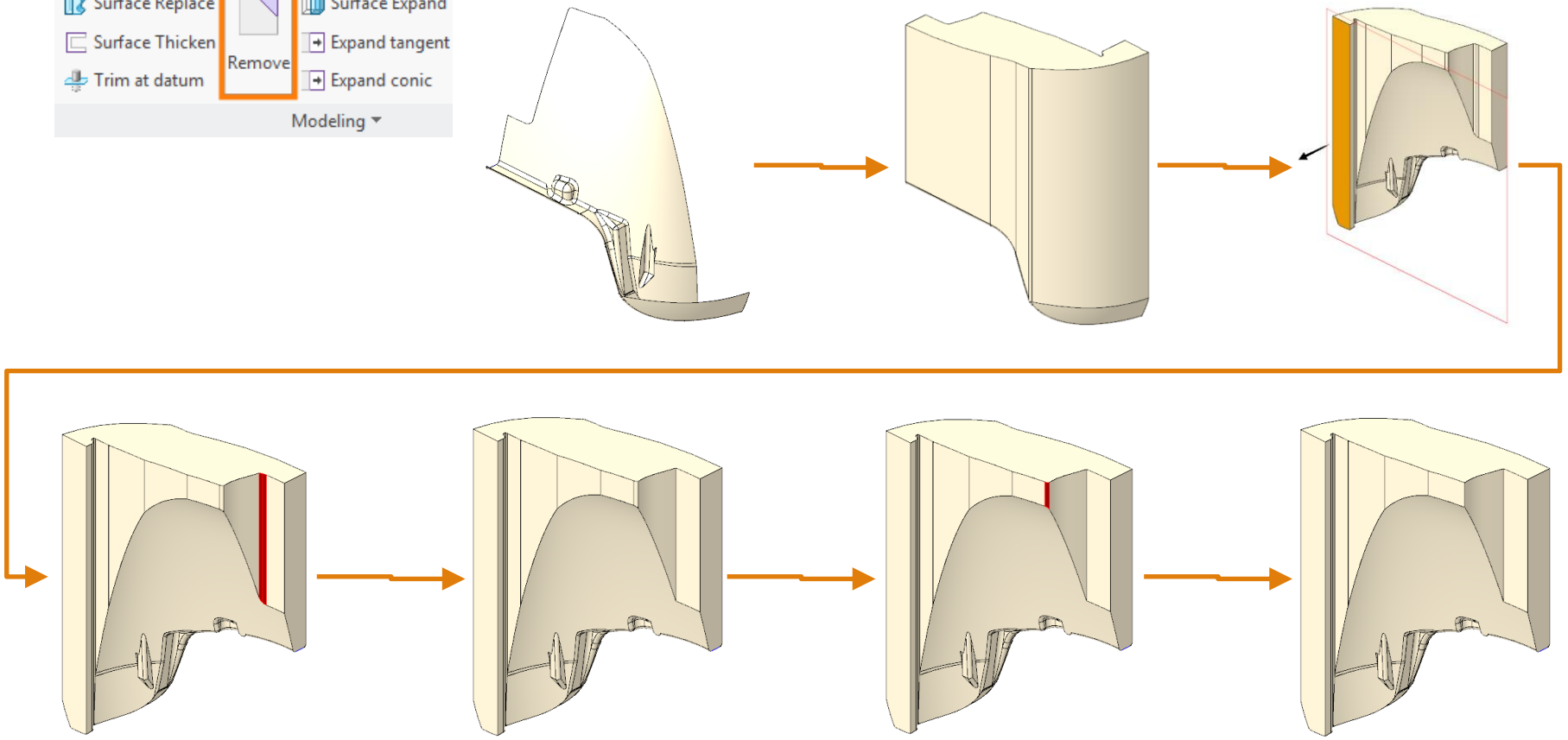
- **Trim at created curve**



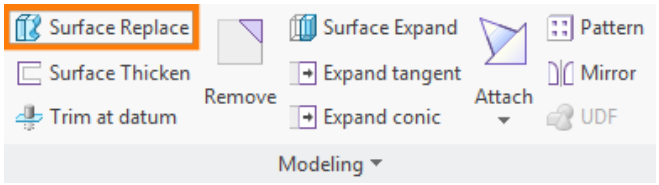
Electrode 12 – Detailing

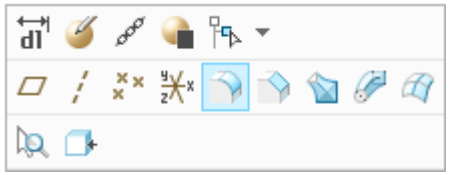


- Attach quilt
- Trim at datum
- Remove

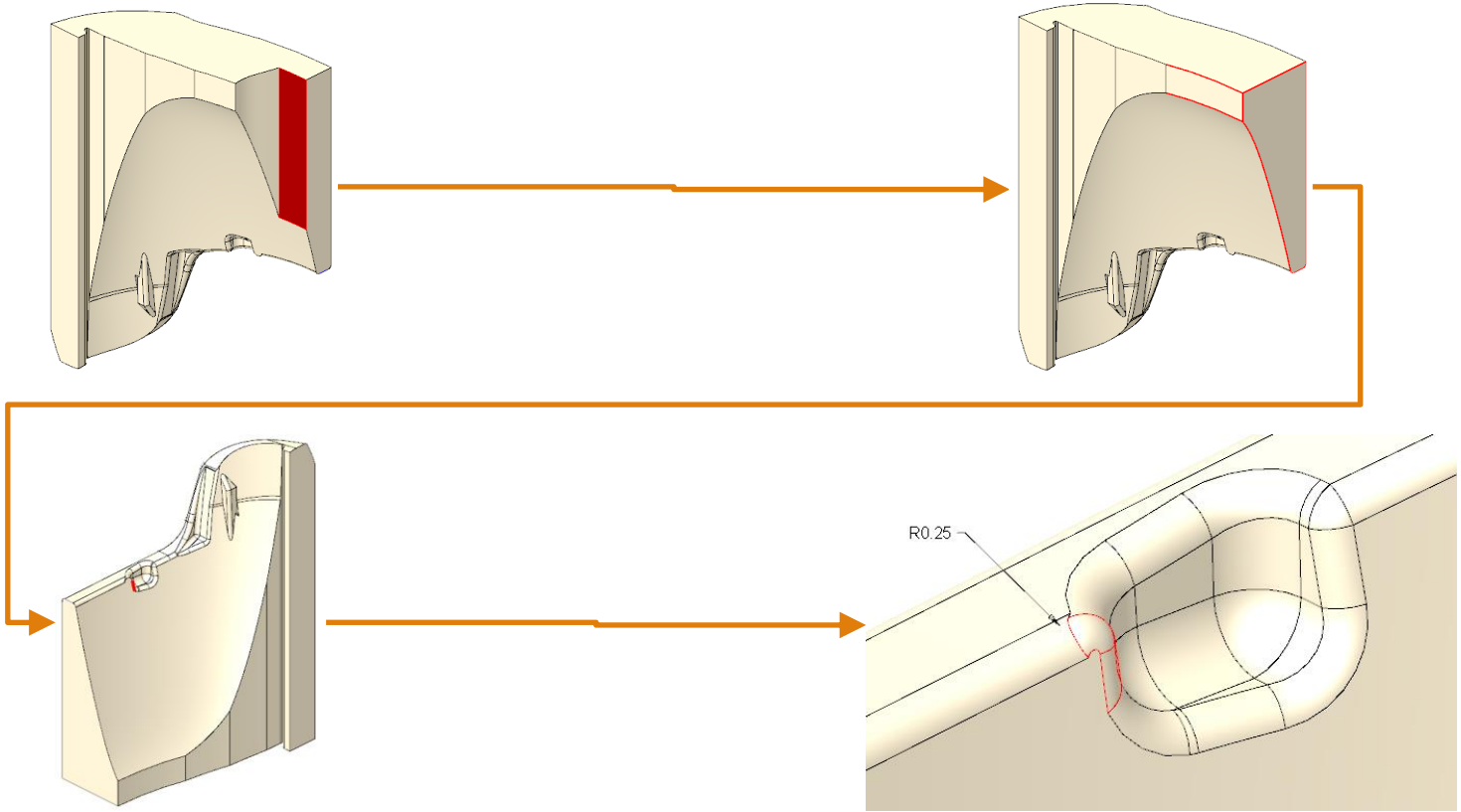


Electrode 12 – Detailing

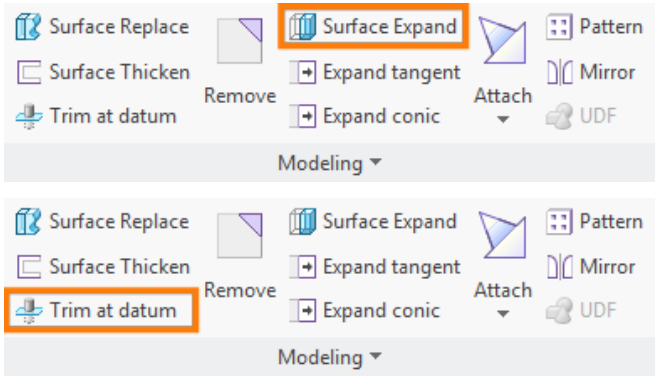




- **Replace surface**
- **Rundung**

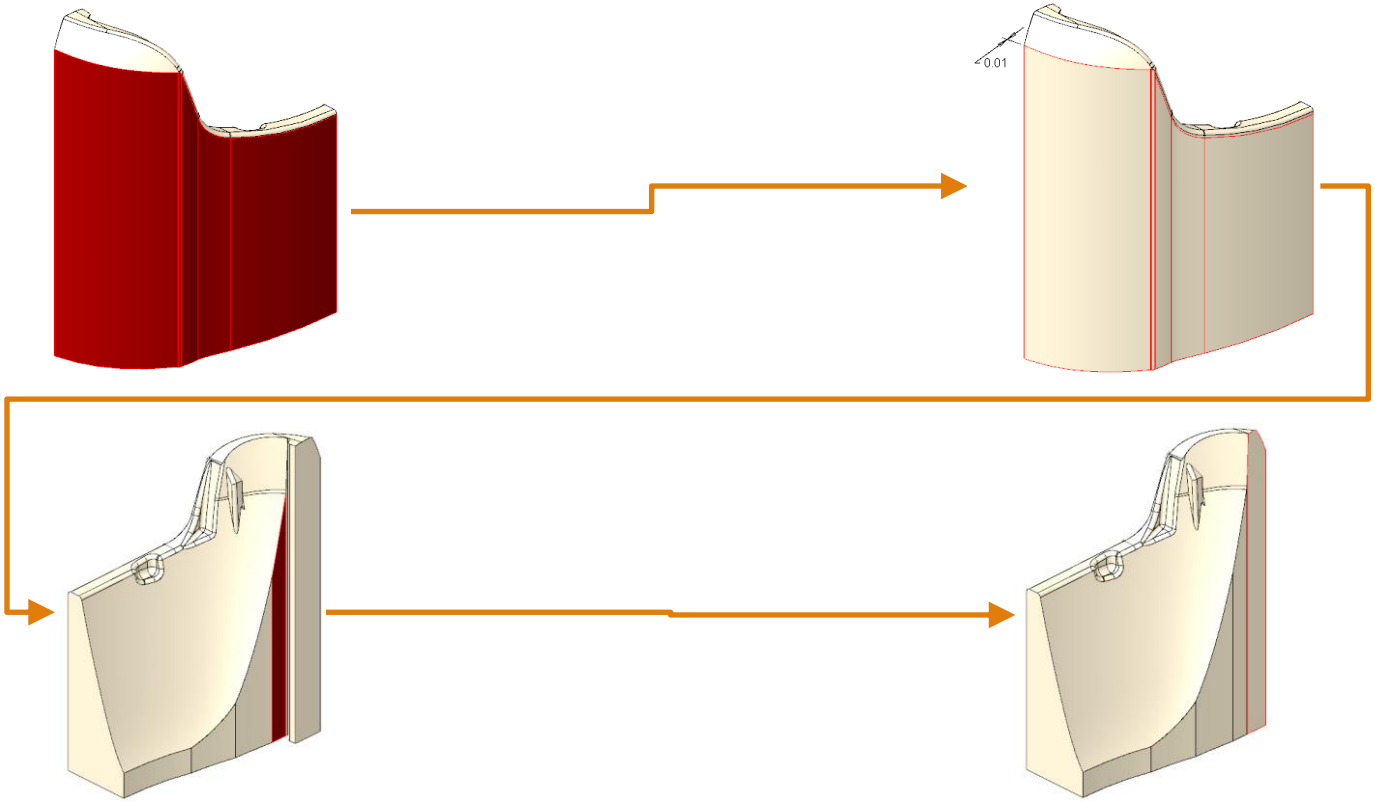


Electrode 12 – Detailing

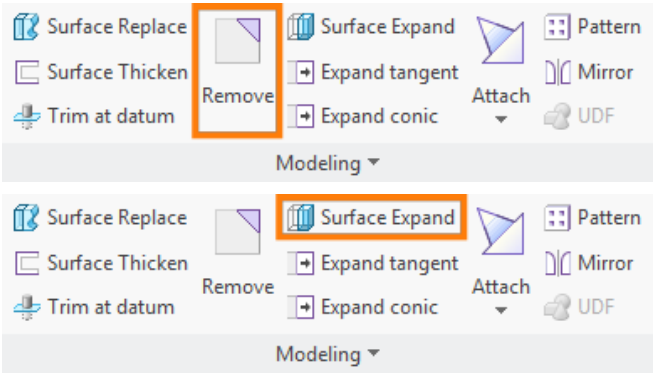


Detailing using…

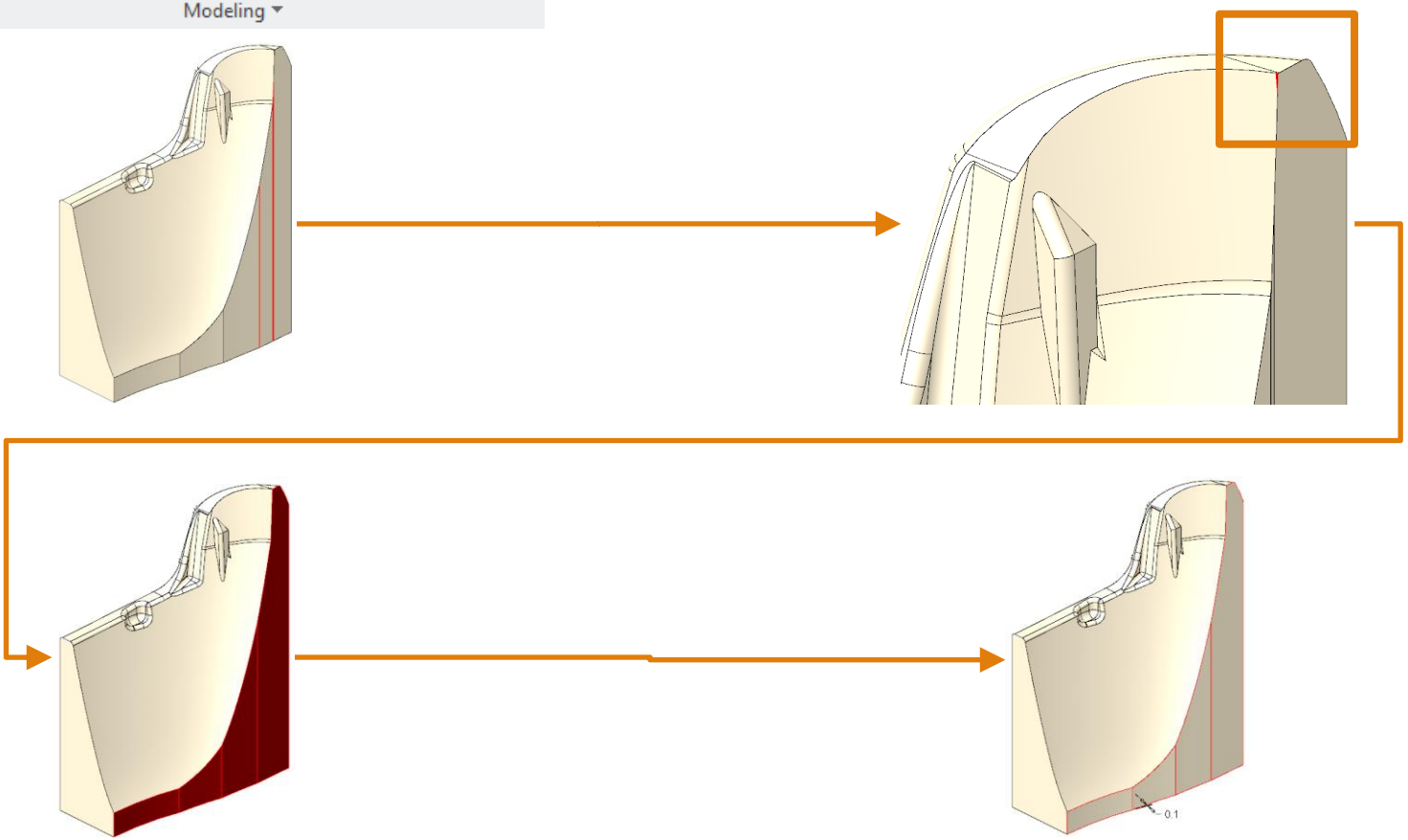
- Surface expand (0.01)
- Trim at datum



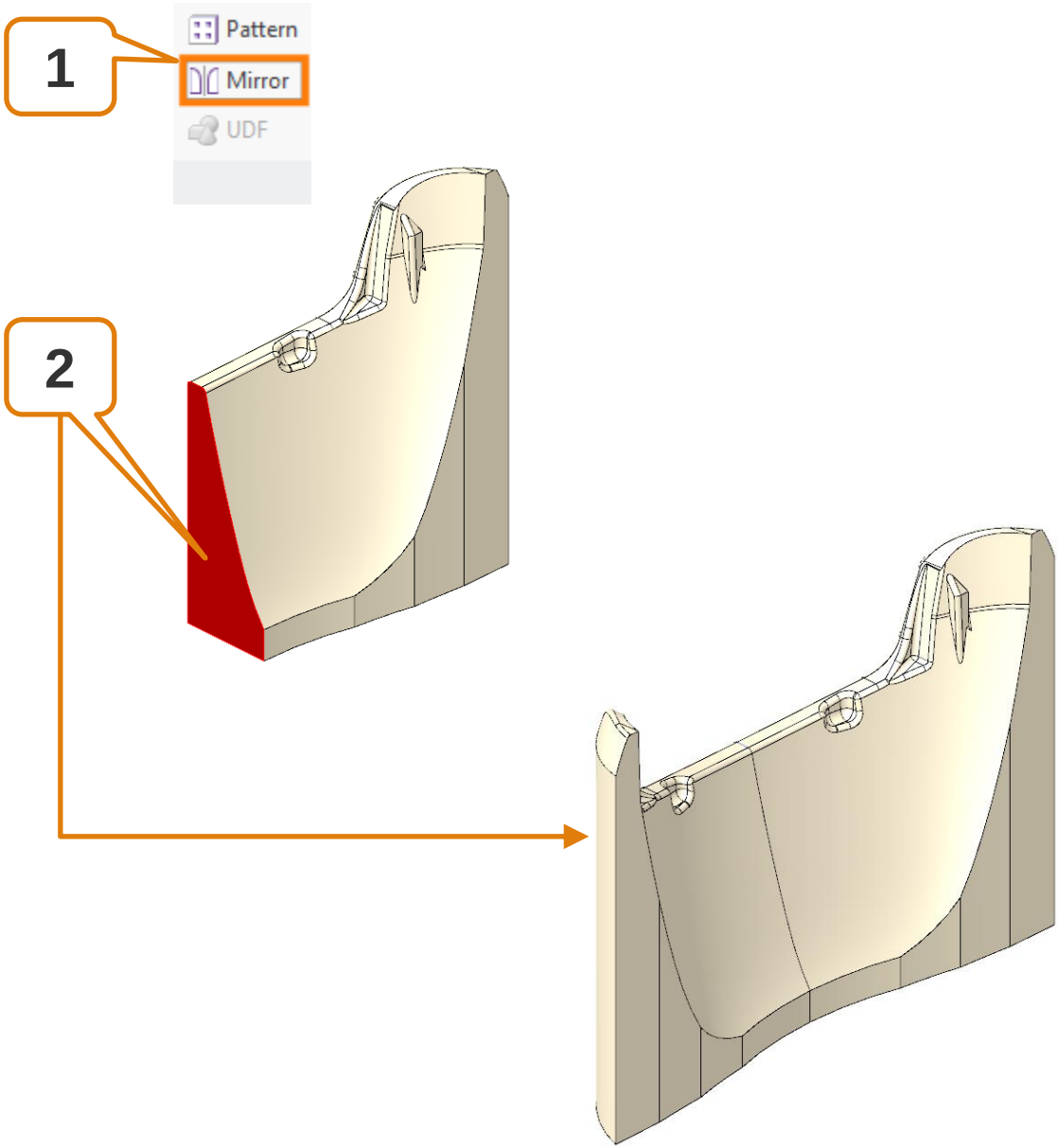
Electrode 12 – Detailing



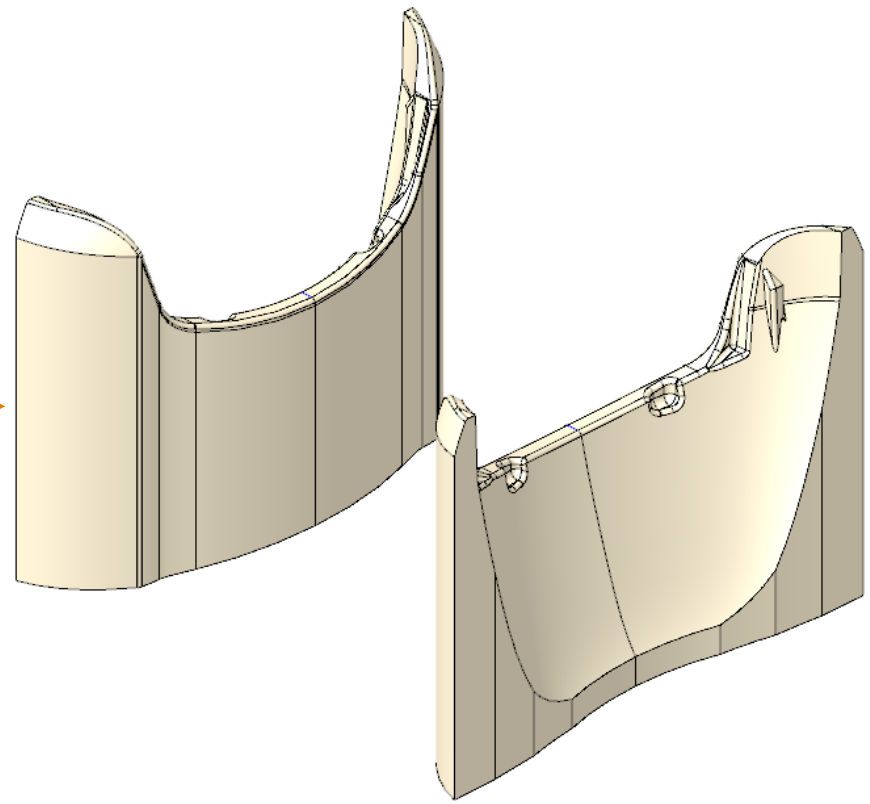
- **Remove**
- **Expand (0.1)**



Electrode 12 – Mirror

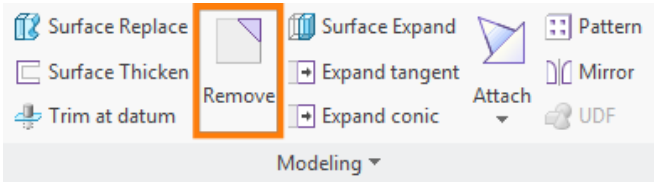


Electrode 12 – Mirror

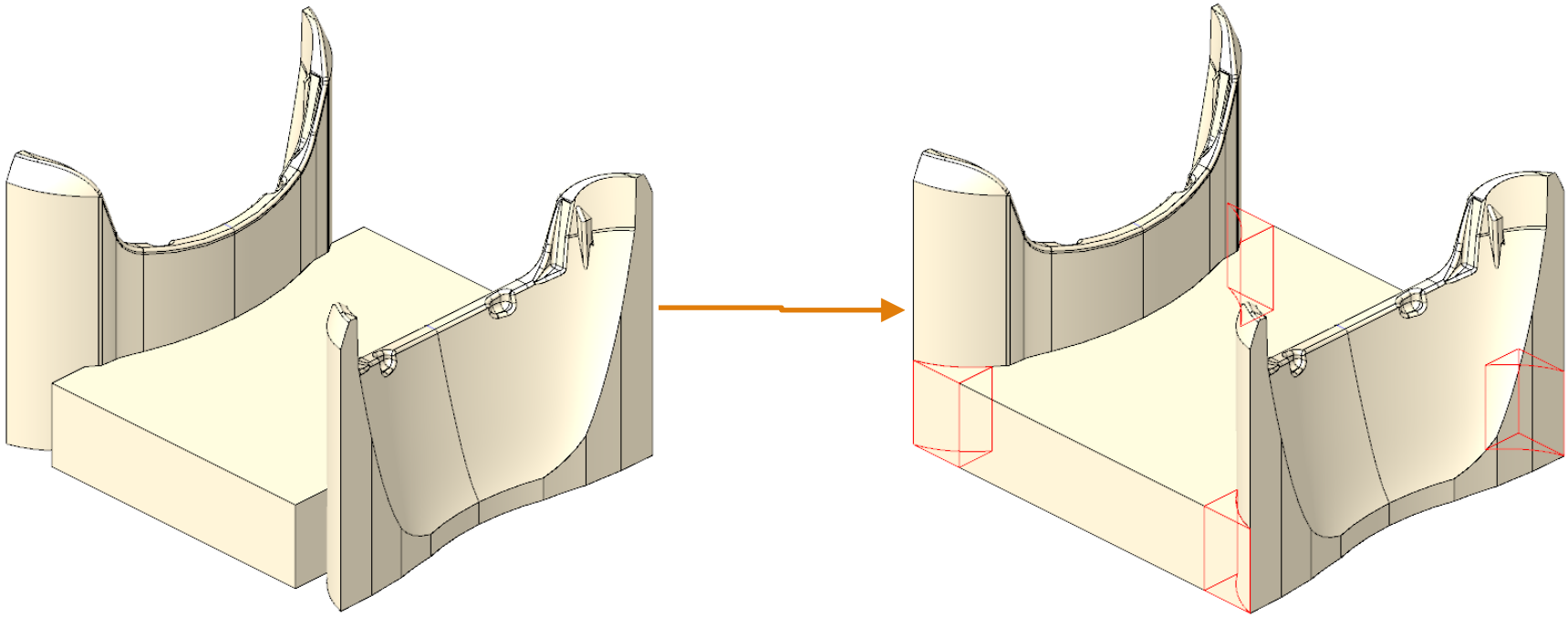


- **Use created datum plane for mirror**

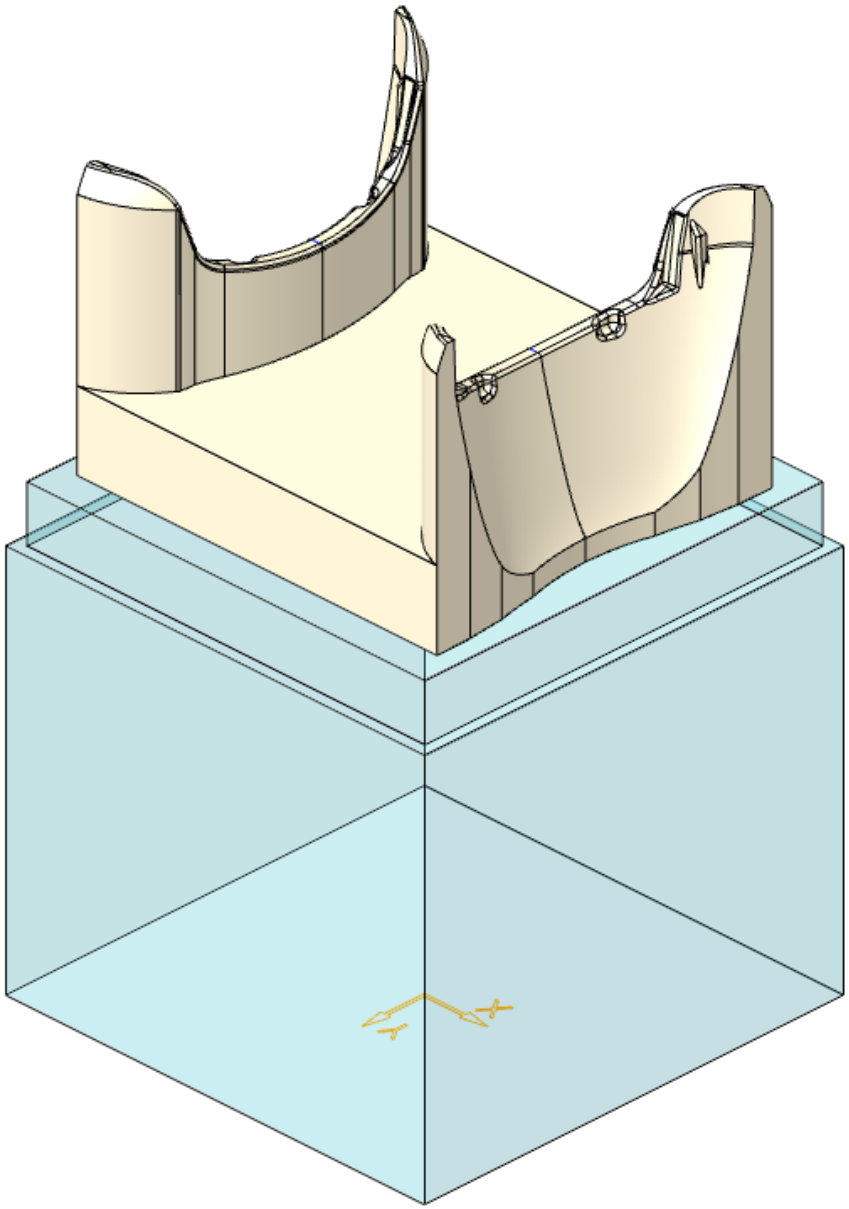
Electrode 12 – Detailing



- **Create extrusion to connect solids**
- **Remove**

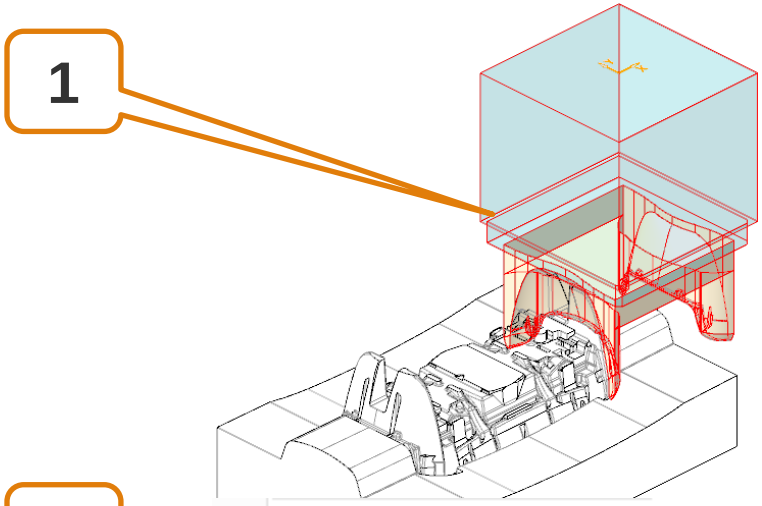


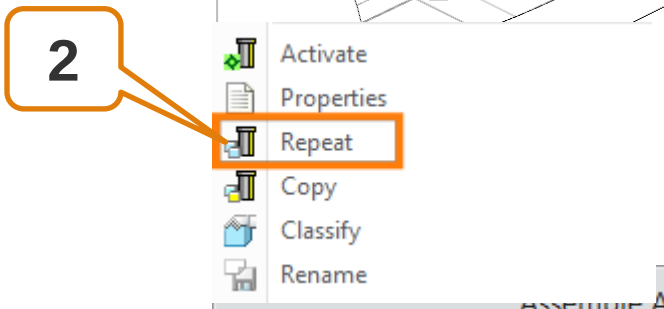
Electrode 12 - Finish

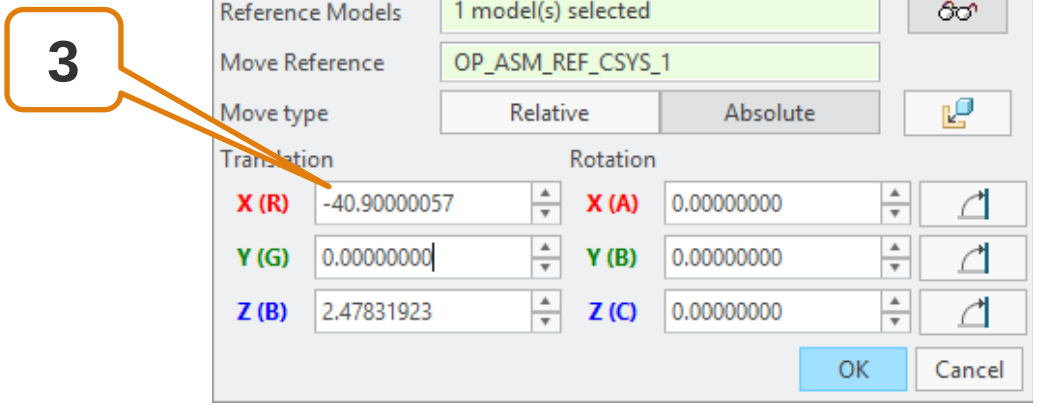


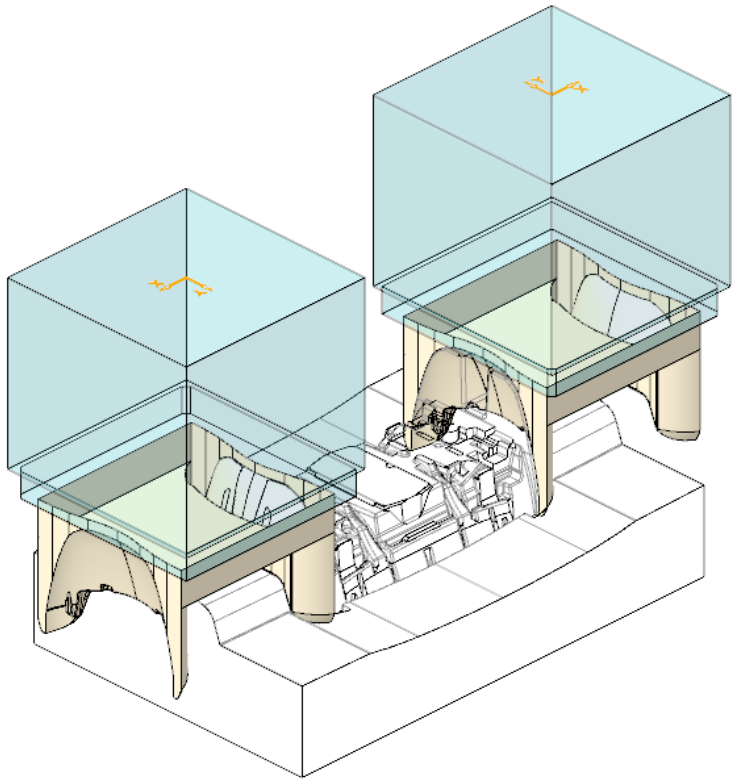
- Create support
- Finish electrode with base

Electrode 12 – Assemble Again





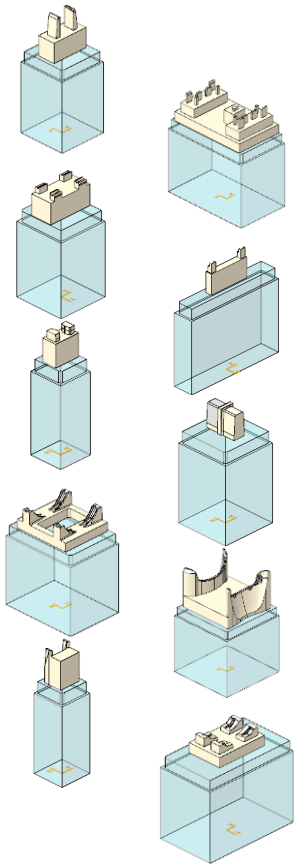




Agenda

Training

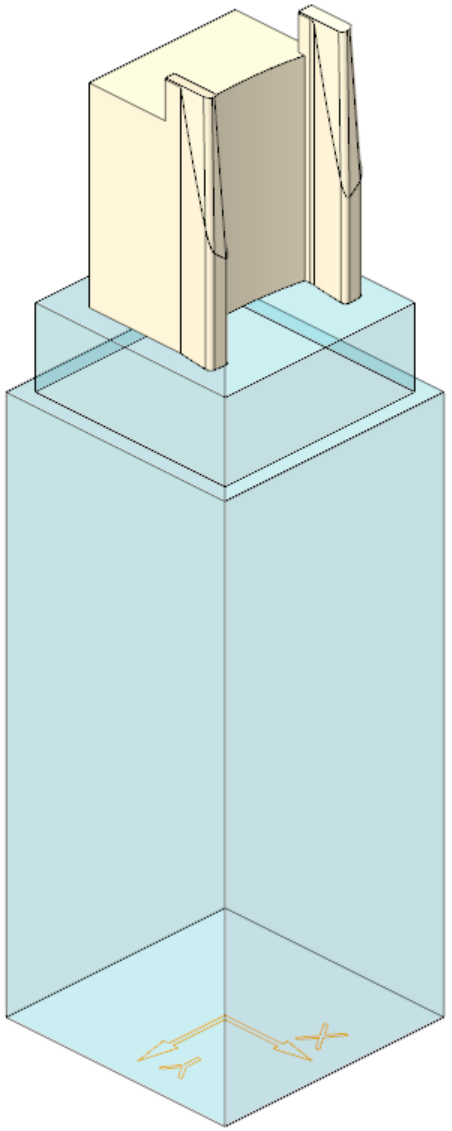
- Electrode 5
- Electrode 6
- Electrode 7
- Electrode 8
- Electrode 9
- Electrode 10
- Electrode 11
- Electrode 12
- **Electrode 13**
- Electrode 14



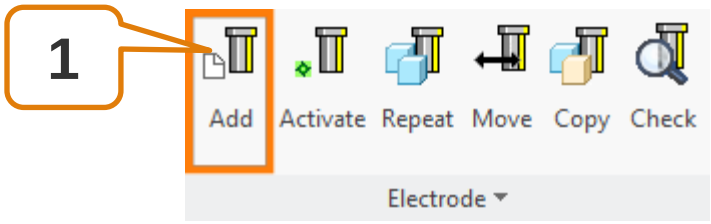
Electrode 13

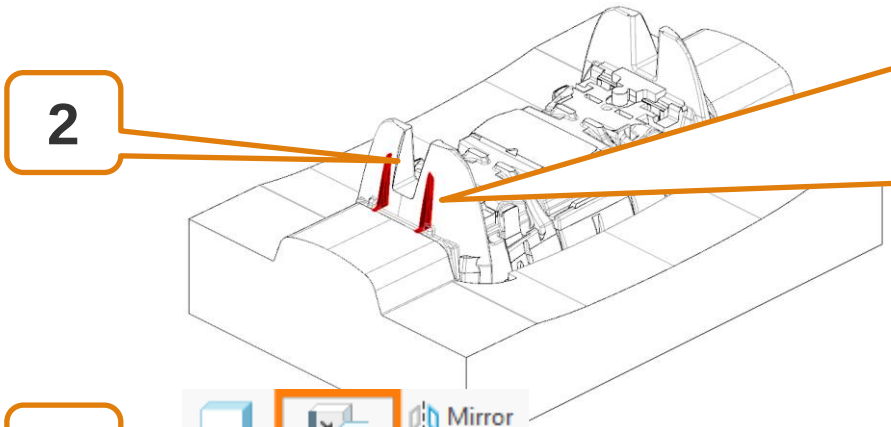
Topics…

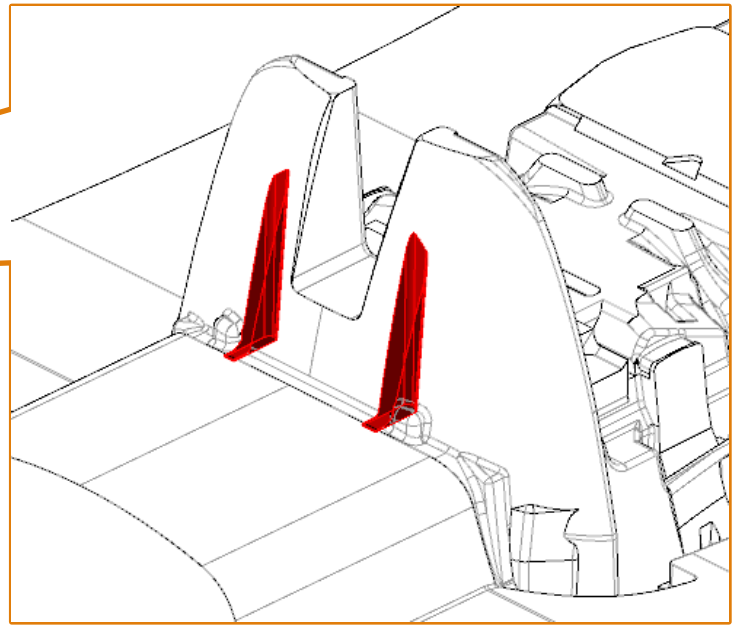
- Working with surfaces

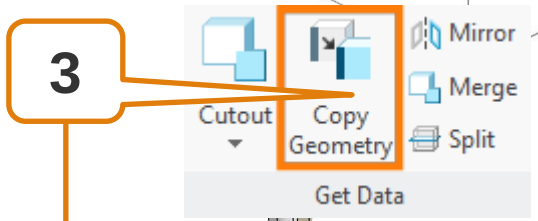


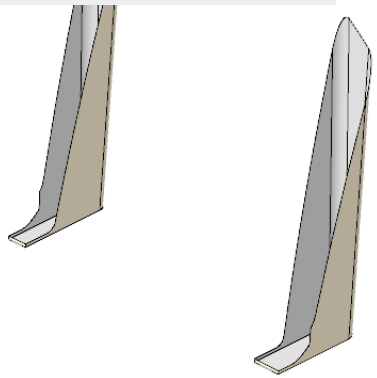
Electrode 13 – Get Data



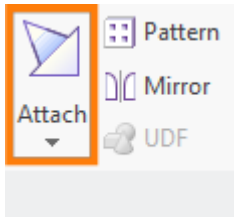


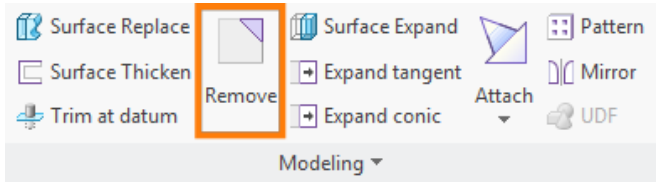




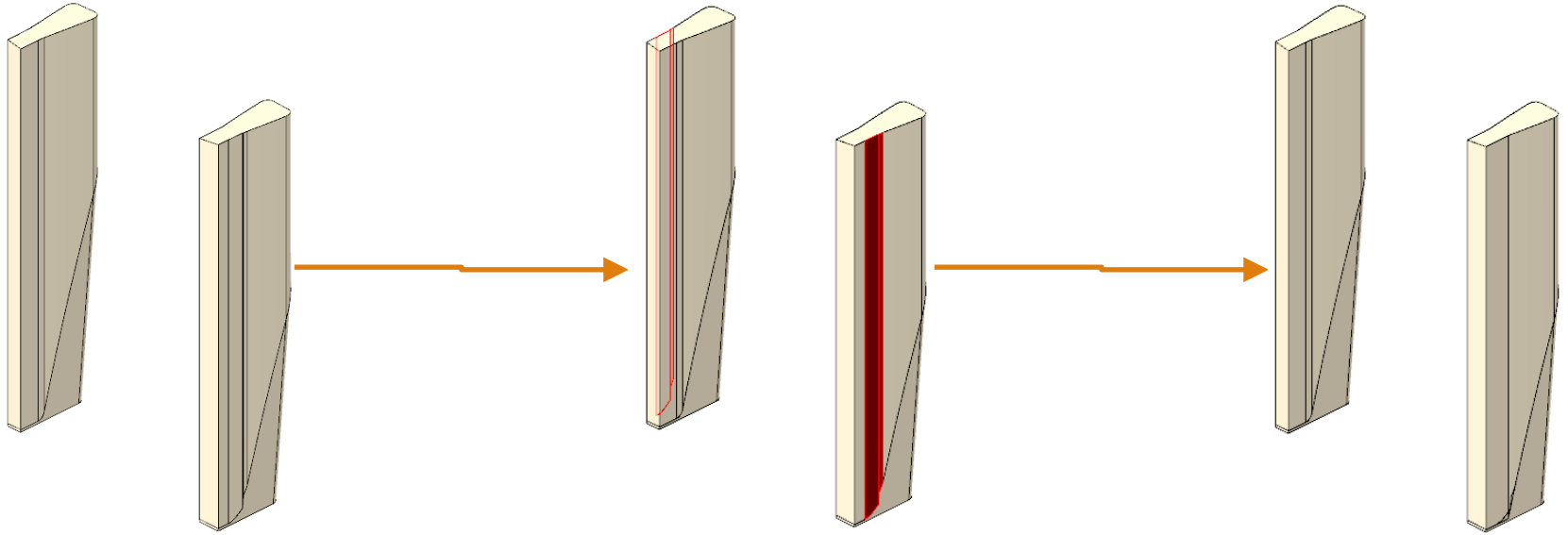


Electrode 13 – Detailing



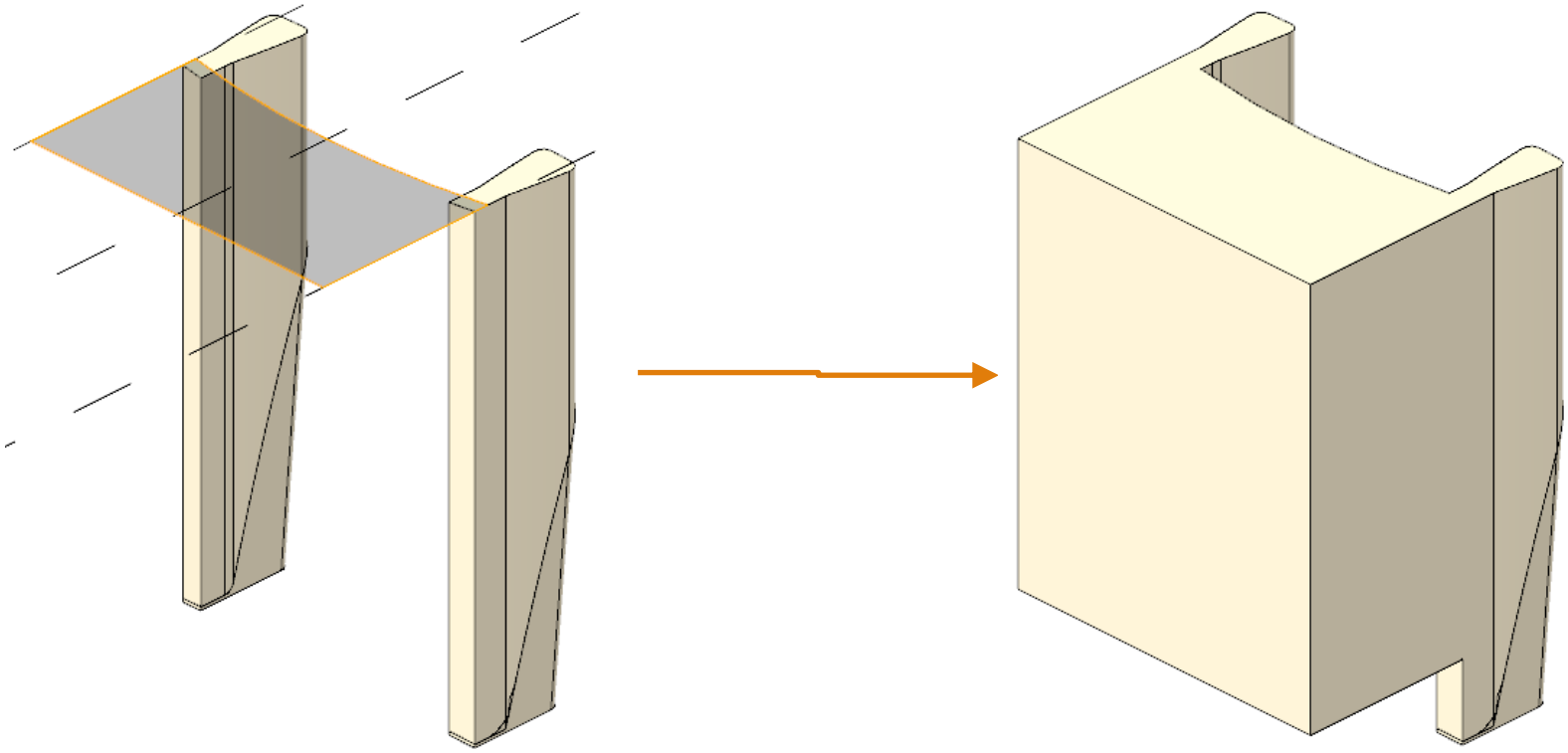


- **Attach quilt**
- **Remove**

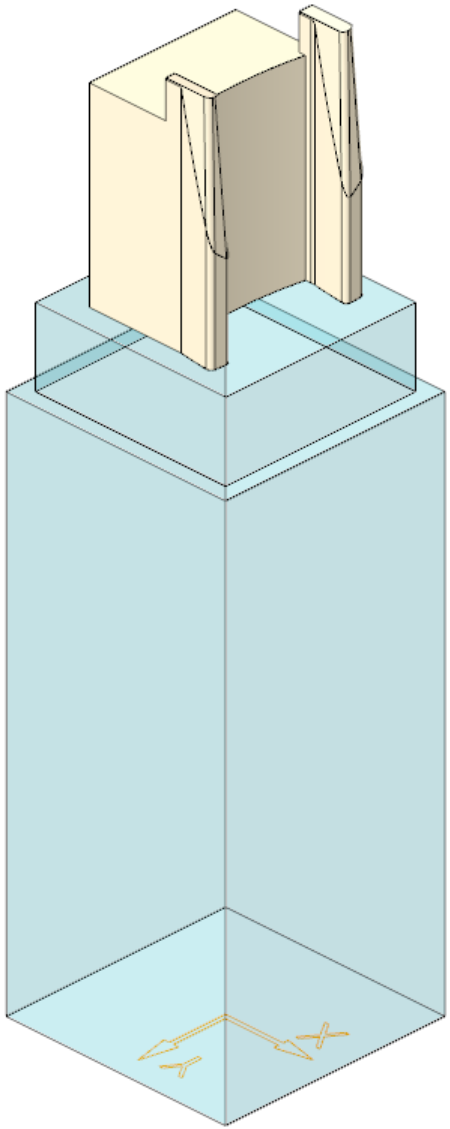


Electrode 13 – Detailing

- **Use extrude to create connection**



Electrode 13 - Finish

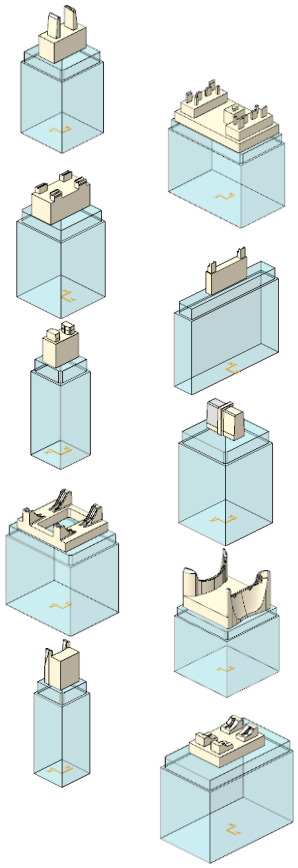


- **Finish electrode with base**

Agenda

Training

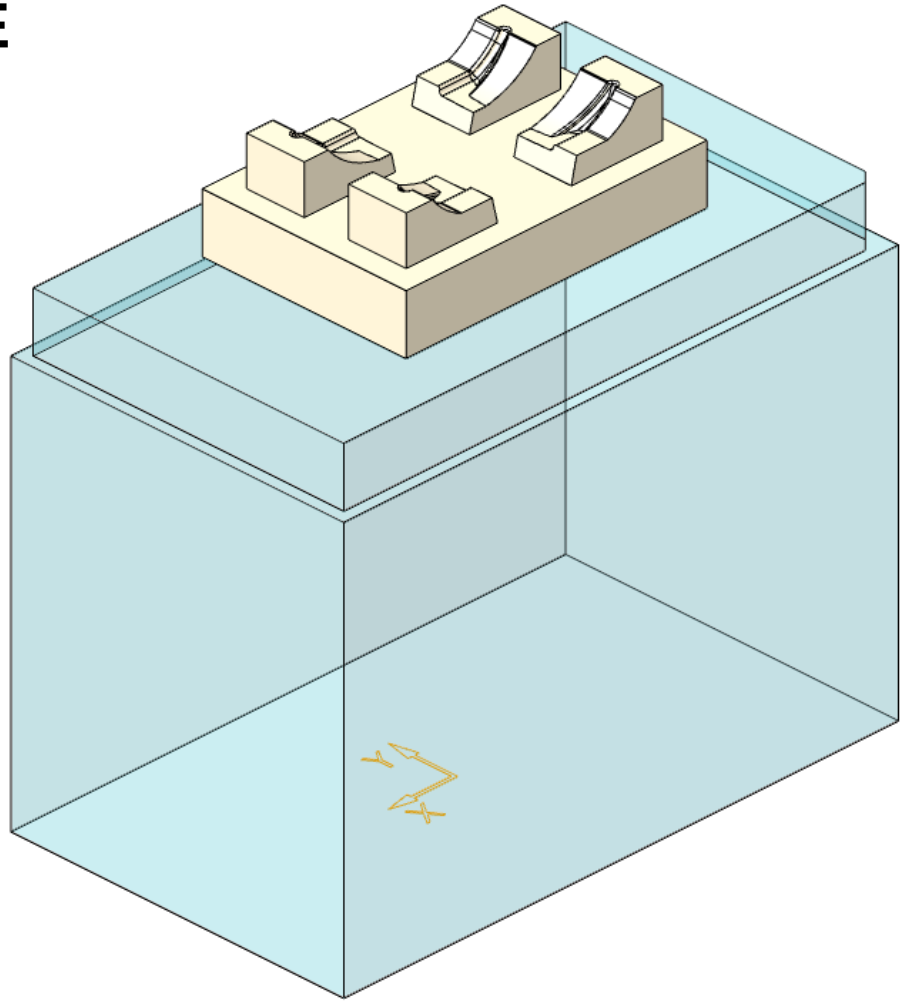
- Electrode 5
- Electrode 6
- Electrode 7
- Electrode 8
- Electrode 9
- Electrode 10
- Electrode 11
- Electrode 12
- Electrode 13
- **Electrode 14**



Electrode 14

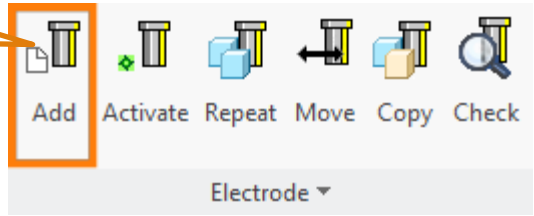
Topics…

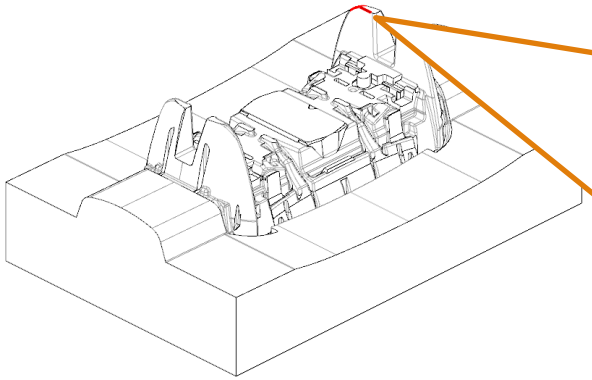
- **Cut out with Creo extrude**
- **User defined FREE_FACE**

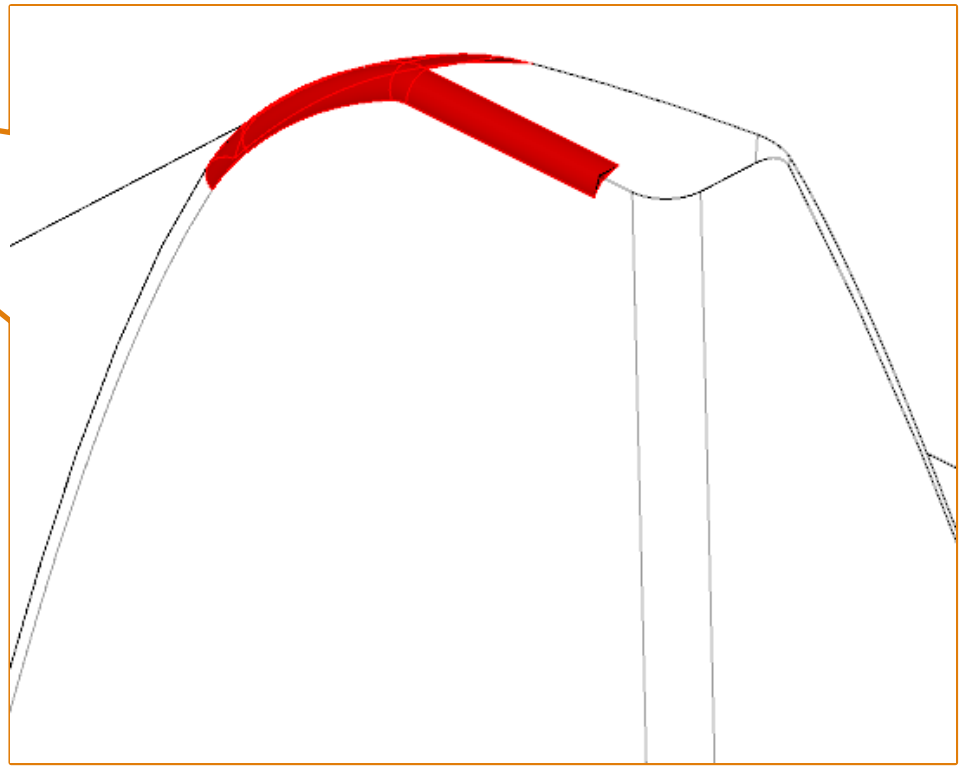


Electrode 14 – Get Data

1







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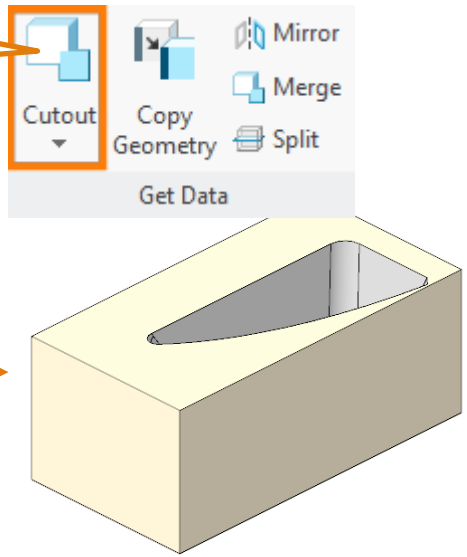
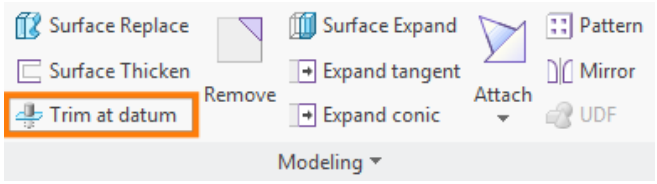
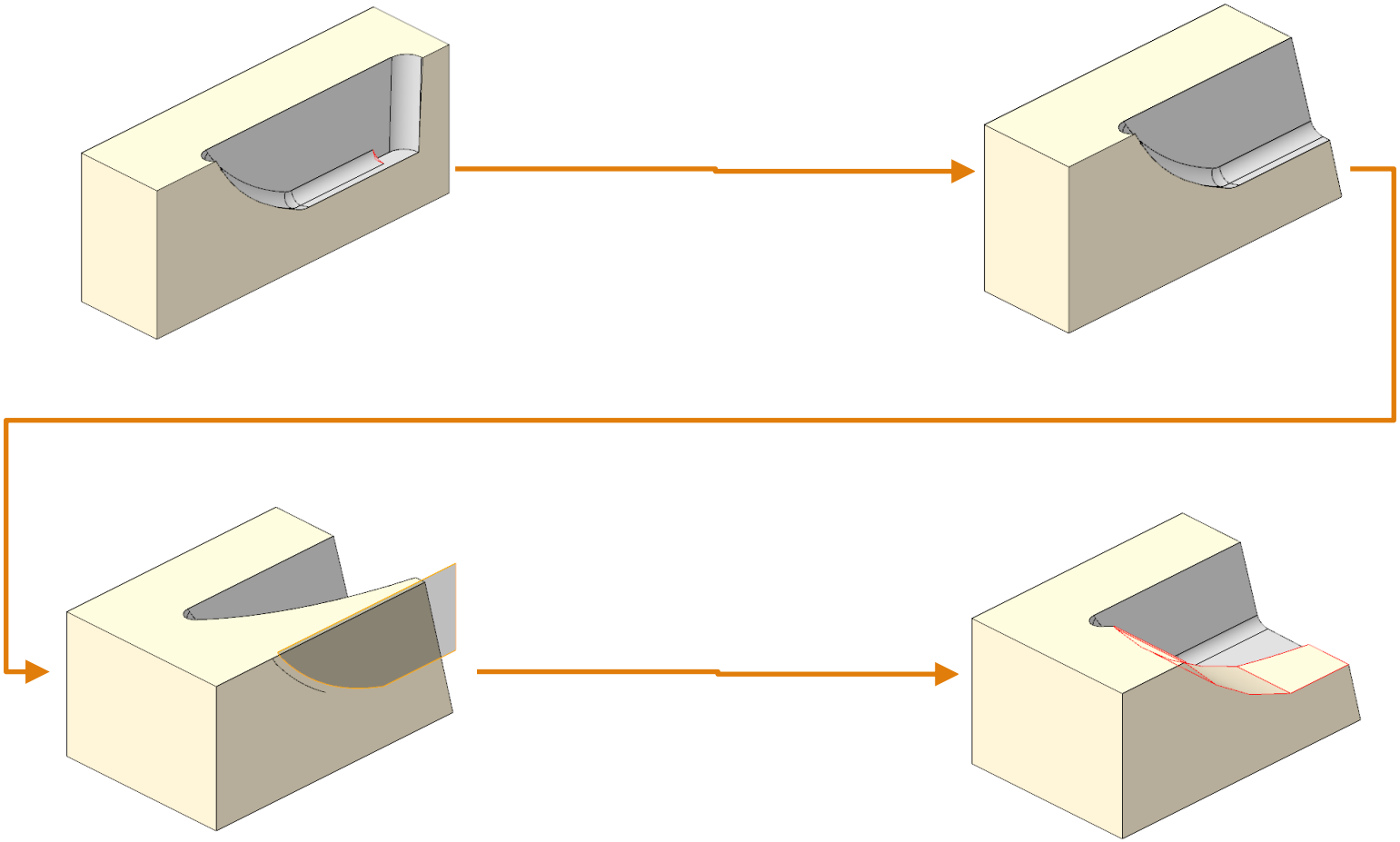


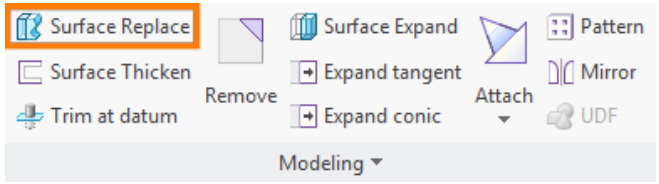
Electrode 14 – Detailing



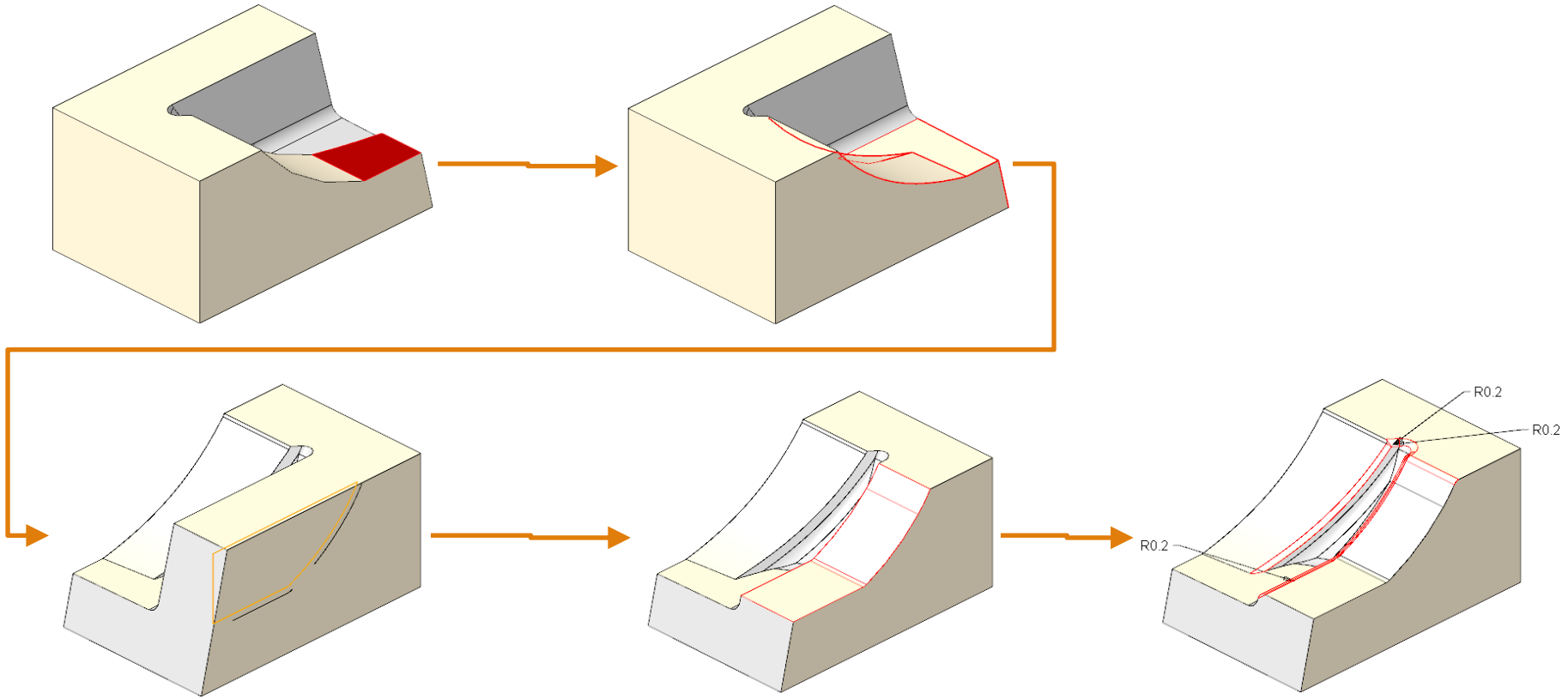
- **Trim at datum**
- **Cut out using Creo extrude**



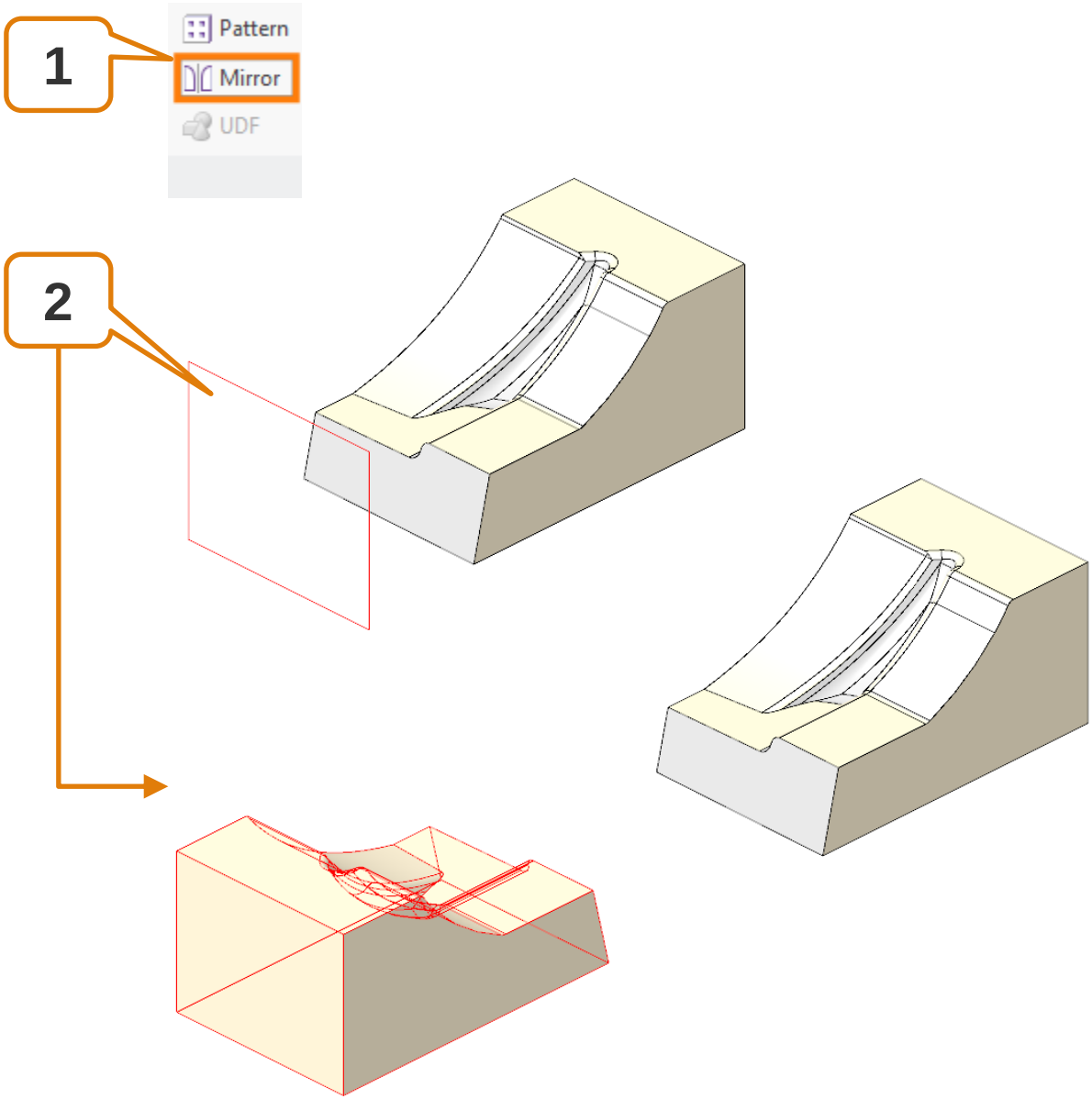
Electrode 14 – Detailing



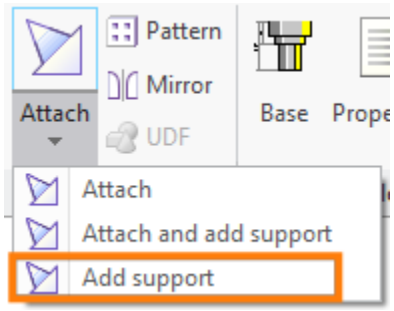
- Replace surface
- Cut out using Creo extrude
- Add rounds (0.2)

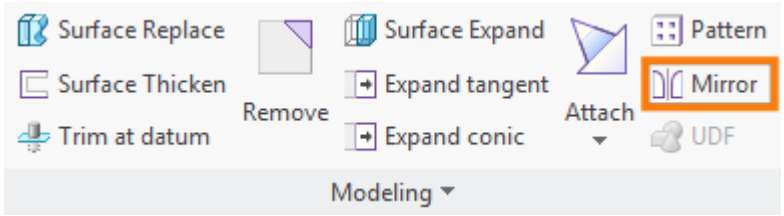


Electrode 14 – Mirror

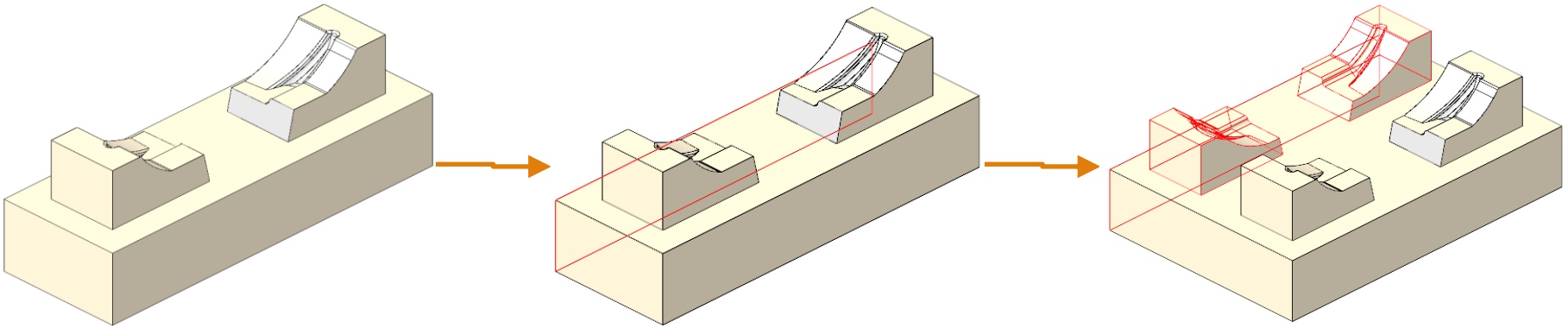


Electrode 14 – Detailing

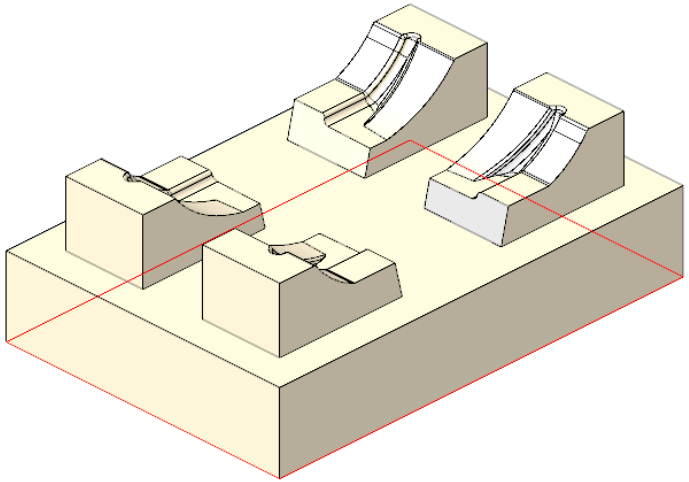




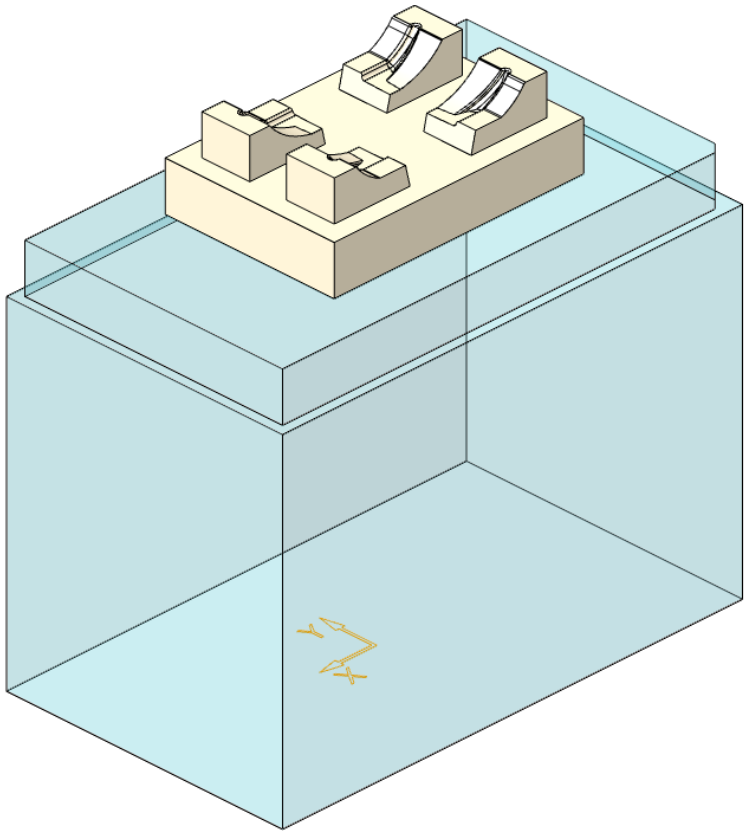
- **Create support**
- **Mirror**



Electrode 14 - Finish

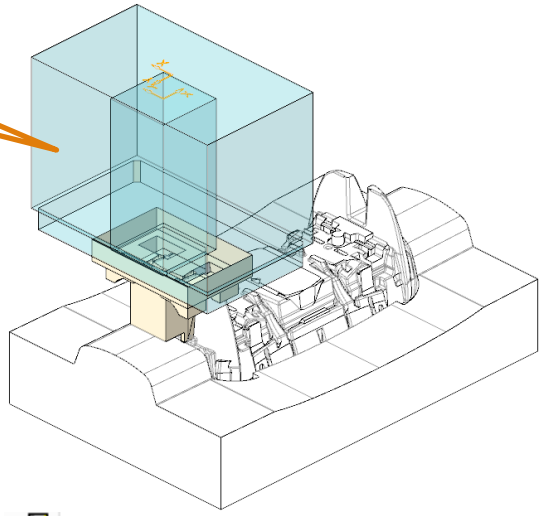


- Select FREE_FACE
- Finish electrode with base

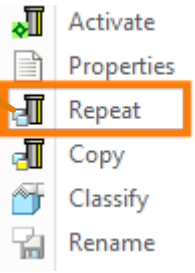


Electrodes 13 & 14 – Assemble Again

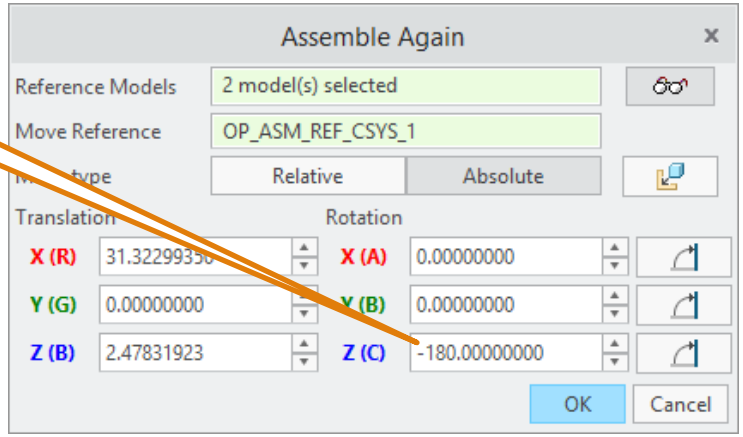
1

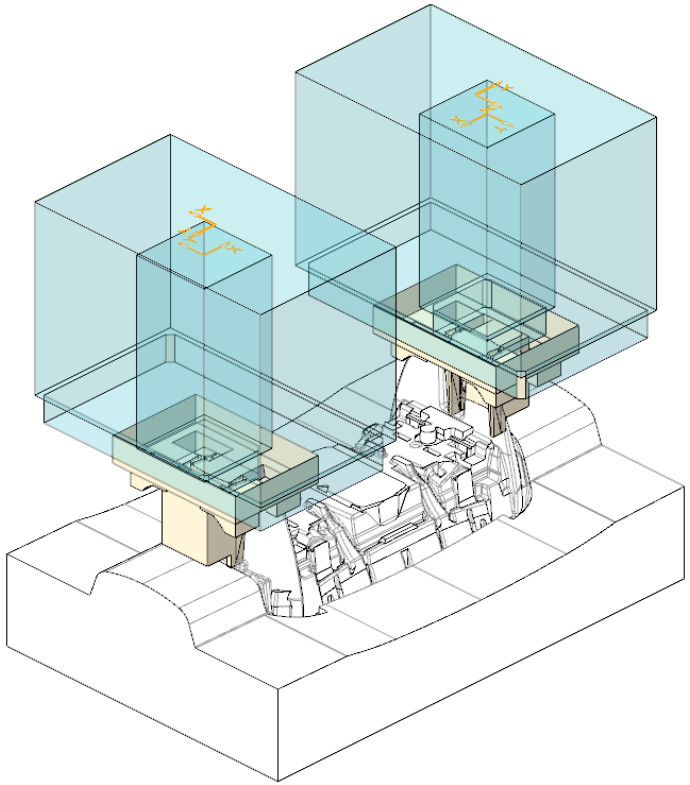


2

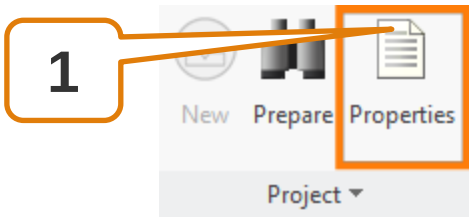


3





Set Electrode Properties



- **Set properties/parameters of**
  - Active component
  - Main Assembly
  - Workpieces/Cores
  - Electrodes
- **System parameters (2) are locked and can't be edited**
- **Unlock normal parameters (3) to overwrite default value (4)**

Agenda

More User Interfaces

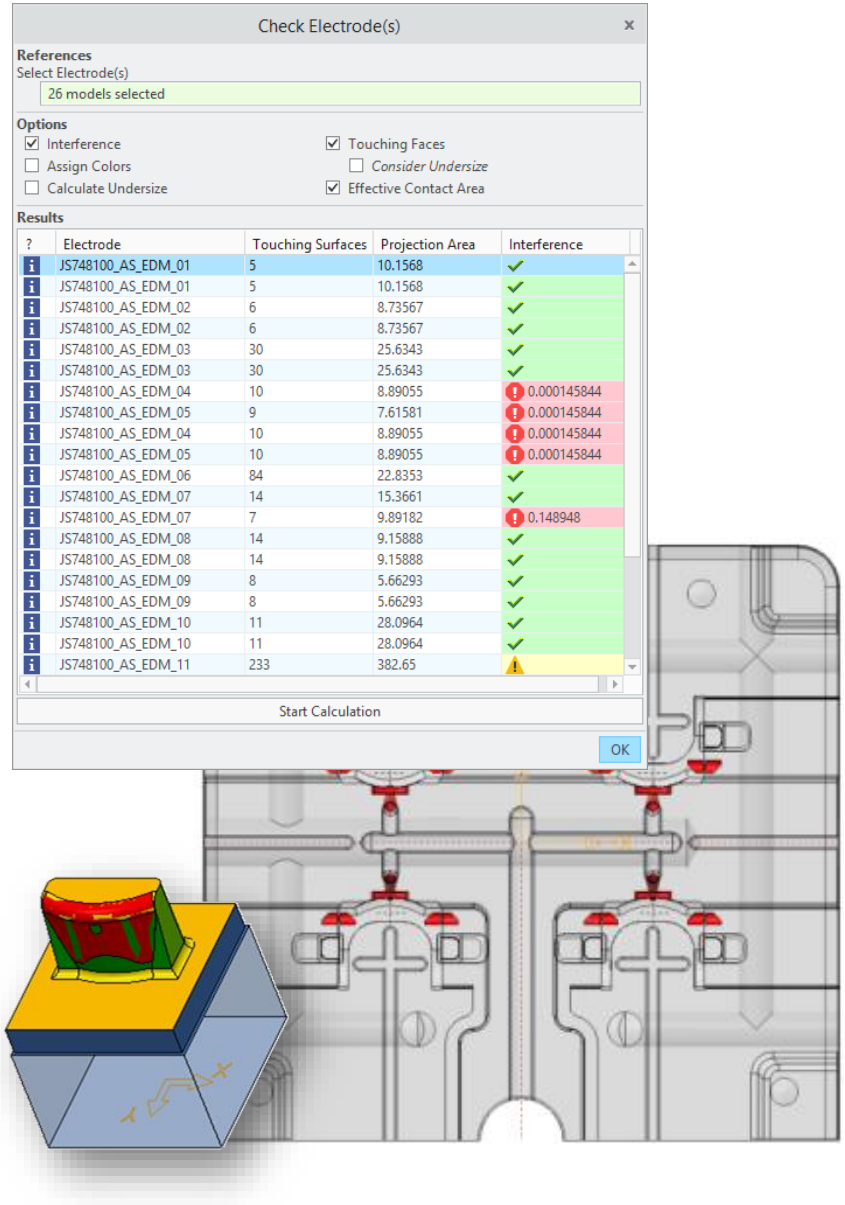
- Check Electrodes
- Holder
- Drawings
- Manufacturing
- Output
- Burnsheet

Configuration

Best Practices

- Modeling
- Design Changes
- Regeneration Behavior in Creo

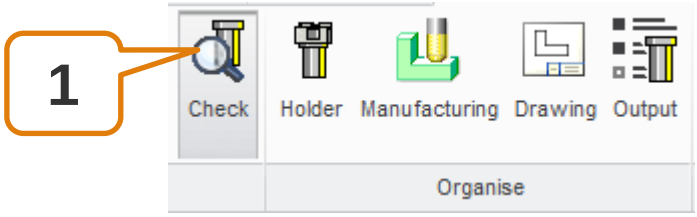
More User Interfaces - Check Electrodes



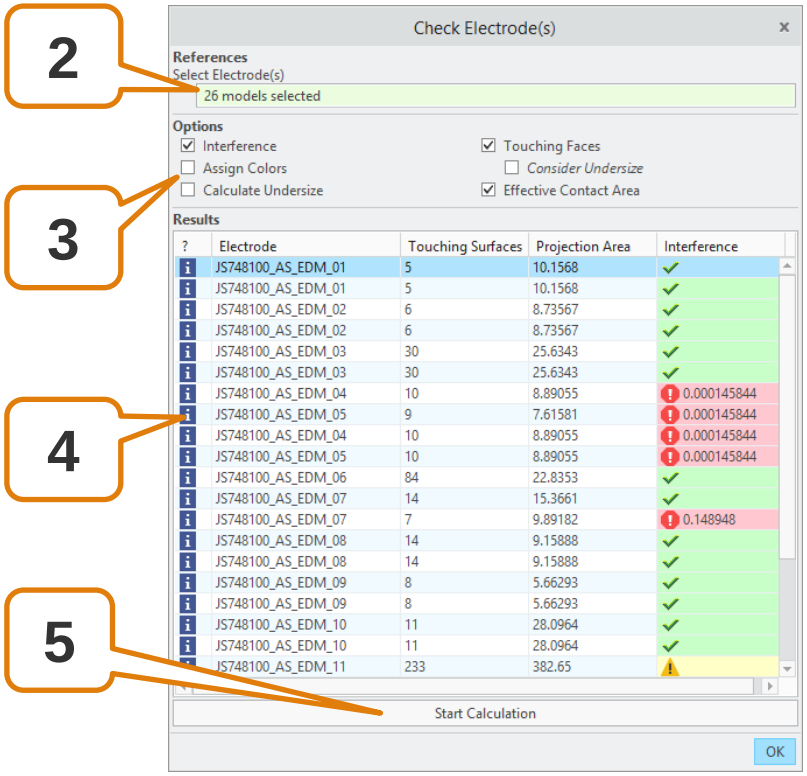
Use Check UI to…

- **Find interferences**
- **Assign color formats**
- **Contact surface**
  (touching surface analysis not available in Creo Parametric)
- **Calculate effective contact area**
- **Calculate undersize using projection and surface quality**

More User Interfaces - Check Electrodes

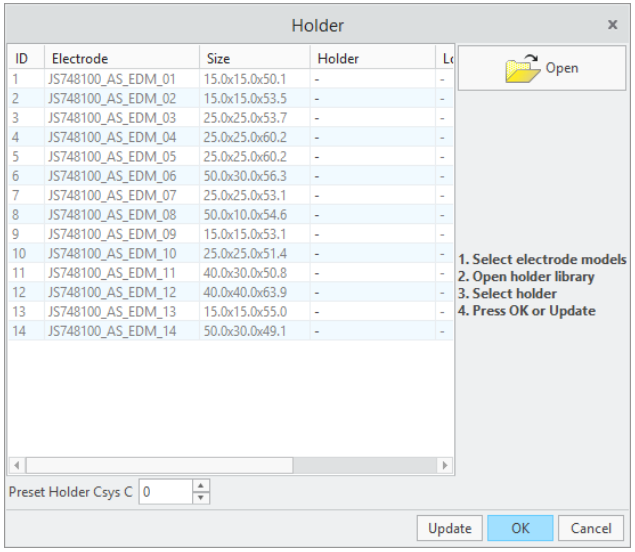


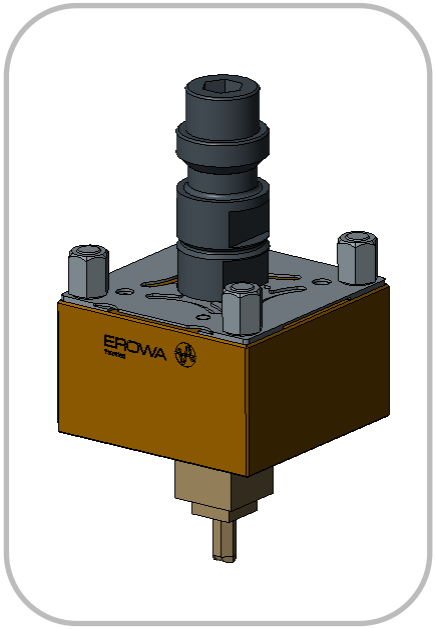
- Open UI (1)



- Select electrodes (2)
- Choose from analysis options (3)
- ‚Start Calculation‘ (5)
- List view with results (4)

More User Interfaces – Electrode Holder

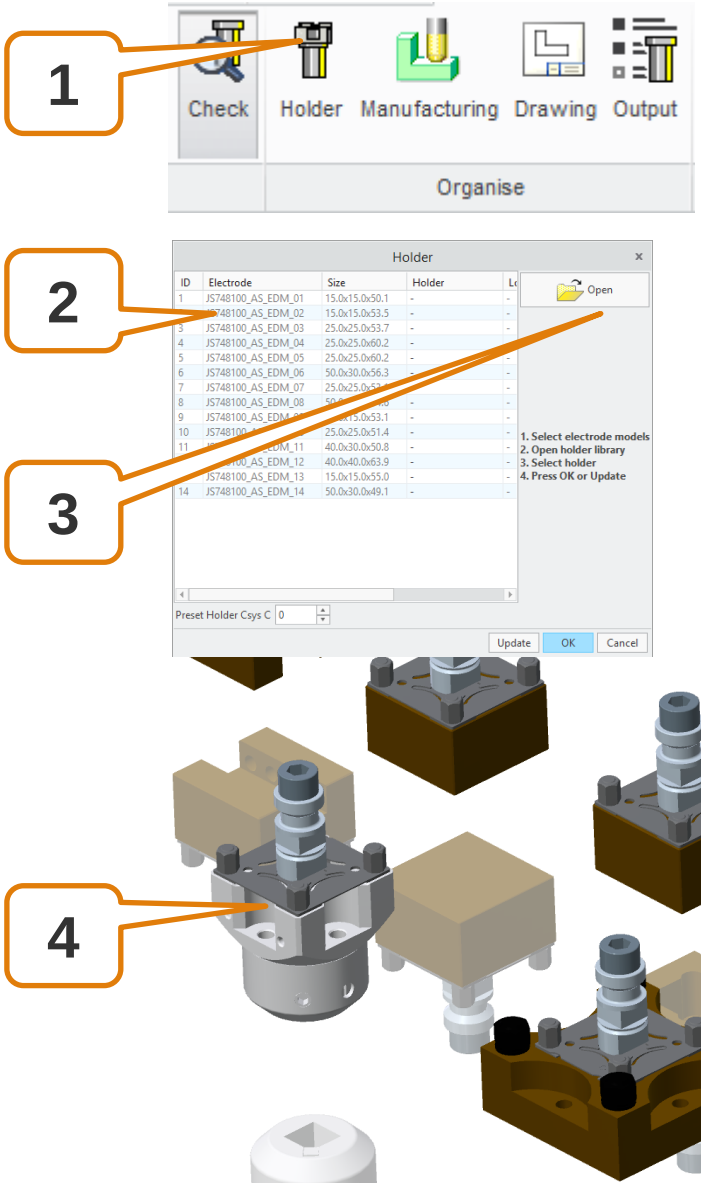




Use Holder UI to

- Select holder
- Set holder for all selected models and their positions
- Holder are imported as surface geometry into electrode model

More User Interfaces - Electrode Holder

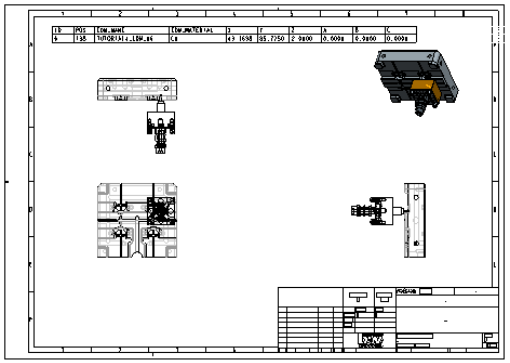


- Open UI (1)
- Select electrodes (2)
- Open library (3)
- Select holder (4)

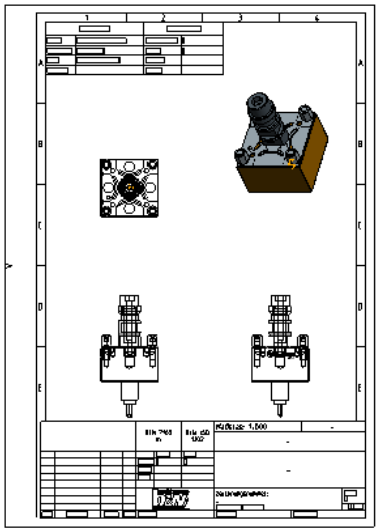
More User Interfaces - Drawings

SE creates two types of drawings:

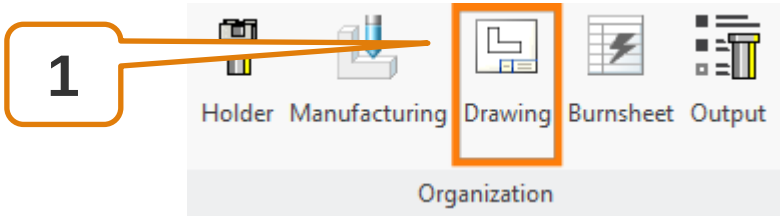
- **Assembly drawing sheets to show *all data related to EDM***
  - Positions
  - Technology

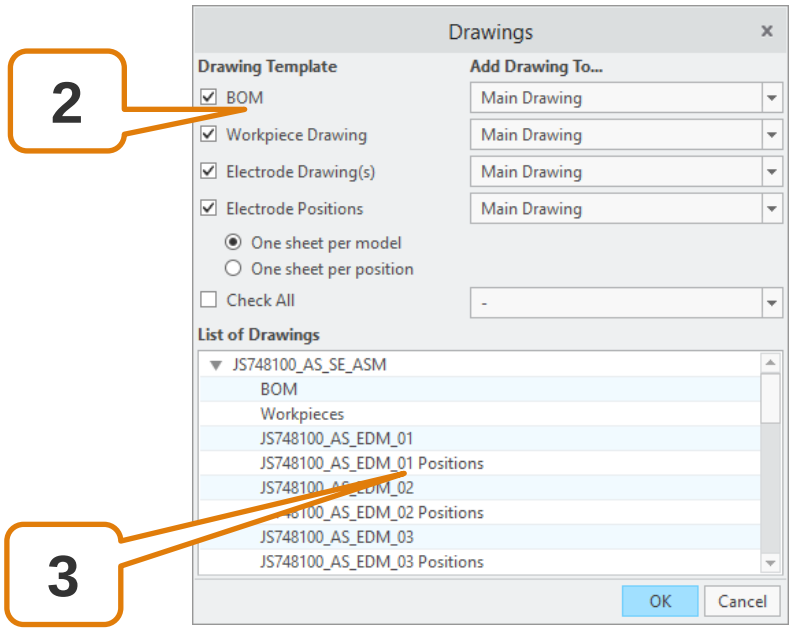


- **Part drawing sheets to show *all data related to manufacturing of electrode***
  - Material
  - Blank size



More User Interfaces - Drawings

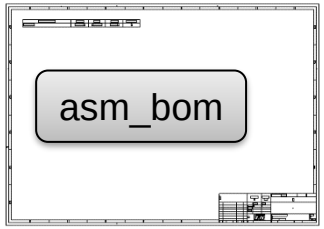




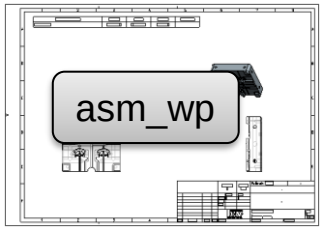
- Open UI (1)
- Select drawing templates to use (2)
- Preview of drawings that will be created (3)

Drawing Templates

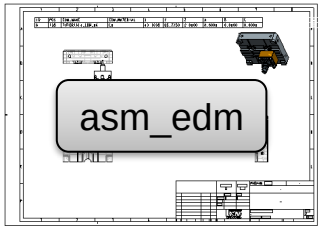
- **There are 4 Creo drawing templates available:**



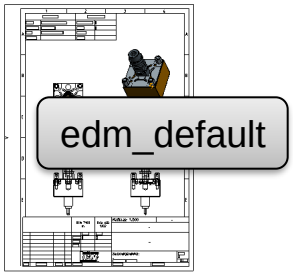
– Shows all electrodes in assembly



– All workpieces will be shown on one sheet

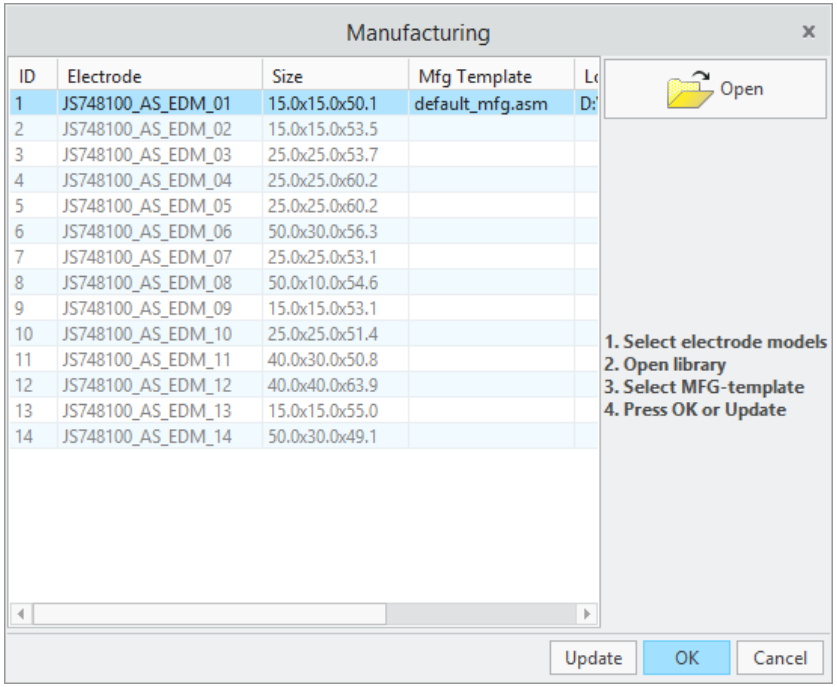


– Template for electrode assembly sheet



– Template for electrode part drawing

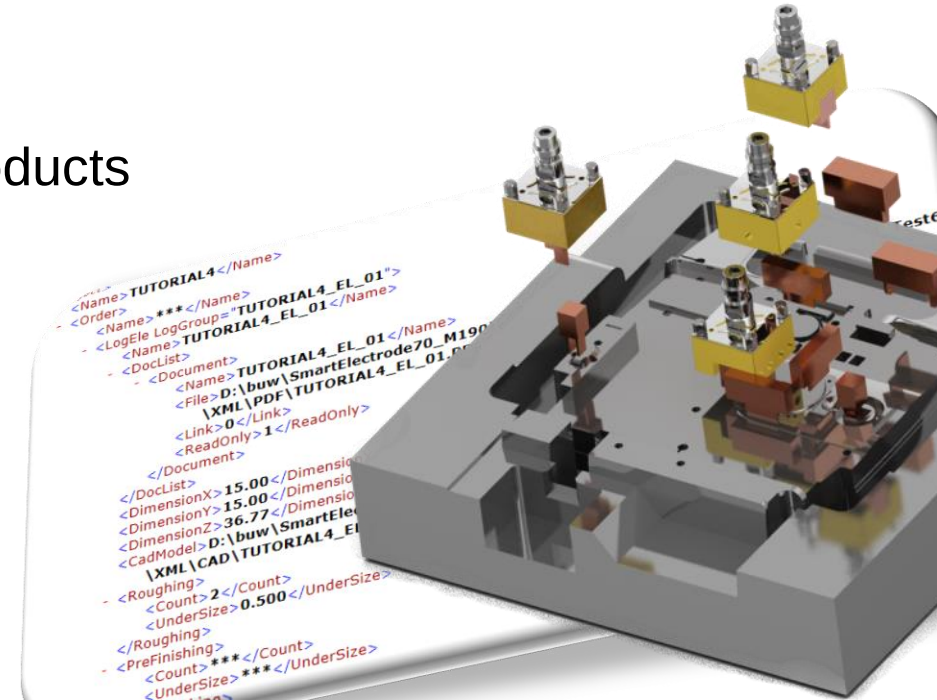
More User Interfaces – Manufacturing UI



- **Templates can be prepared for different use cases**
- **Templates follow a fixed structure that allows replacement of workpiece and reference model**

More User Interfaces - Output UI

- **Use Output UI to export data for EDM programming system**
  - Save time
  - Reduce errors
- **Available formats:**
  - Backup 2d and 3d CAD-data
  - CMM-Data
  - CAM-Data
  - Export for Microsoft Office Products
  - XML or HTML format
  - Production control systems
  - Interfaces to EDM



More User Interfaces - Output UI

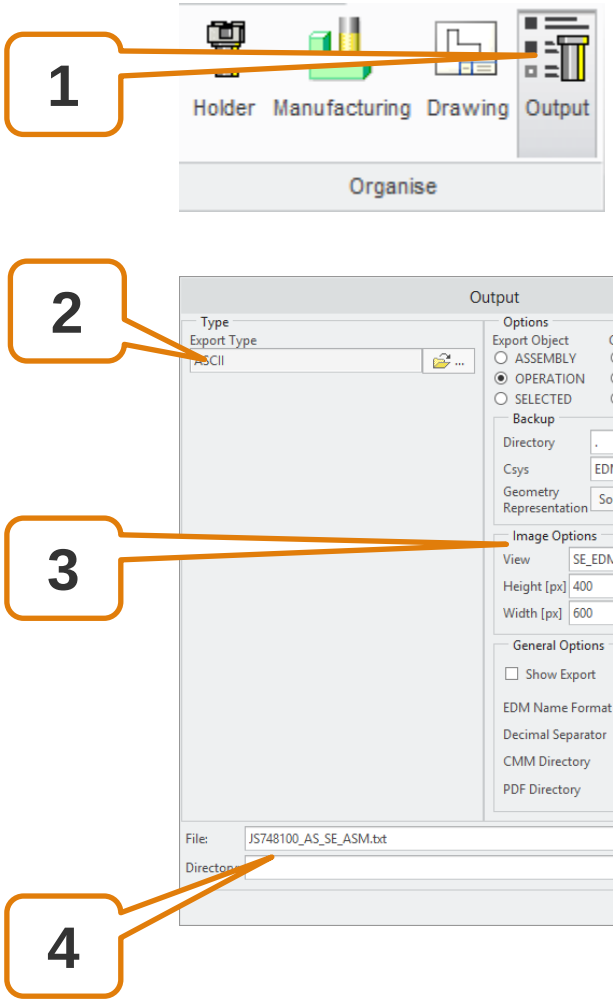
PAID INTERFACES

- **Agie**
- **Charmilles**
- **Ingersoll**
- **Exeron**
- **Makino** (EPX)
- **Mitsubishi** (EPX)
- **Sodick** (EPX)
- **Zimmer & Kreim**
- **Certa Systems**
  (Zwicker Systems)

CUSTOM FORMATS

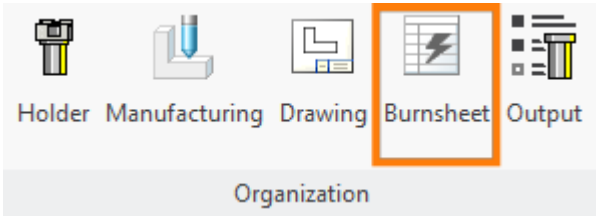
- **TXT**
- **XML**
- **HTML**
- **CSV**
- **STEP**
- **IGES**
- **CAQ / CMM**
- **CAM**

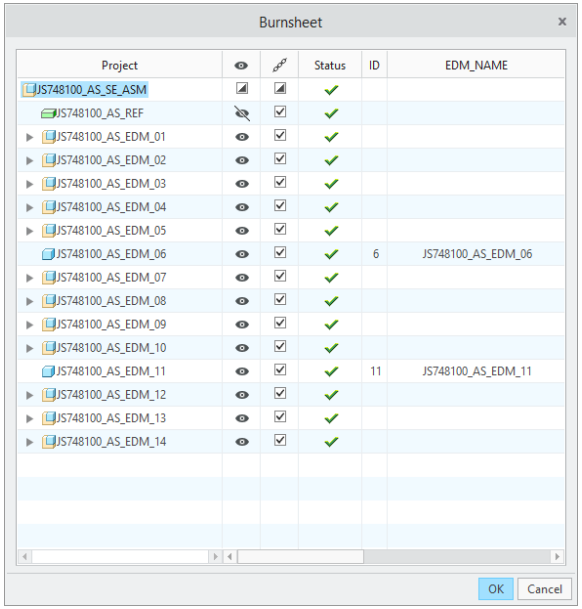
More User Interfaces – Output UI



- Open UI (1)
- Select export type (2)
- Set Options (3)
- Name and location (4)

More User Interfaces – Burnsheet UI

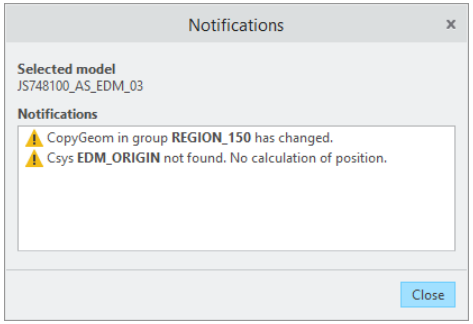




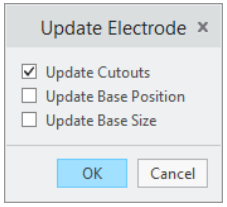
Burnsheet shows all visible parameters.

Use UI to …

- **Change parameters**
- **Set visibility and dependency**
- **Check notifications and**



- **Update electrodes**



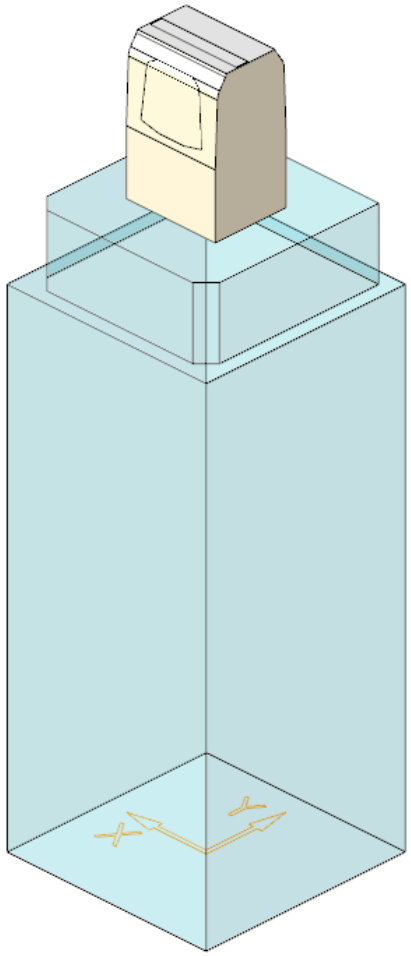
Agenda

- More User Interfaces
  - Check Electrodes
  - Holder
  - Drawings
  - Manufacturing
  - Output
  - Burnsheet
- **Configuration**
- Best Practices
  - Modeling
  - Design Changes
  - Regeneration Behavior in Creo

Placement Rules for Templates

Topics…

- **All values set (installation state)**
- **Minimum blank length**
- **Minimum base height**
- **Rounded height of contour**

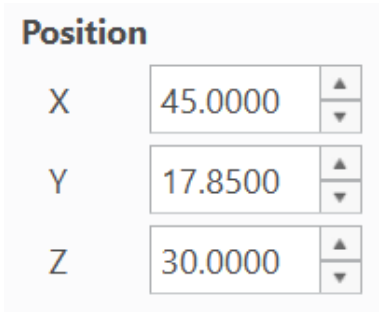


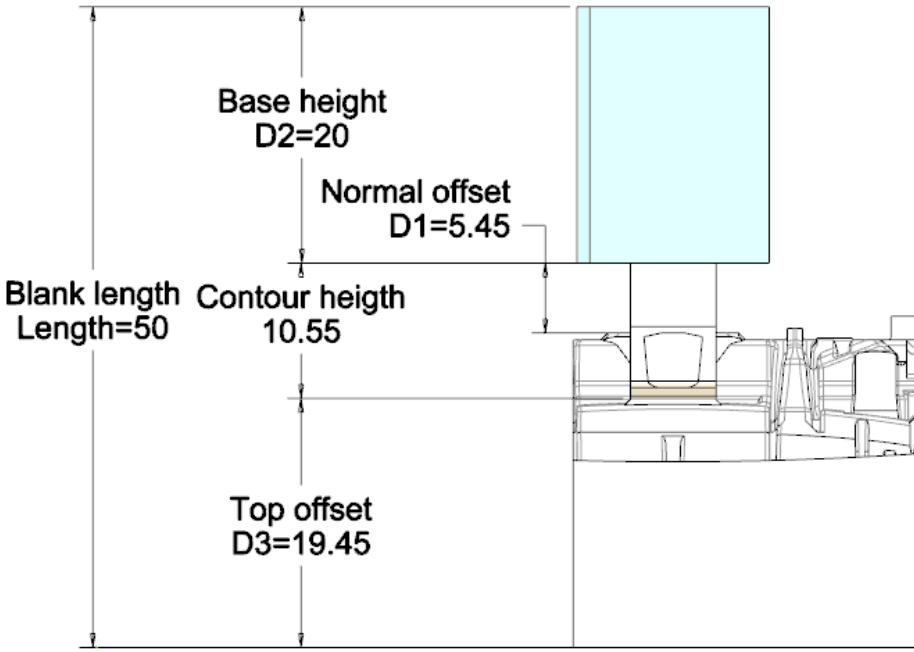
All Values Set

Settings

- **Initial state of template data after installation**
- **Options**
  - INCREMENT_SIZE=1.0
  - INCREMENT_POS=0.5
- **All values in data file are set**
  - LENGTH = 50
  - D2 = 20
  - D1 = 5
  - D3 = 0
- **Height of contour will be rounded to a value, where…**
  - D1 corresponds at least to value in data file (D1 ≥ 5.0)
  - Z position of base rounded to INCREMENT_POS (30.0)
- **As blank length and base height are fix values all the remaining height is added to D3**
- **NOTE**
  Normal offset D1 and top offset D3 are measured values, no dimensions! They define minimum values and are allowed to get bigger!

Result



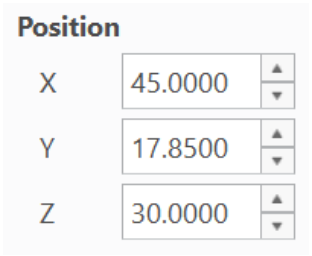


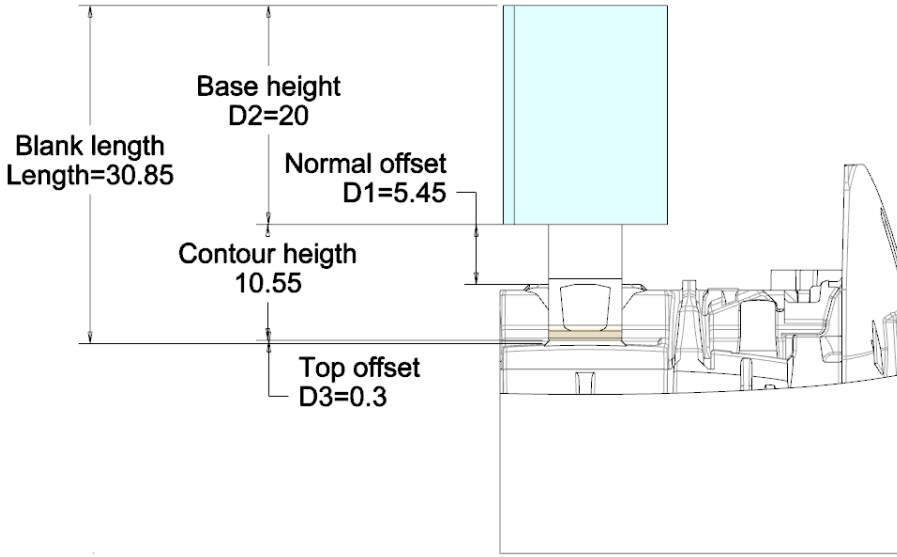
Minimum Blank Length

Settings

- **Requirements**
  - Blank length should be set to minimum value
  - Top offset D3 should be given an exact value
- **Options INCREMENT_SIZE=0 (exact calculation, no rounding)**
- **INCREMENT_POS=0.5**
- **Values in data file**
  - LENGTH = -1 (this allows SMARTElectrode to calculate LENGTH)
  - D2 = 20
  - D1 = 5
  - D3 = 0.3
- **Height of contour will be rounded to a value, where…**
  - D1 corresponds at least to value in data file (D1 ≥ 5.0)
  - Z position of base rounded to INCREMENT_POS (30.0)
- **Base height is a fixed value (20.0)**
- **Blank length will be set to a value, where…**
  - D3 corresponds exactly to the value in data file (0.3)
  - LENGTH = Contour height + D2 + D3 (30.85)

Result



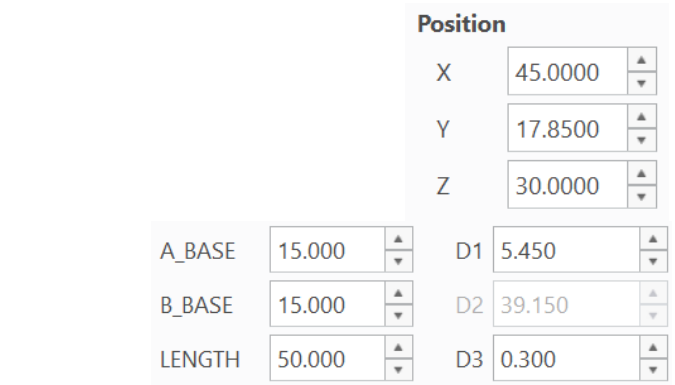


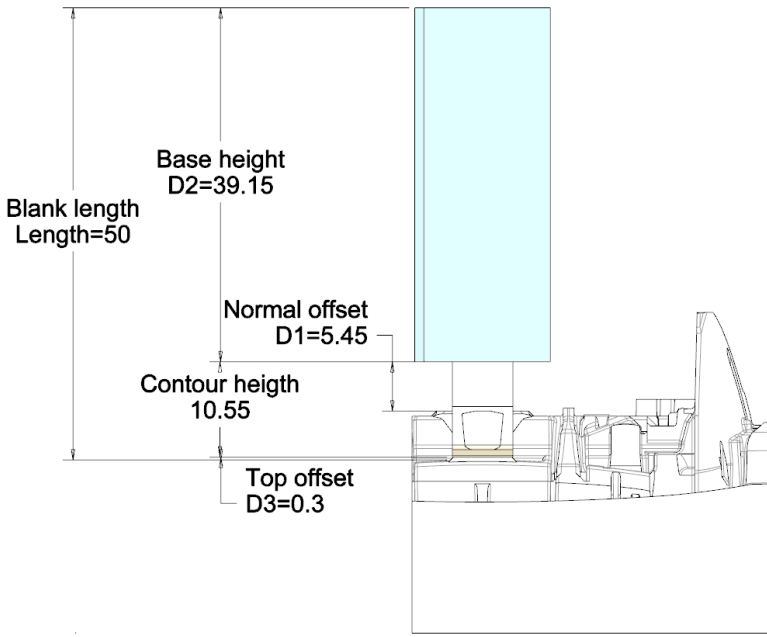
Minimum Base Height

Settings

- **Base height D2 should be set to minimum value**
- **Top offset D3 should be given an exact value**
- **Options INCREMENT_SIZE=0 (exact calculation, no rounding)**
- **INCREMENT_POS=0.5**
- **Values in data file**
  - LENGTH = 50
  - D2 = -1 (this allows SMARTElectrode to calculate D2)
  - D1 = 5
  - D3 = 0.3
- **Height of contour will be rounded to a value, where…**
  - D1 corresponds at least to value in data file (D1 ≥ 5.0)
  - Z position of base rounded to INCREMENT_POS (30.0)
- **Blank length is a fixed value**
- **Base height will be set to a value, where…**
  - D3 corresponds exactly to the value in data file (0.3)
  - D2 = LENGTH - Contour height - D2 (39.15)

Result



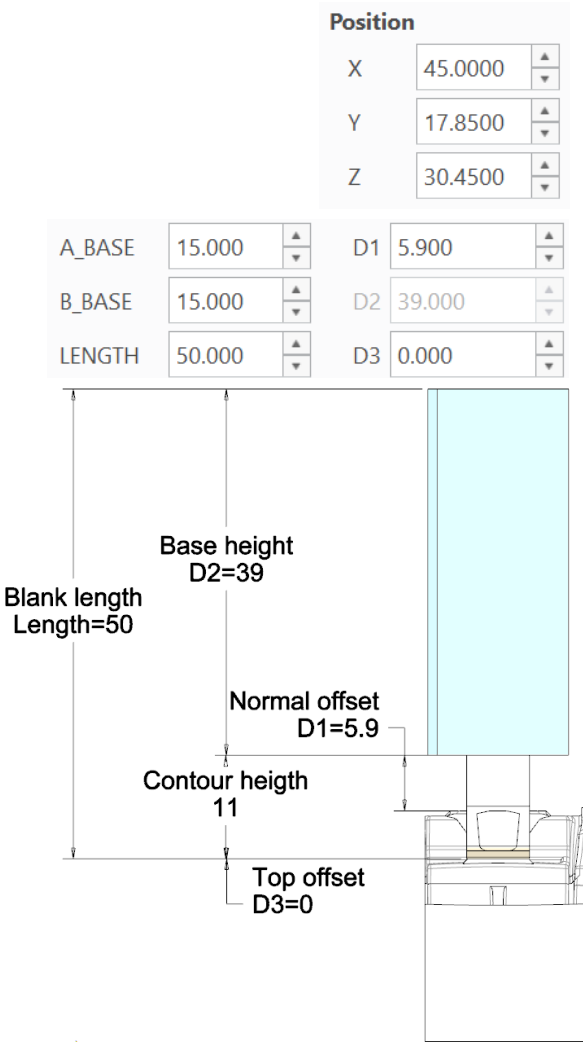


Rounded (Even) Height of Contour

Settings

- **Contour height including D3 should be rounded to even value**
- **Z position of base can be set freely**
- **Options**
  - INCREMENT_SIZE=1.0
  - INCREMENT_POS=0 (exact position, no rounding)
- **Values in data file**
  - LENGTH = 50
  - D2 = -1 (this allows SMARTElectrode to calculate D2)
  - D1 = 5
  - D3 = 0
- **Height of contour will be rounded to a value, where…**
  - D1 corresponds at least to value in data file (D1 ≥ 5.0)
  - D3 corresponds exactly to value in data file
  - Contour height is rounded to INCREMENT_SIZE
- **Blank length is a fixed value**
- **Base height will be set to a value, where…**
  - D3 corresponds exactly to the value in data file (0.0)
  - D2 = LENGTH - Contour height - D2 (11.0)
- **Z position is unrounded value (30.45)**

Result



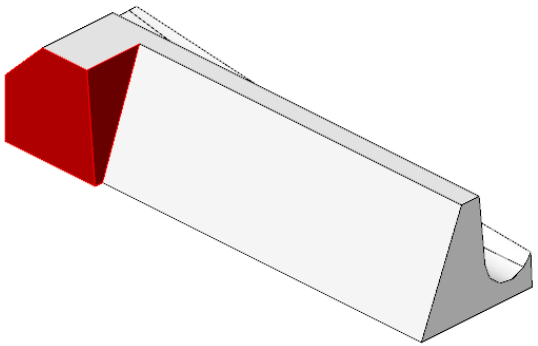
Agenda

- More User Interfaces
  - Check Electrodes
  - Holder
  - Drawings
  - Manufacturing
  - Output
  - Burnsheet
- Configuration
- **Best Practices**
  - Modeling
  - Design Changes
  - Regeneration Behavior in Creo

Best Practices - Modeling

Problem

- Problems with remove of Material



Solutions

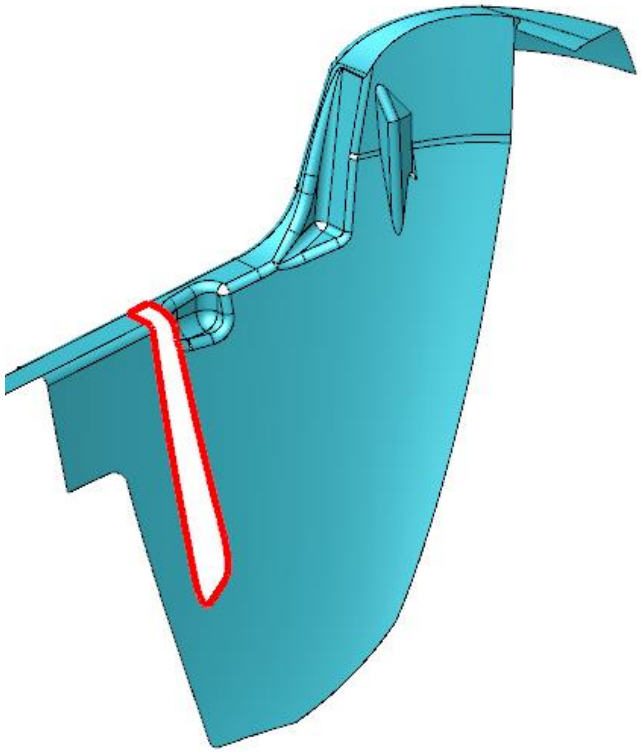
Use various features…

- Remove
- Replace surface
- Cut Block
- Thicken as cut
- Creo extrude

Best Practices - Modeling

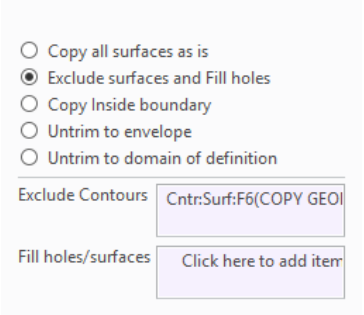
Problem

- **Close holes in quilts**

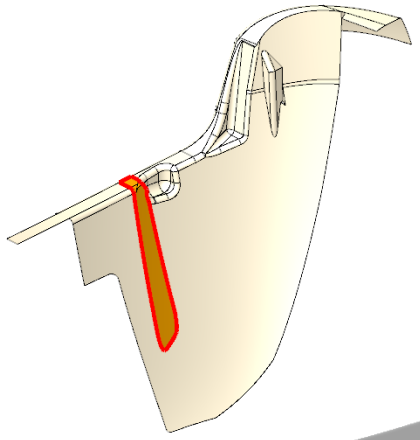


Solutions

- **Copy with option „Fill holes/surfaces“**



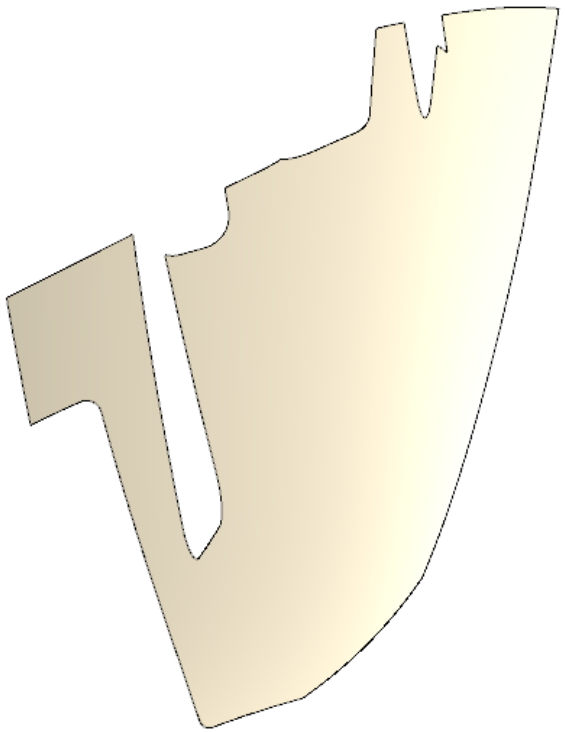
- **Remove feature with option „Edges to remove“**



Best Practices - Modeling

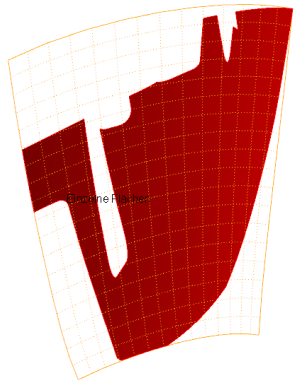
Problem

- Cleanup contour of surface

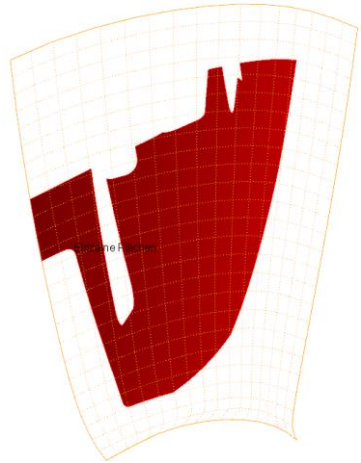


Solutions

- Copy with option „Untrim to envelope“



- Copy with option „Untrim to domain of definition“

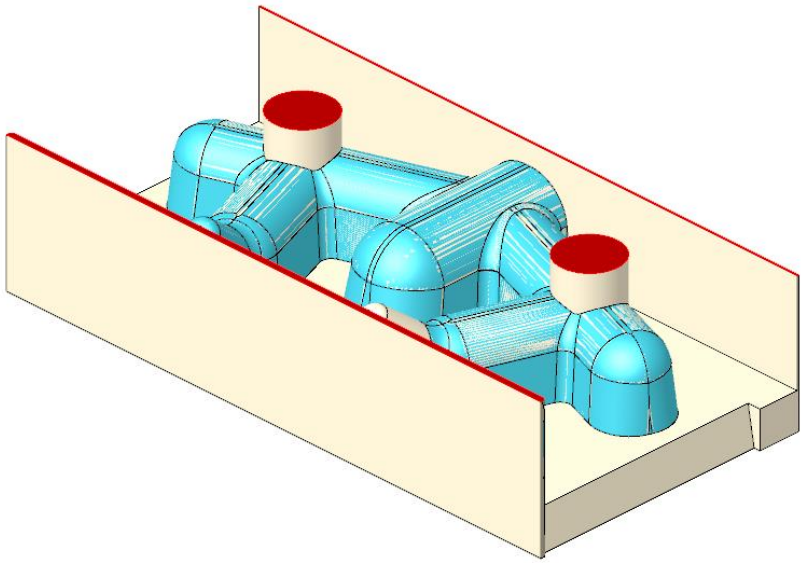


- Trim and/or merge may be necessary aftewards

Best Practices - Modeling

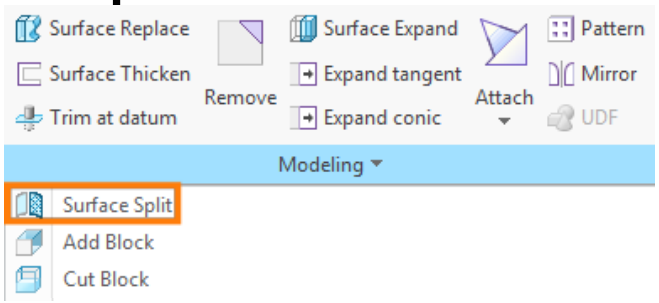
Problem

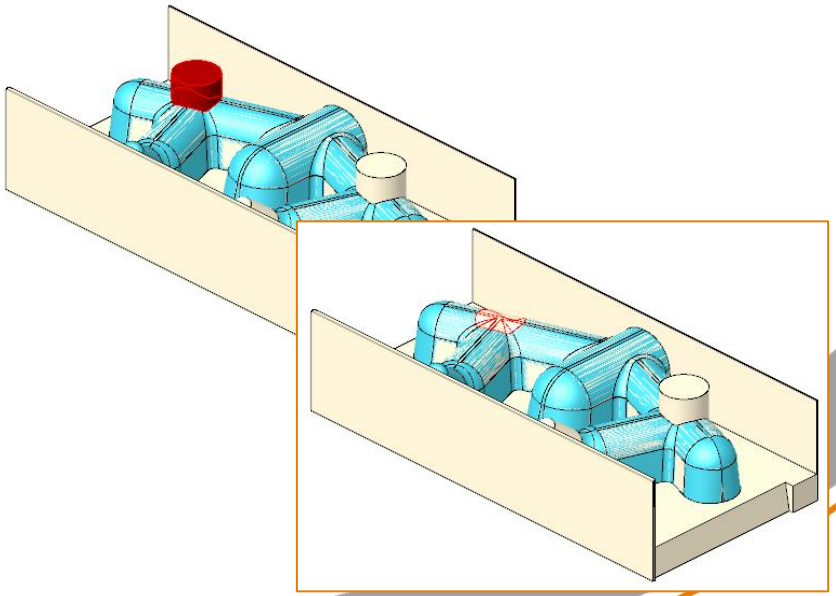
- **Surfaces with several contours can‘t be removed or replaced**



Solutions

- **Separate contours into unique surfaces**





Best Practices - Design Changes

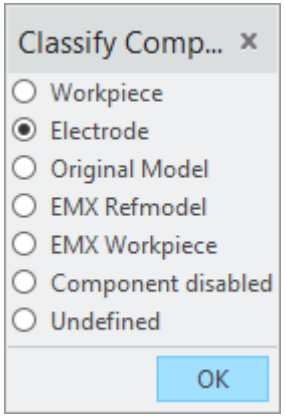
Problem

- Add additional workpieces

Solution

- Assemble model electrode assembly

- Classification will be done on next update of data



Best Practices - Design Changes

Problem

- **Electrodes patterned in assembly**

Solution

- **Use Creo command ‚Pattern ‘**
- *Ctrl+A* **to activate window**
- **SE captures data automatically**

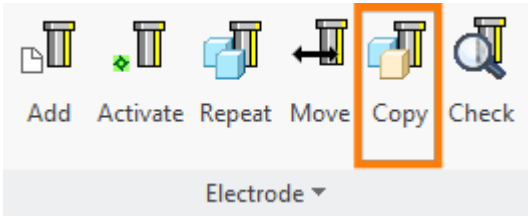
Best Practices - Design Changes

Problem

- Reuse electrodes from other SMARTElectrode-assemblies
- Use prepared electrodes

Solution

- Assemble electrode or complete assembly
- Copy electrodes to be added to assembly



- Electrodes from other assemblies will be independent always

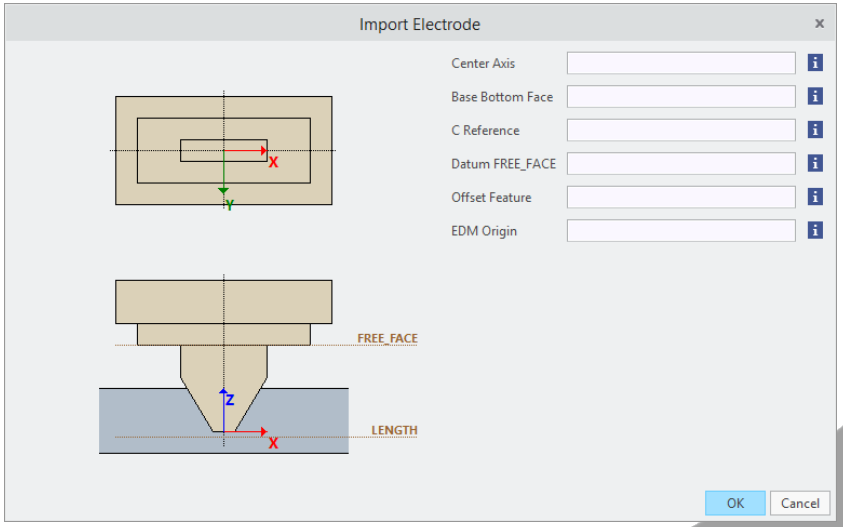
Best Practices - Design Changes

Problem

- Use electrodes NOT created in SMARTElectrode

Solution

- Assemble electrode
- *Ctrl+A* to activate window
- Classify as electrode
- Import UI will be opened automatically



Best Practices - Design Changes

Problem

- Extensive design changes necessary

Solution

- Activate component to show Design-ribbon
- Delete base
- Add or redefine cutouts
- Detail
- Add base again

Best Practices - Design Changes

Problem

- **Avoid unwanted regenration for assembly/electrodes**

Solution

- **Use options to change behavior of software**
- *SET_COPY_GEOM_INDEPENDENT =YES*
  Creates independent reference models
- *MAKE_TRIM_DEPENDENT=NEIN*
  Creates independent electrodes
- **Status for cutouts and copy-geoms can be switched in Burnsheet UI**

- **<u>Note</u>**
  Ctrl+C **and** *Ctrl+V* **creates depdent copies without reference control**

Best Practices – Regeneration Behavior in Creo

Reason

- Baugruppe wird aufgrund Design Changes durchregeneriert

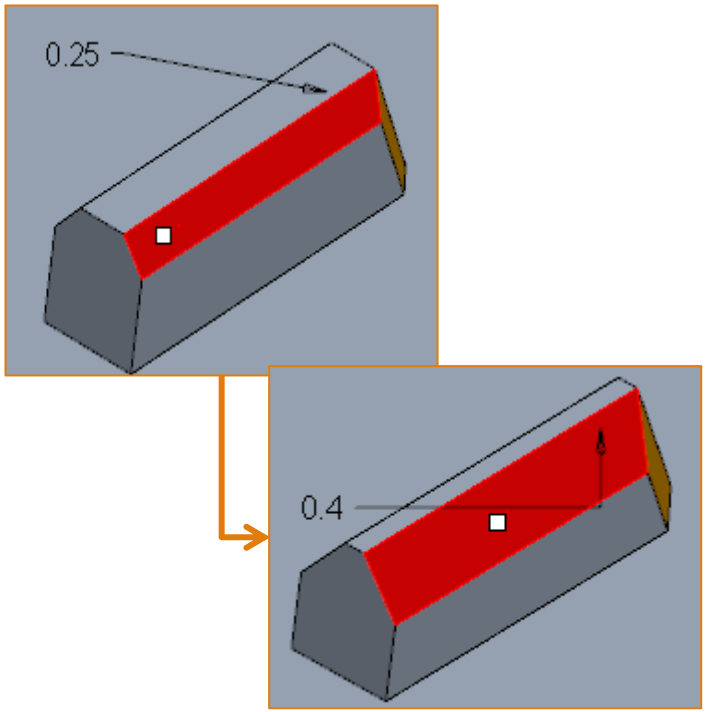
Possible results

1. Assembly regenerates without error, electrodes are up-to-date and geometrically correct
2. Assembly regenerates without error, electrodes are up-to-date and geometrically wrong
3. Regeneration error in Creo electrodes are not up-do-date and geometrically wrong

Best Practices – Regeneration Behavior in Creo

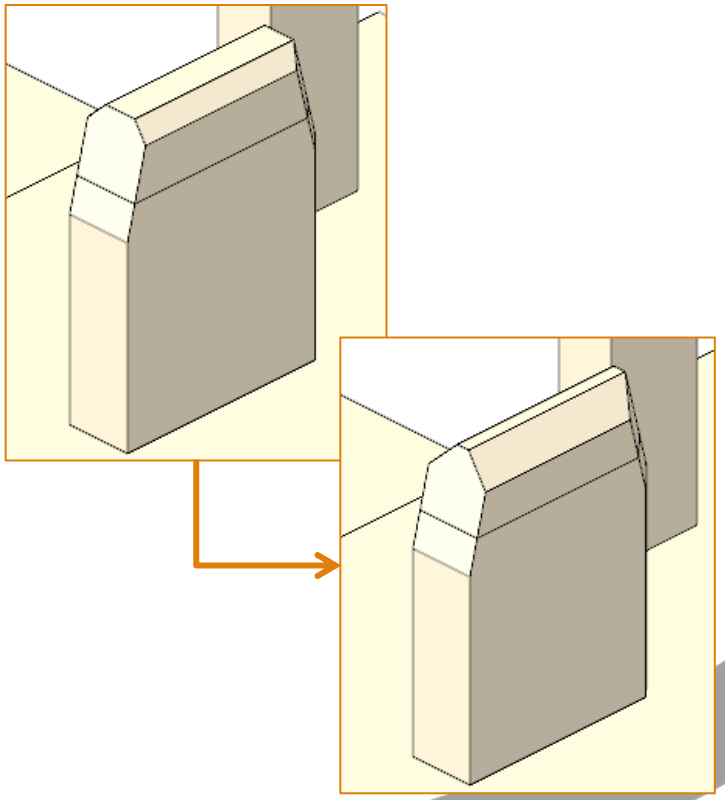
Result

1. **Assembly regenerates without error, electrodes are up-to-date and geometrically correct**



Necessary Action

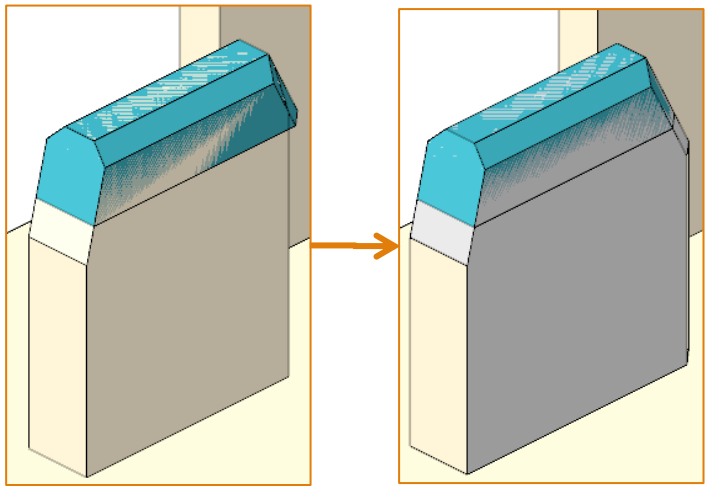
- **No action necessary!**



Best Practices – Regeneration Behavior in Creo

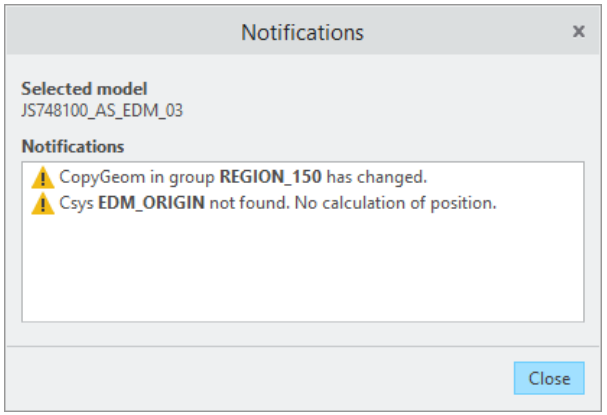
Result

1. …
2. Assembly regenerates without error, electrodes are up-to-date and geometrically wrong

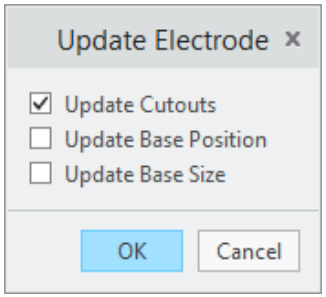


Necessary Action

- If selected burn-faces changed outline, a notification will be shown in burnsheet UI



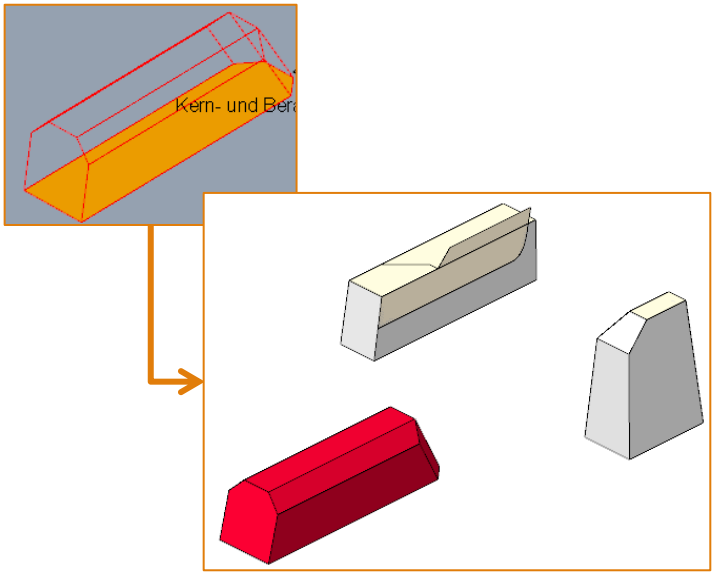
- Use context menu to update cutouts



Best Practices – Regeneration Behavior in Creo

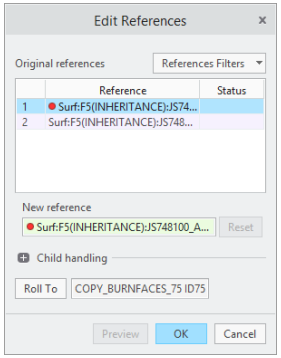
Result

1. …
2. …
3. **Regeneration error in Creo electrodes are not up-do-date and geometrically wrong**

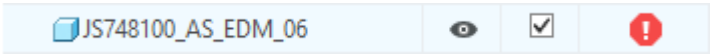


Necessary Action

- **Solve regenration errors in Creo**



- **Check for interferences**
- **Update effective burn-area**
- **Open Burnsheet UI to get additional information**

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