



A large, stylized graphic element consisting of two curved bands. The upper band is orange and the lower band is gray, both curving from the bottom left towards the top right. They overlap each other, creating a layered effect.

SMARTElectrode

Training

Agenda

Comparison and compatibility with SE 7.0

Workflow

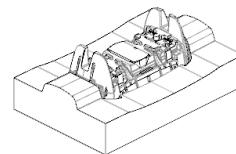
User Interface

Assembly Mode

Part Mode

Training

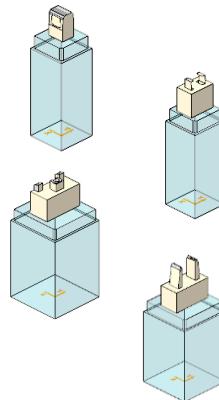
Assembly Creation



Preparation

Set Zero

Electrode 1



Electrode 2

Electrode 3

Electrode 4

Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

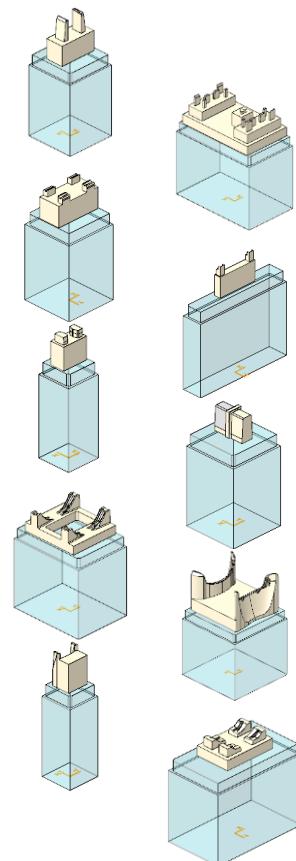
Electrode 10

Electrode 11

Electrode 12

Electrode 13

Electrode 14



Agenda

More User Interfaces

Check Electrodes

Holder

Drawings

Manufacturing

Output

Burnsheet

Best Practices

Modeling

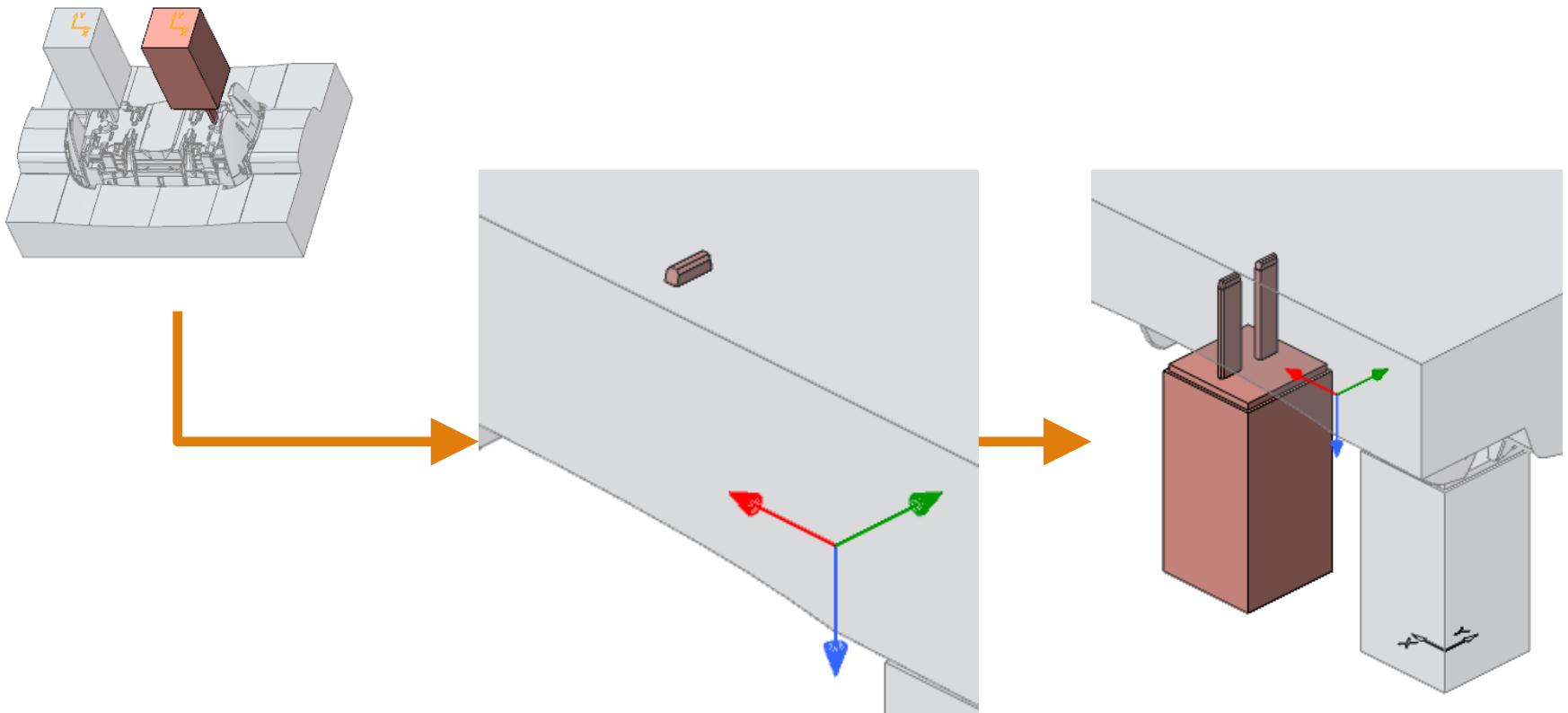
Design Changes

Regeneration Behavior in Creo

YouTube-Playlist

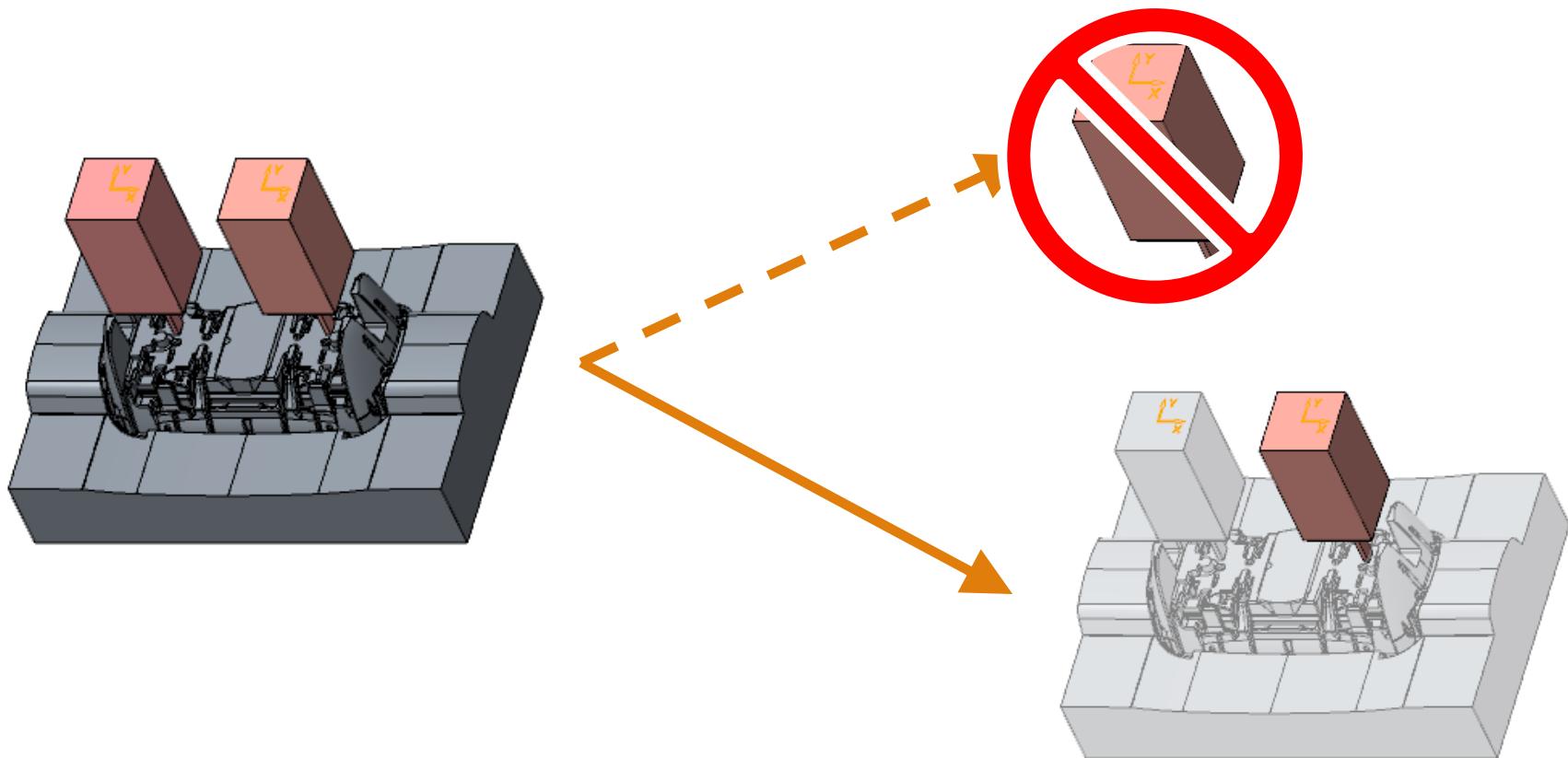
Comparison and compatibility with SE 7.0

✓ Electrodes can be changed at any time!



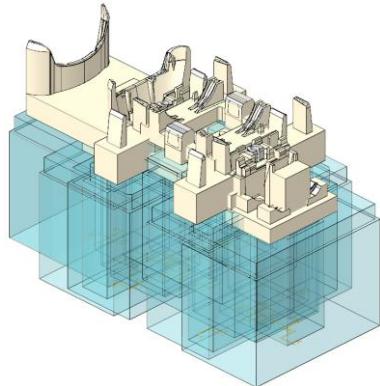
Comparison and compatibility with SE 7.0

- ✓ All tasks are done in the project assembly - no change between parts and assembly mode!



- ✓ **Electrodes can be changed at any time!**
- ✓ **All tasks are done in the project assembly!**
- ✓ **Add or remove models directly!**
- ✓ **Definition of Operation**
 - ✓ No additional sub-assembly necessary!
 - ✓ New defaults for free face, start and secure position!
- ✓ **Project Management**
 - ✓ Holder can be assigned to several models!
 - ✓ Create drawings at any time!
 - ✓ Create output at any time!

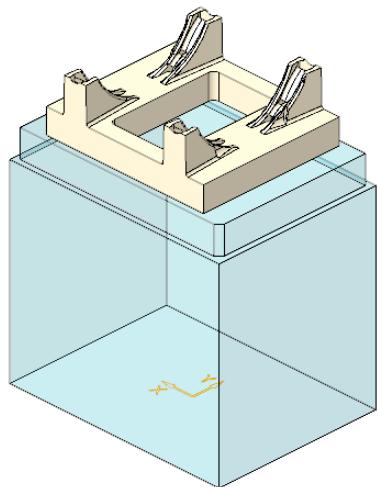
Compatibility with SE 7.0



Following features are available for assemblies from SE 7.0:

- Edit parameter
- Create output
- Check functionality
- Drawing creation
- Control of visibility

Electrodes from SE 7.0



- Edit parameter
- Check functionality
- Import in **current assembly**
- Design changes have to be done interactively!

Agenda

Comparison and compatibility with SE 7.0

Workflow

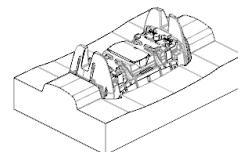
User Interface

Assembly Mode

Part Mode

Training

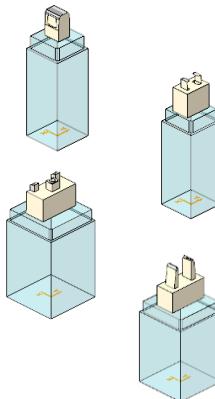
Assembly Creation



Preparation

Set Zero

Electrode 1



Electrode 2

Electrode 3

Electrode 4

Creation...

...of assembly and zero (Operation)

Creation...

...of electrodes

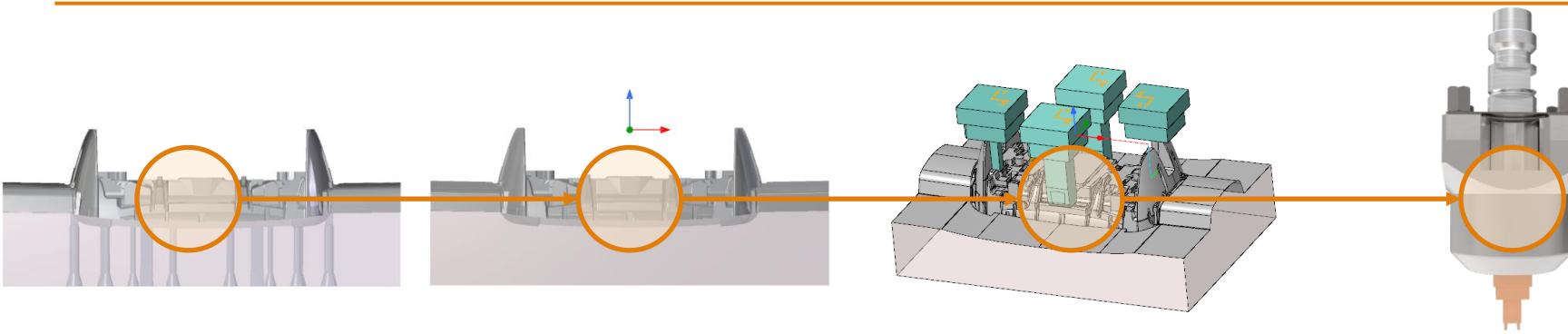
Add...

...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

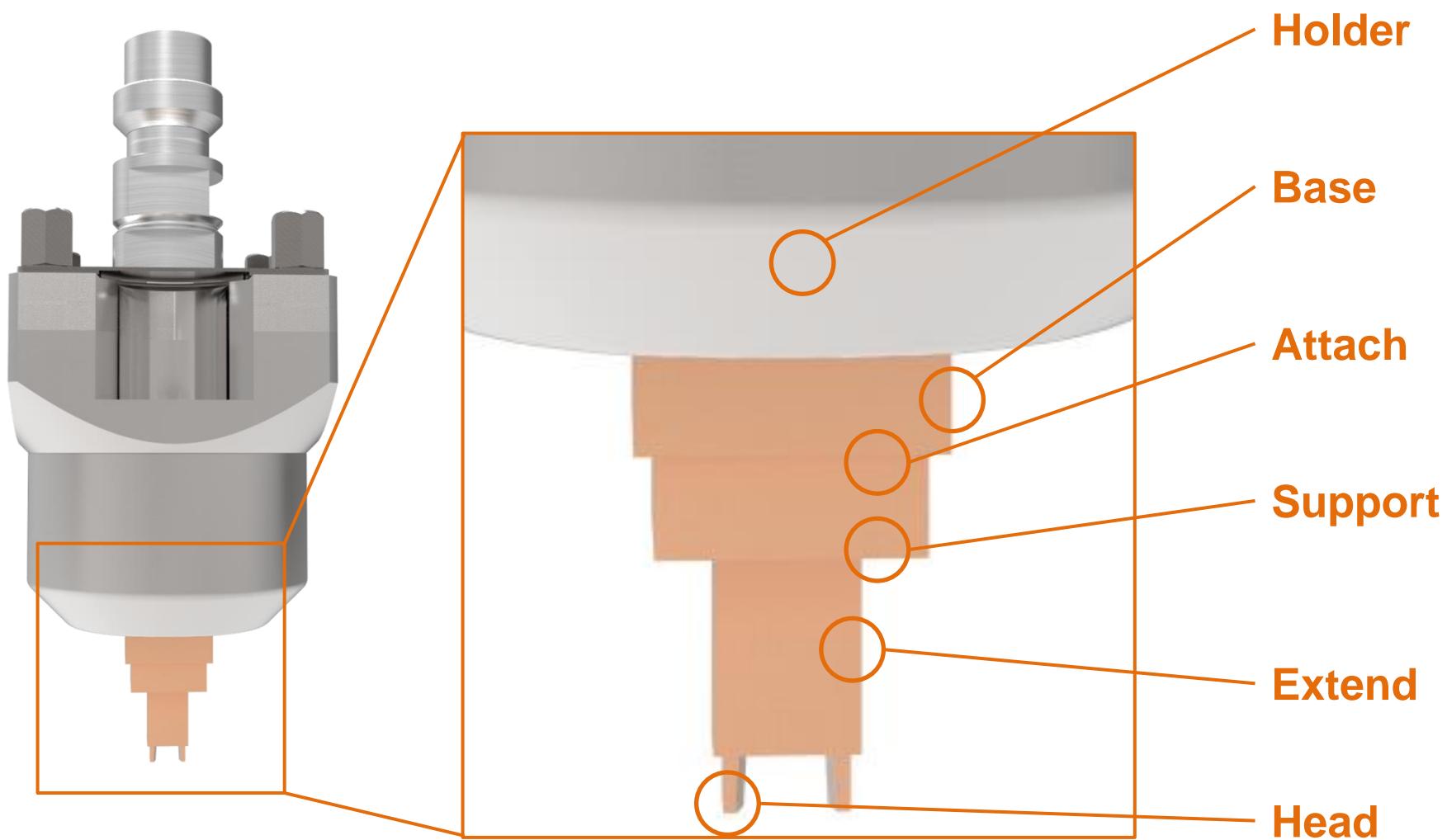
3d Output

EDM Output

Workflow Electrode Creation

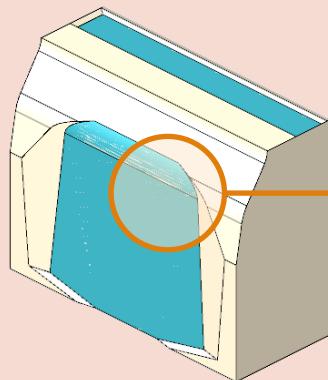
Note

Creation from top to base!

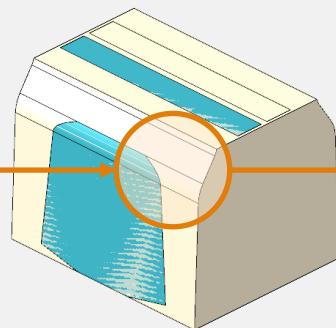


Workflow Electrode Creation

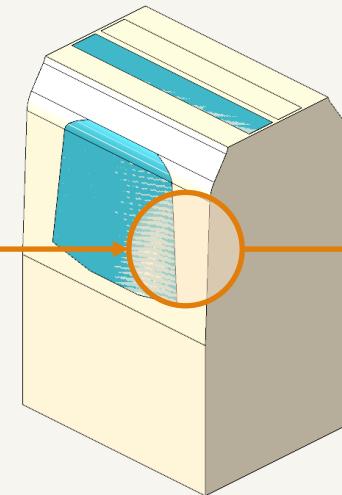
Get Data



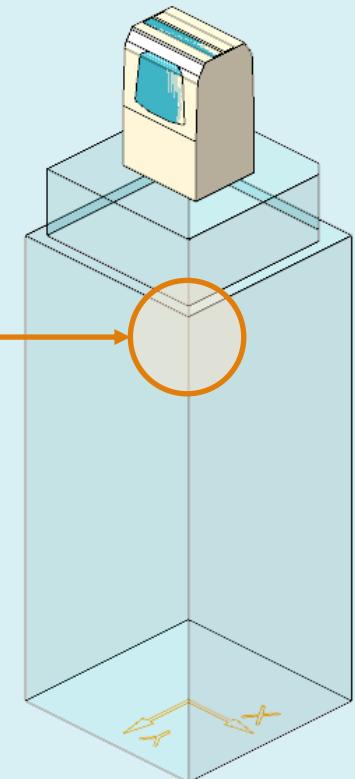
Detailing



Attach

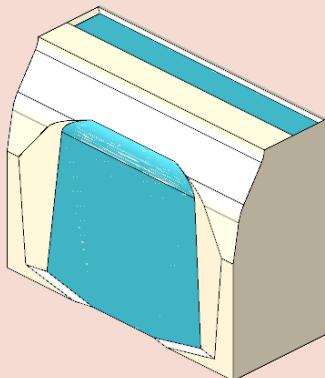


Base



Workflow Electrode Creation

Get Data



Get selected geometry from **Workpiece using:**

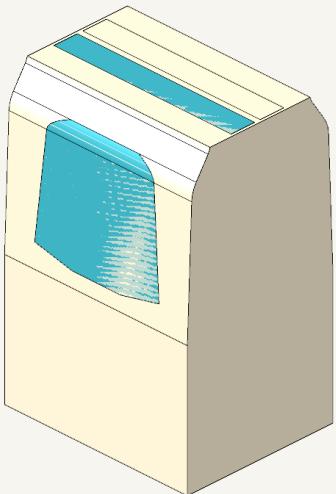
- **Solid + Cutout**
- **CopyGeometry of surfaces**

Get geometry from **Electrodes:**

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

Workflow Electrode Creation

Attach

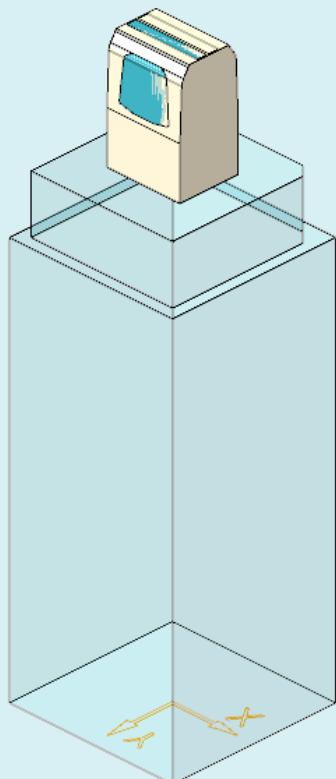


On **Attach** material between head and **FREE_FACE** is inserted. The following options are available:

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

Workflow Electrode Creation

Base



Adding the base completes the design of the electrode

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

Agenda

Comparison and compatibility with SE 7.0

Workflow

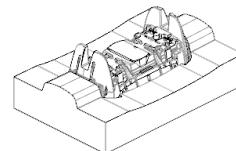
User Interface

Assembly Mode

Part Mode

Training

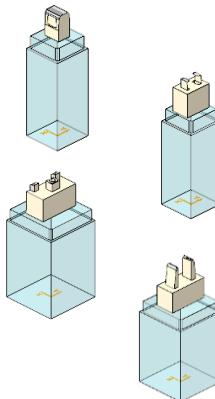
Assembly Creation



Preparation

Set Zero

Electrode 1



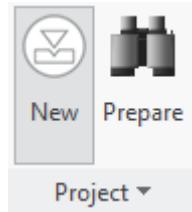
Electrode 2

Electrode 3

Electrode 4

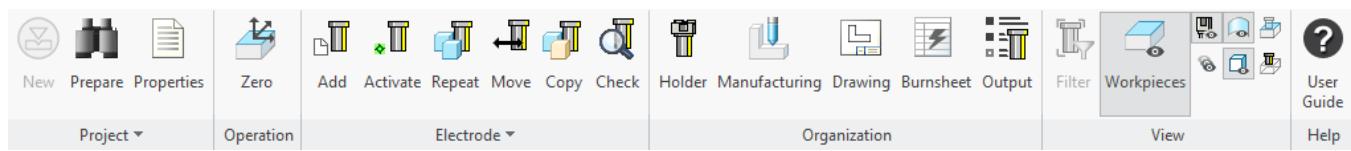
User Interface

Empty Session



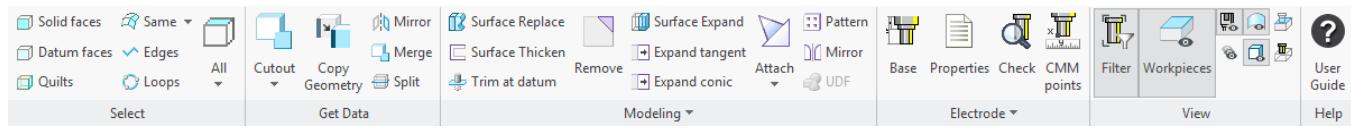
Process Level

Active Assembly

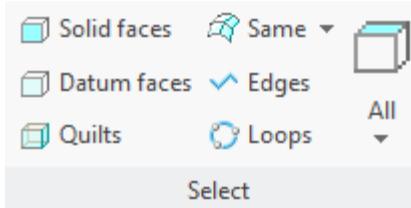


Design Sub-menu

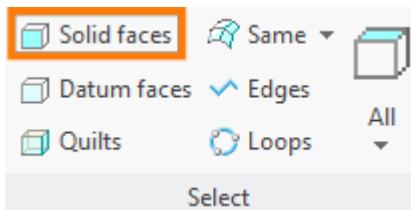
Active Electrode Component



Ribbon UI – Group 'Select'



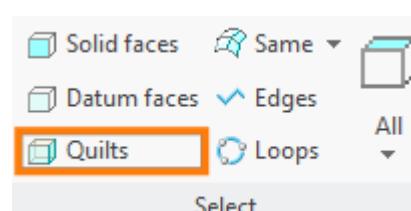
The selection commands can be used to extract or detail electrode geometry.



- **Solid faces**

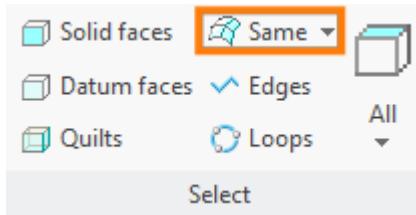


- **Datum surfaces**



- **Quilts**

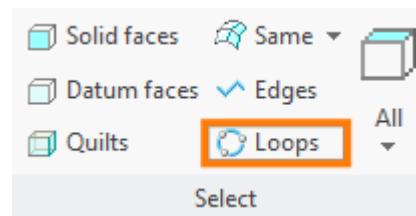
Ribbon UI – Group „Select“



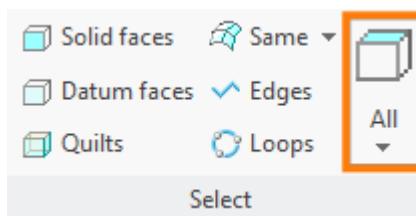
- Special selection filters for rounds, similar surfaces and areas with same color



- Boundary edges (one-sided edges)

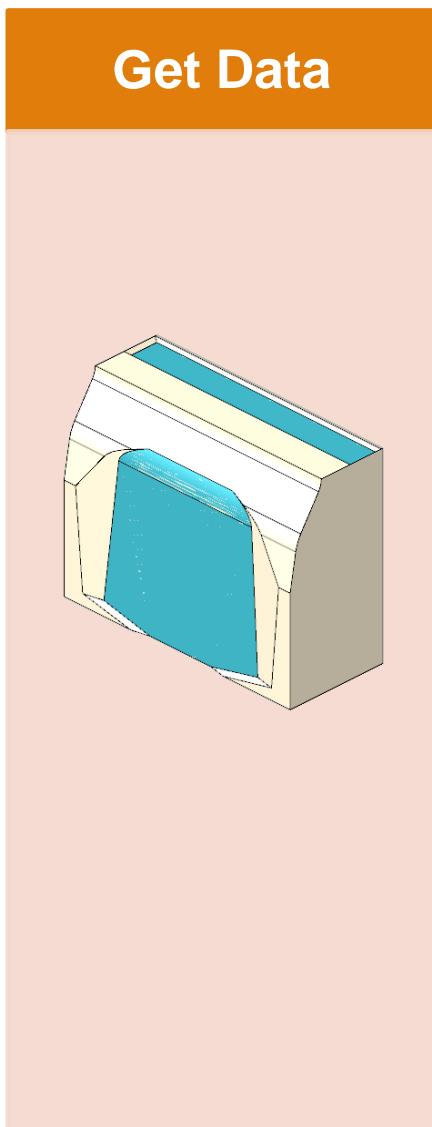


- Complete boundary loops of quilts



- Top surfaces that are not attached

Ribbon UI – Group 'Get Data'



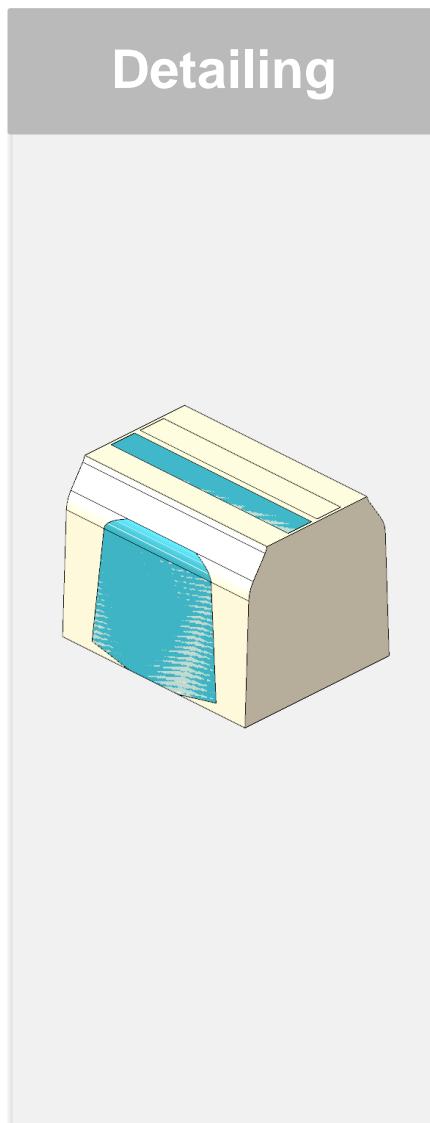
Get selected geometry from **workpiece using:**

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

Get geometry from electrodes:

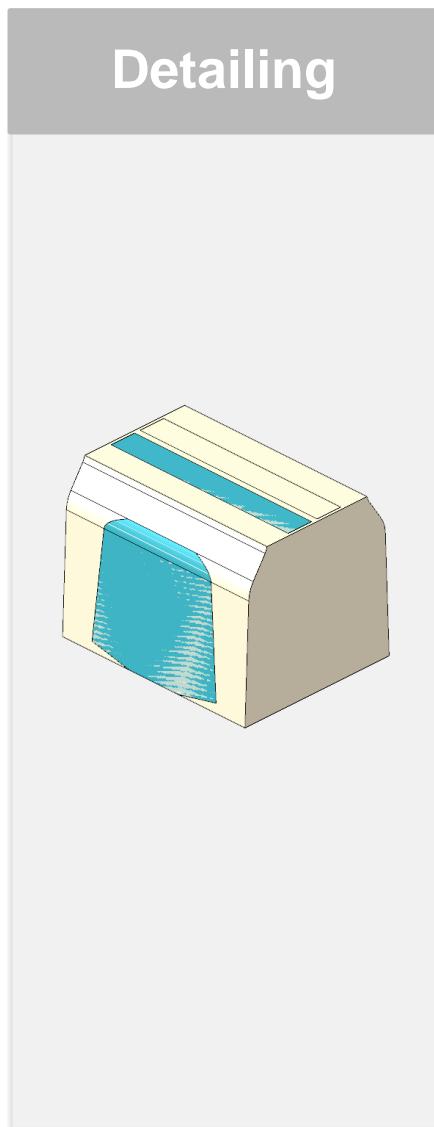
- **Mirror**
- **Merge**
- **Split up**

Ribbon UI – Group „Modeling“



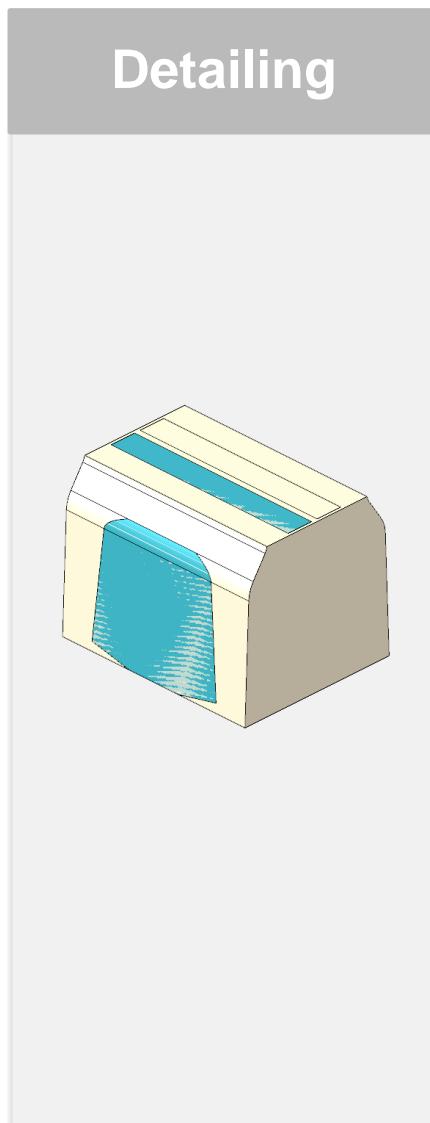
- **Replace surface through surface**
- **Thicken surface**
- **Trim at datum**
- **Remove**
- **Expand surface**

Workflow Electrode Creation



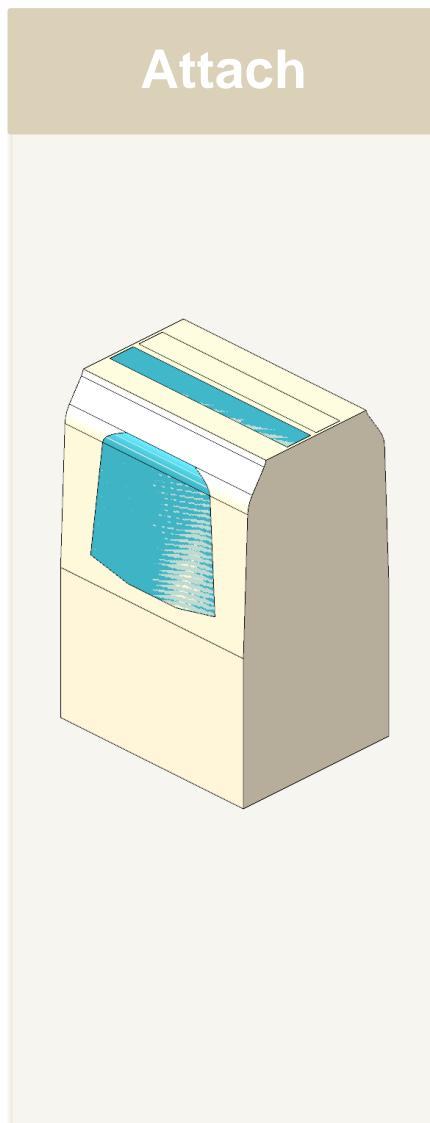
- **Expand tangent**
- **Expand conic**
- **Surface split**
- **Add block**
- **Cut block**

Ribbon UI – Group „Modeling“



- Create geometry pattern
- Mirror electrode geometry

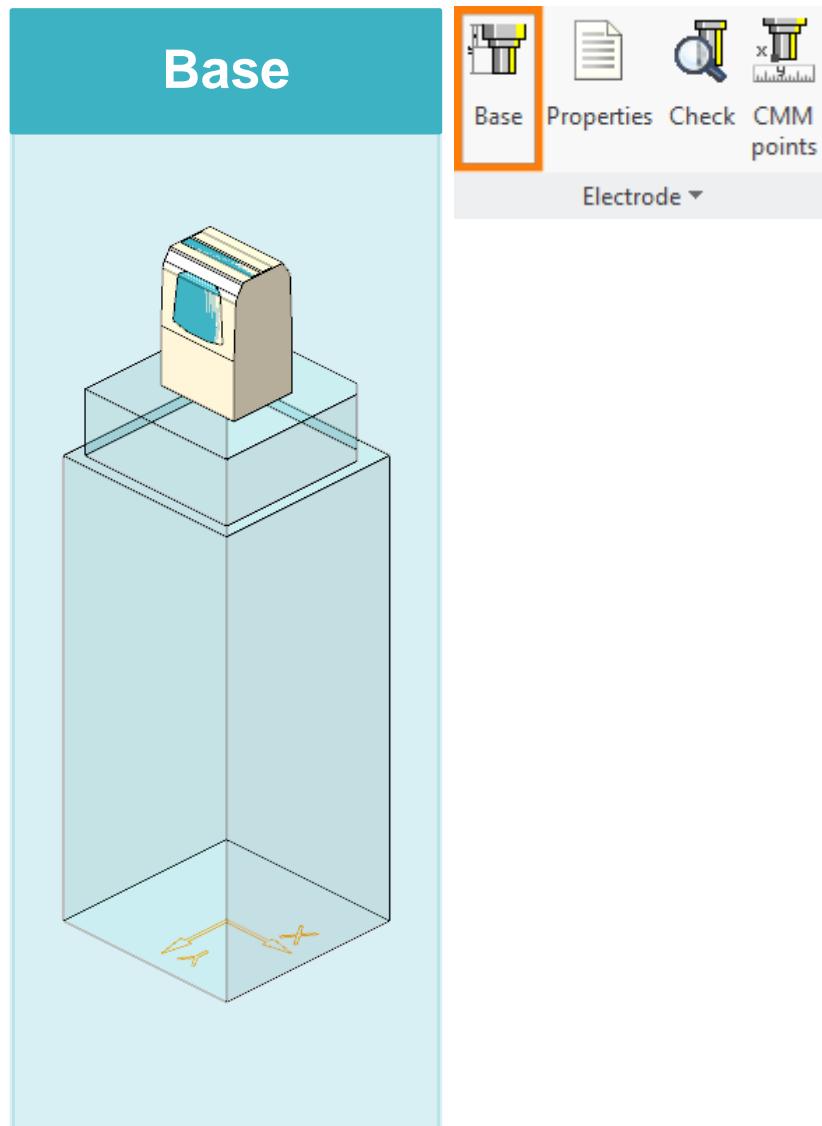
Ribbon UI – ,Attach‘



Attach fills gap between solid and later base.

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

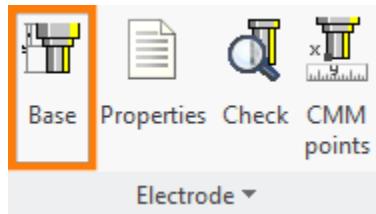
Ribbon UI – Group ‚Electrode‘



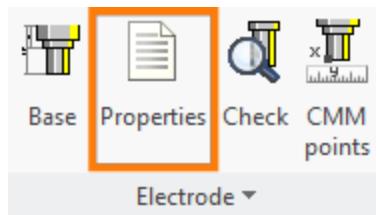
Set data of electrode

- Add or change base

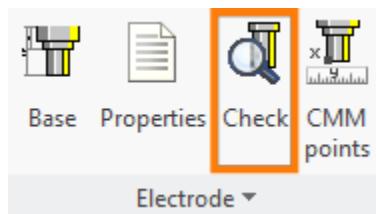
Ribbon UI – Group ‚Electrode‘



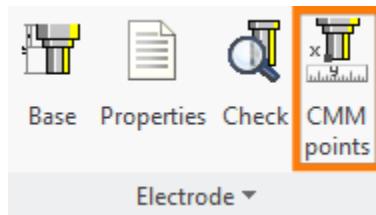
- Add or change base



- Edit electrode parameter

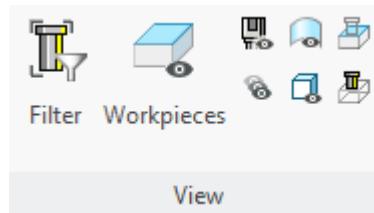


- Check active electrode

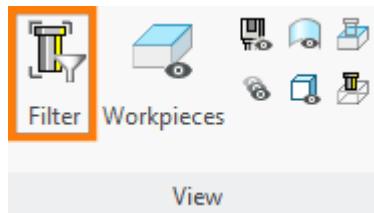


- Add CMM points

Ribbon UI – Group ,View'



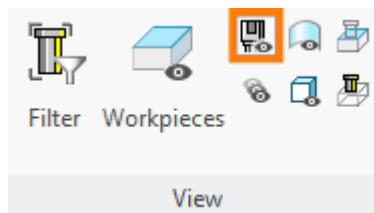
The commands in 'View' control the visibility of objects and elements. These commands are available at any time.



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

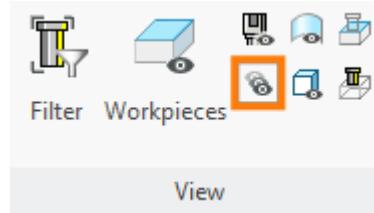


- **Show/hide workpieces**



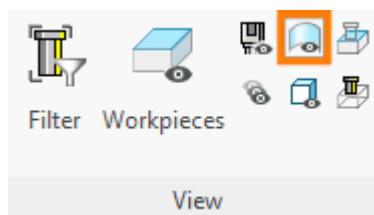
- **Show/hide holders**

Ribbon UI – Group ,View‘

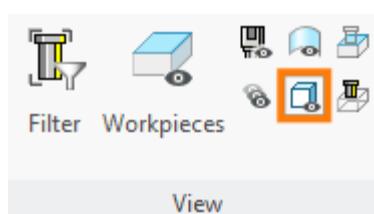


- **Show all**

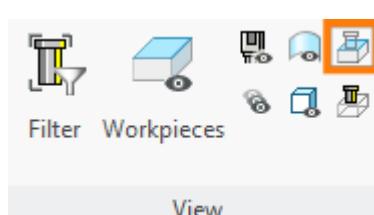
Show all objects – also objects hidden by user.



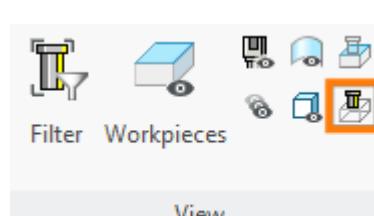
- **Show/hide datum surfaces/quilts**



- **Show/hide of Volumengeometrie**



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



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

Agenda

Comparison and compatibility with SE 7.0

Workflow

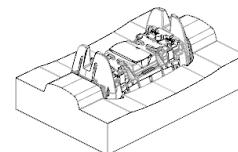
User Interface

Assembly Mode

Part Mode

Training

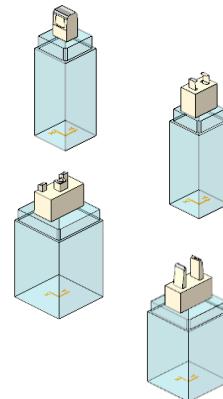
Assembly Creation



Preparation

Set Zero

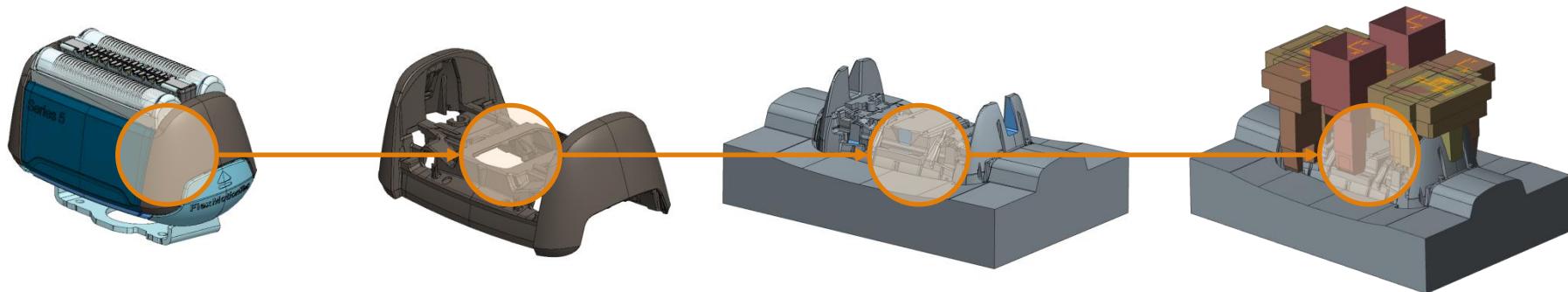
Electrode 1



Electrode 2

Electrode 3

Electrode 4



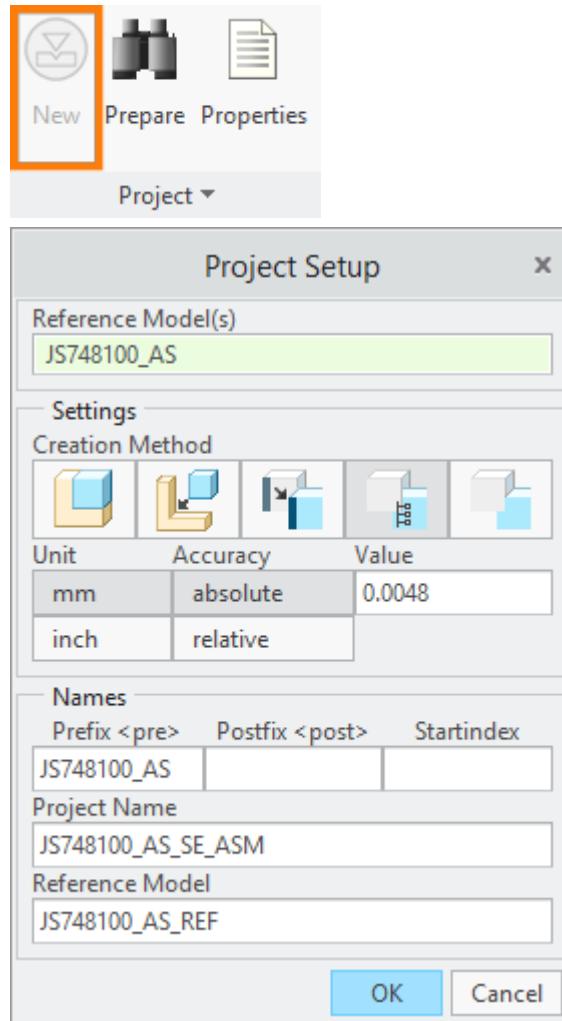
Usage of model

`js748100_as`

and

default configuration

Creation Main Assembly

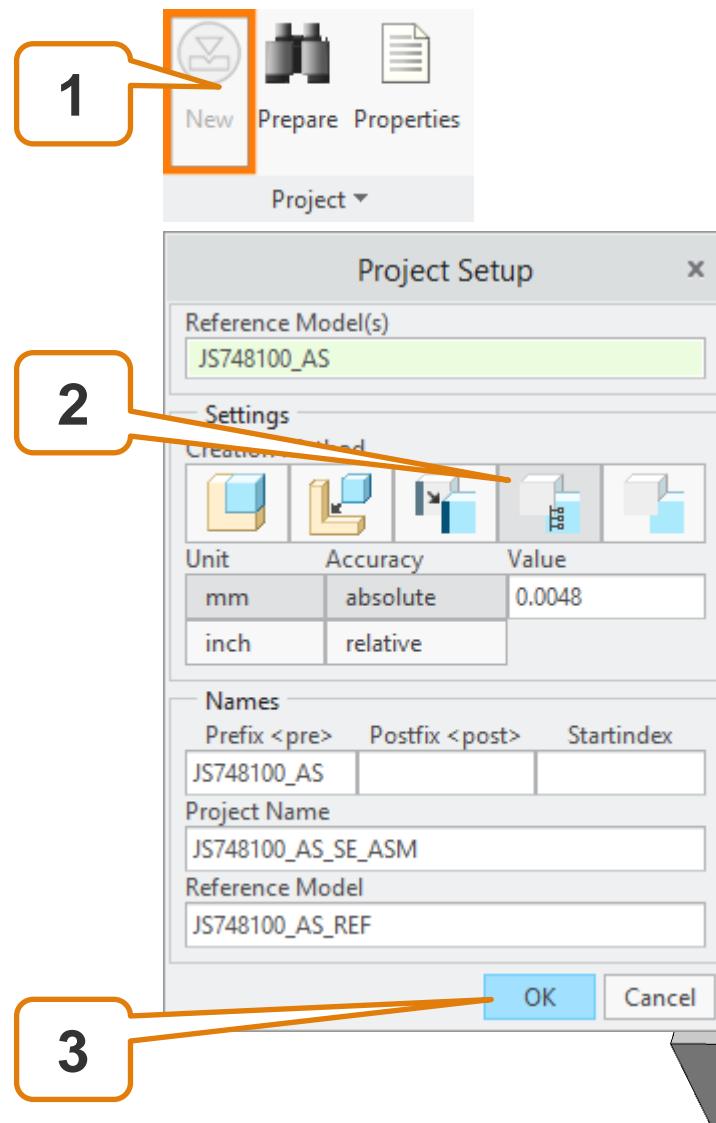


- **Main Assembly**
 - Workpieces (Cores)
 - Operation (Zero)
 - Electrodes
- **Select workpieces**
- **Reference Method**
 - Use current assembly
 - Use original models
 - Create reference model
 - Inheritance
 - Merge
 - Copy solid faces and solidify

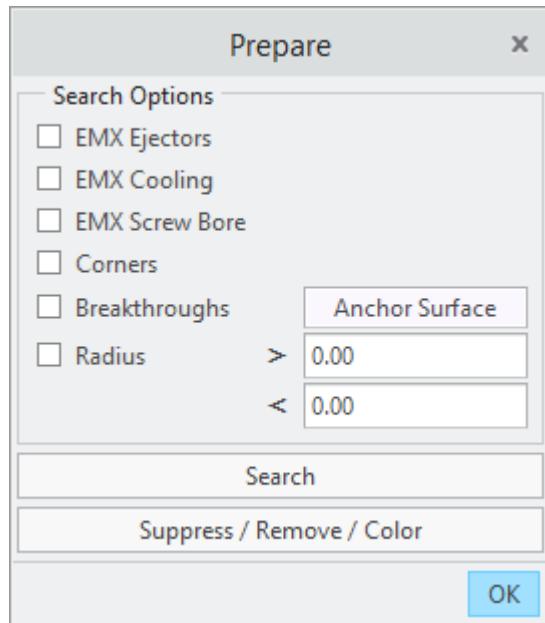
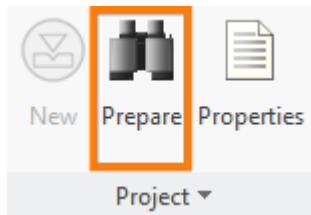
Note

When using a reference model, zero offsets are corrected.

Creation Main Assembly



Preparation



Simplification of geometry

- in reference models
- to simplify electrode extraction

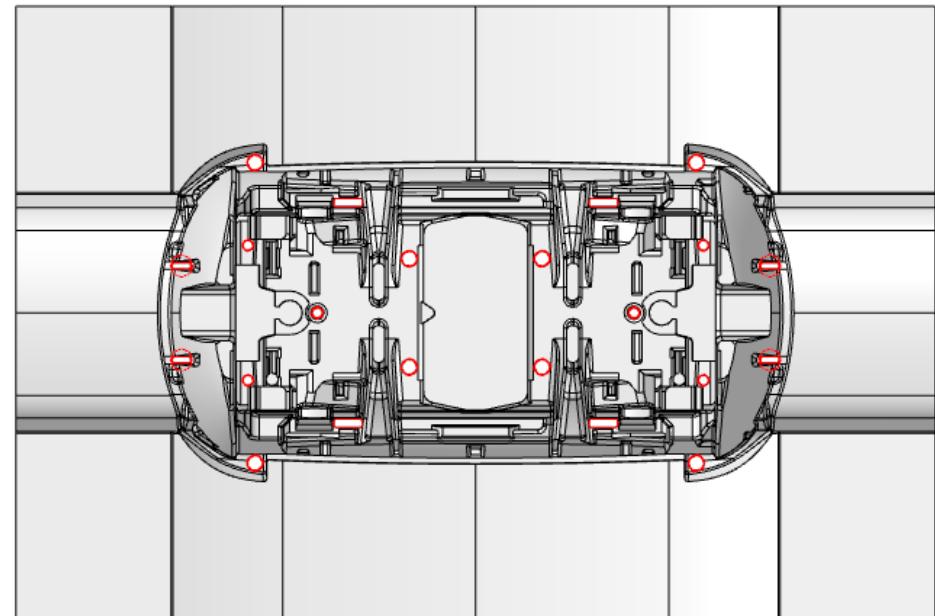
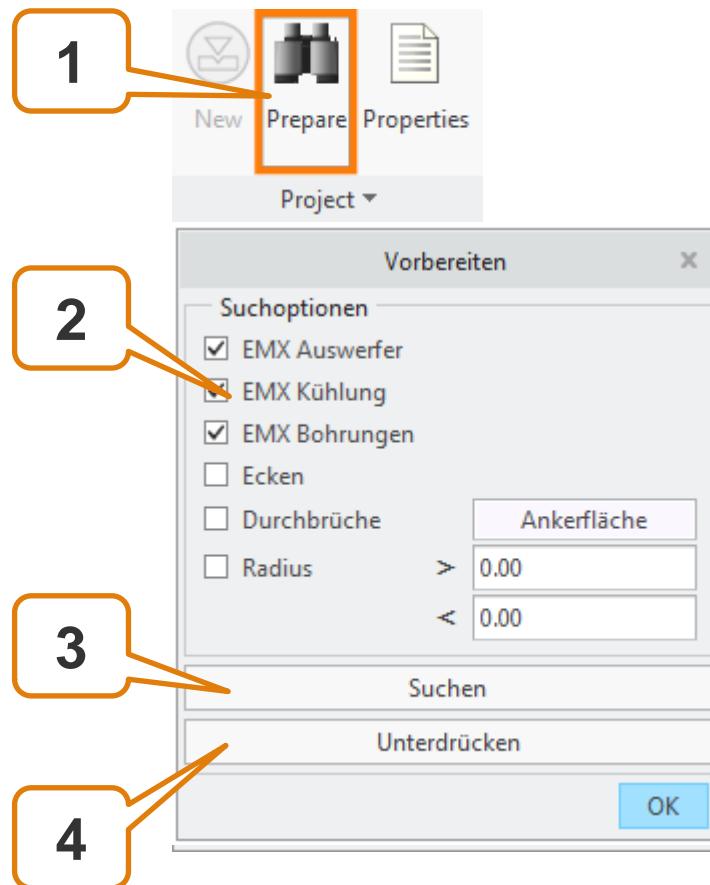
Suppress or remove

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

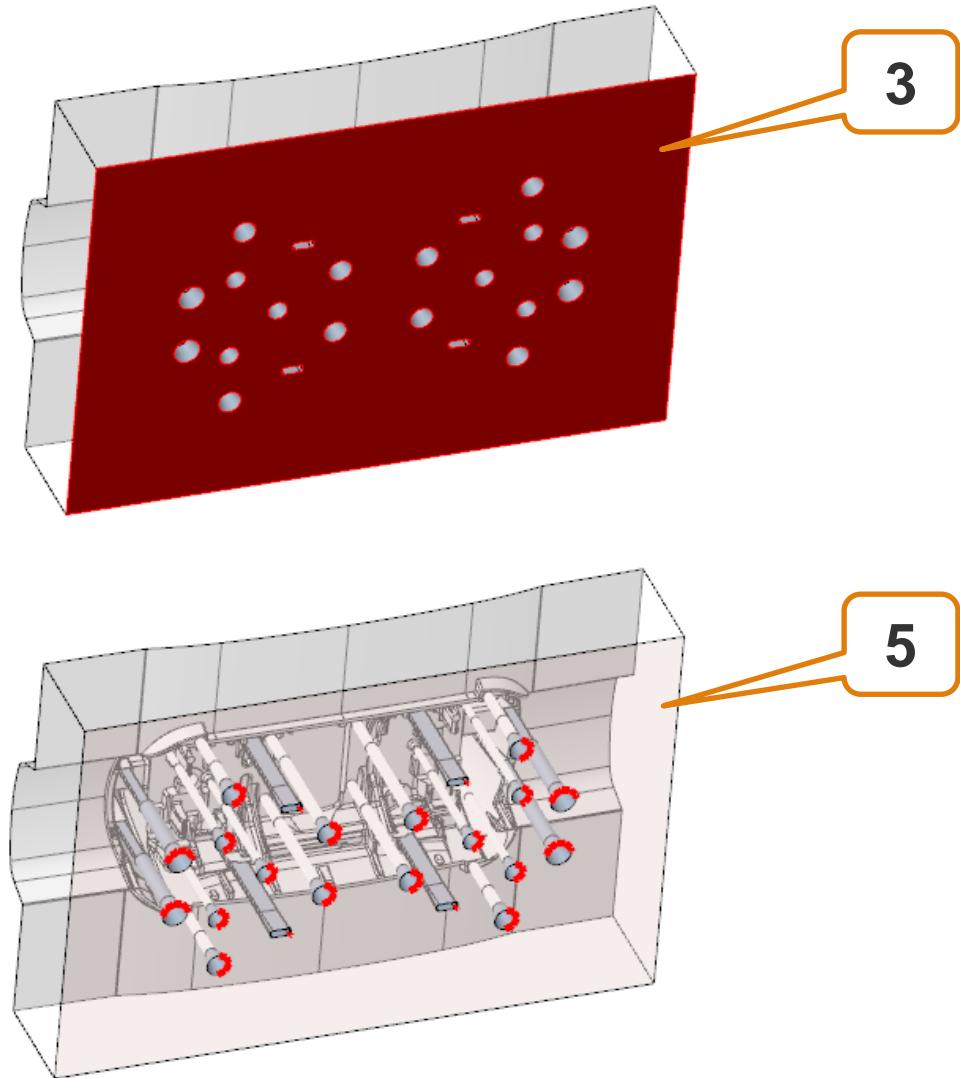
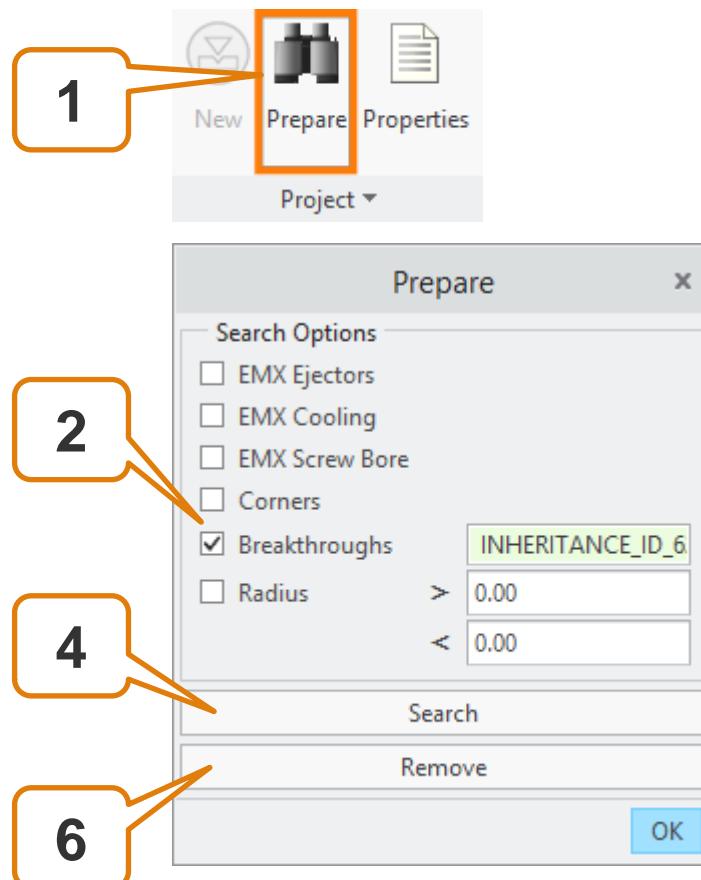
Search & Color

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

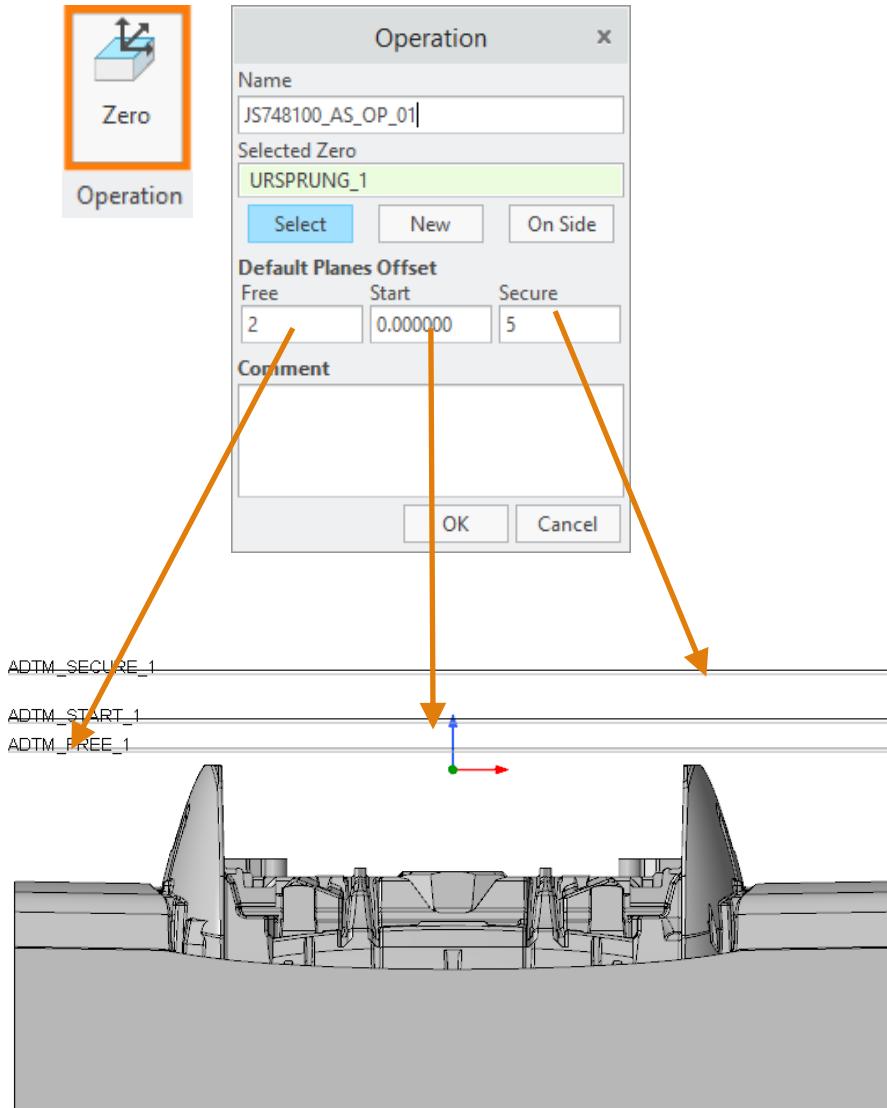
Preparation – Features from EMX



Preparation – Import



Creation of Zero



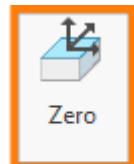
Operation

- Defines reference CSYS for Electrodes
- One zero per assembly
- Definition can be changed at any time

Retraction Planes

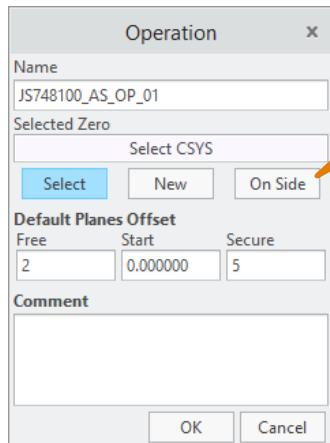
- Free face / Z-reference
- Start plane (Standard)
- Secure plane (Standard)

Csys on centers of bounding box



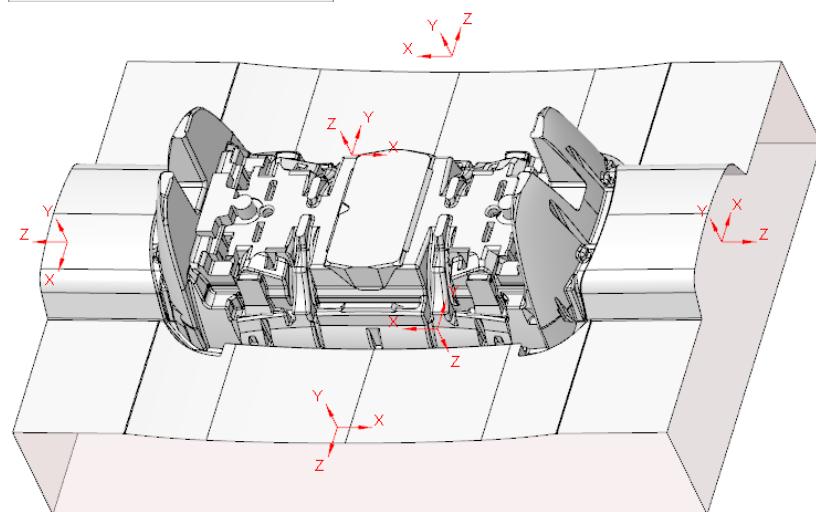
Zero

Operation

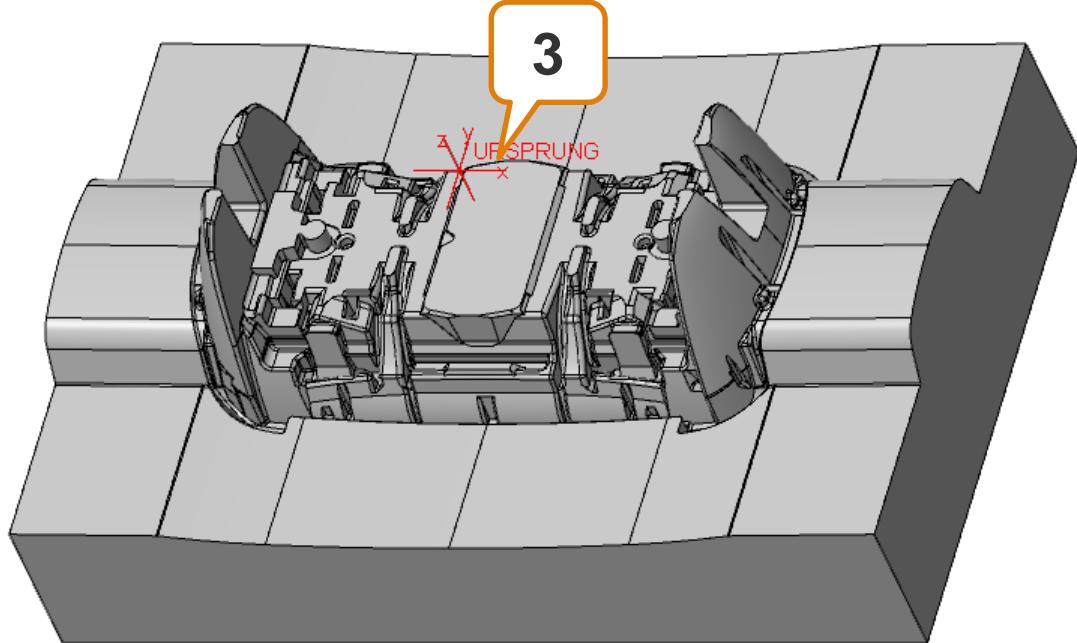
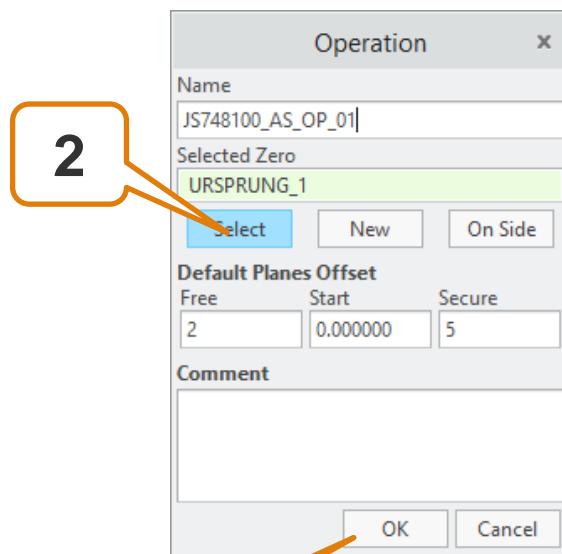


On side

- One Csys on each side of the bounding box
- Csys can be updated in UI



Selection of Zero



Agenda

Comparison and compatibility with SE 7.0

Workflow

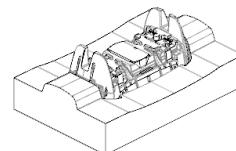
User Interface

Assembly Mode

Part Mode

Training

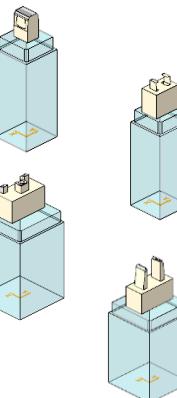
Assembly Creation



Preparation

Set Zero

Electrode 1

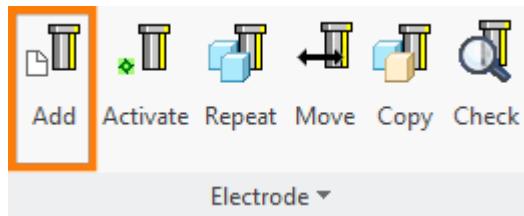


Electrode 2

Electrode 3

Electrode 4

New Electrode



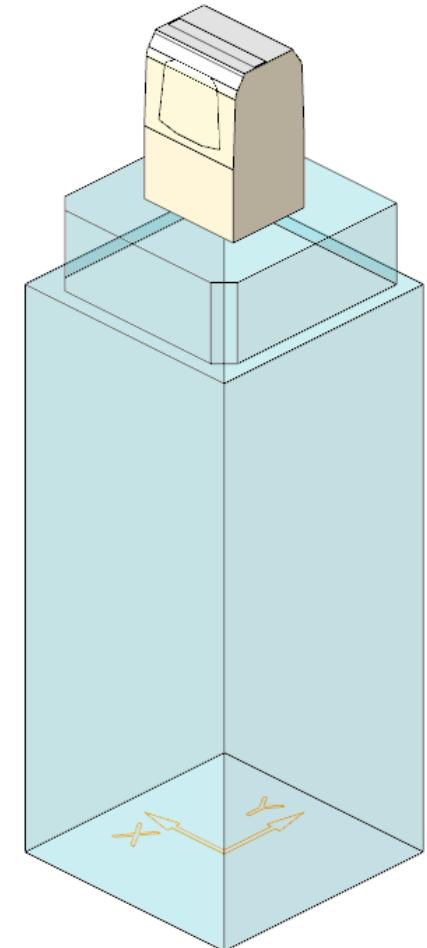
A new Electrode is ...

- 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

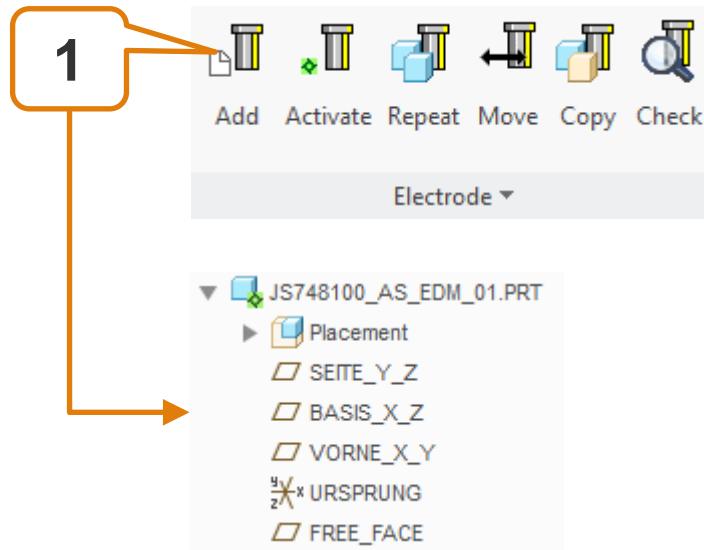
Electrode 1

Topics...

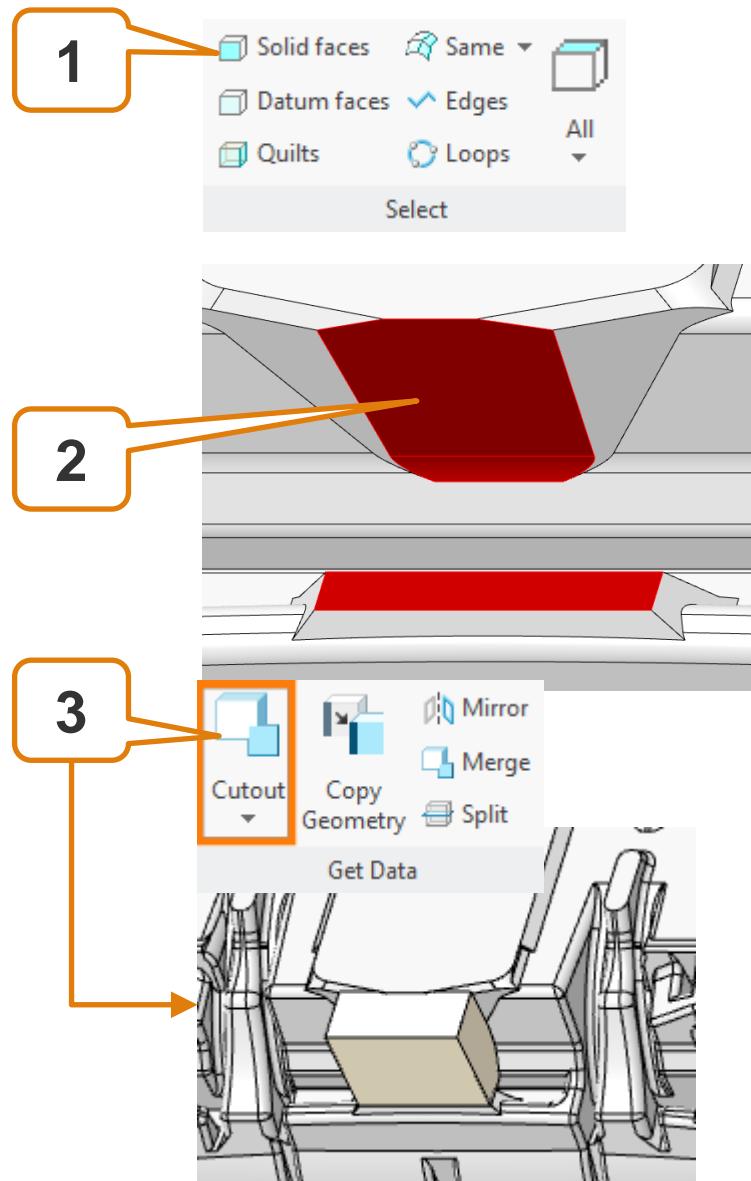
- Add new electrode
- Copy burn-faces
- Detailing
- Mirror geometry
- Attach to FREE_FACE
- Add base
- Assemble electrode again



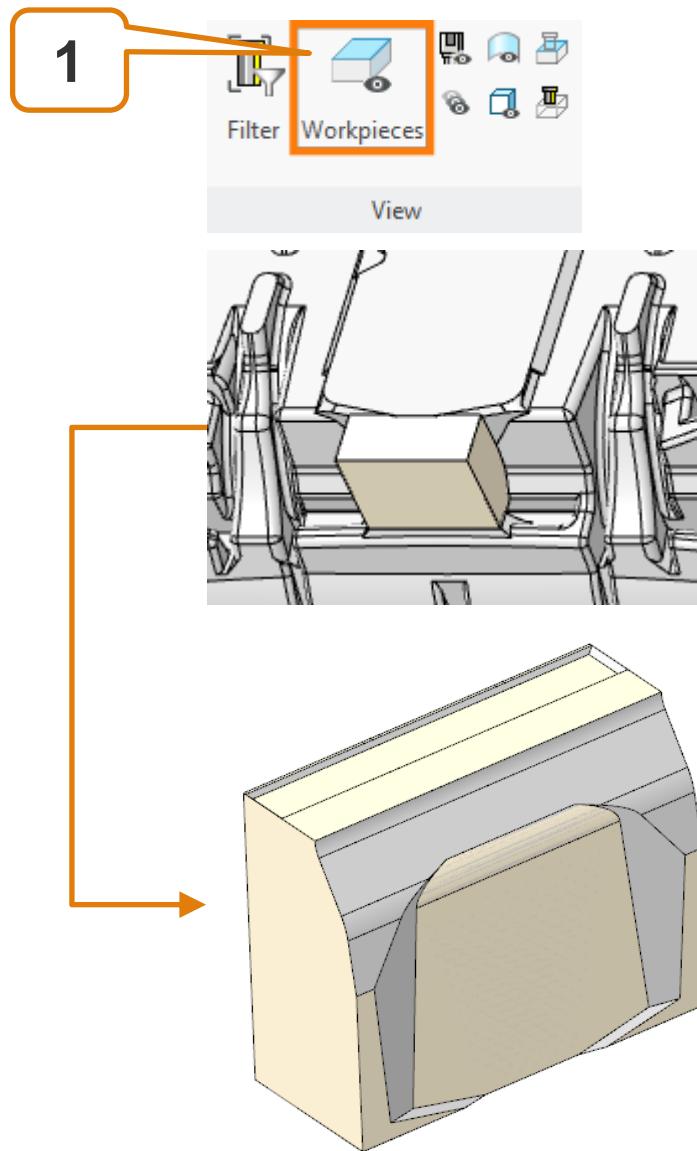
Electrode 1 – Add new Electrode



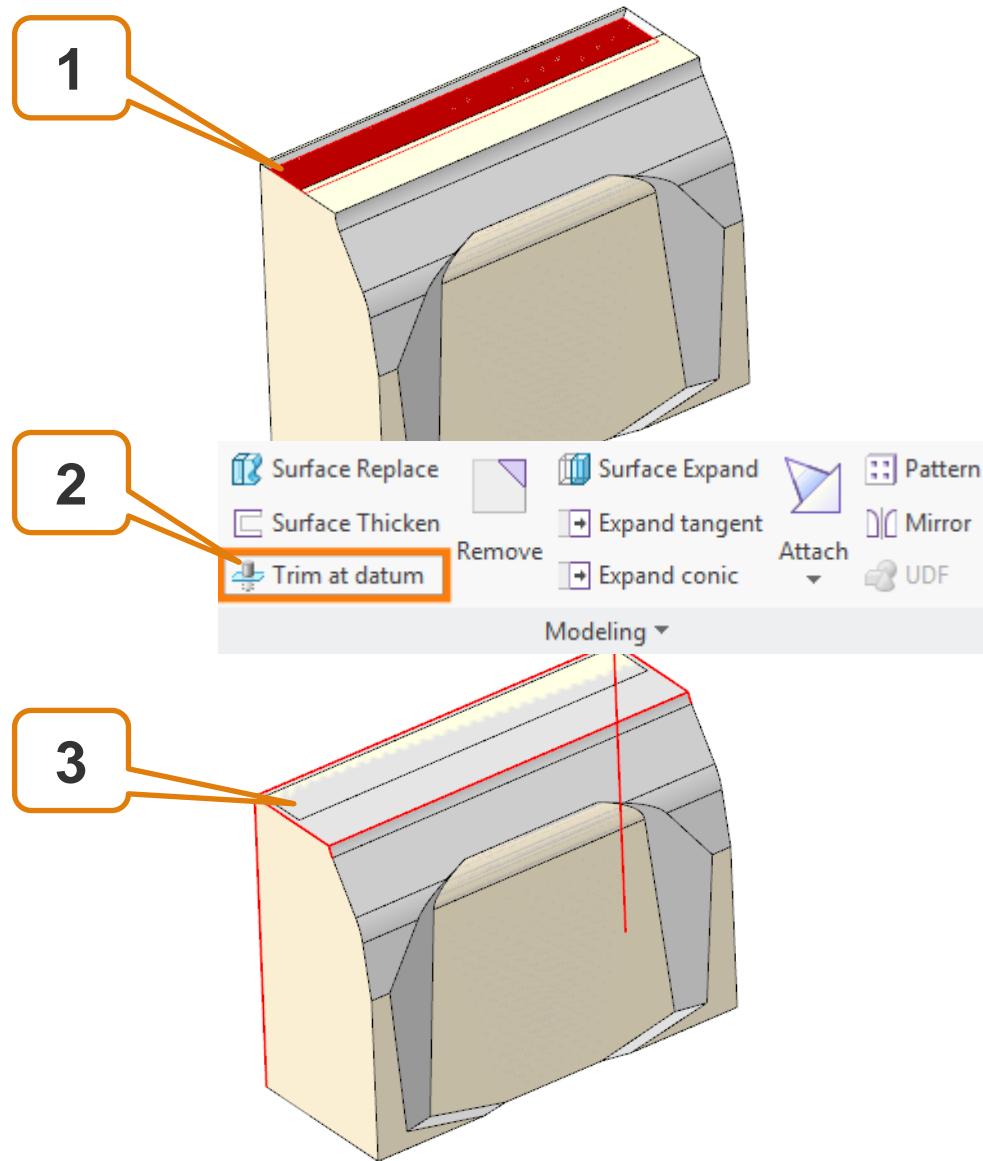
Electrode 1 – Get Data



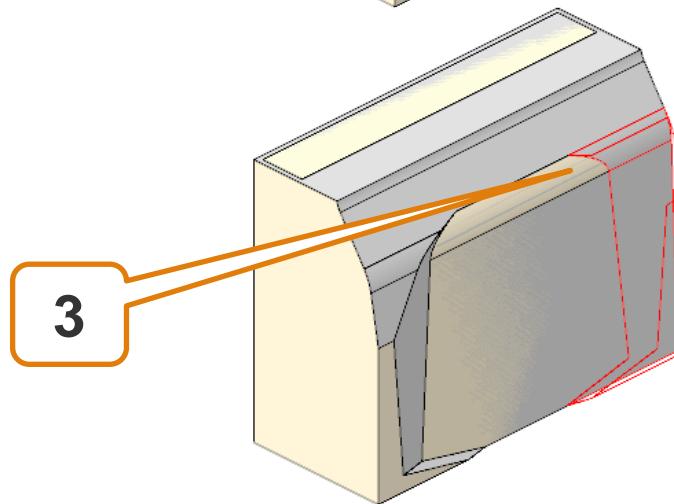
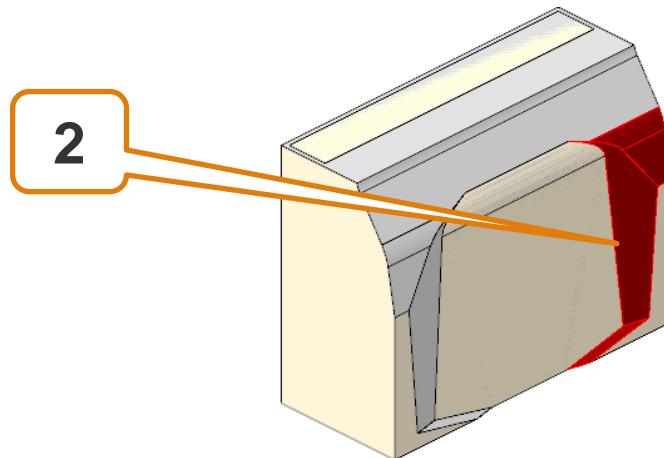
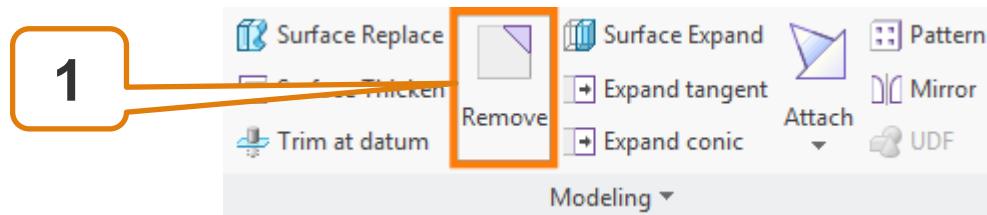
Electrode 1 – Set View



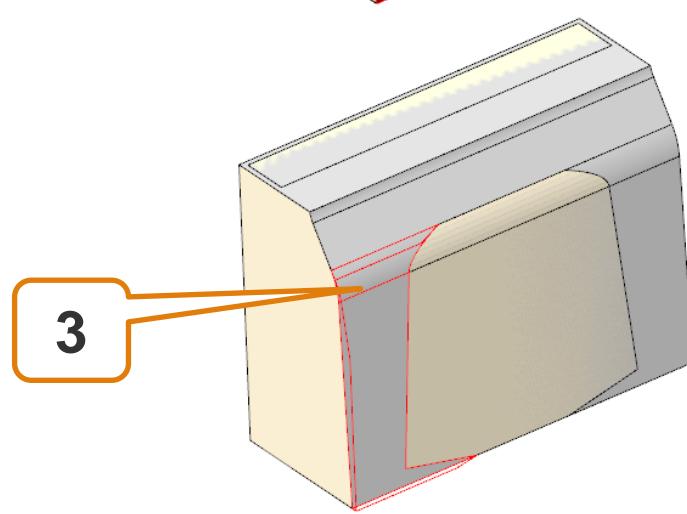
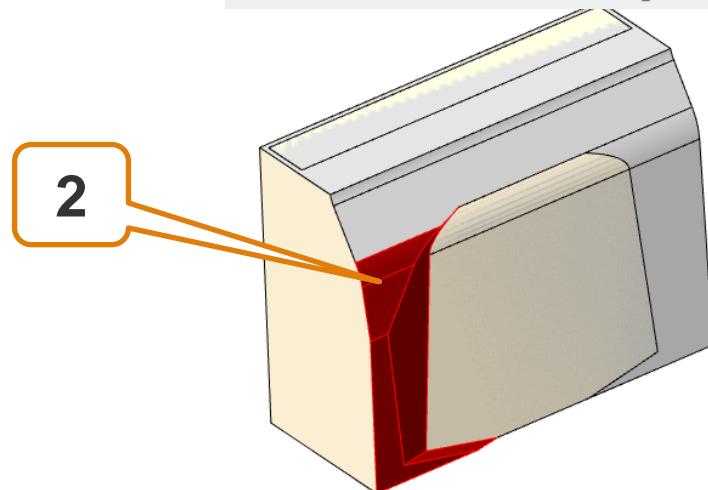
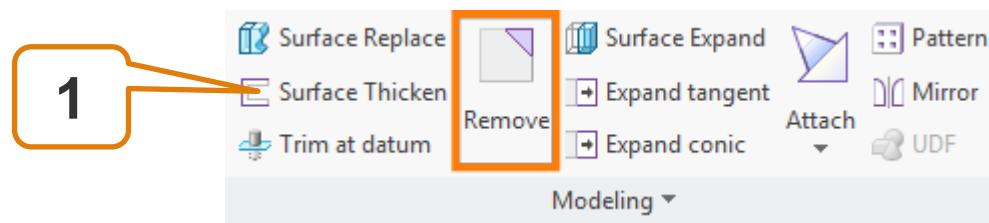
Electrode 1 – Detailing



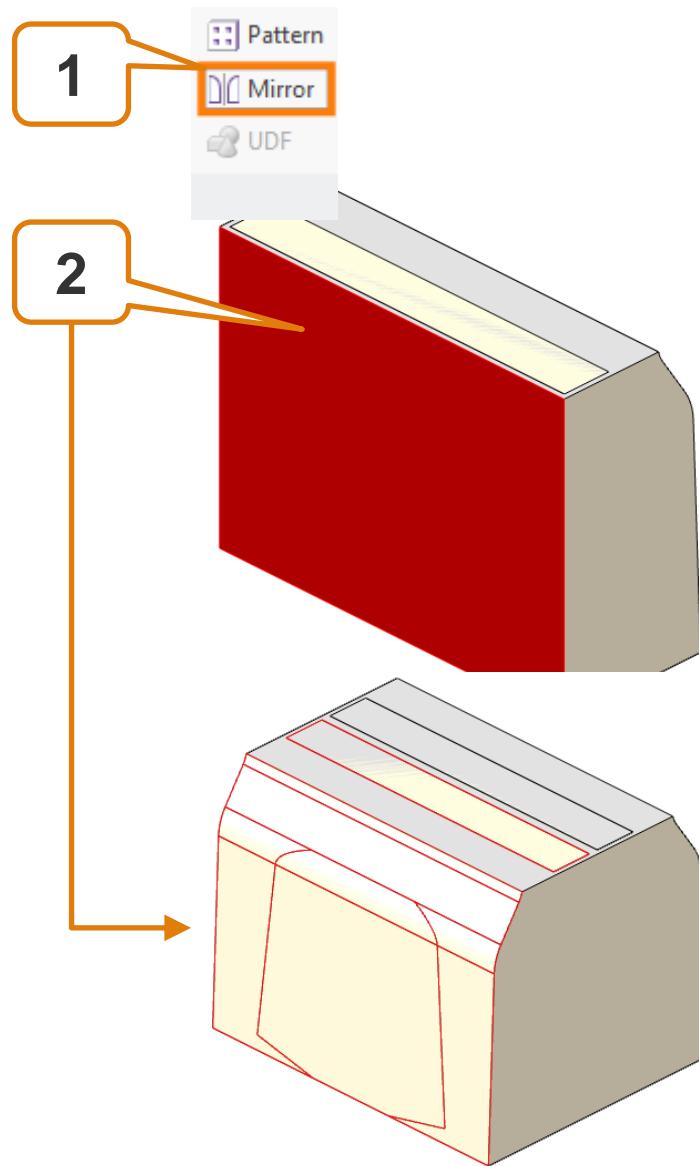
Electrode 1 – Detailing



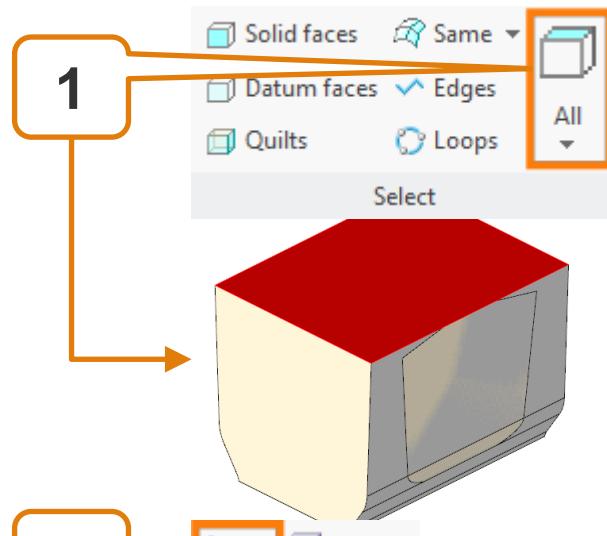
Electrode 1 – Detailing



Electrode 1 – Mirror



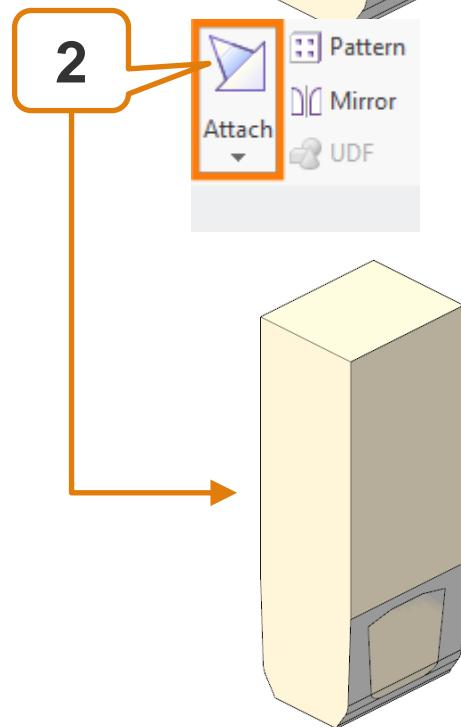
Electrode 1 – Attach



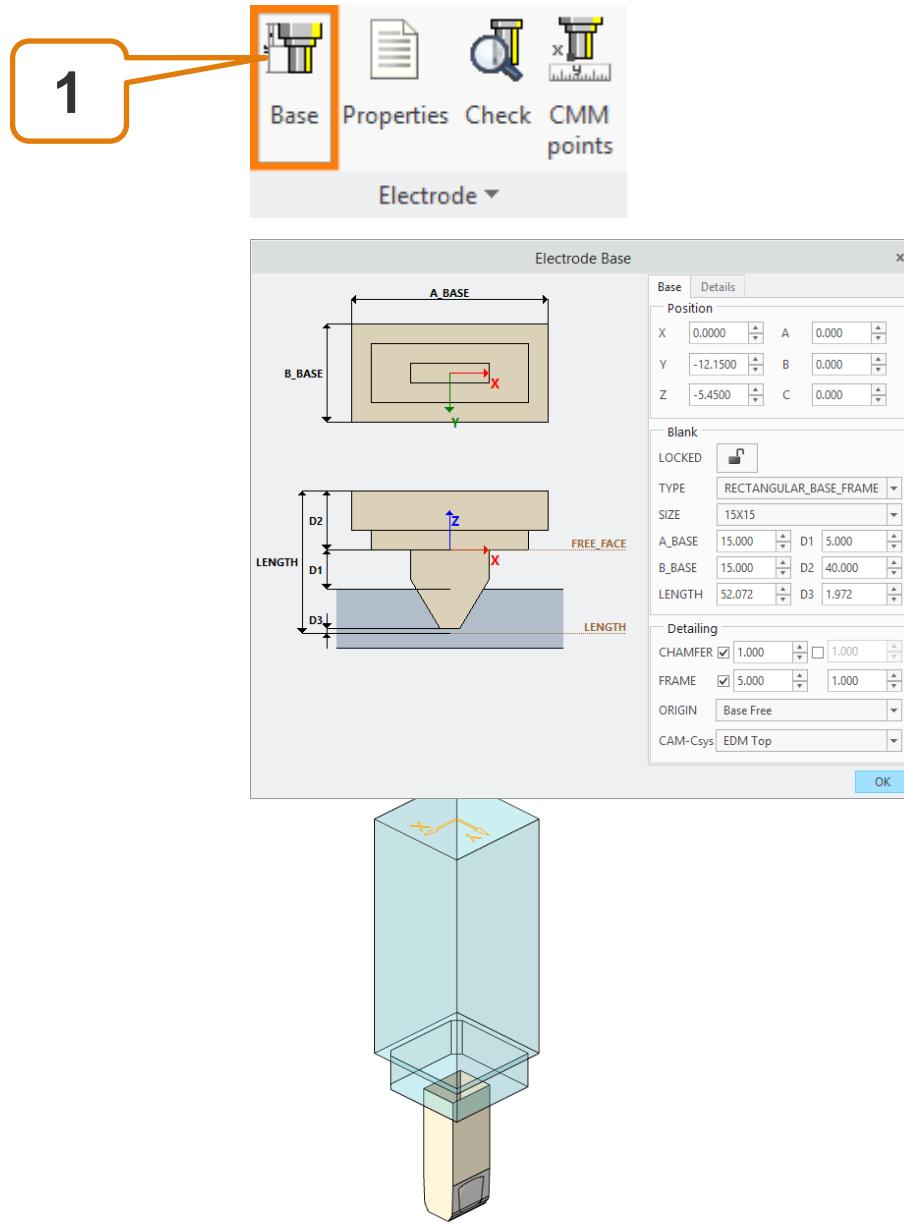
Attach to FREE_FACE

- (1) **Filter ,All Tops** ‘
 - Selects all faces that are **not** attached to FREE_FACE

- (2) **Command ,Attach**‘
 - Expands solid
 - Connects solid with FREE_FACE



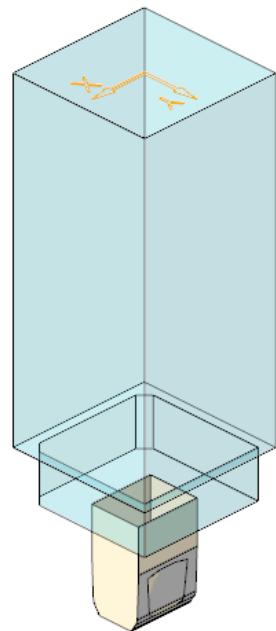
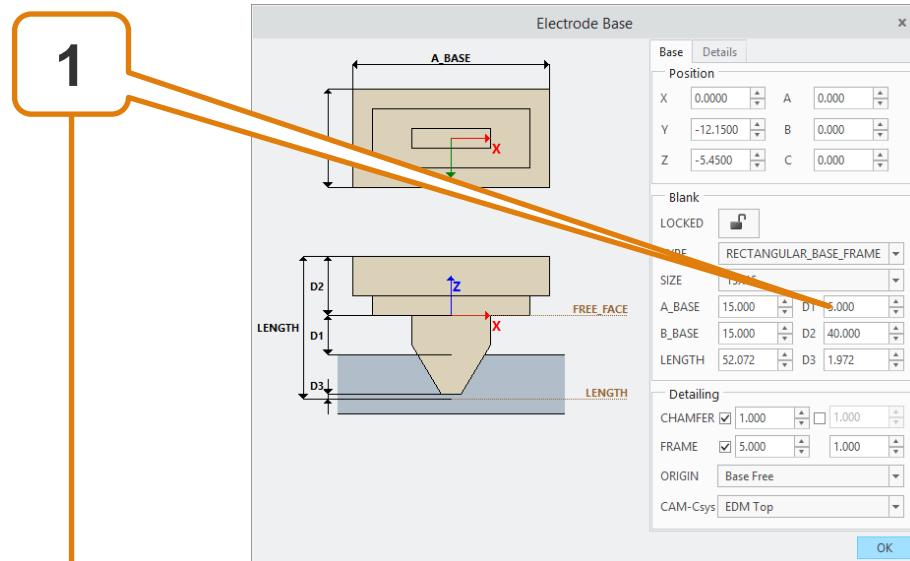
Electrode 1 - Add Base



- **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

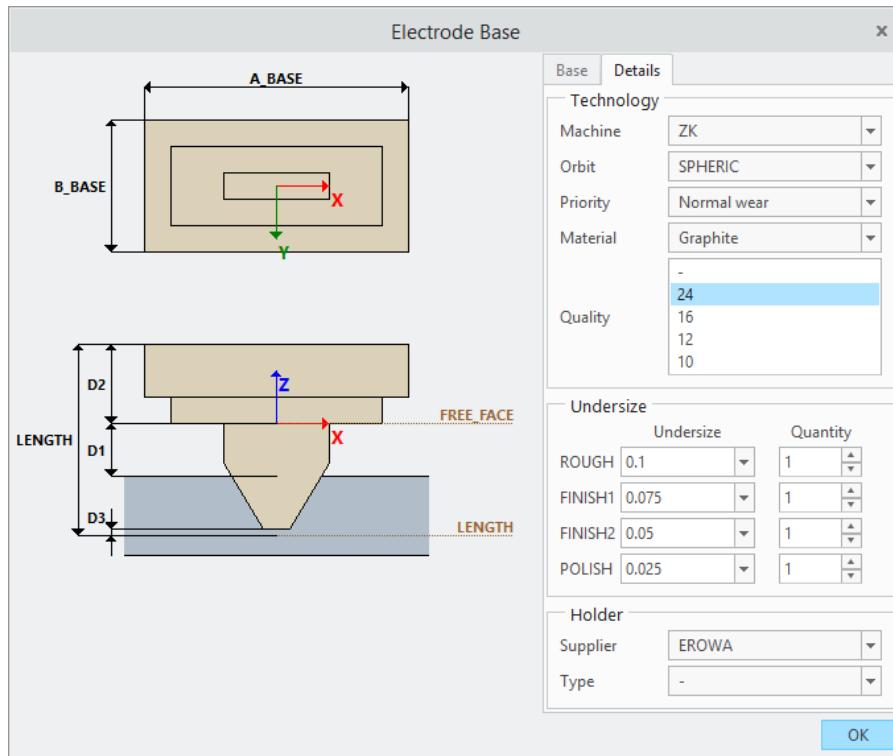
• Dimensions

- 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

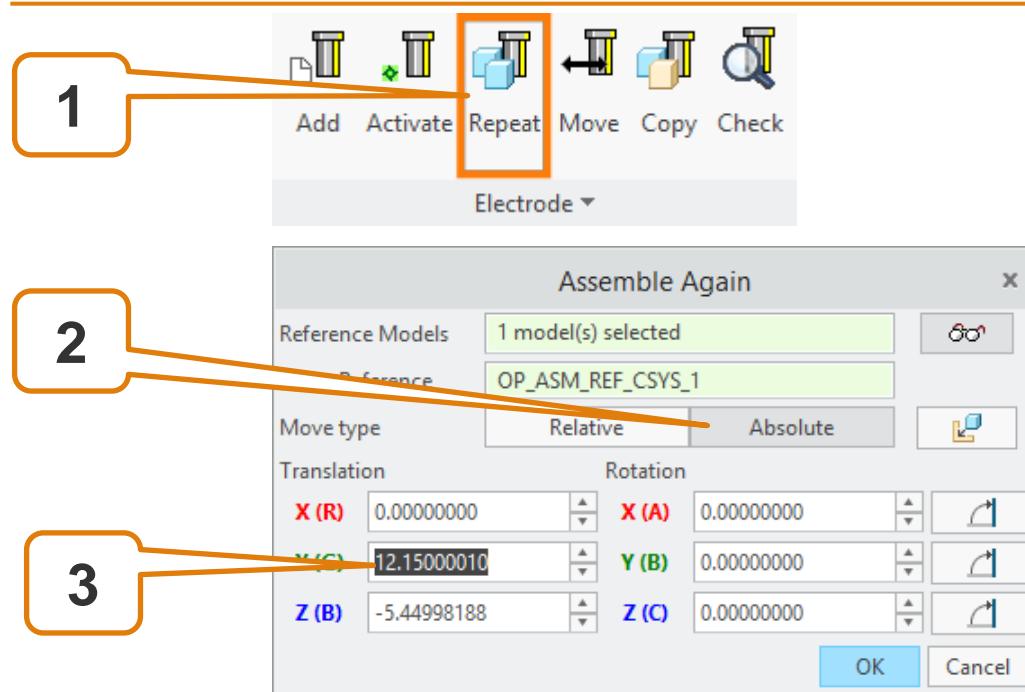


Technology data on 2nd page

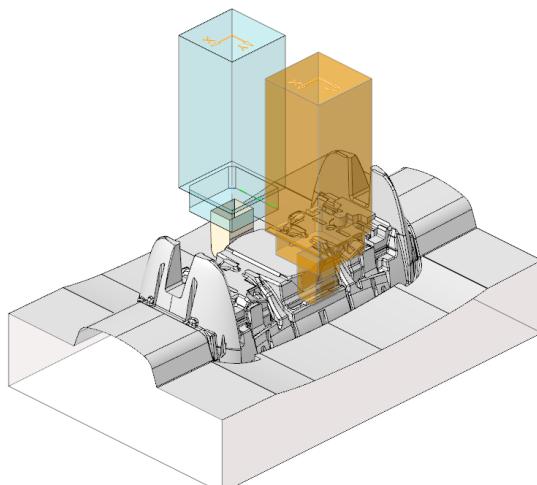
- Control
- Orbit
- Undersize/burngap
- Holder

- Close with *OK*
- Press *Strg+A* to activate 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

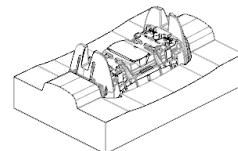
User Interface

Assembly Mode

Part Mode

Training

Assembly Creation

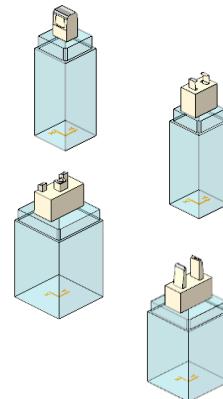


Preparation

Set Zero

Electrode 1

Electrode 2

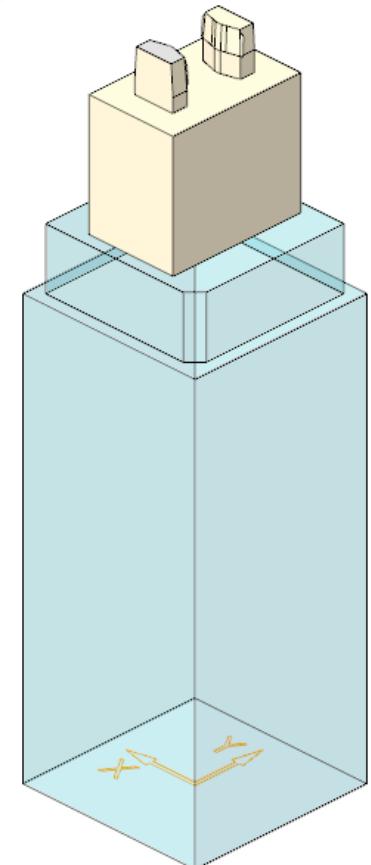


Electrode 3

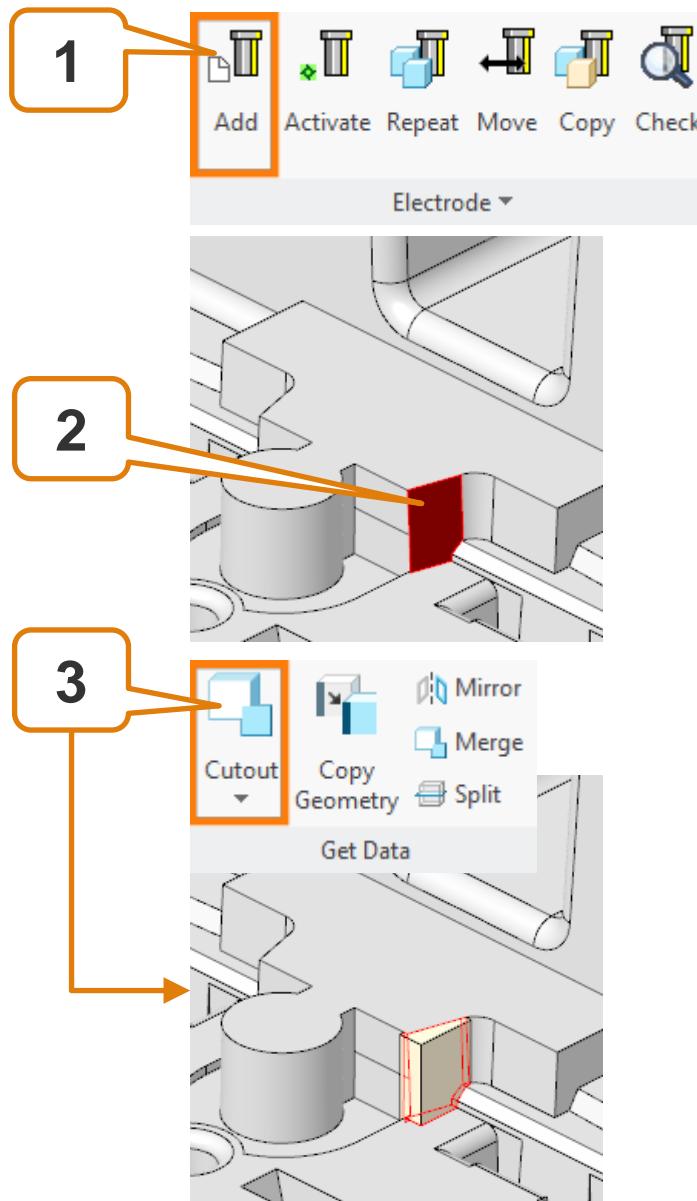
Electrode 4

Topics...

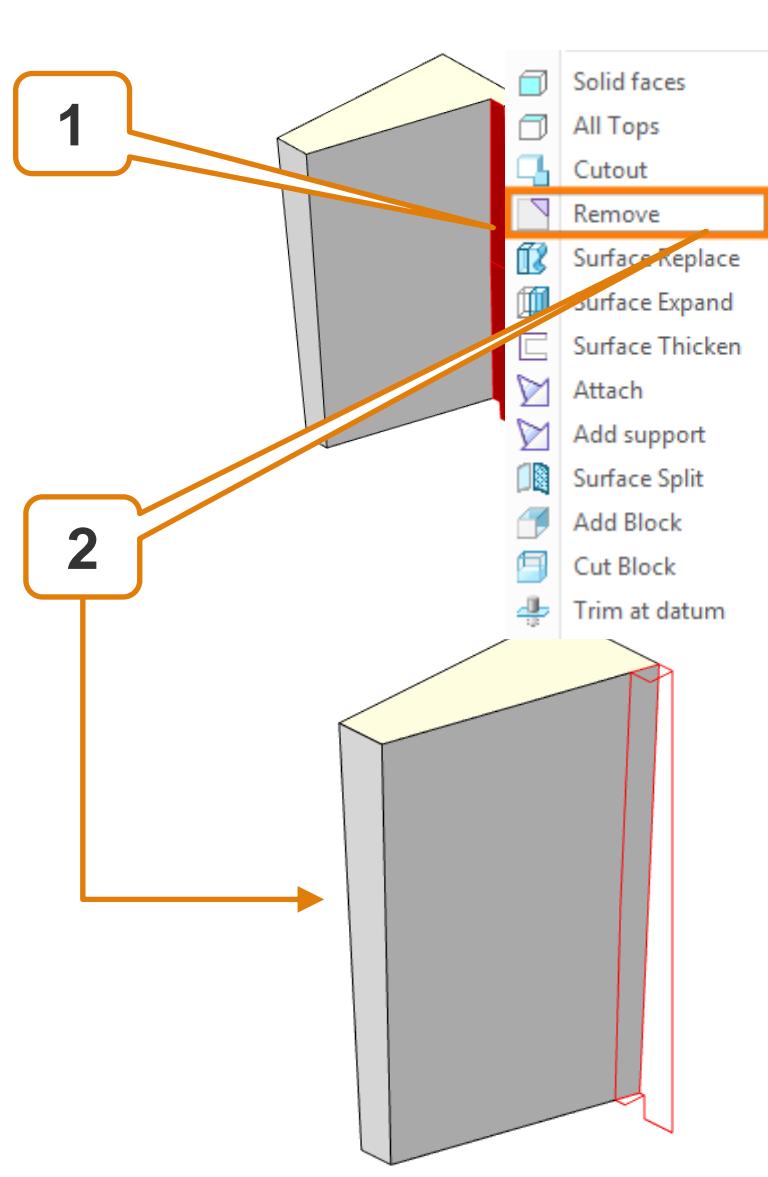
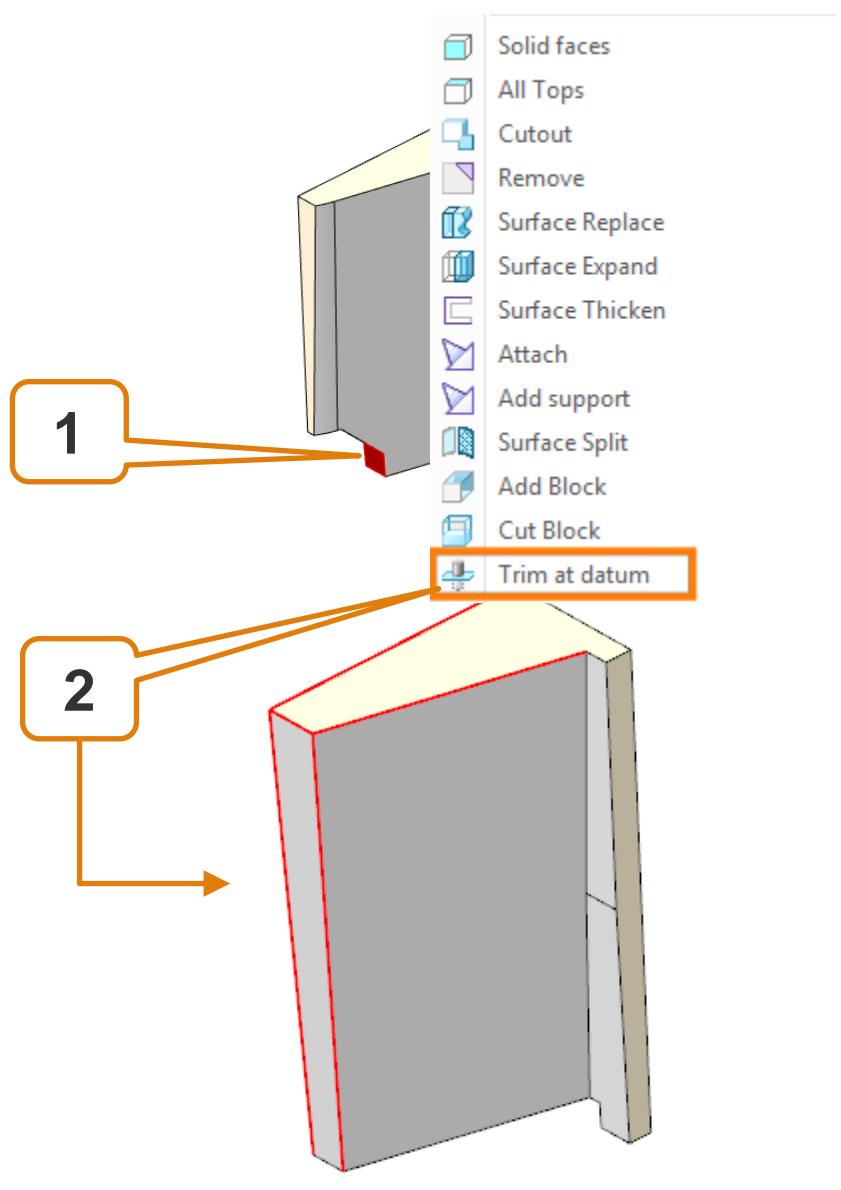
- **Usage of context menu**
(right mouse button)



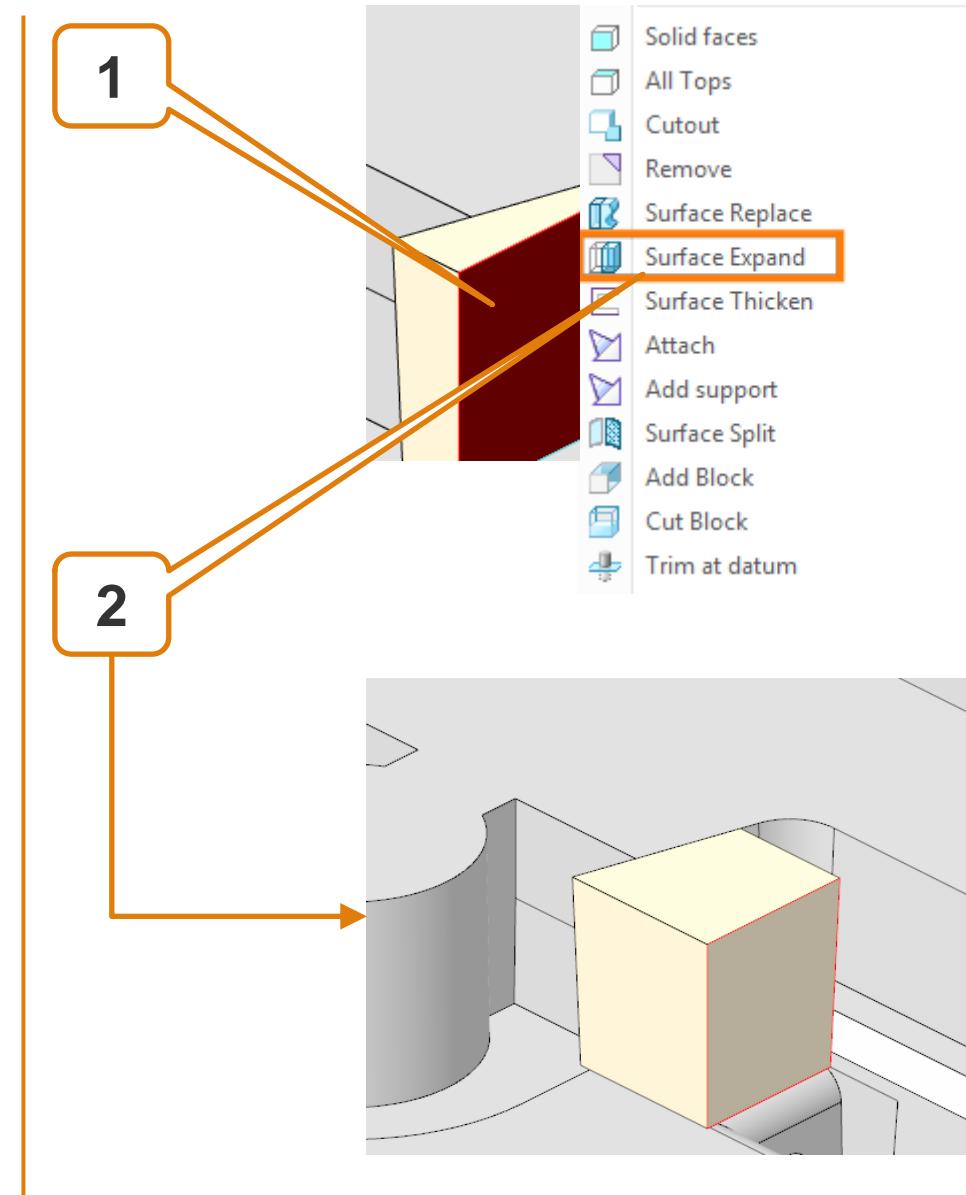
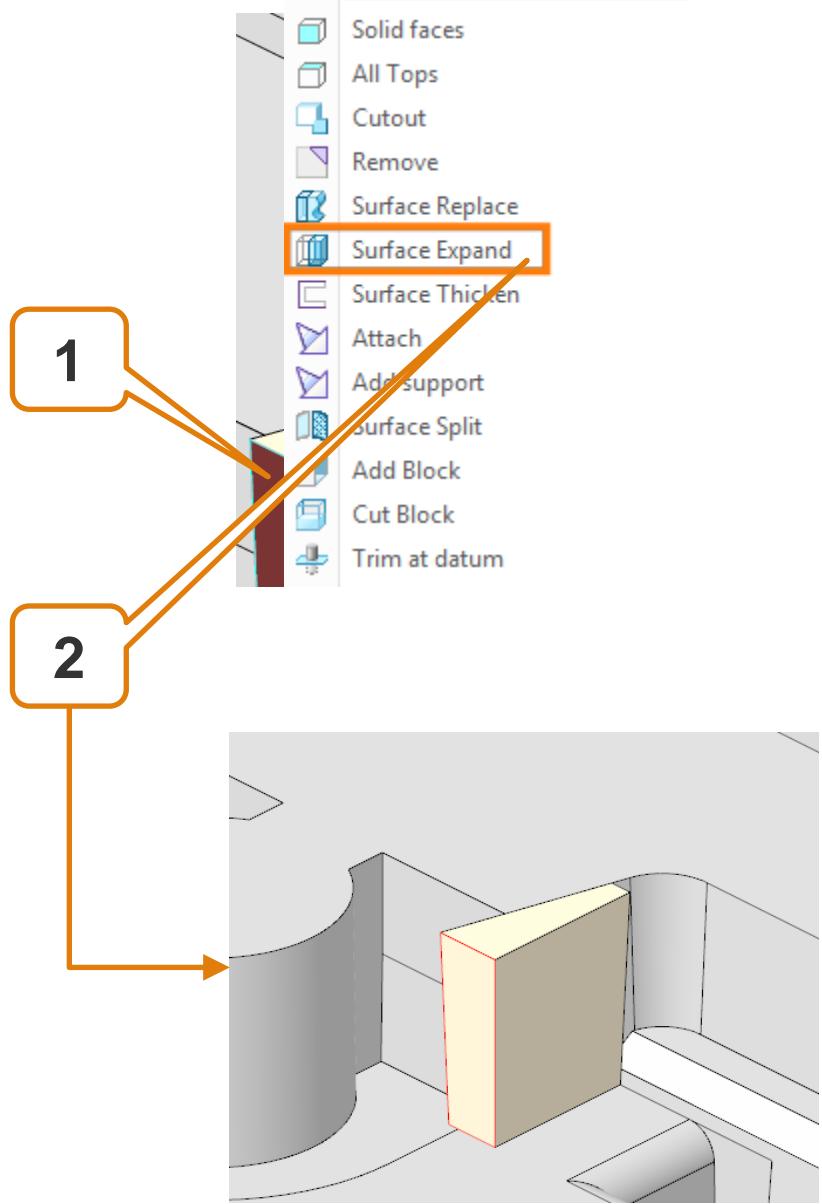
Electrode 2 – Get Data



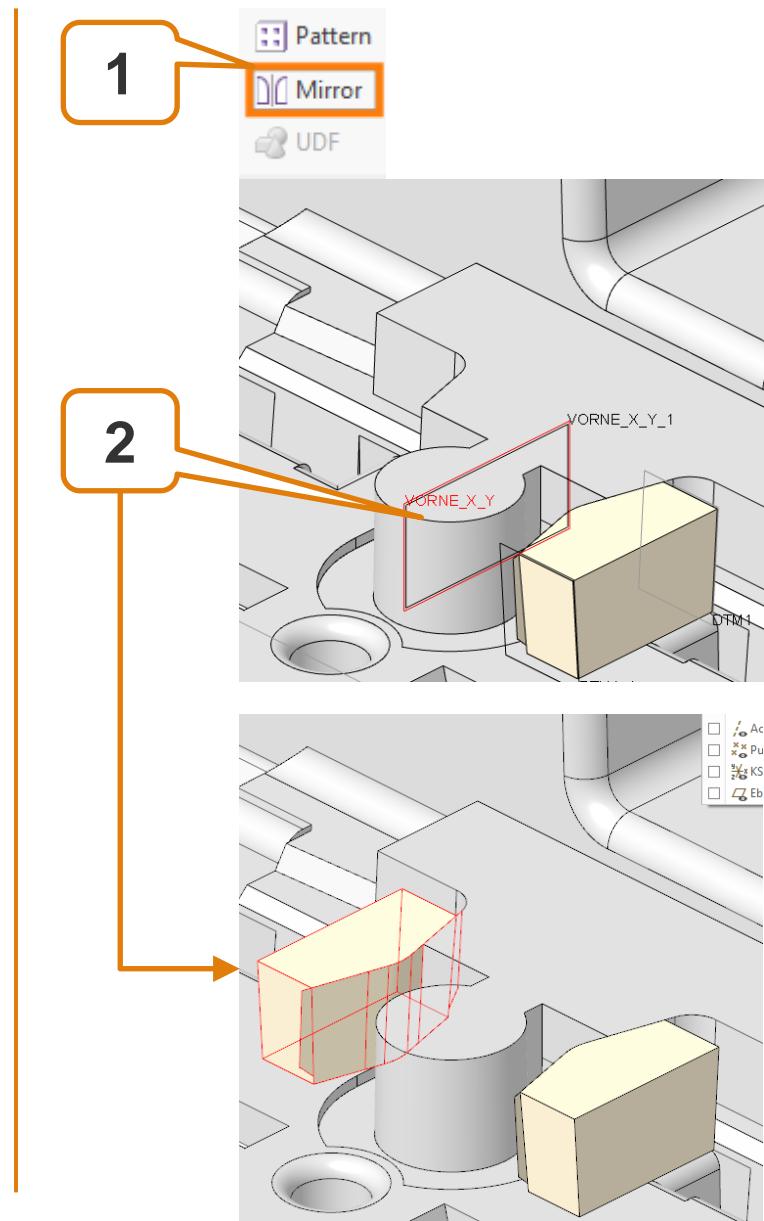
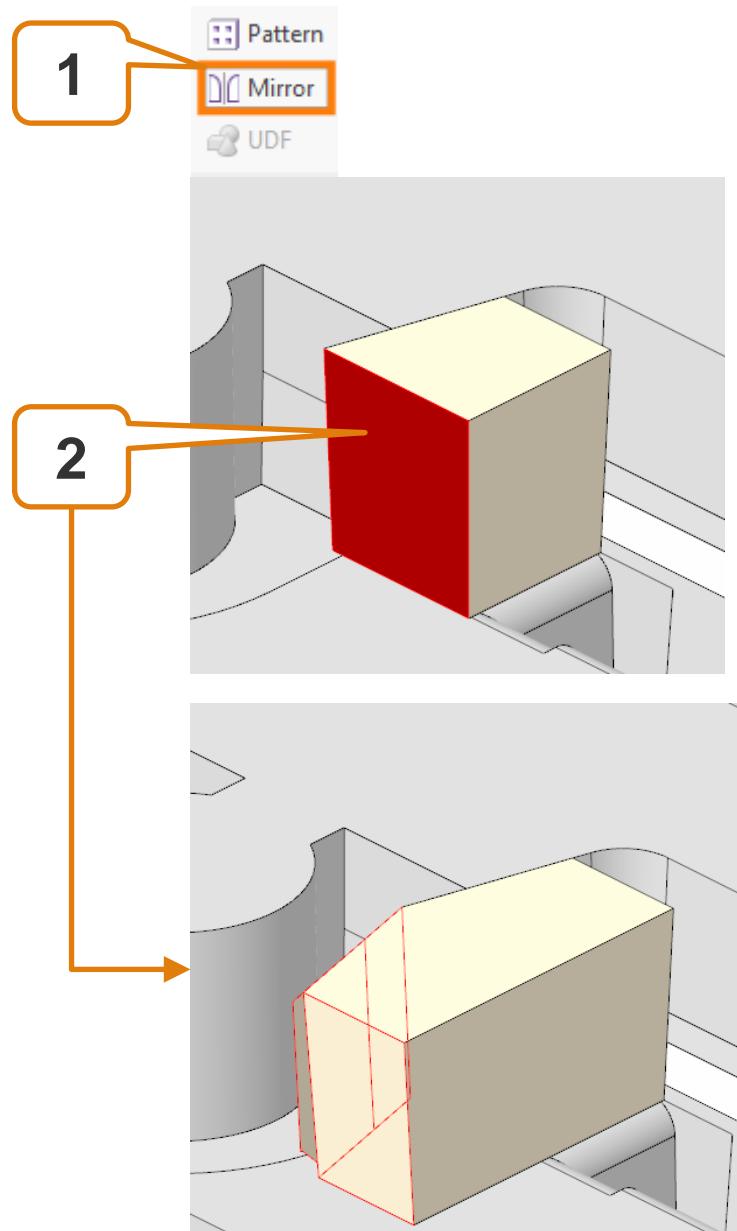
Electrode 2 – Detailing



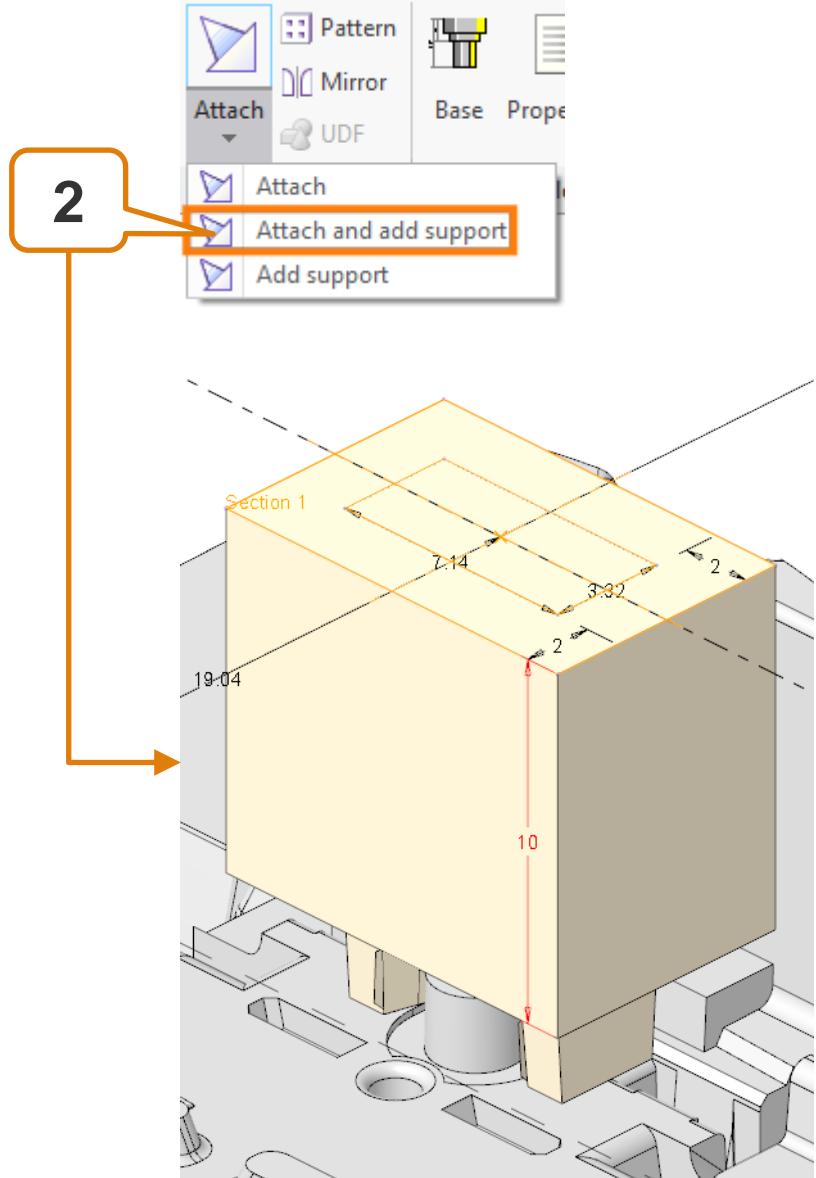
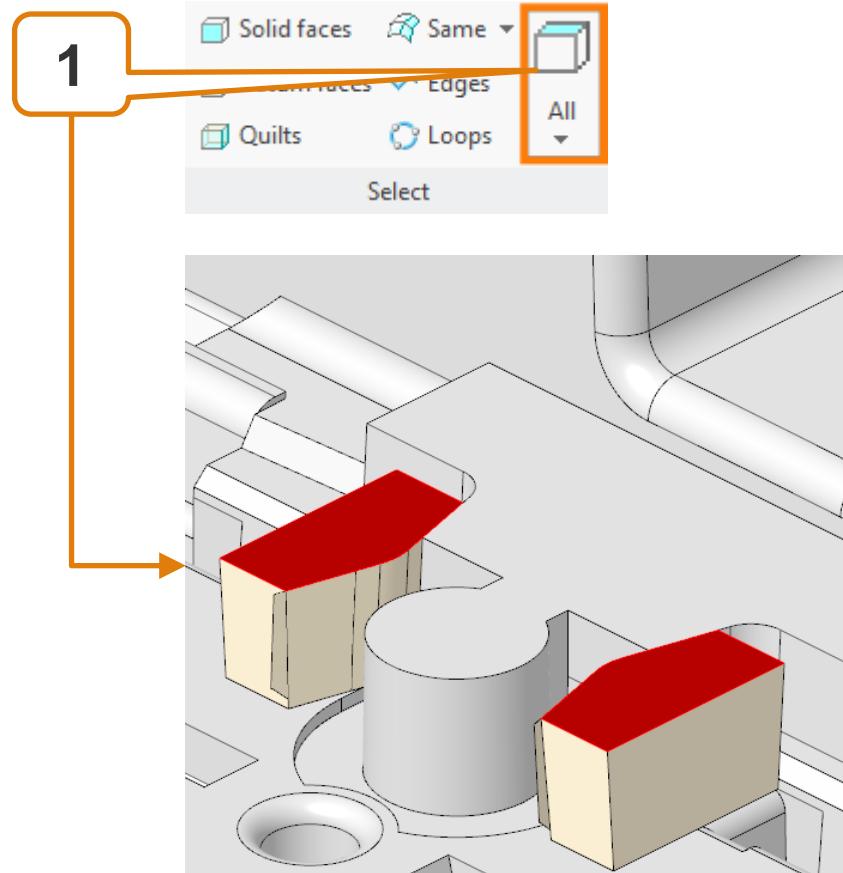
Electrode 2 – Detailing



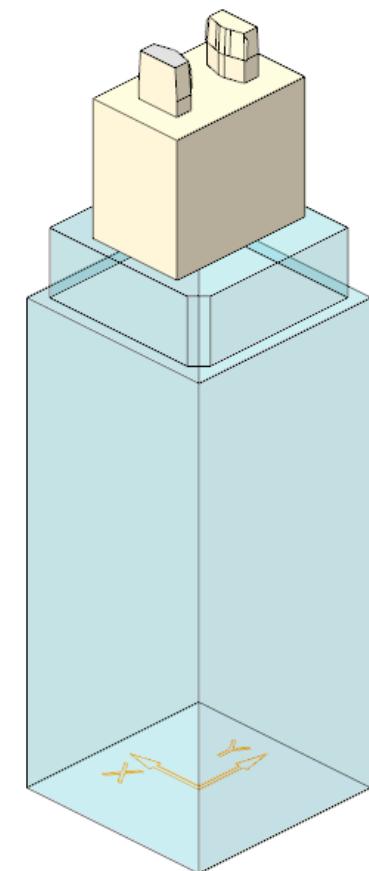
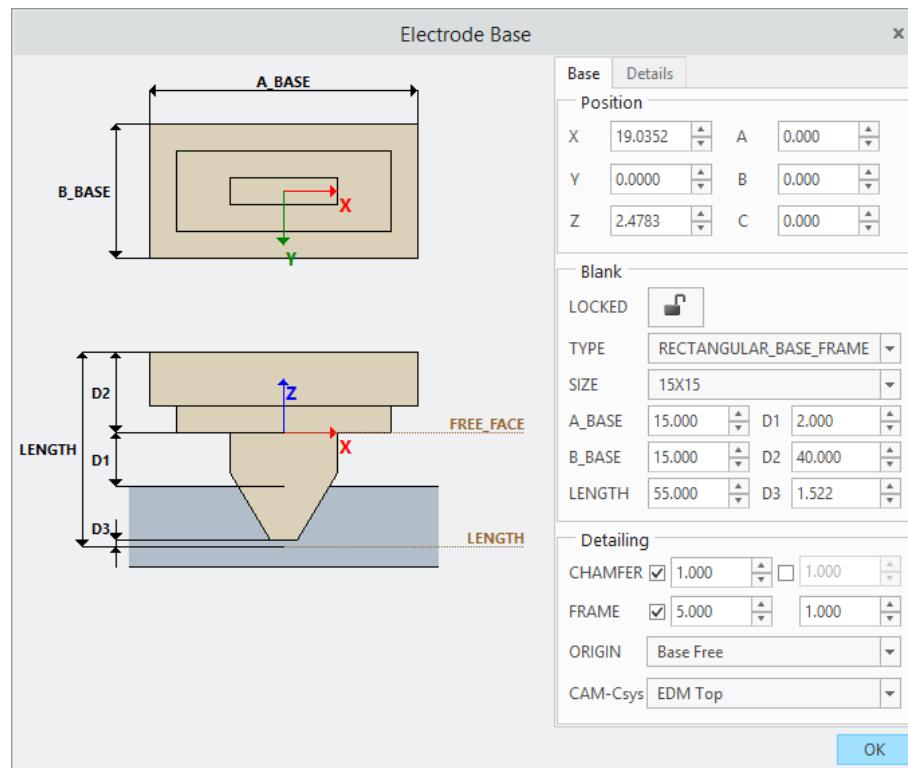
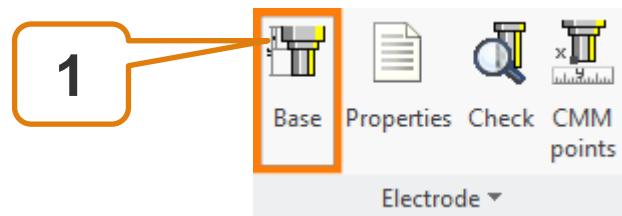
Electrode 2 – Detailing



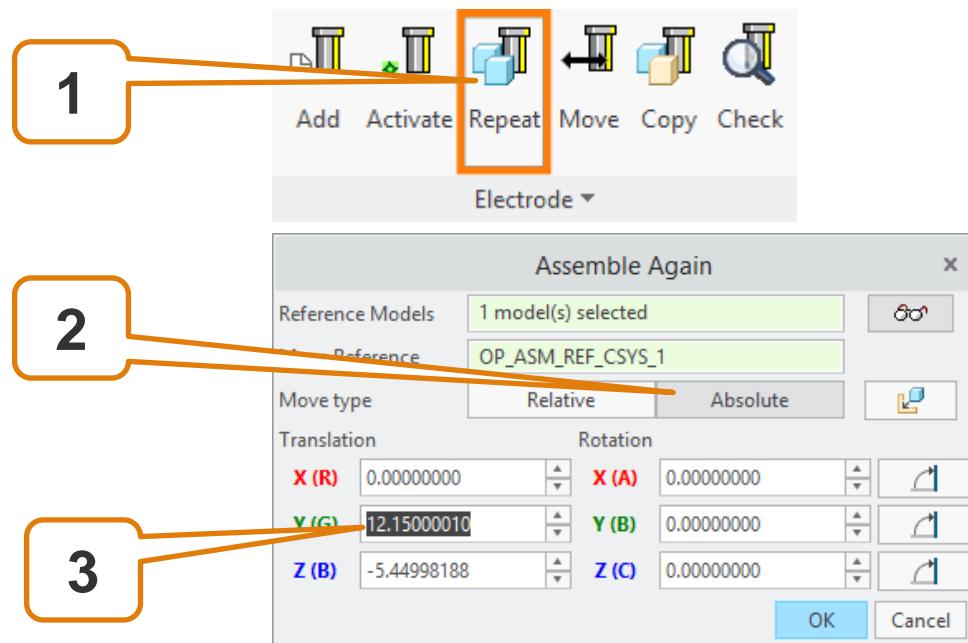
Electrode 2 – Attach



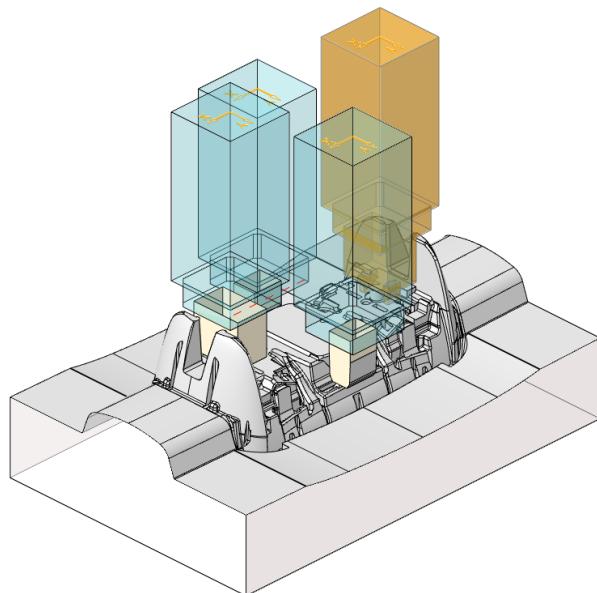
Electrode 2 – Add Base



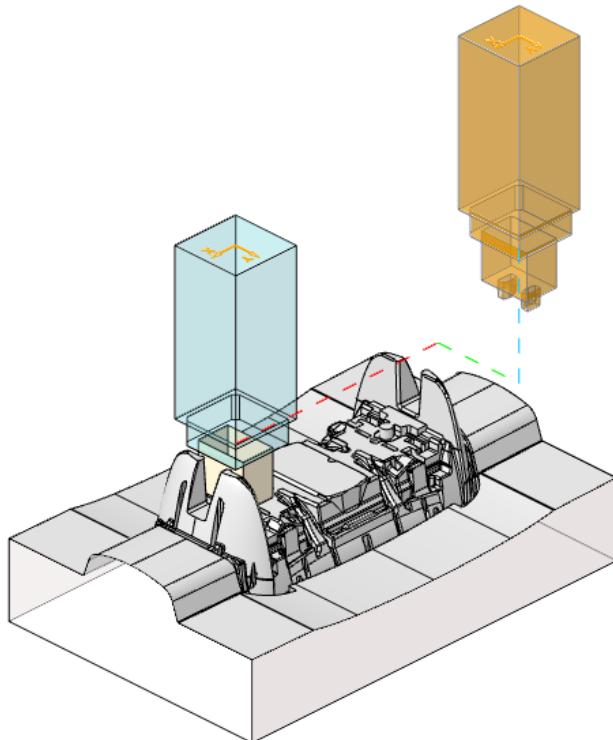
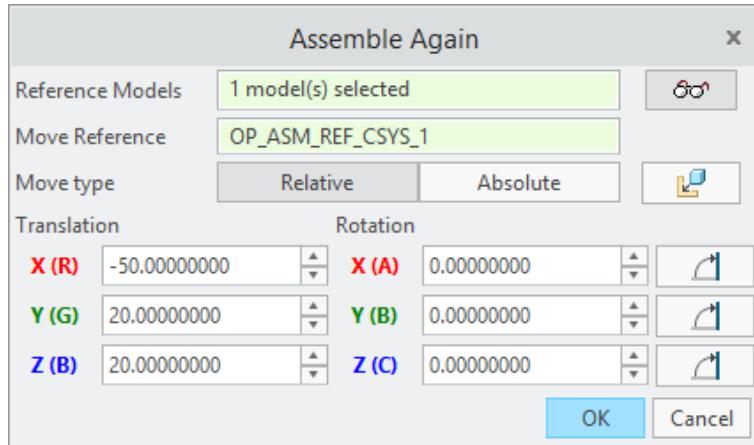
Electrode 2 – Assemble Again



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



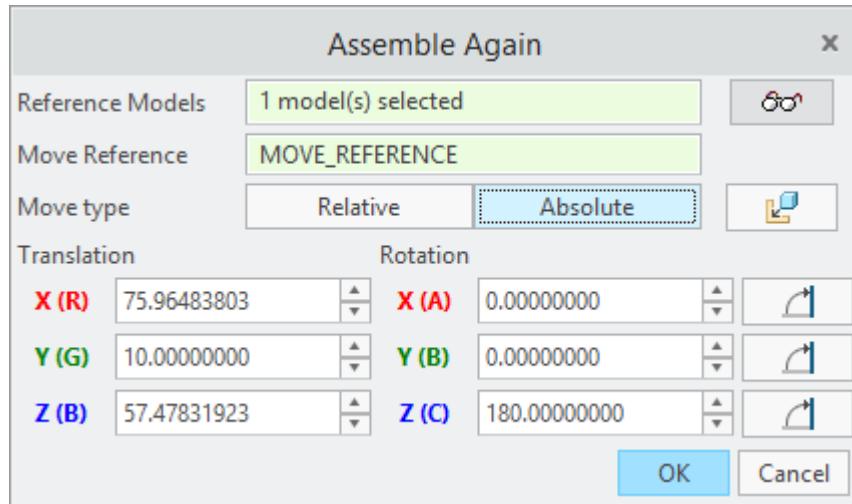
Description - Assemble Again



Relative Movement

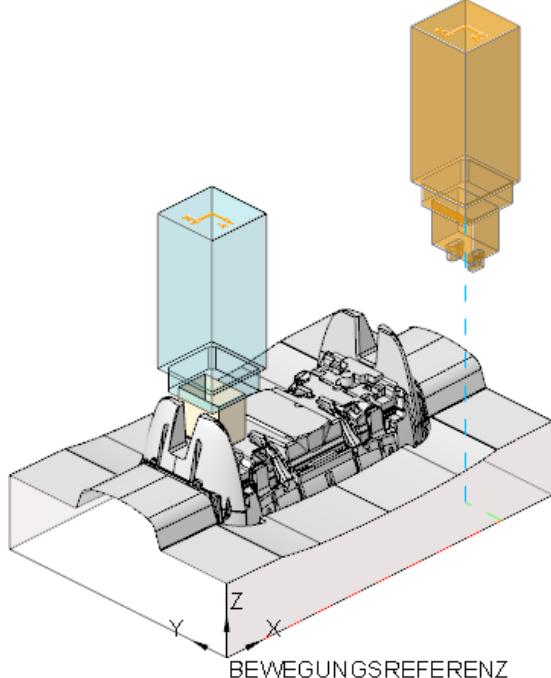
Movement regarding current position of the Electrode

Description - Assemble Again

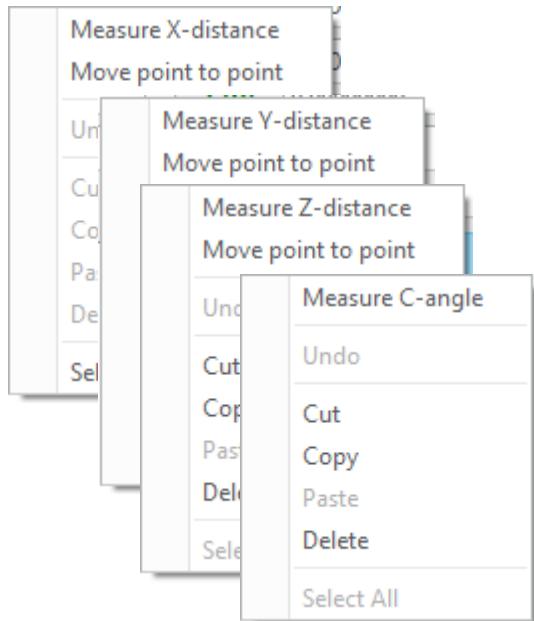


Absolute Movement

- **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

Workflow

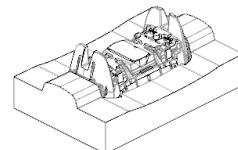
User Interface

Assembly Mode

Part Mode

Training

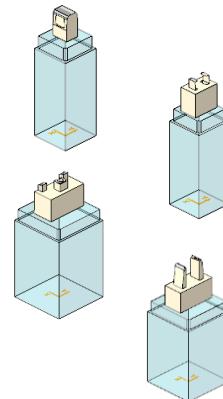
Assembly Creation



Preparation

Set Zero

Electrode 1



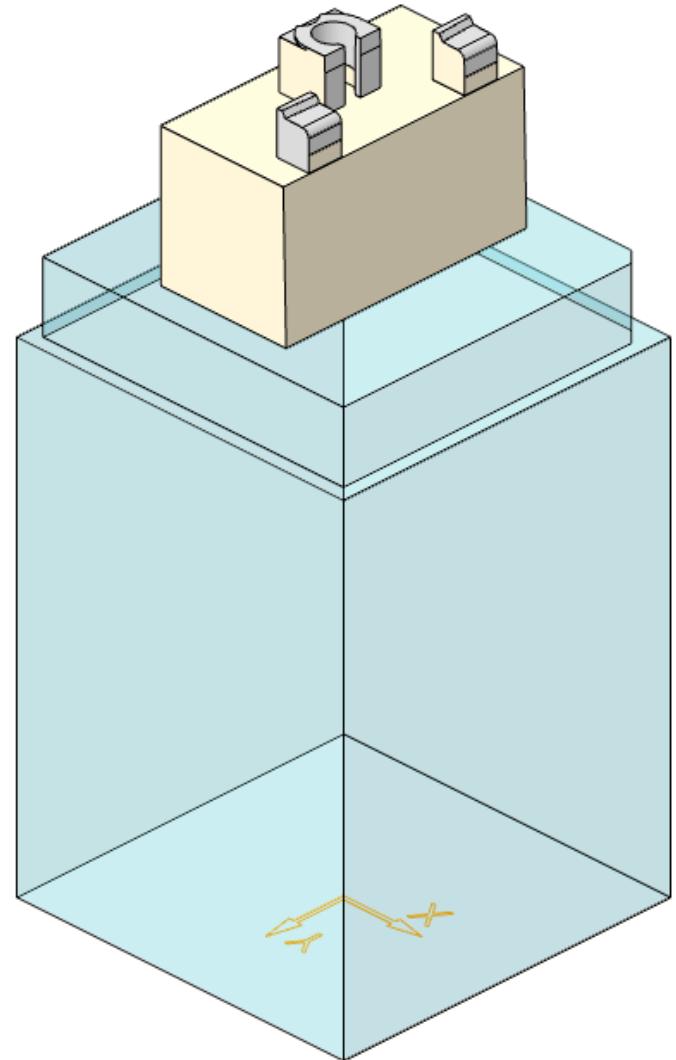
Electrode 2

Electrode 3

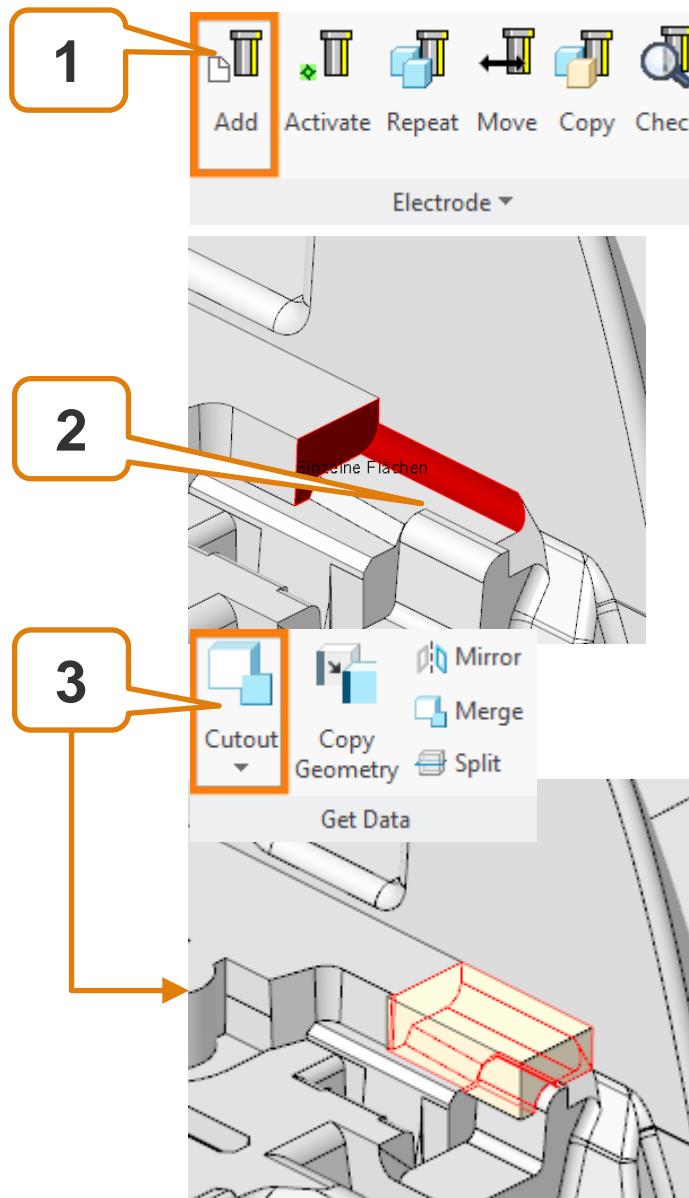
Electrode 4

Topics...

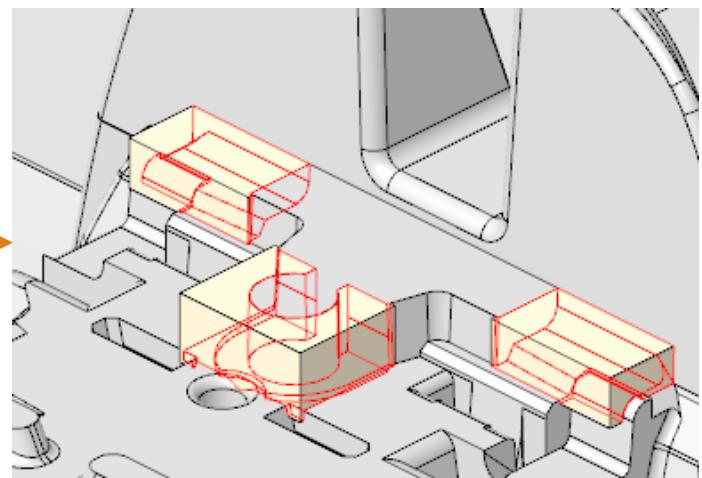
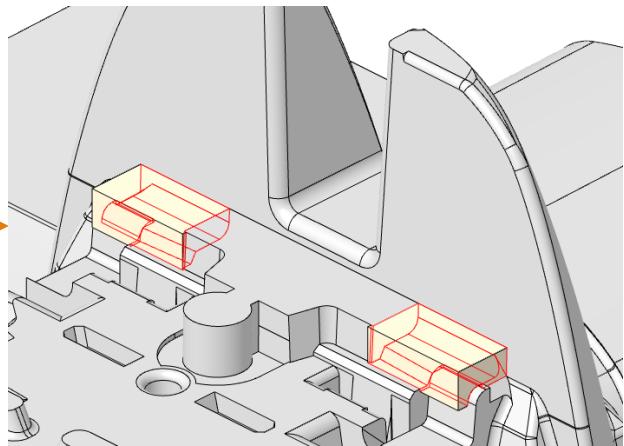
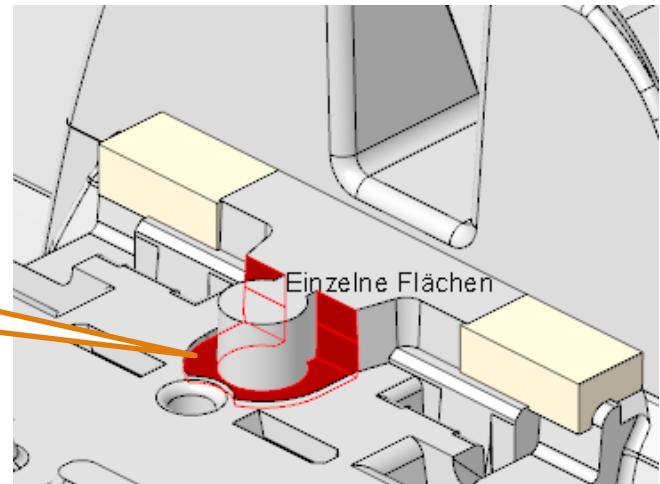
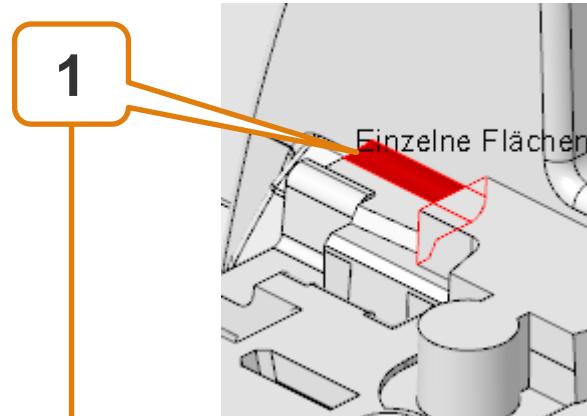
- Several cutous
- Replace with external reference



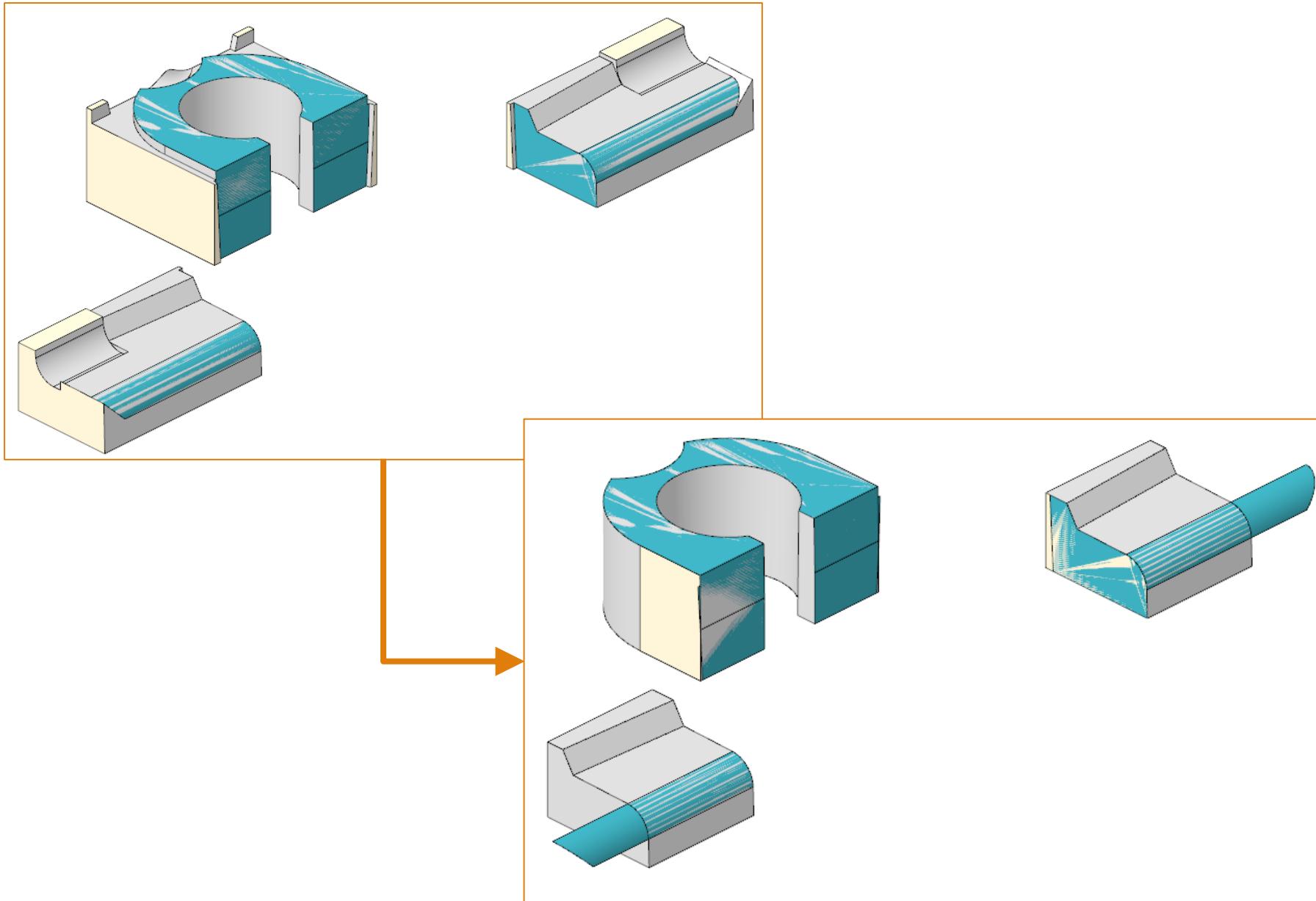
Electrode 3 – Get Data



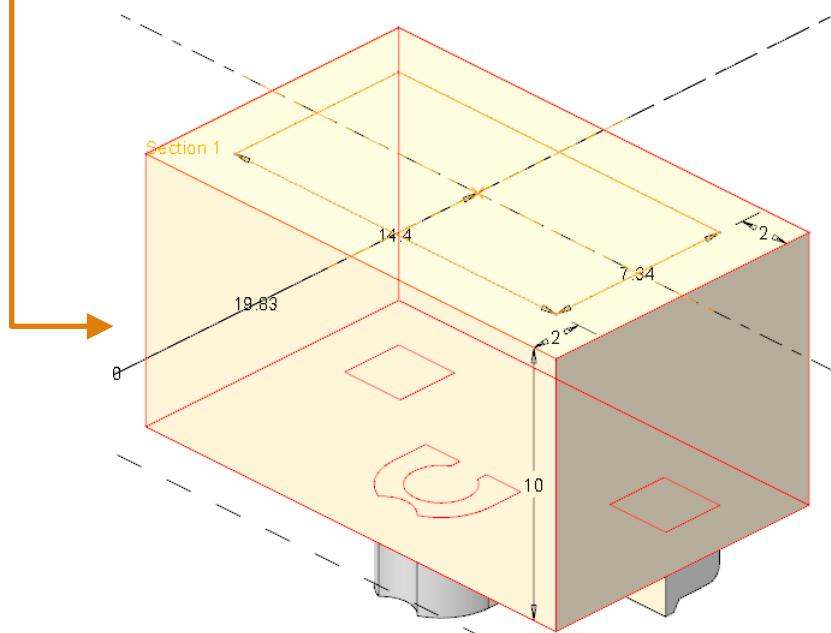
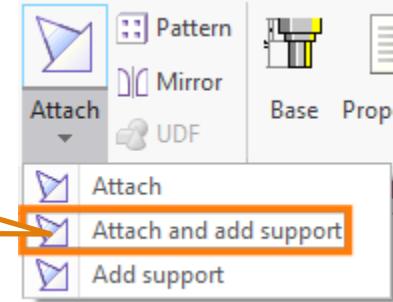
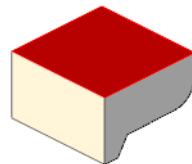
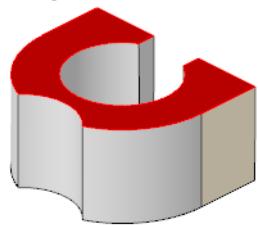
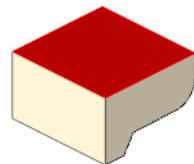
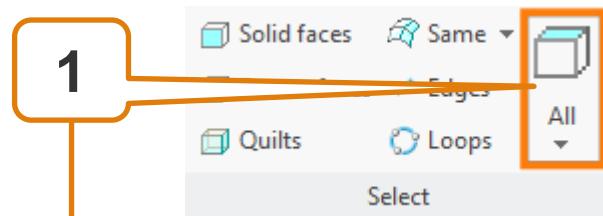
Electrode 3 – Get Data



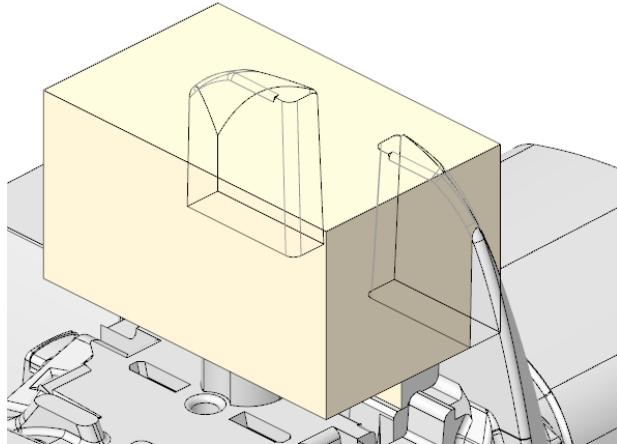
Electrode 3 – Detailing



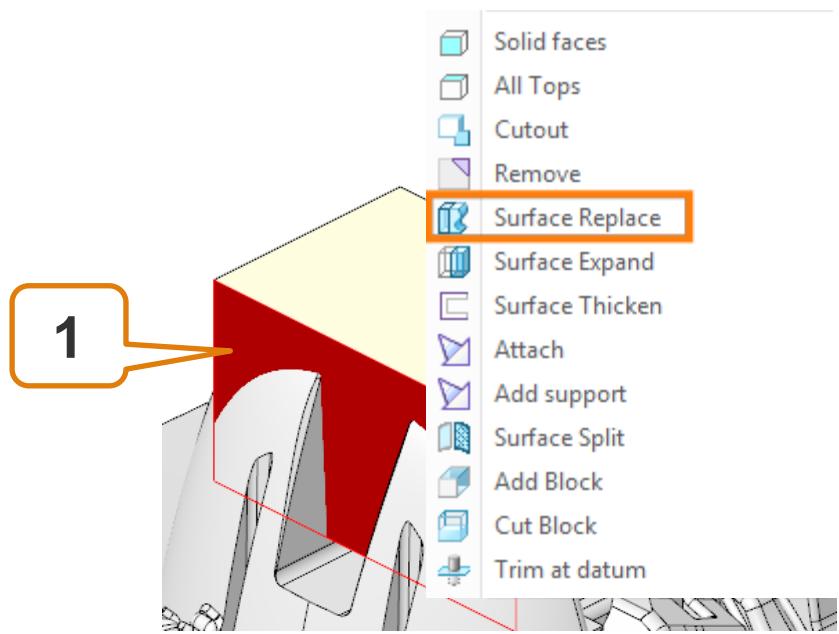
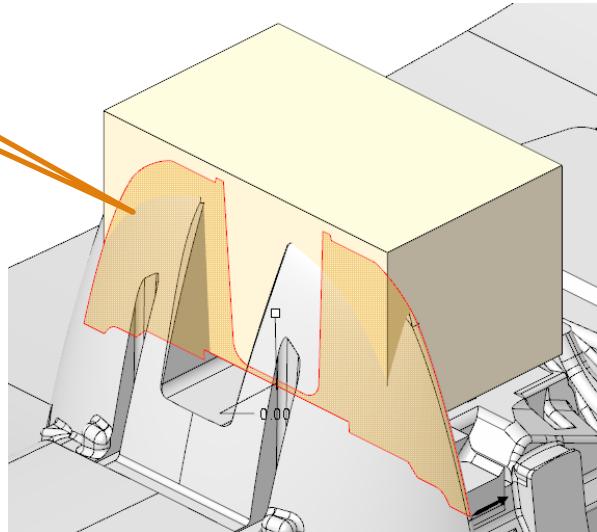
Electrode 3 – Attach with support



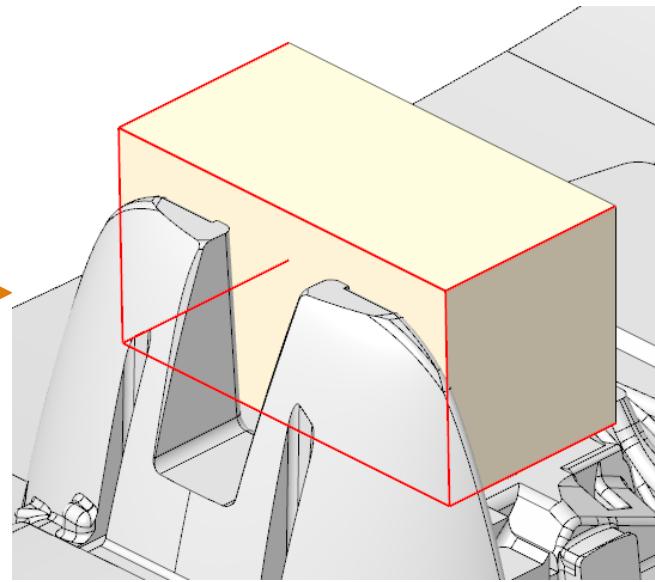
Electrode 3 – Ersetzen an externer Referenz



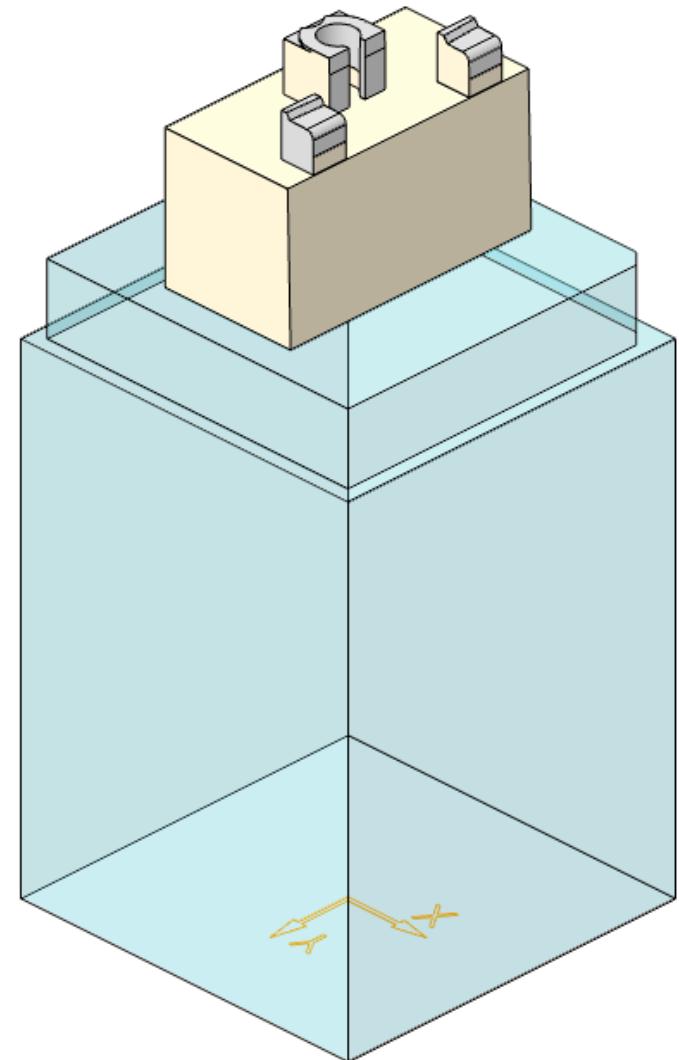
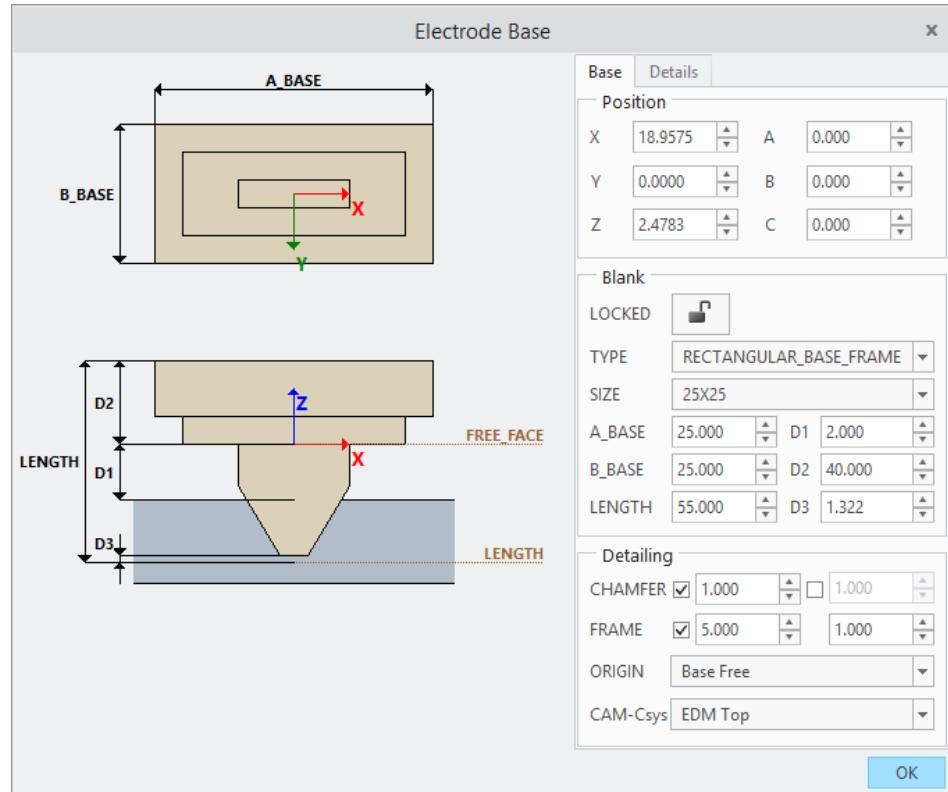
2



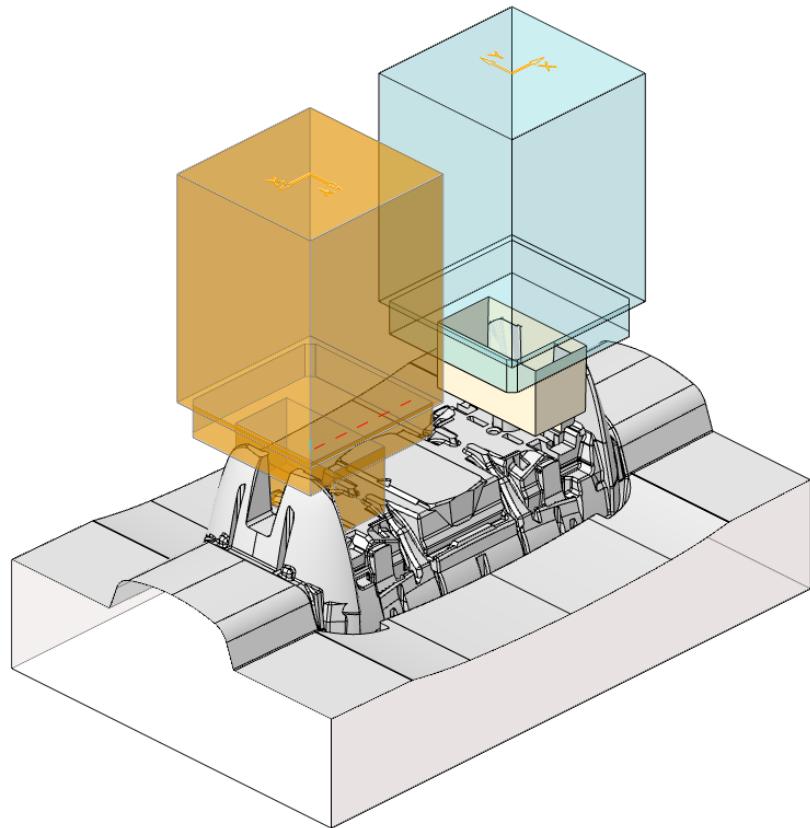
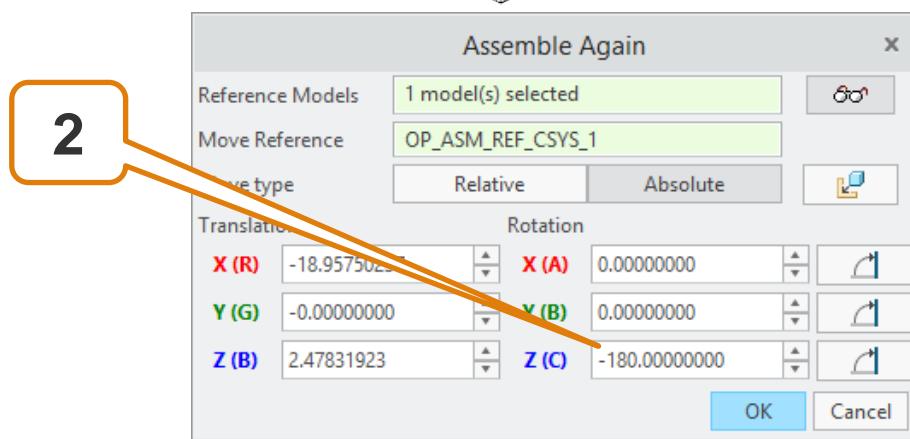
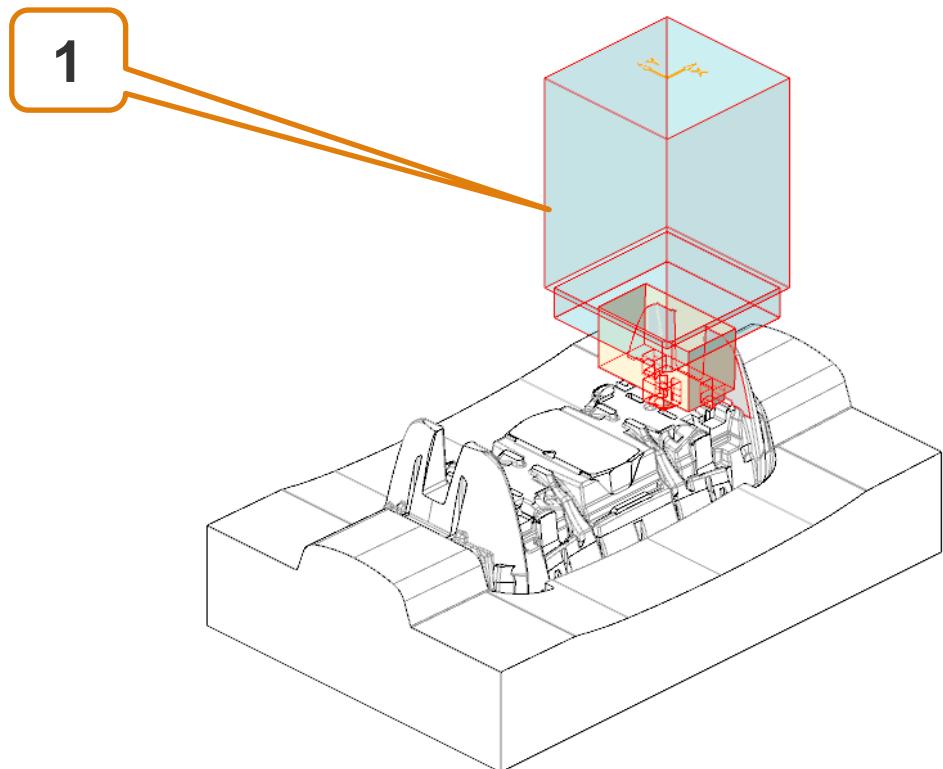
1



Electrode 3 – Finish



Electrode 3 – Assemble Again



Agenda

Comparison and compatibility with SE 7.0

Workflow

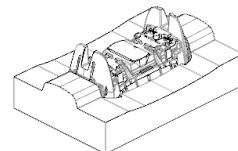
User Interface

Assembly Mode

Part Mode

Training

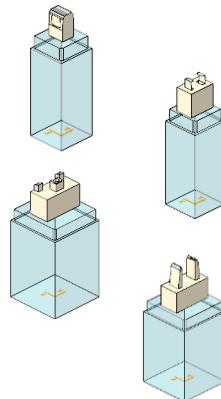
Assembly Creation



Preparation

Set Zero

Electrode 1



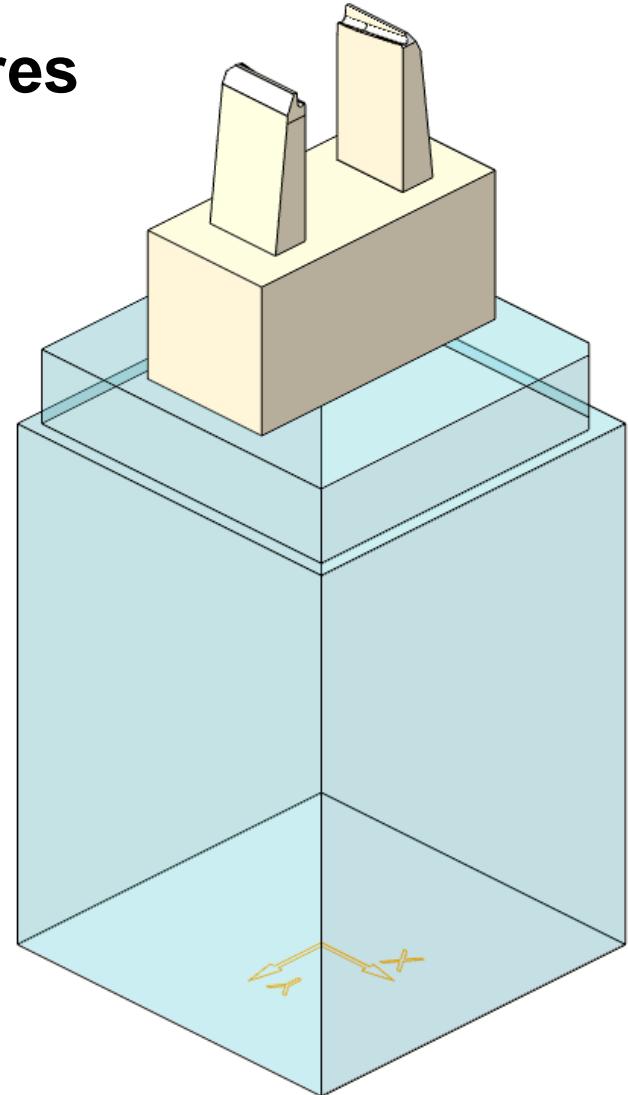
Electrode 2

Electrode 3

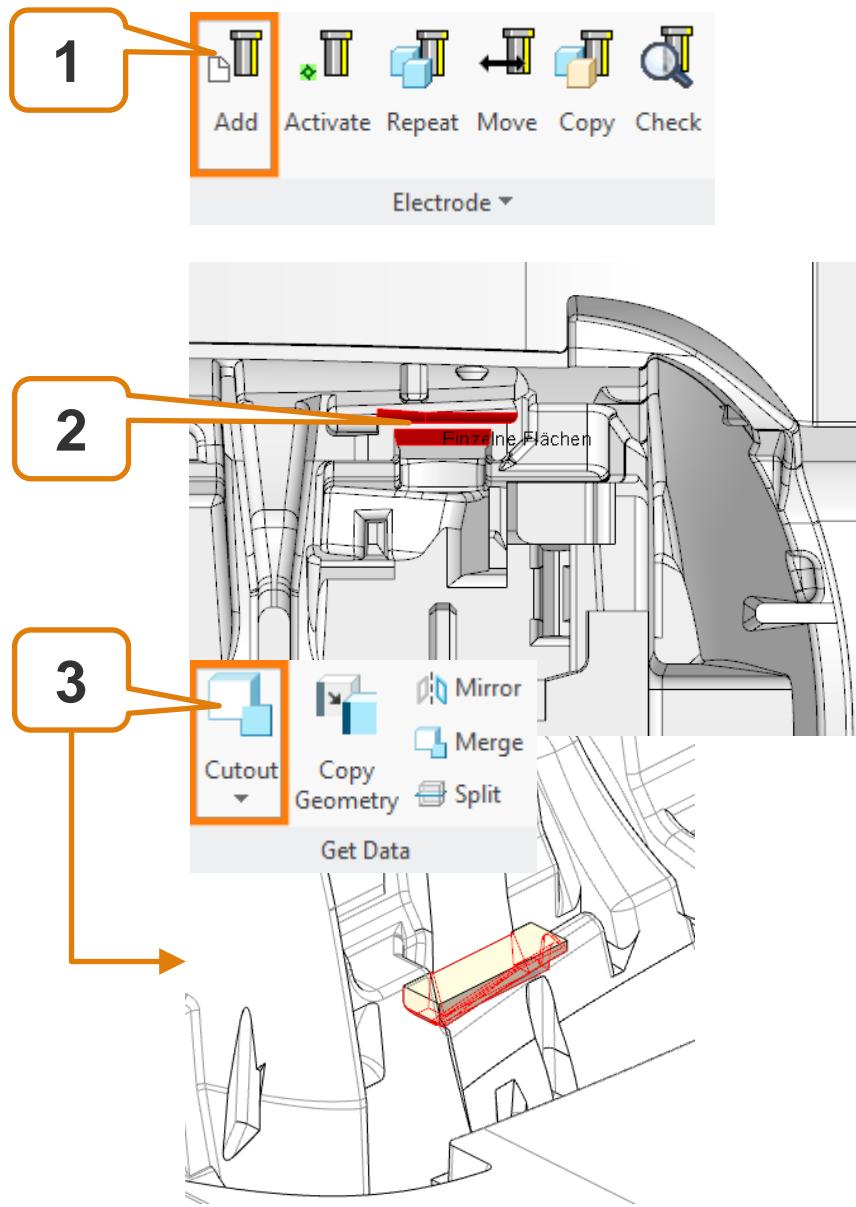
Electrode 4

Topics...

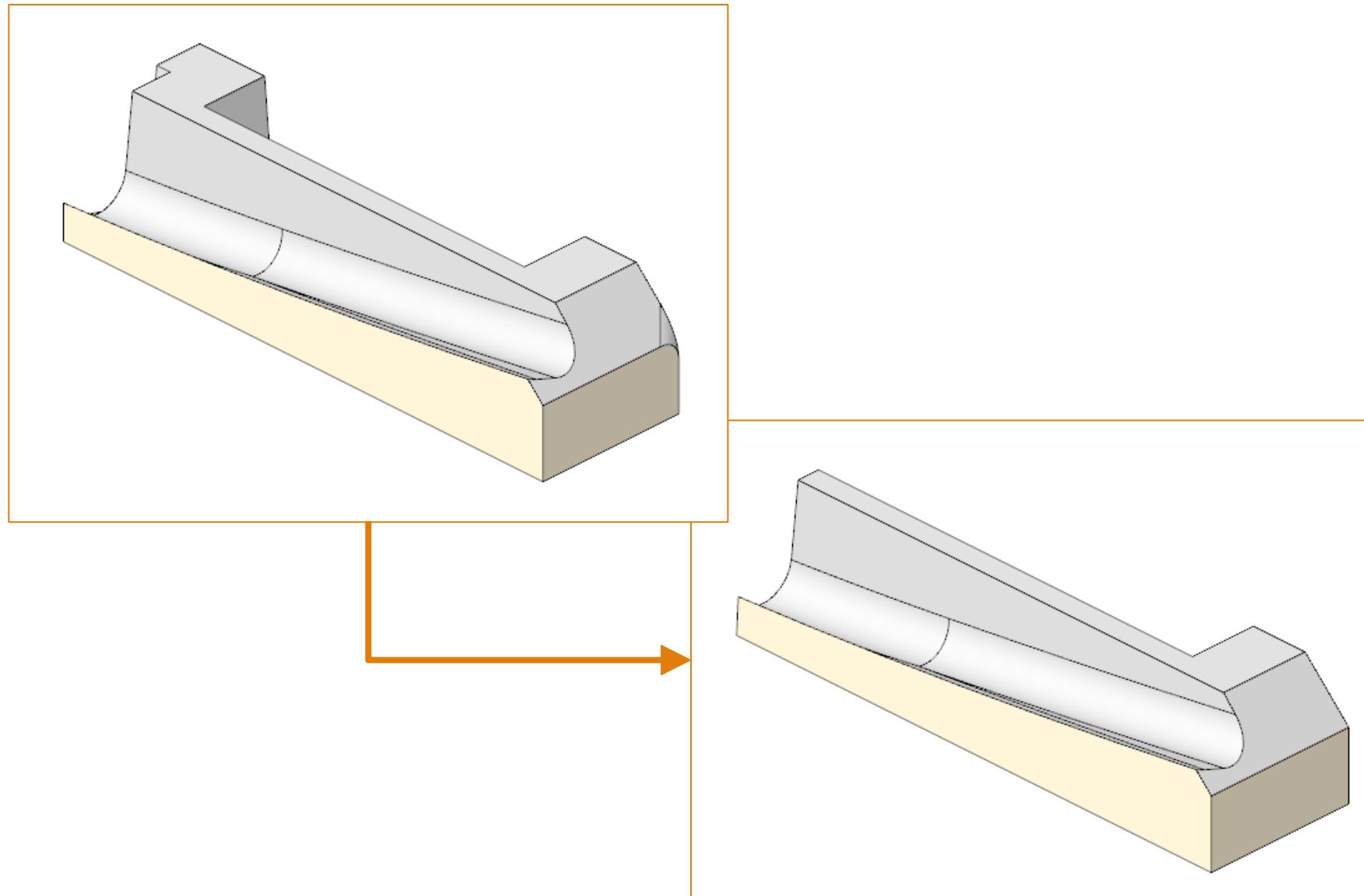
- Mix SE commands and Creo features
- Command ,**Cut Block** ‘
- Create geometry pattern



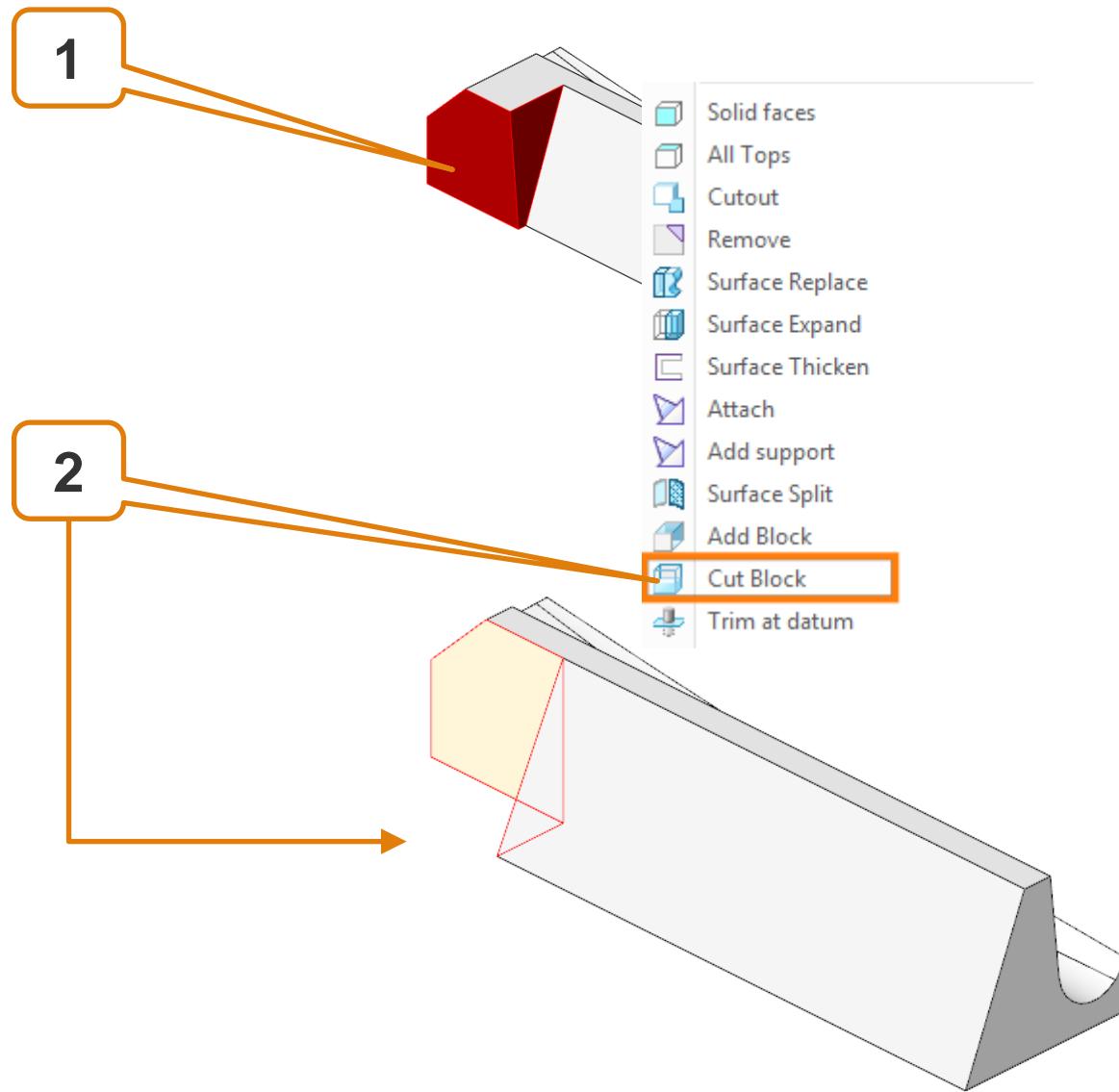
Electrode 4 – Get Data



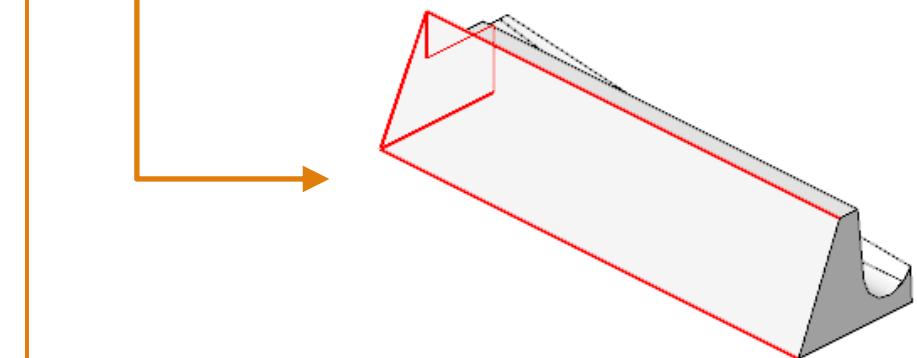
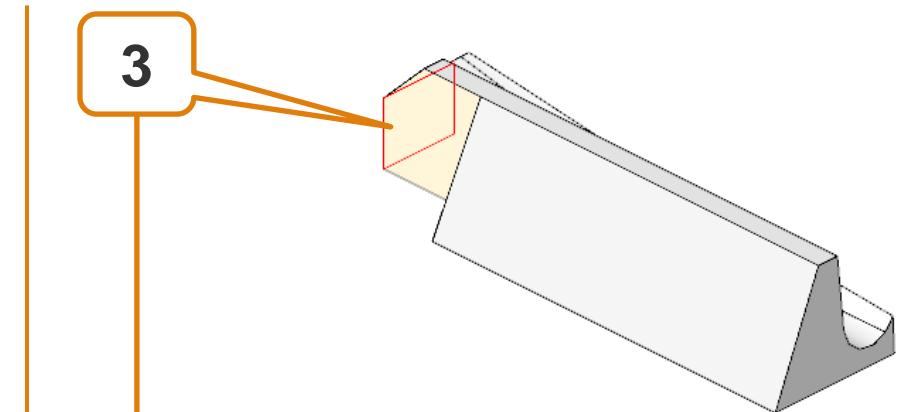
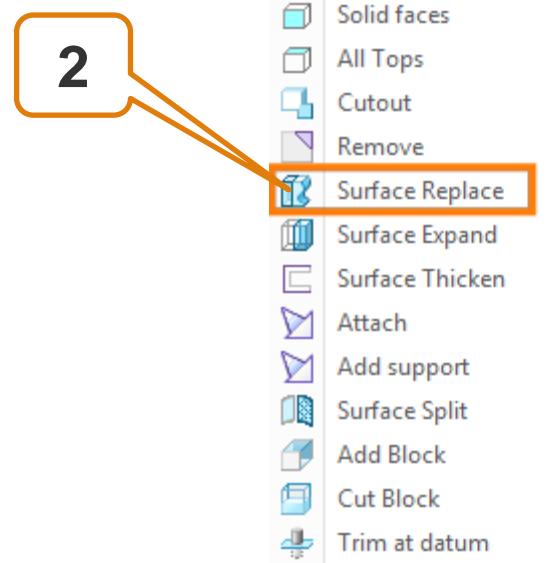
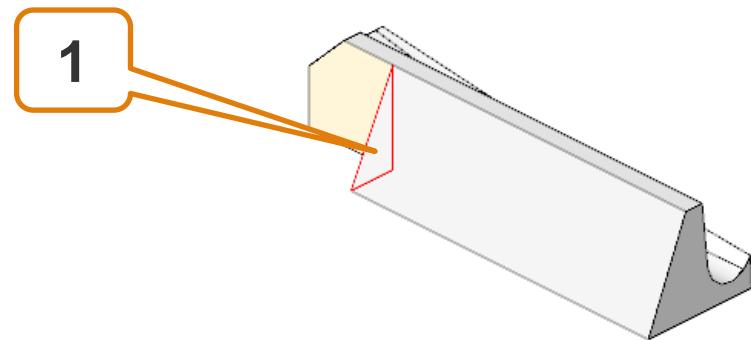
Electrode 4 – Detailing



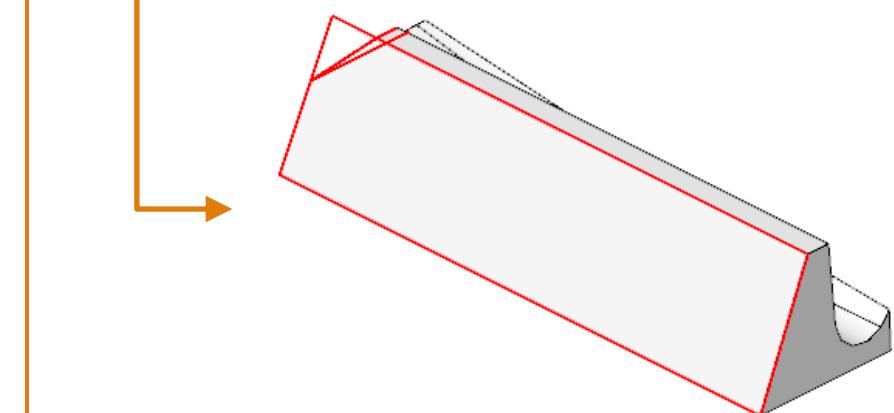
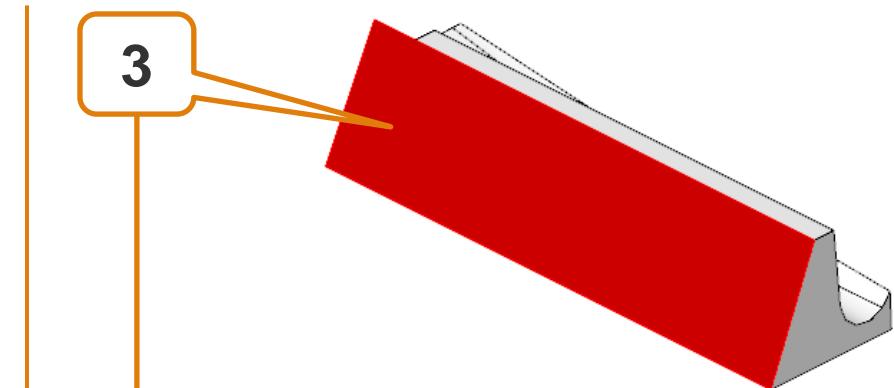
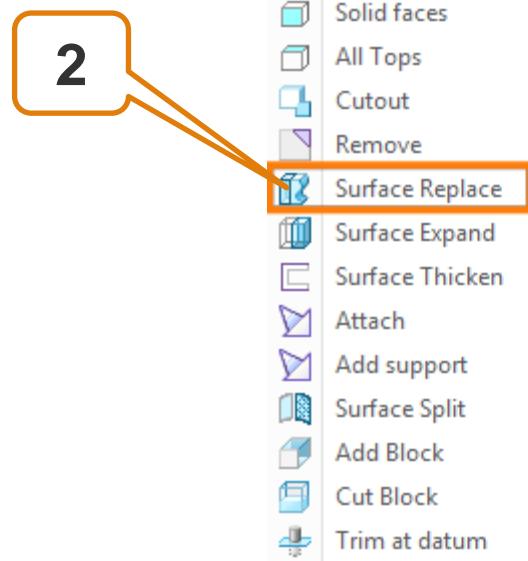
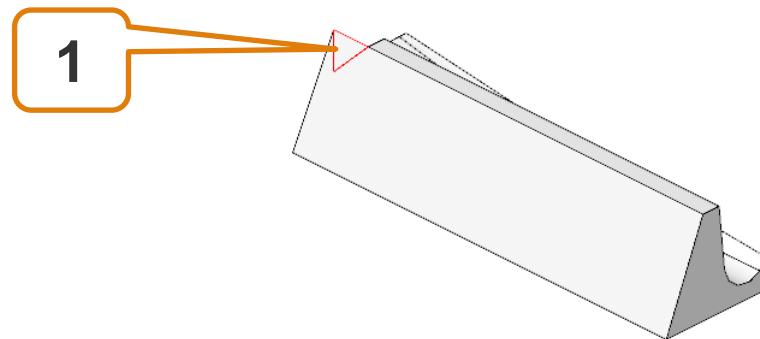
Electrode 4 – Detailing



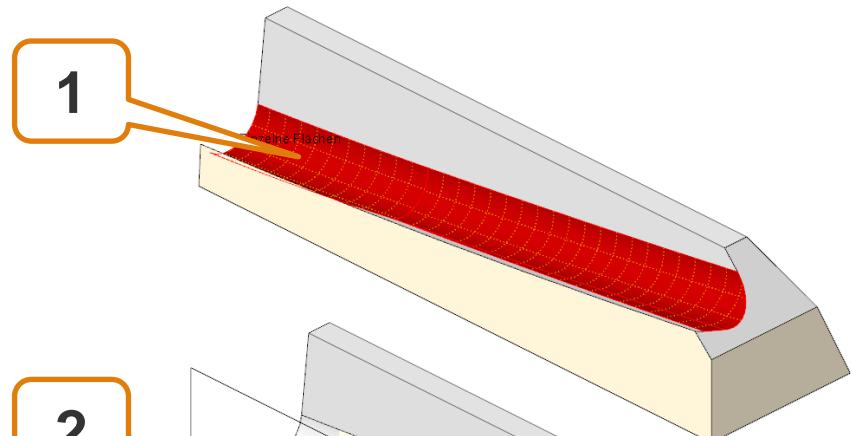
Electrode 4 – Detailing



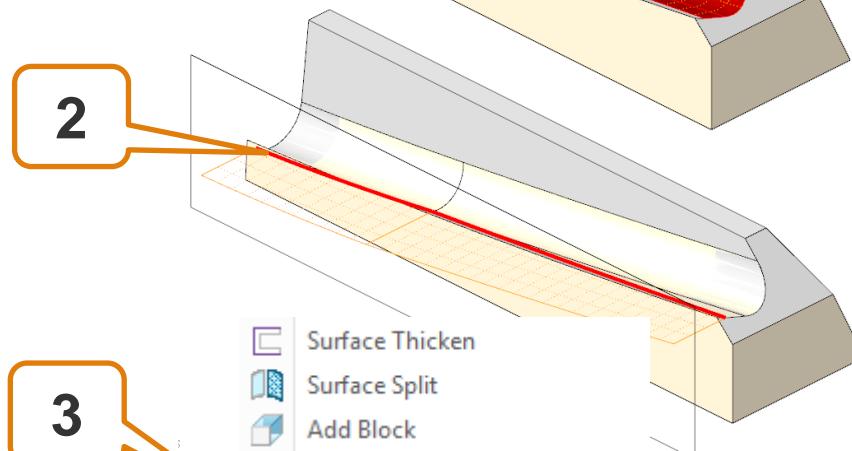
Electrode 4 – Detailing



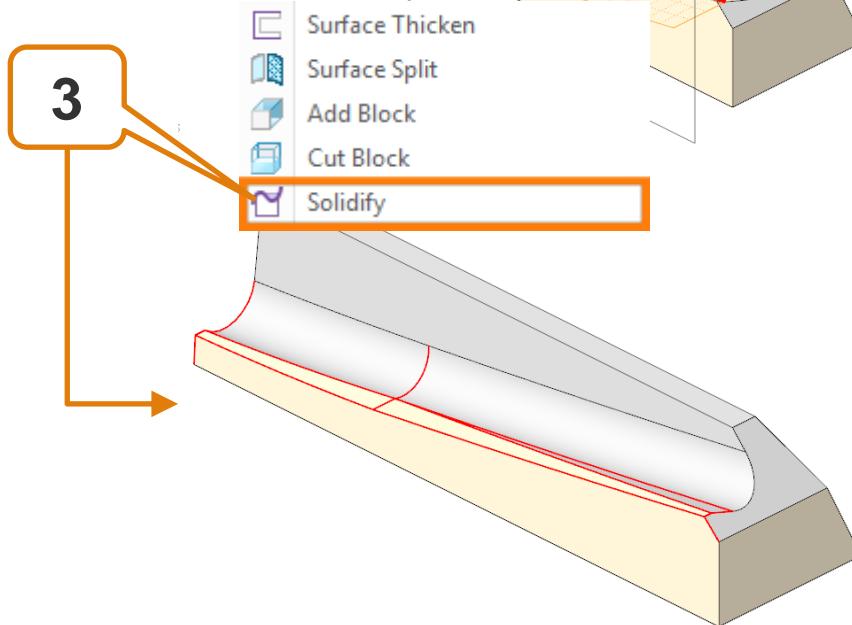
Electrode 4 – Surface Modeling



- Copy surfaces



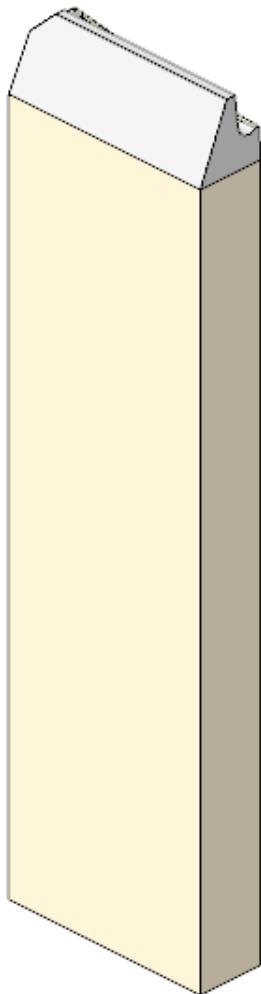
- Extend quilt at contour



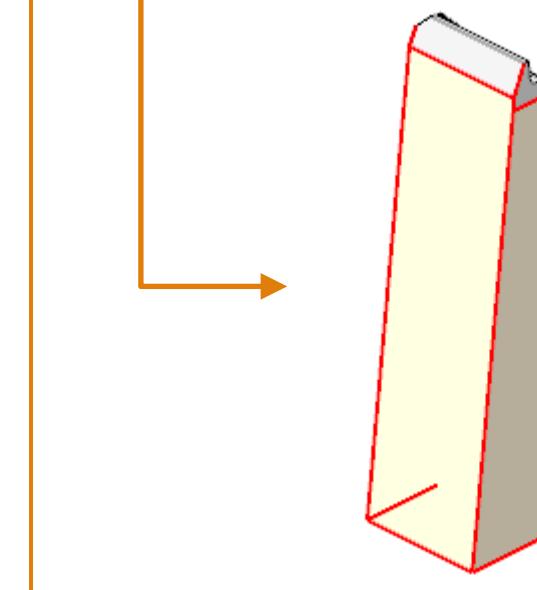
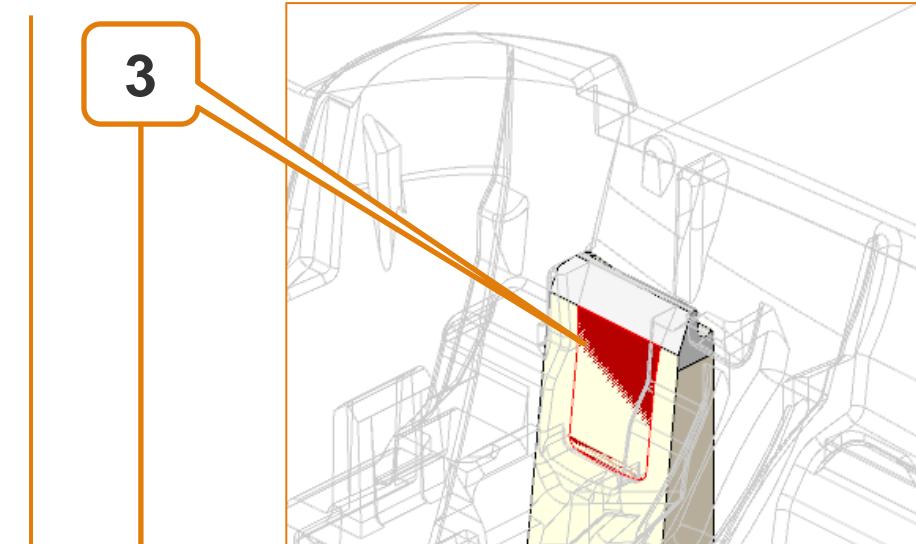
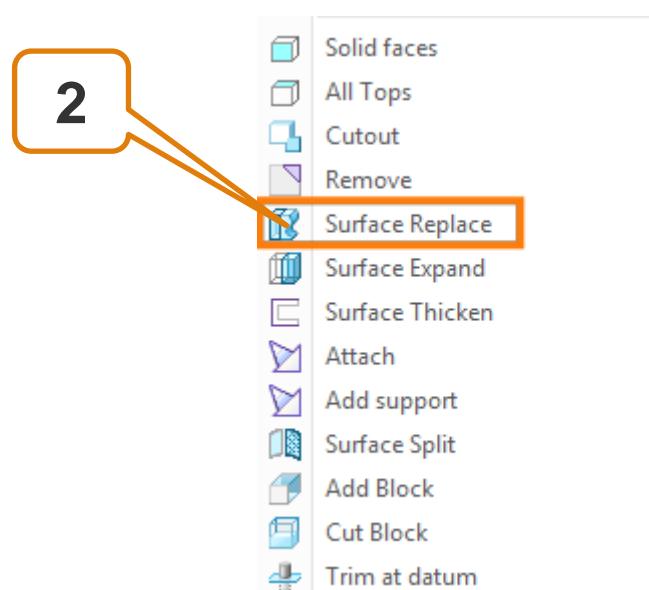
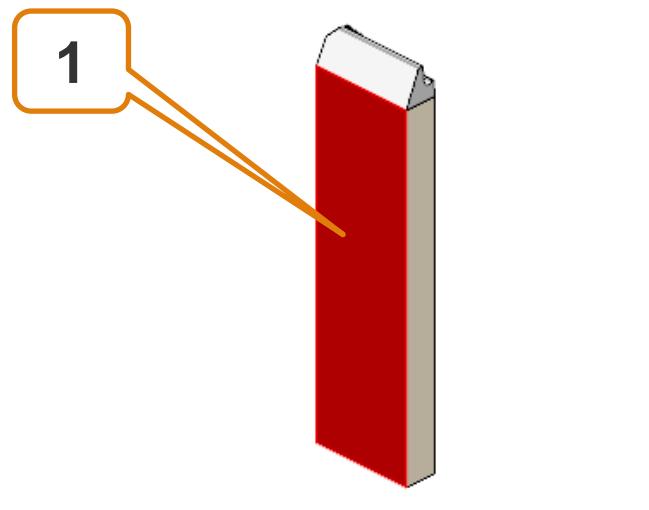
- Replace with quilt
(solidify)

Electrode 4 – Detailing

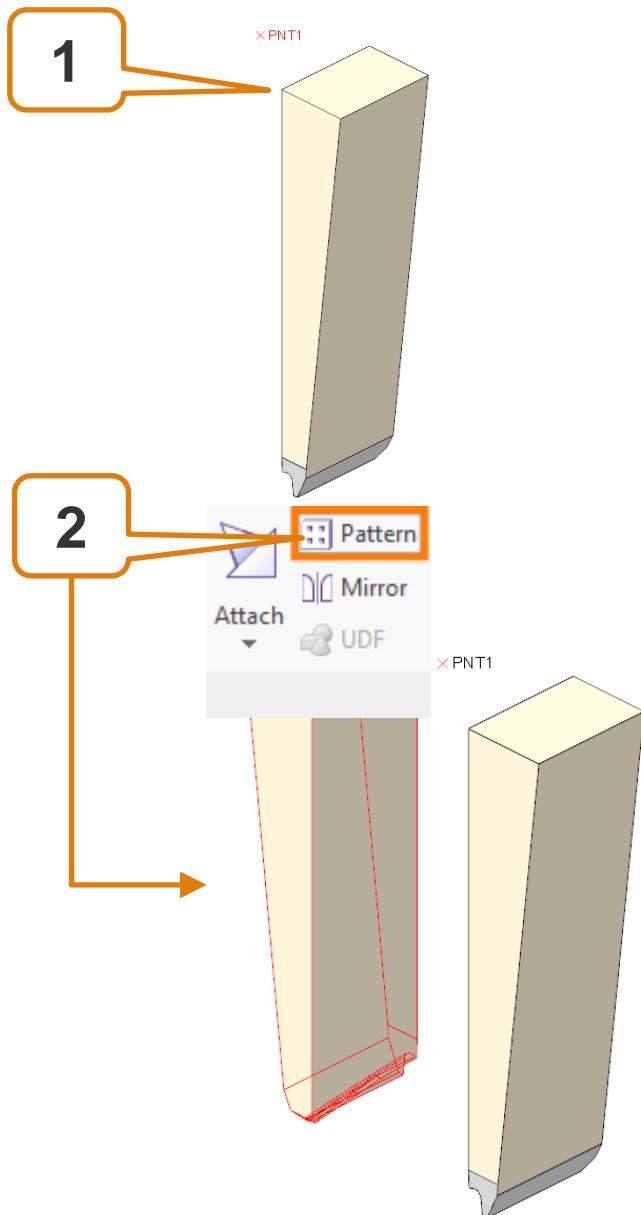
- Attach solid



Electrode 4 – Detailing



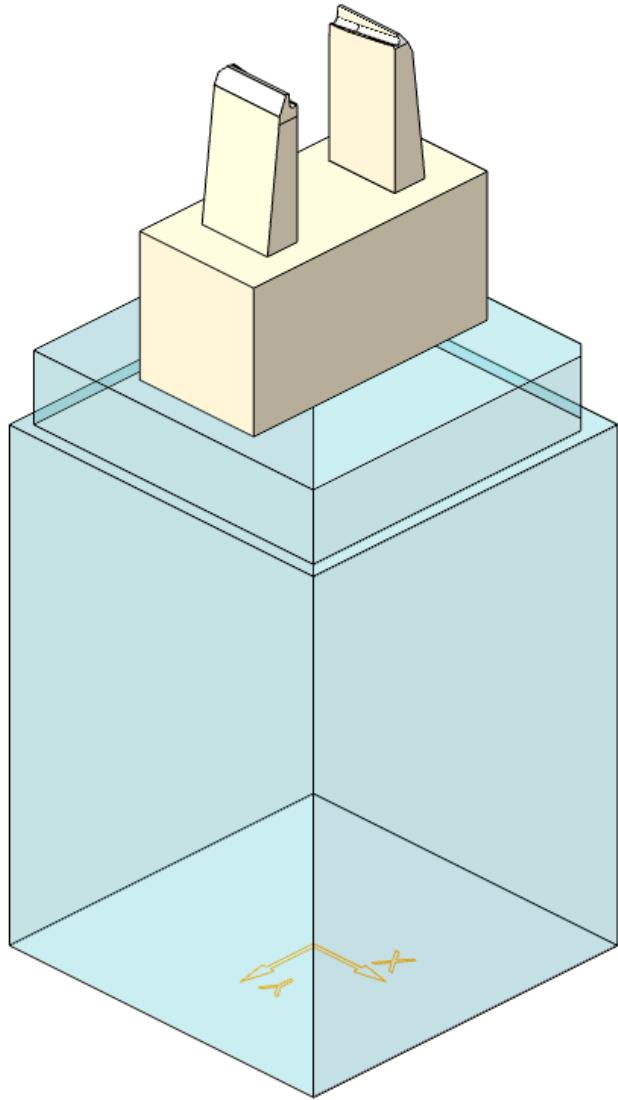
Electrode 4 – Geometriemuster



- 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

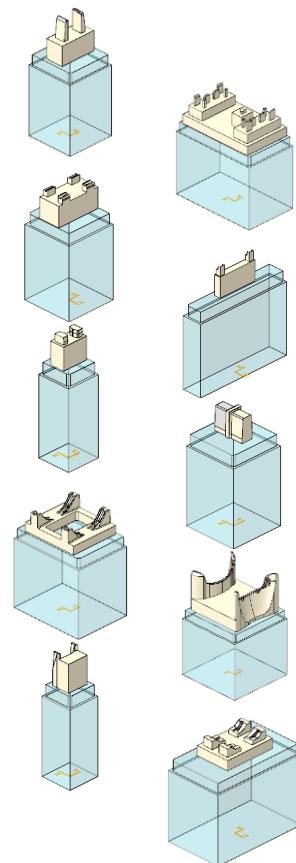
Electrode 10

Electrode 11

Electrode 12

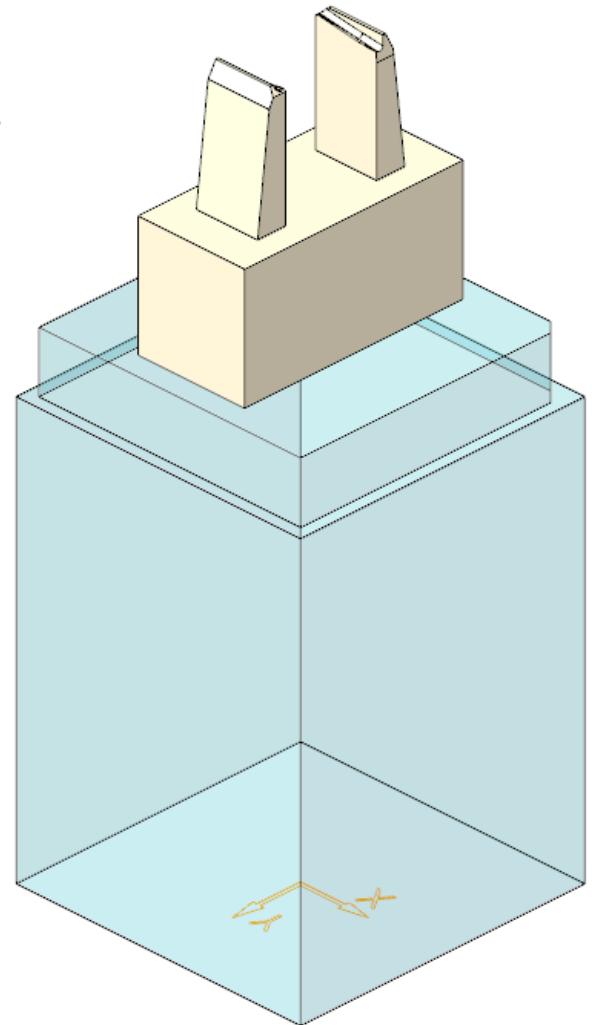
Electrode 13

Electrode 14

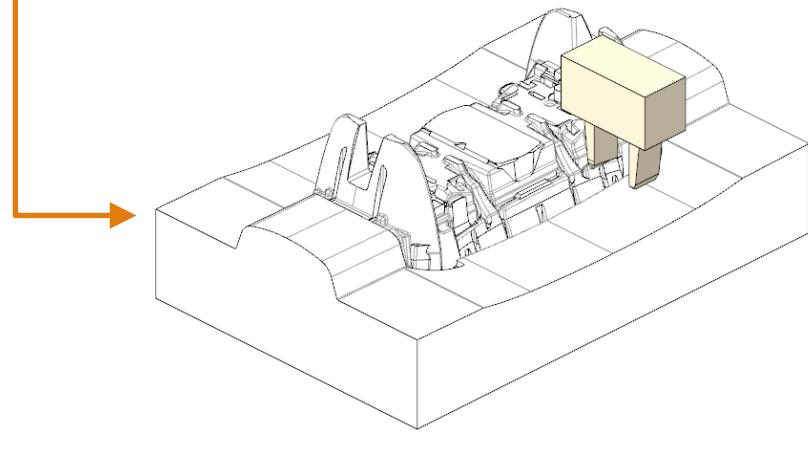
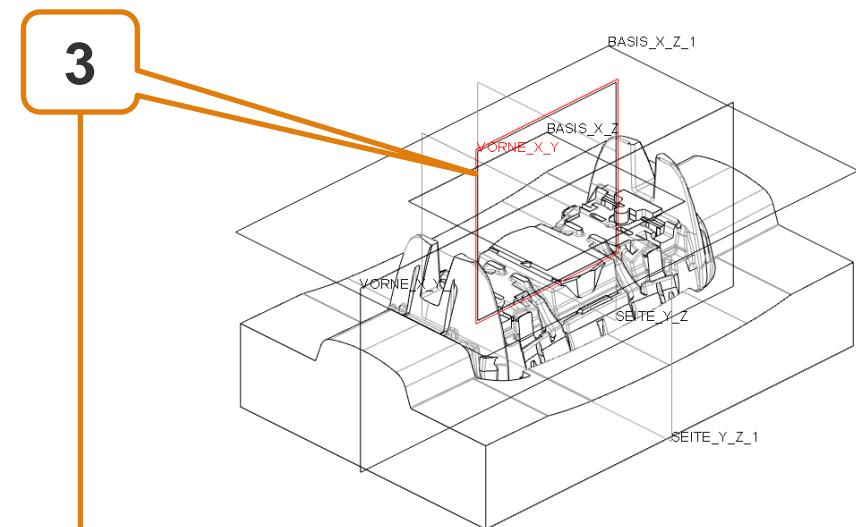
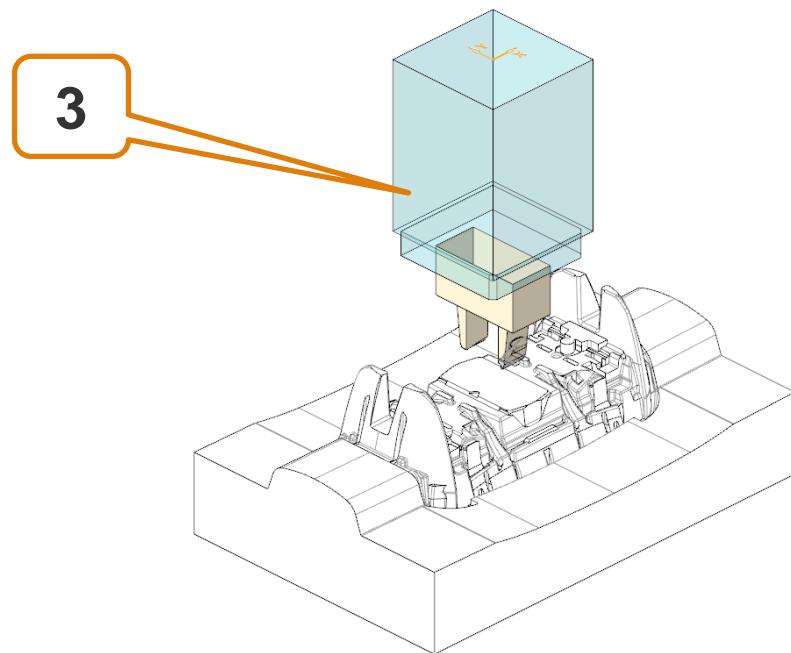
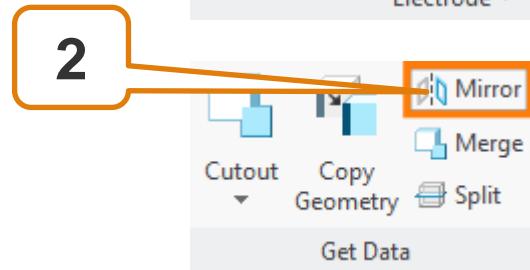


Topics...

- Mirror electrode geometry
- Assemble again several electrodes

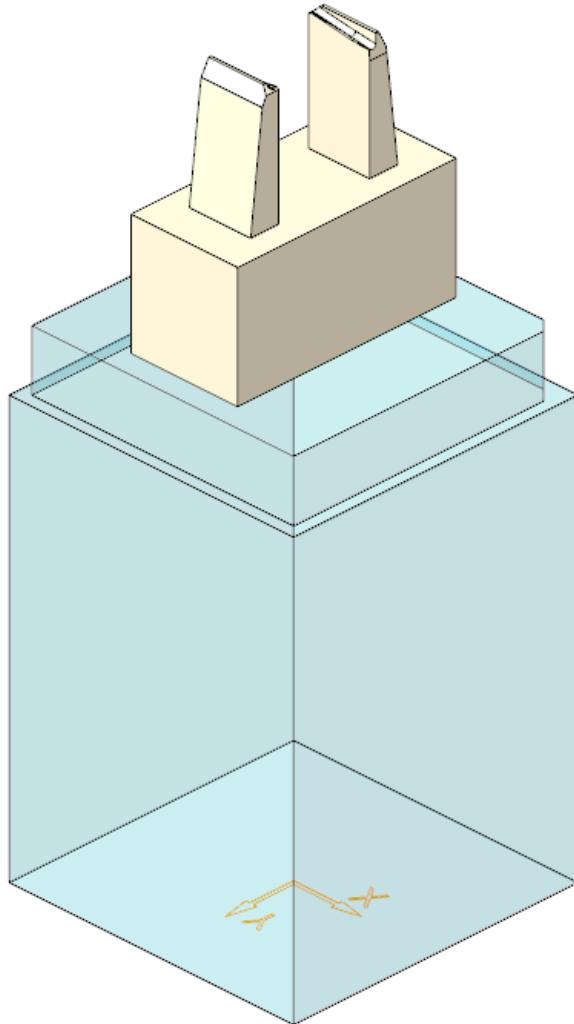


Electrode 5 – Electrode Mirror

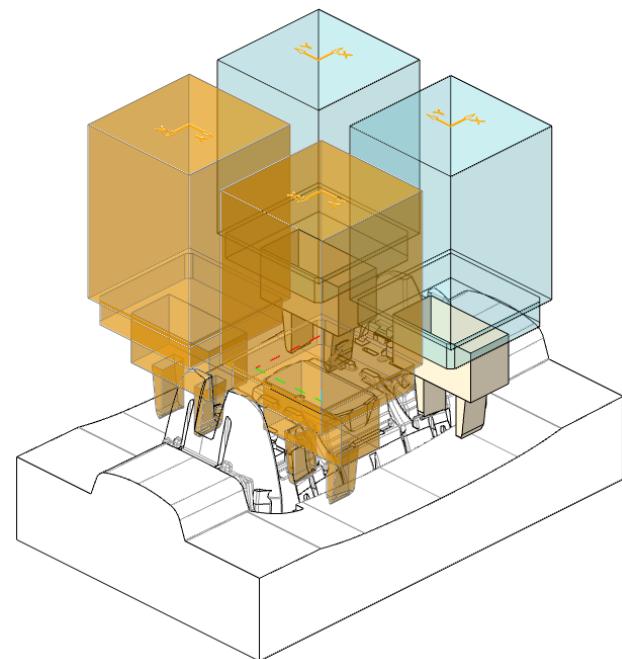
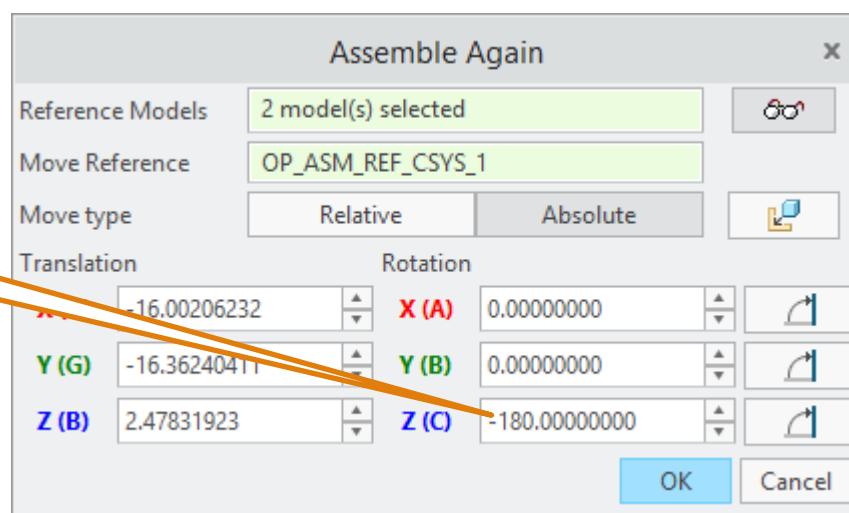
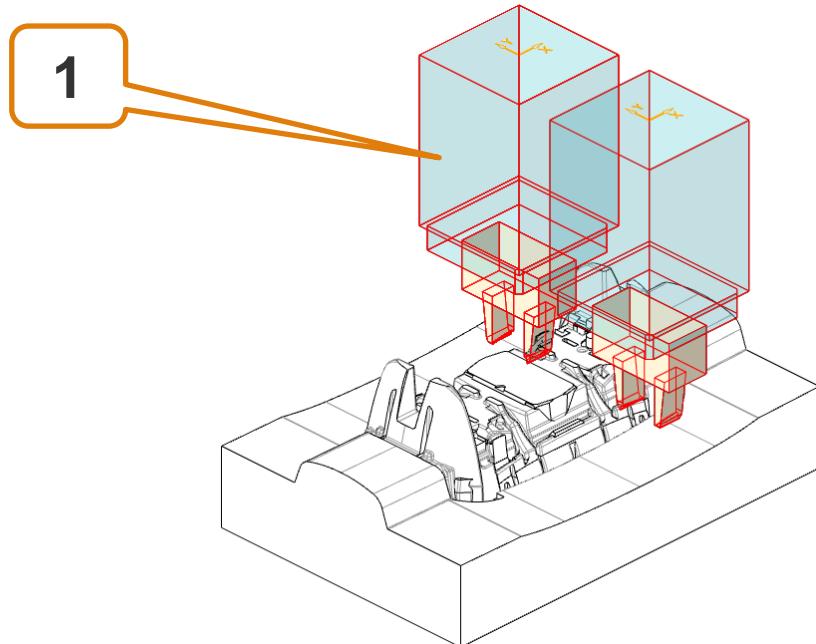


Electrode 5 - Base

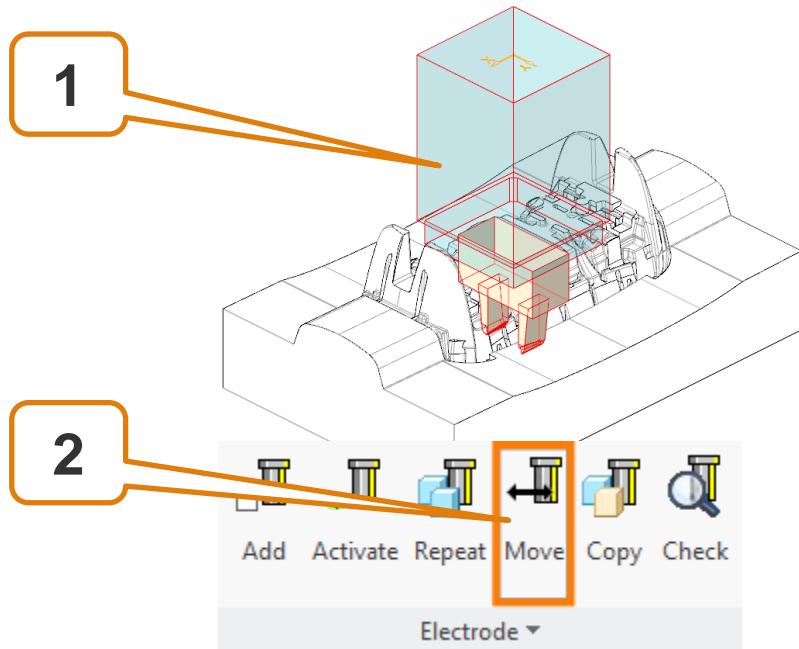
- Add Base



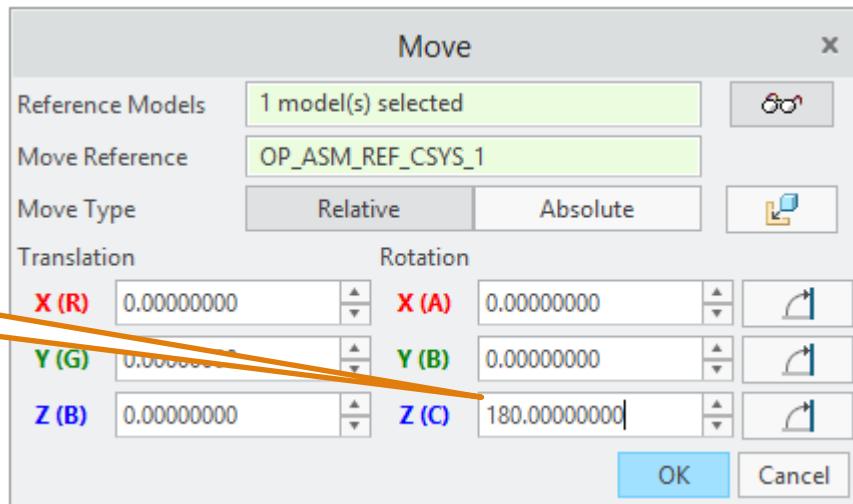
Electrode 4 & 5 – Assemble Again



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



3

Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

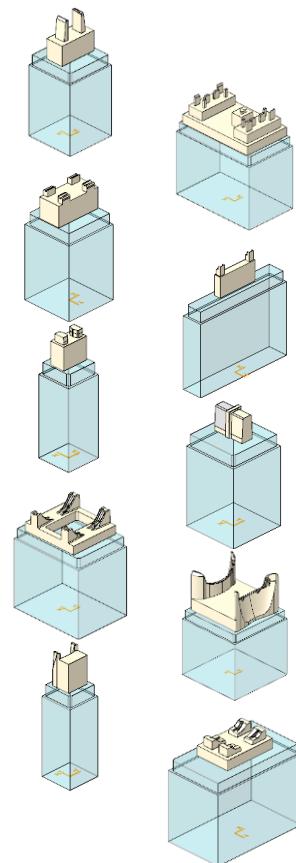
Electrode 10

Electrode 11

Electrode 12

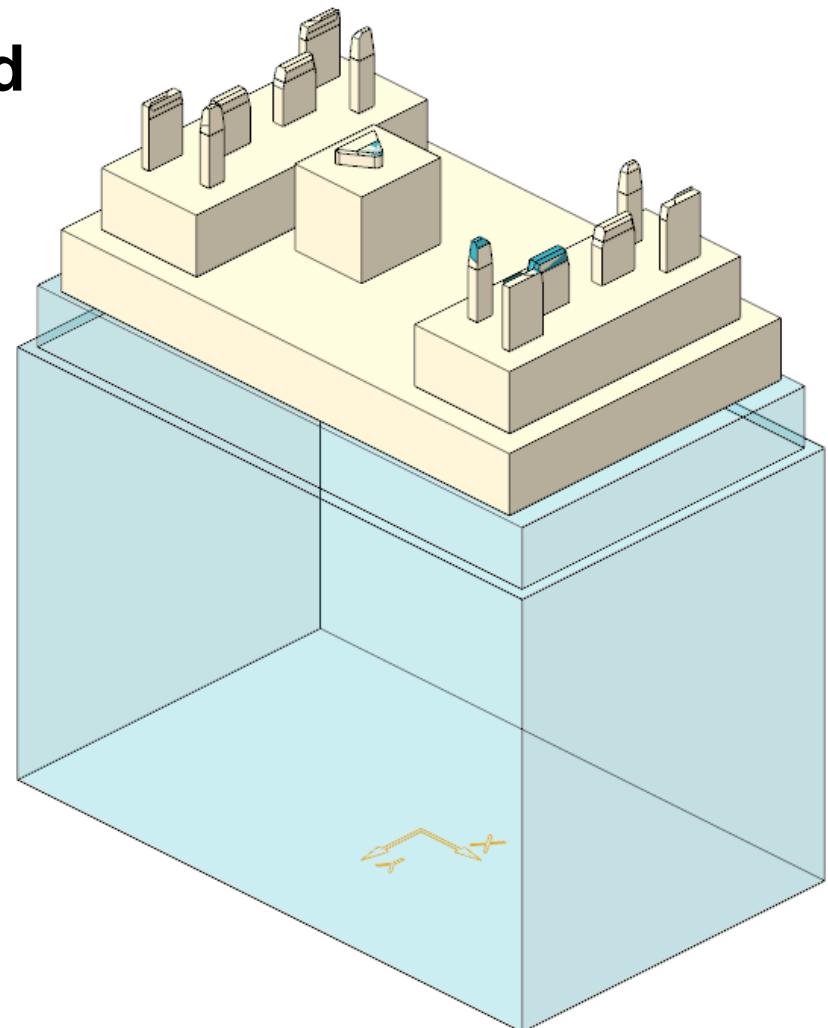
Electrode 13

Electrode 14

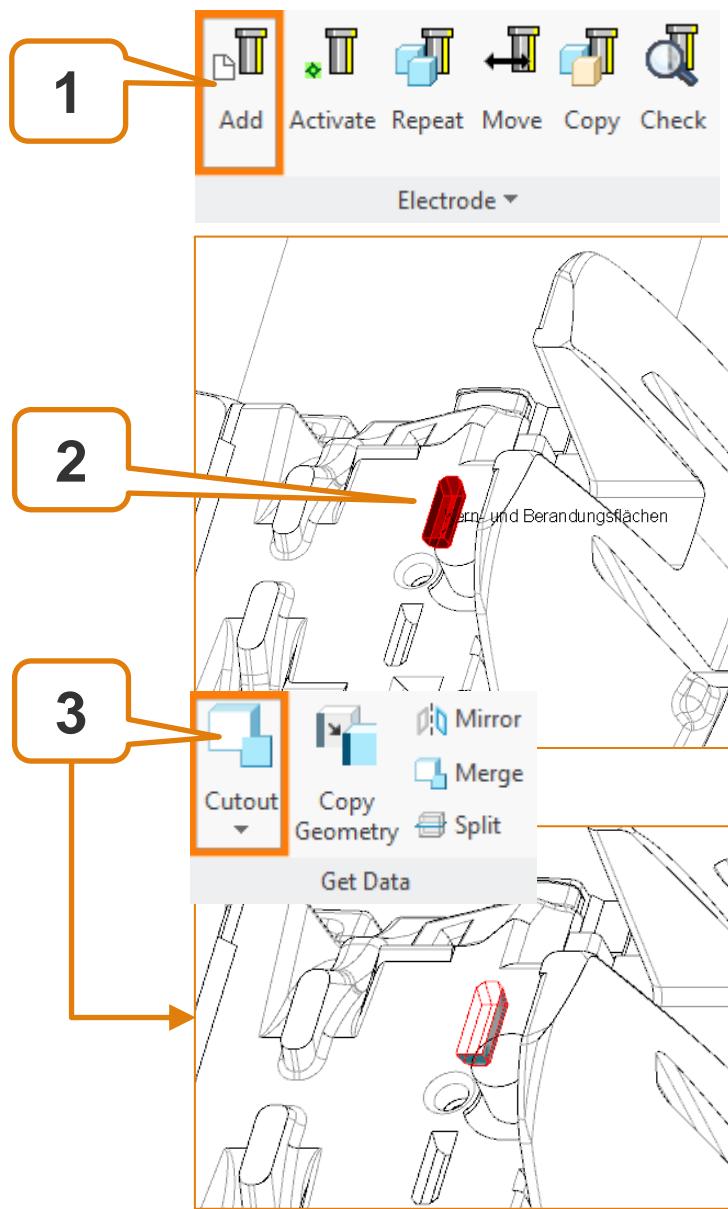


Topics...

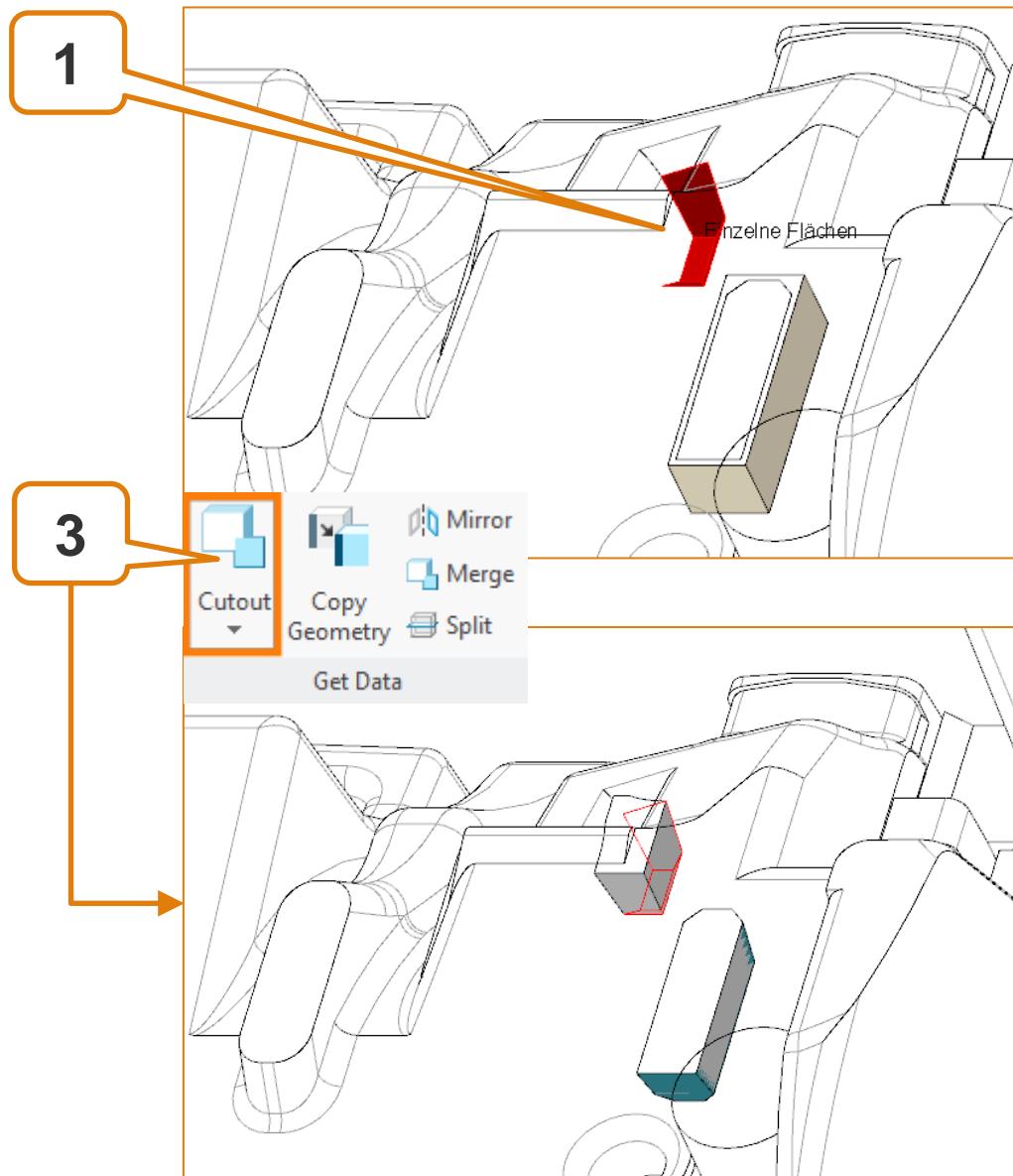
- Mix solid and surface approach
- Mirror several times and add support



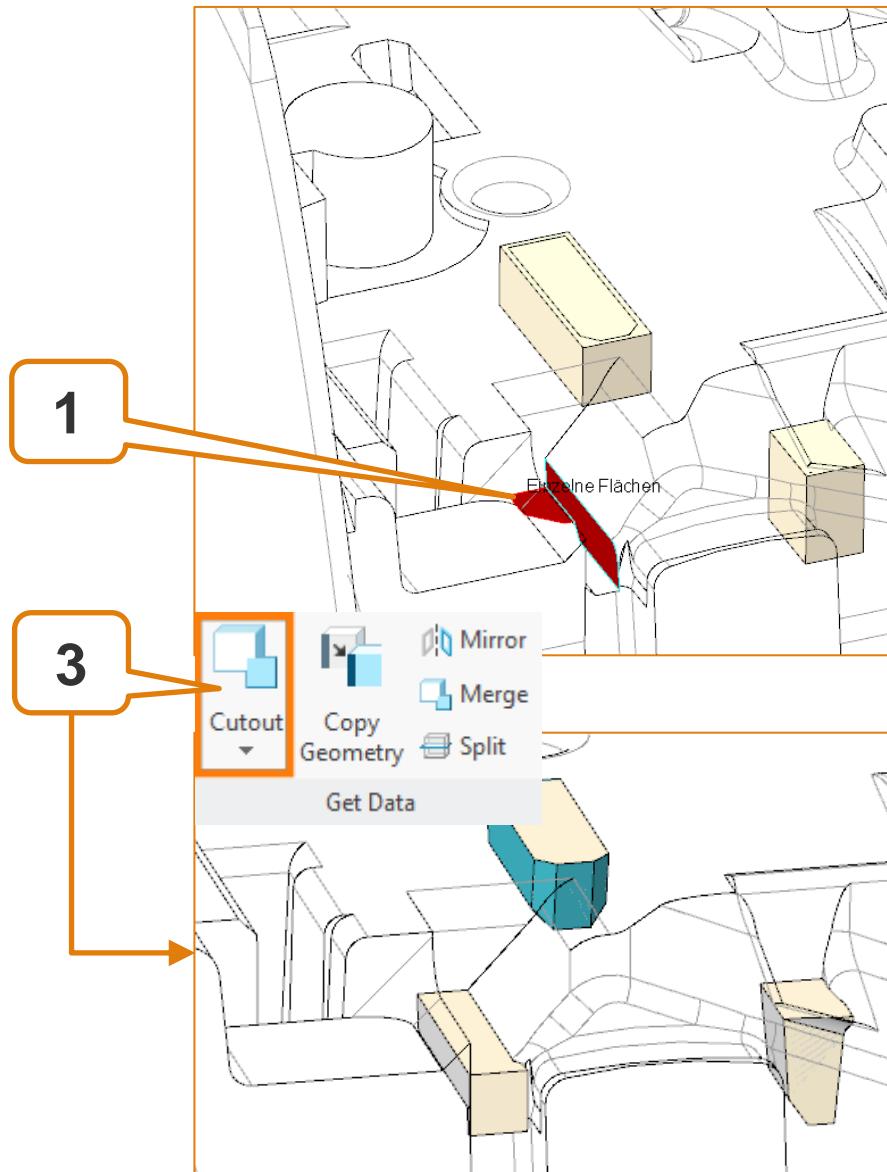
Electrode 6 – 1. Bereich ausschneiden



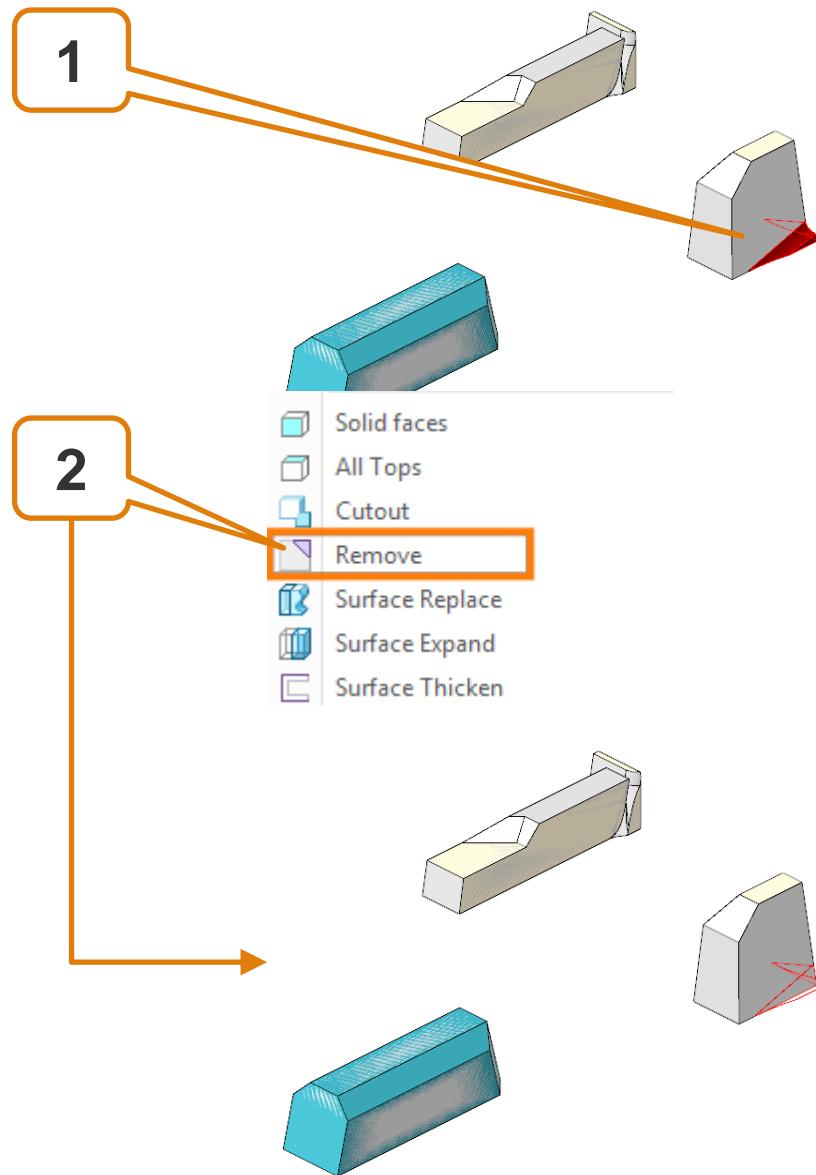
Electrode 6 – 2. Bereich ausschneiden



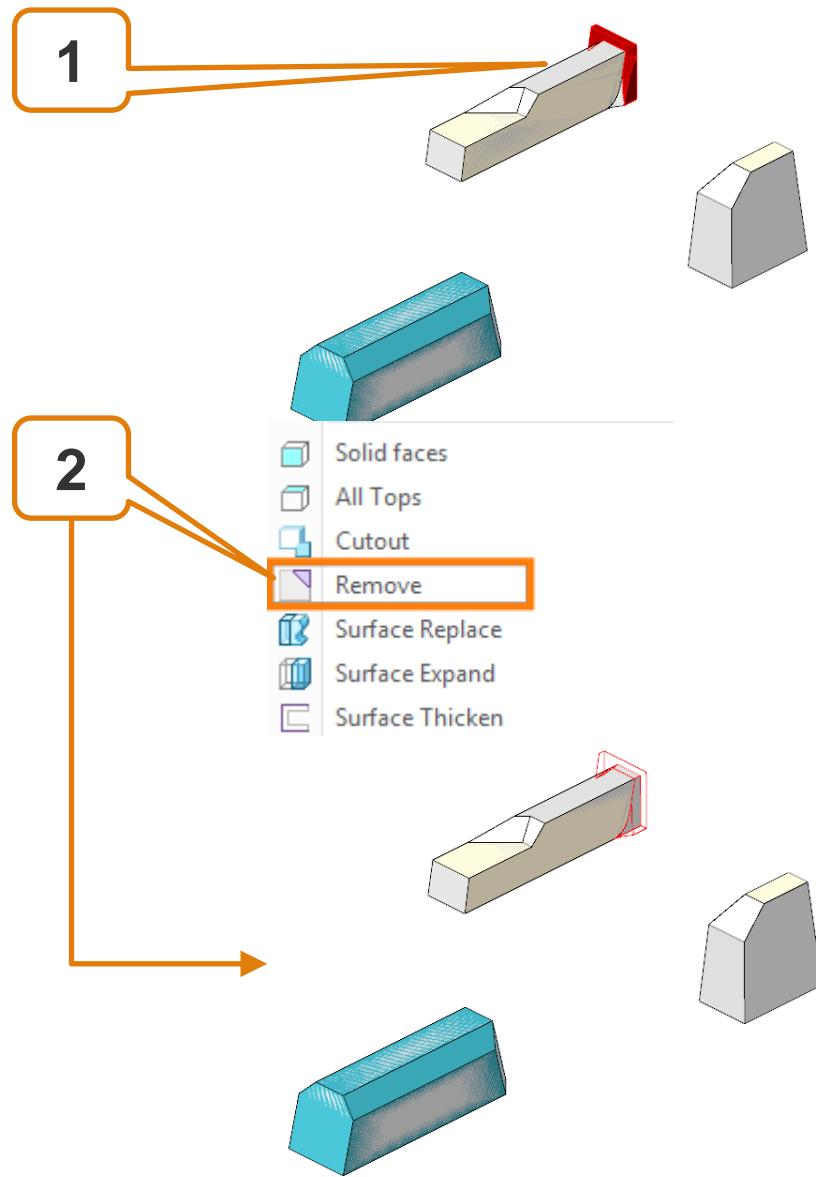
Electrode 6 – 3. Bereich ausschneiden



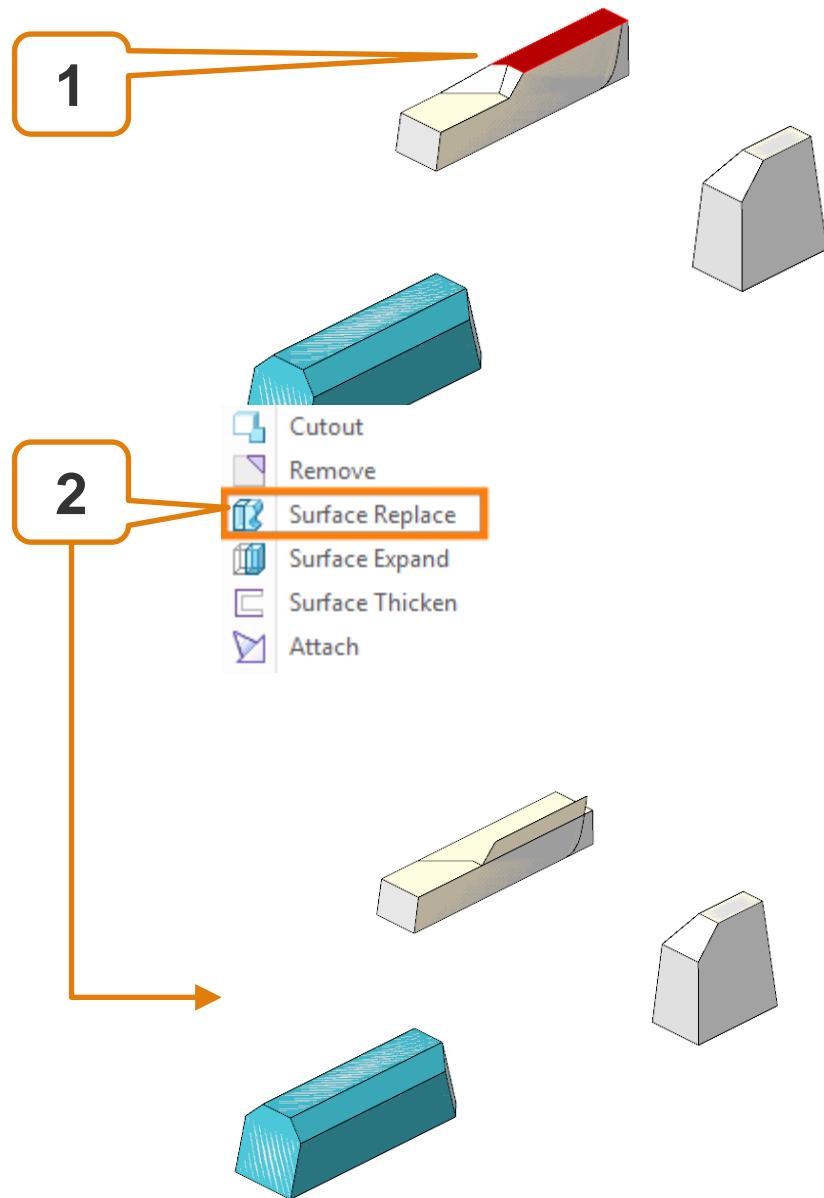
Electrode 6 – Detailing



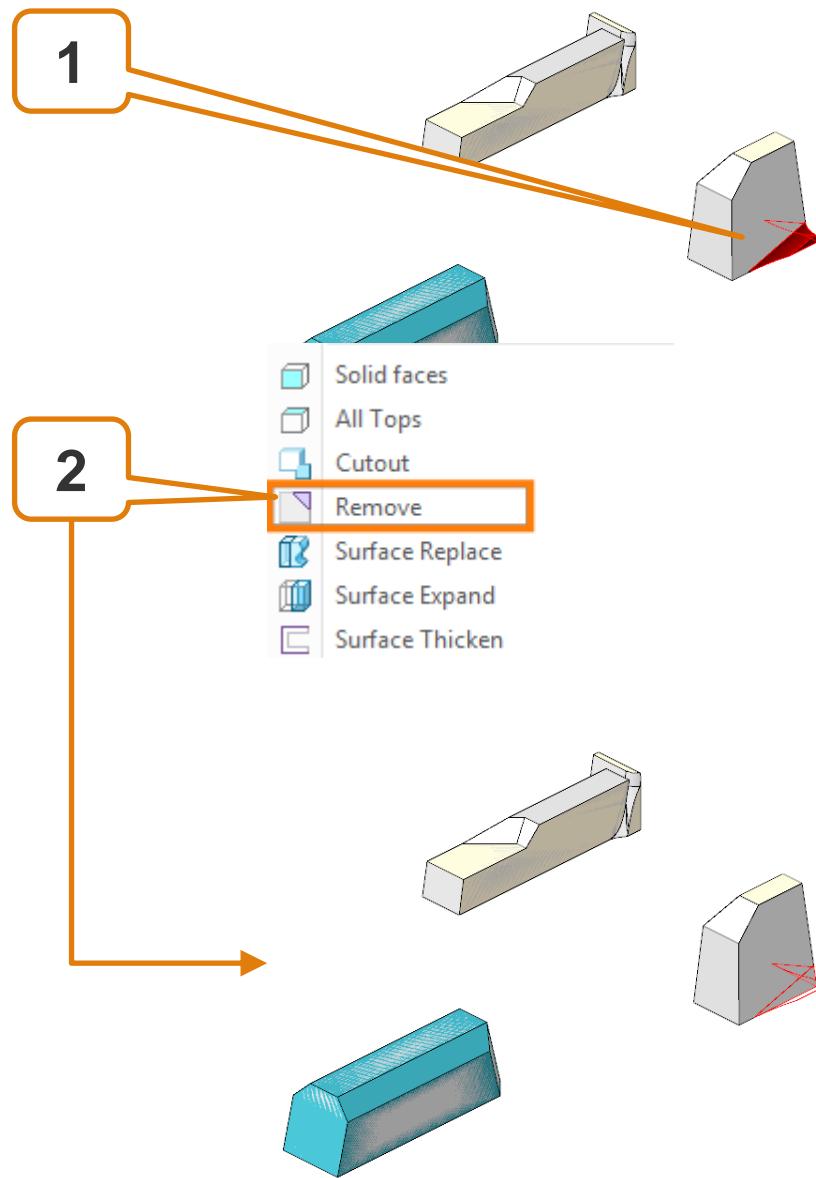
Electrode 6 – Detailing



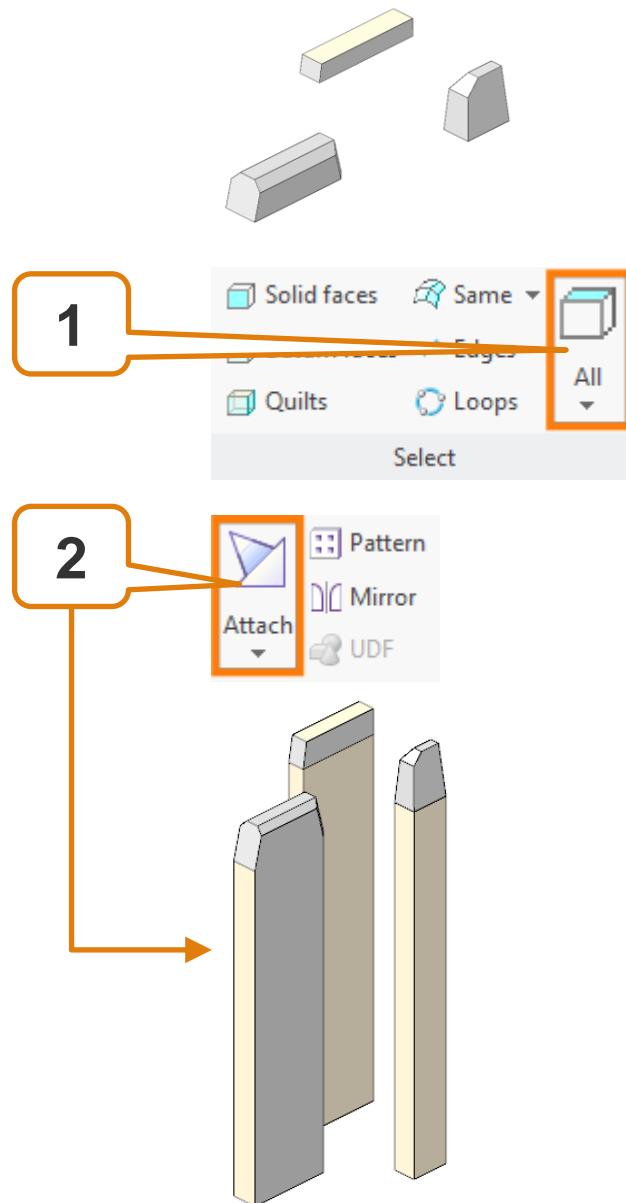
Electrode 6 – Detailing



Electrode 6 – Detailing

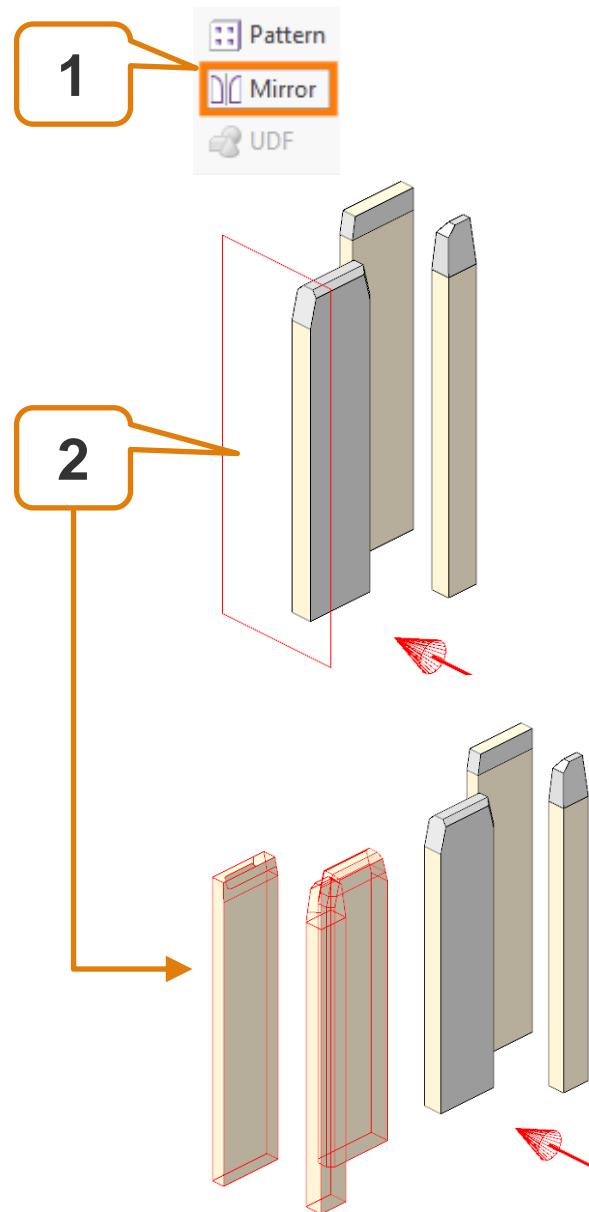


Electrode 6 - Attach

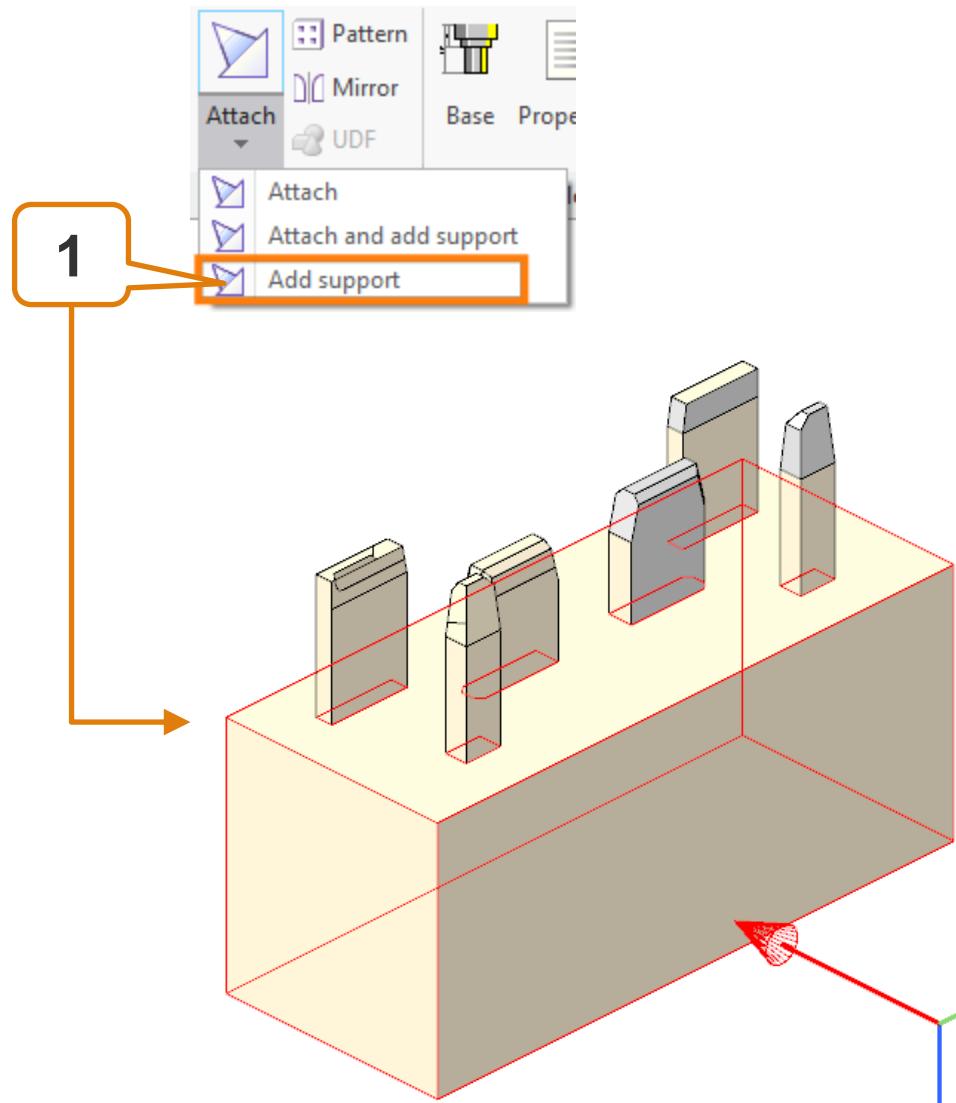


- Select all top surfaces that are not attached
- Attach solid to **FREE_FACE**

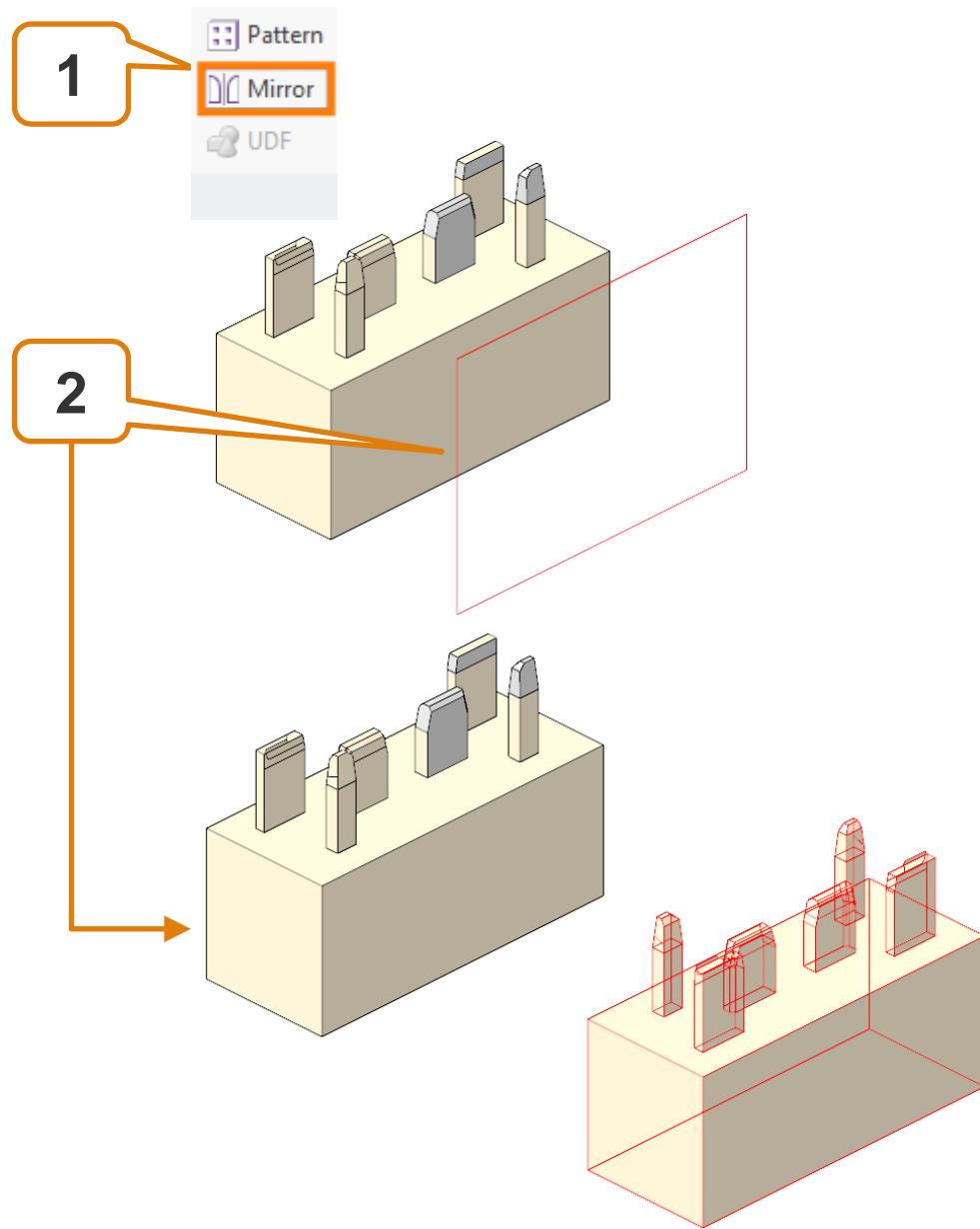
Electrode 6 – Mirror



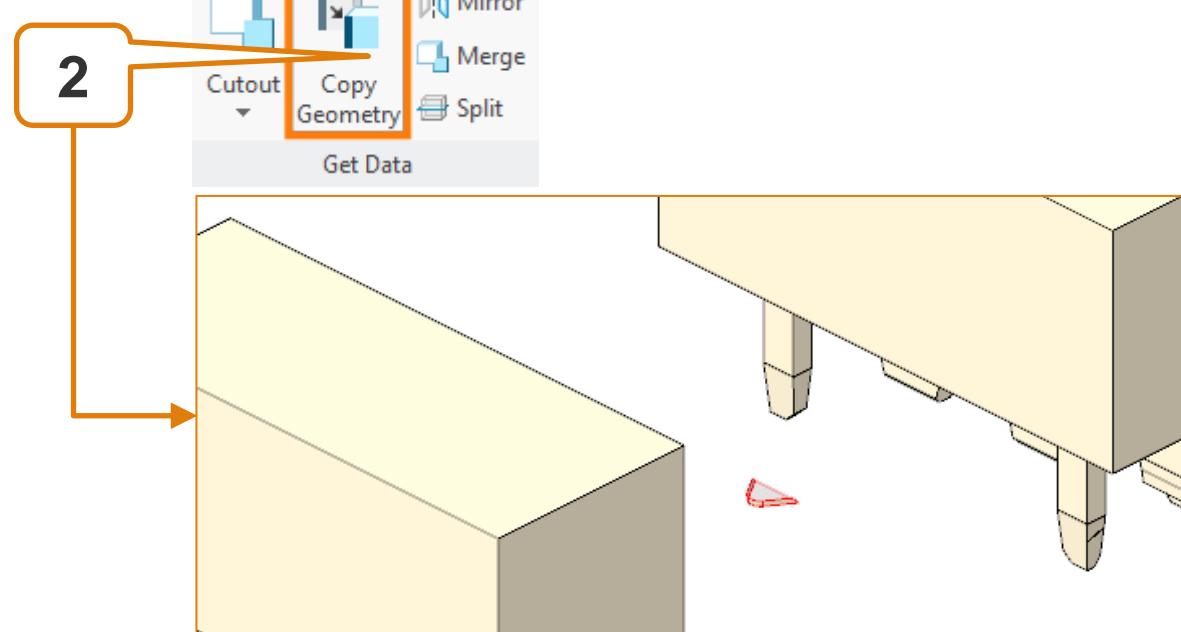
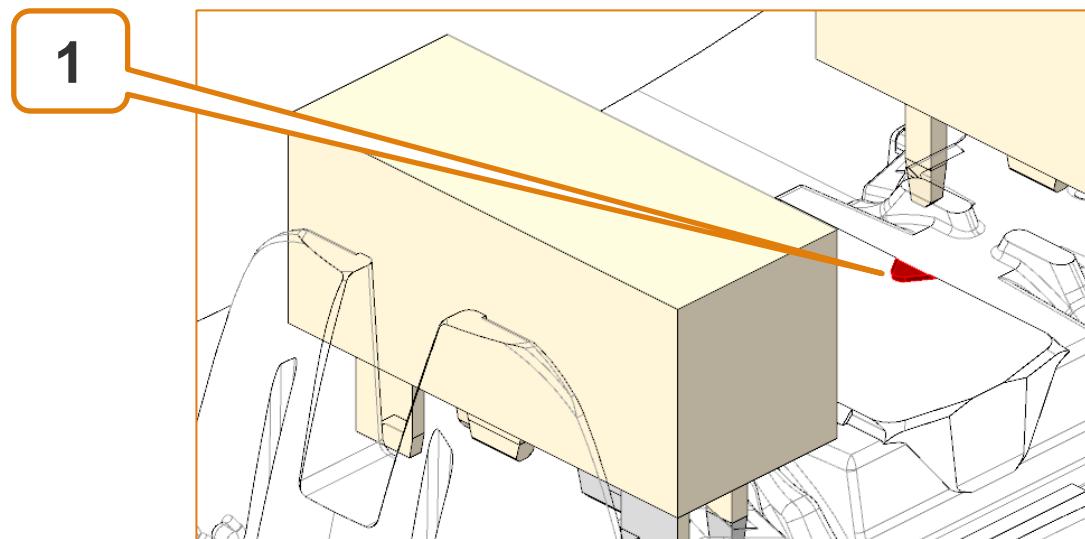
Electrode 6 – Detailing



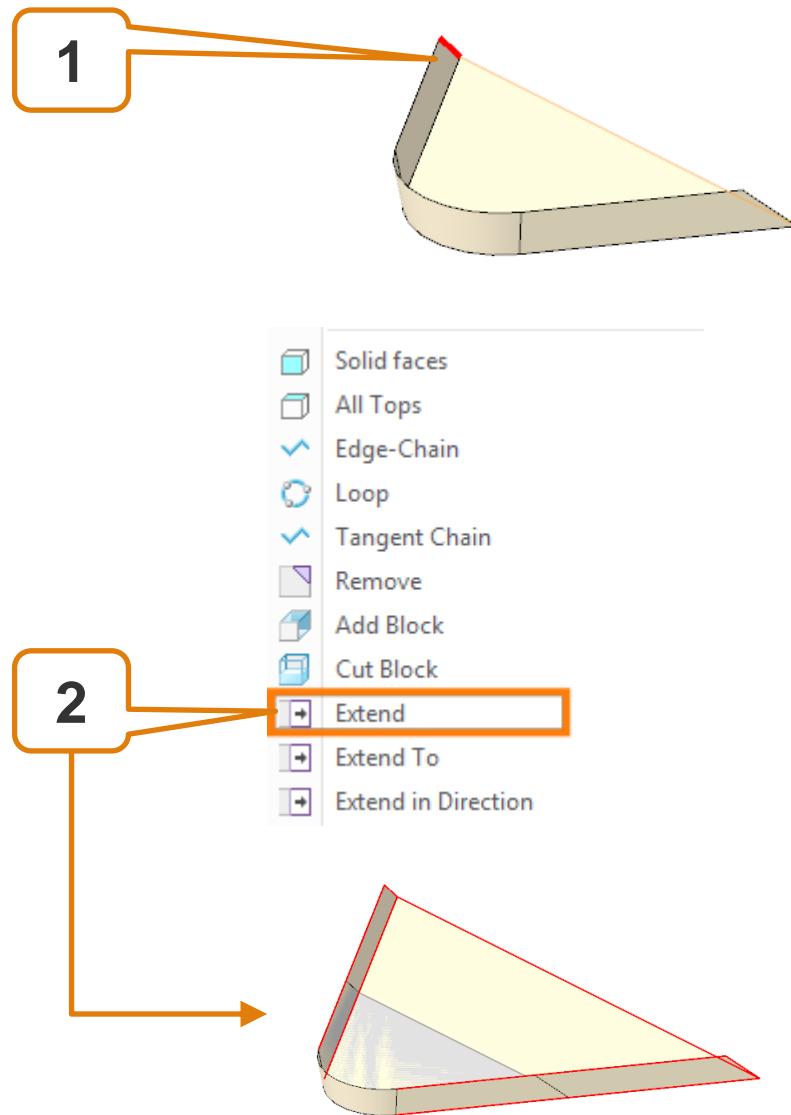
Electrode 6 – Mirror



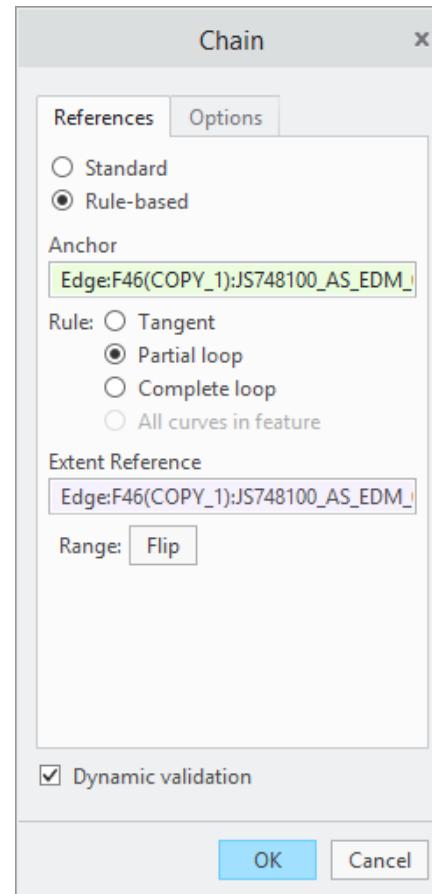
Electrode 6 – Copy 4. Region



Electrode 6 – Detailing

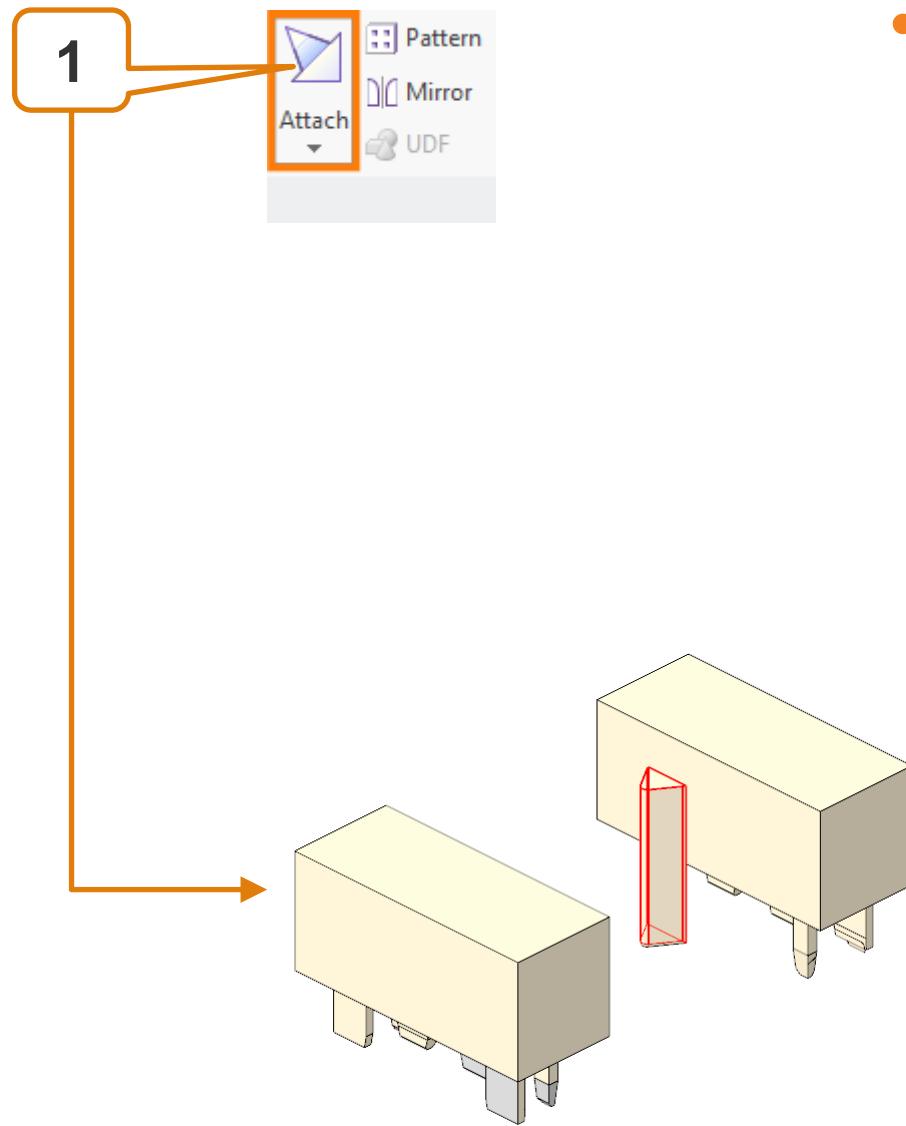


- Select curve chain



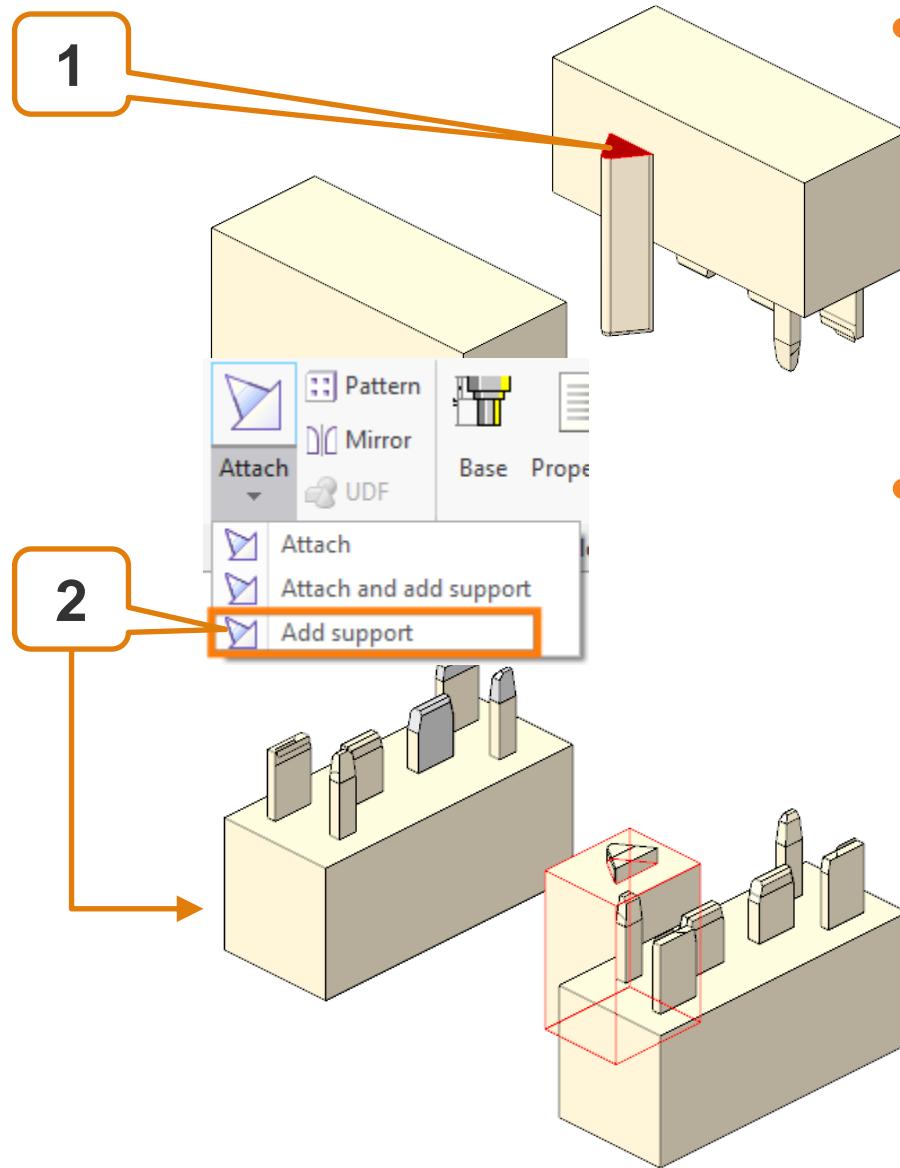
- Extend quilt

Electrode 6 – Attach



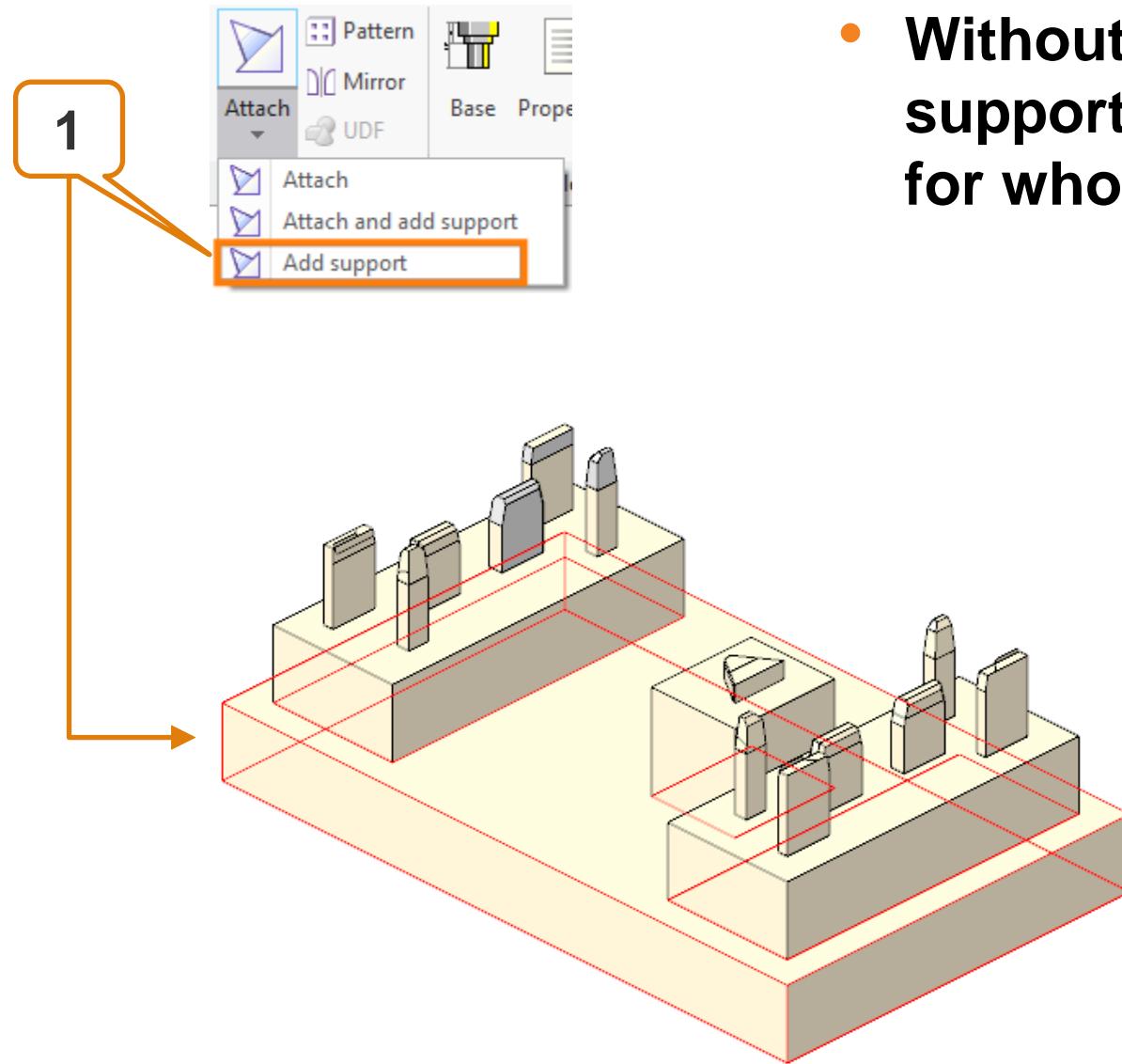
- **Activate 'Attach', because new feature is still selected**

Electrode 6 – Support



- Select surface
- Create support for selected surface

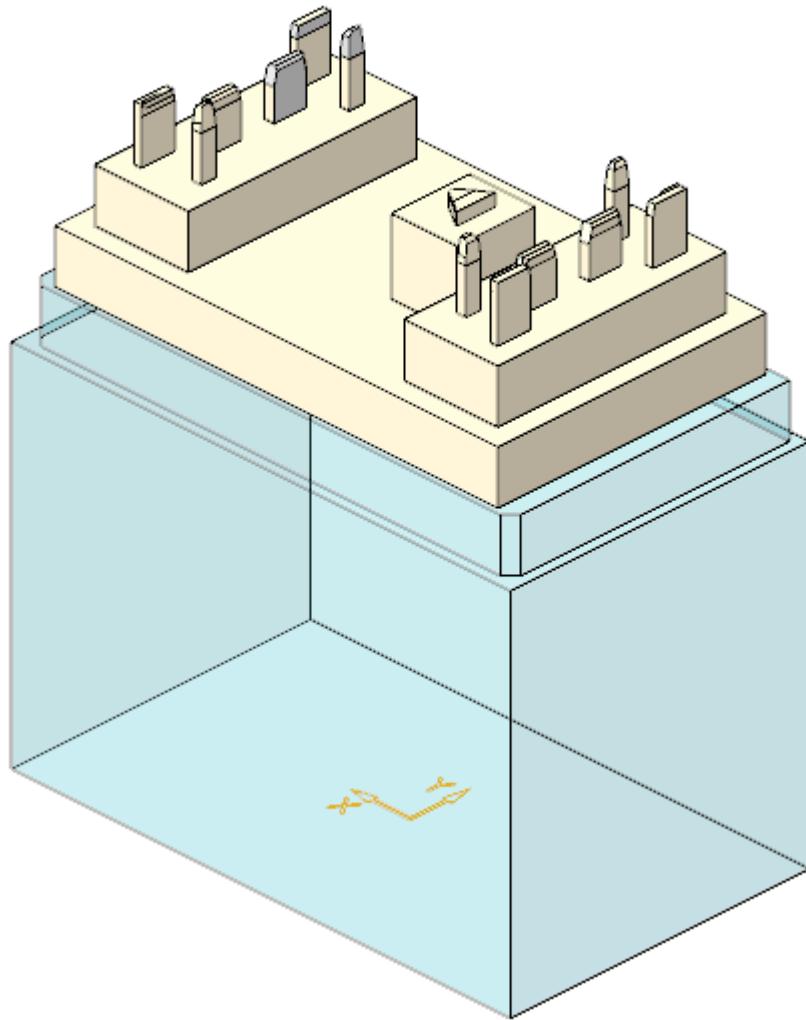
Electrode 6 – Support



- **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

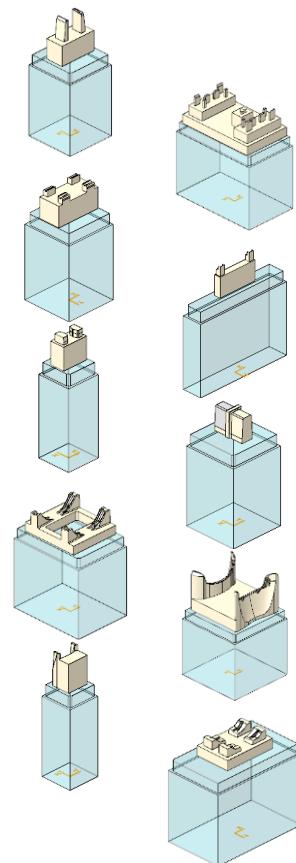
Electrode 10

Electrode 11

Electrode 12

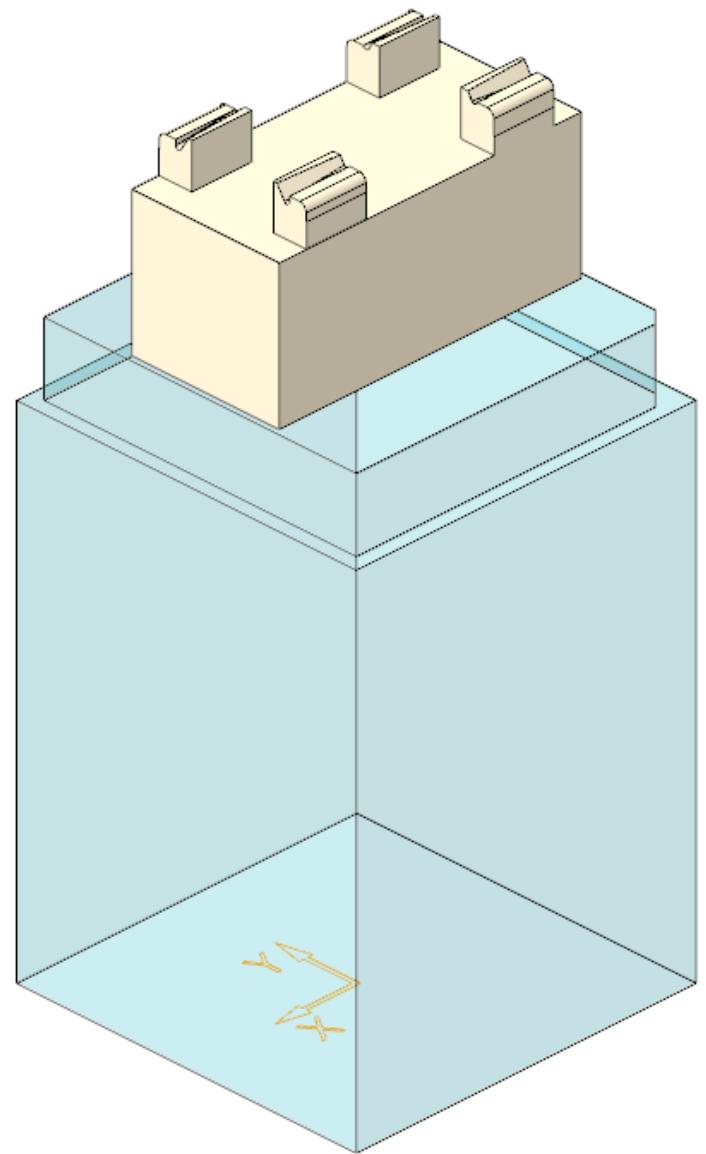
Electrode 13

Electrode 14

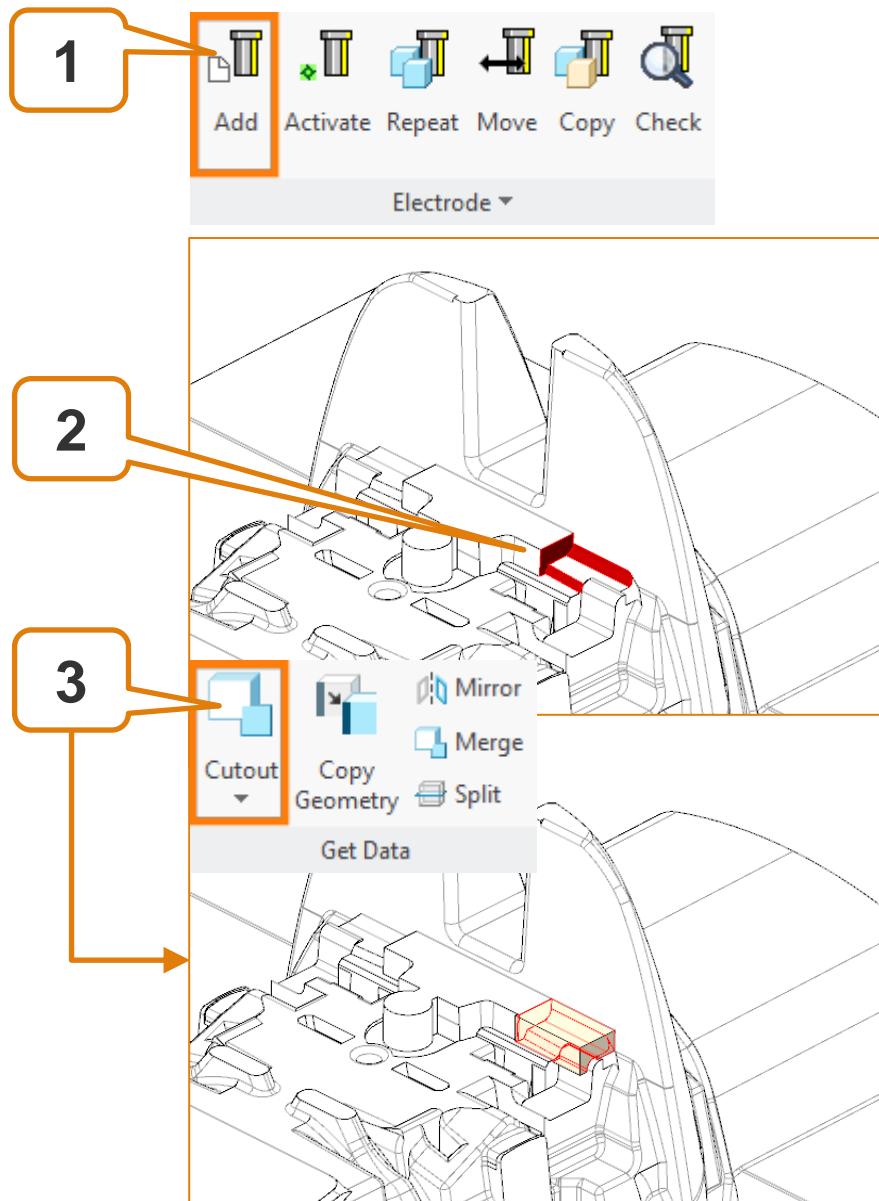


Topics...

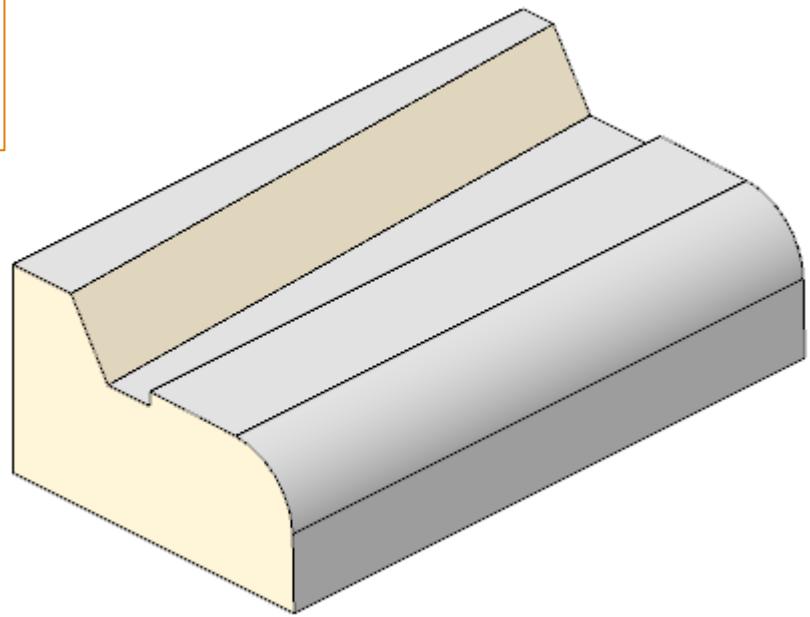
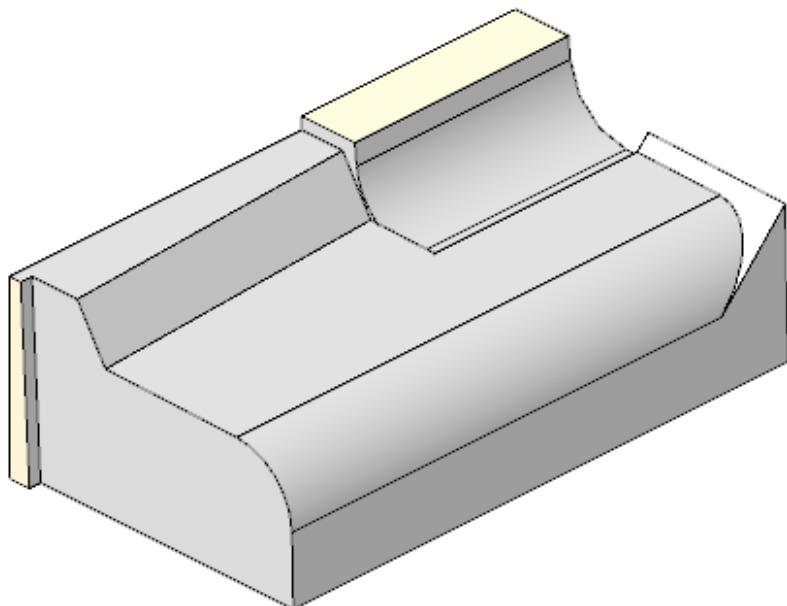
- Usage of Creo features



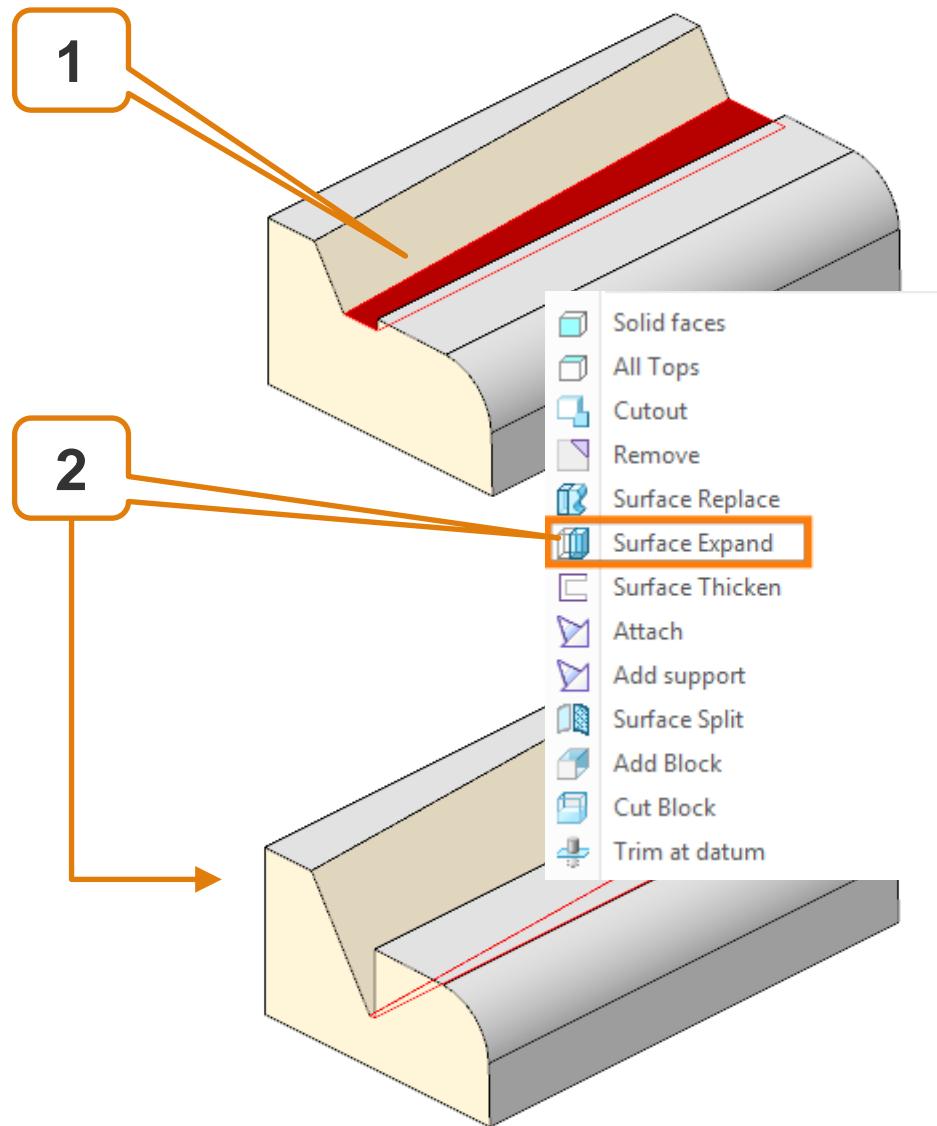
Electrode 7 – Get Data



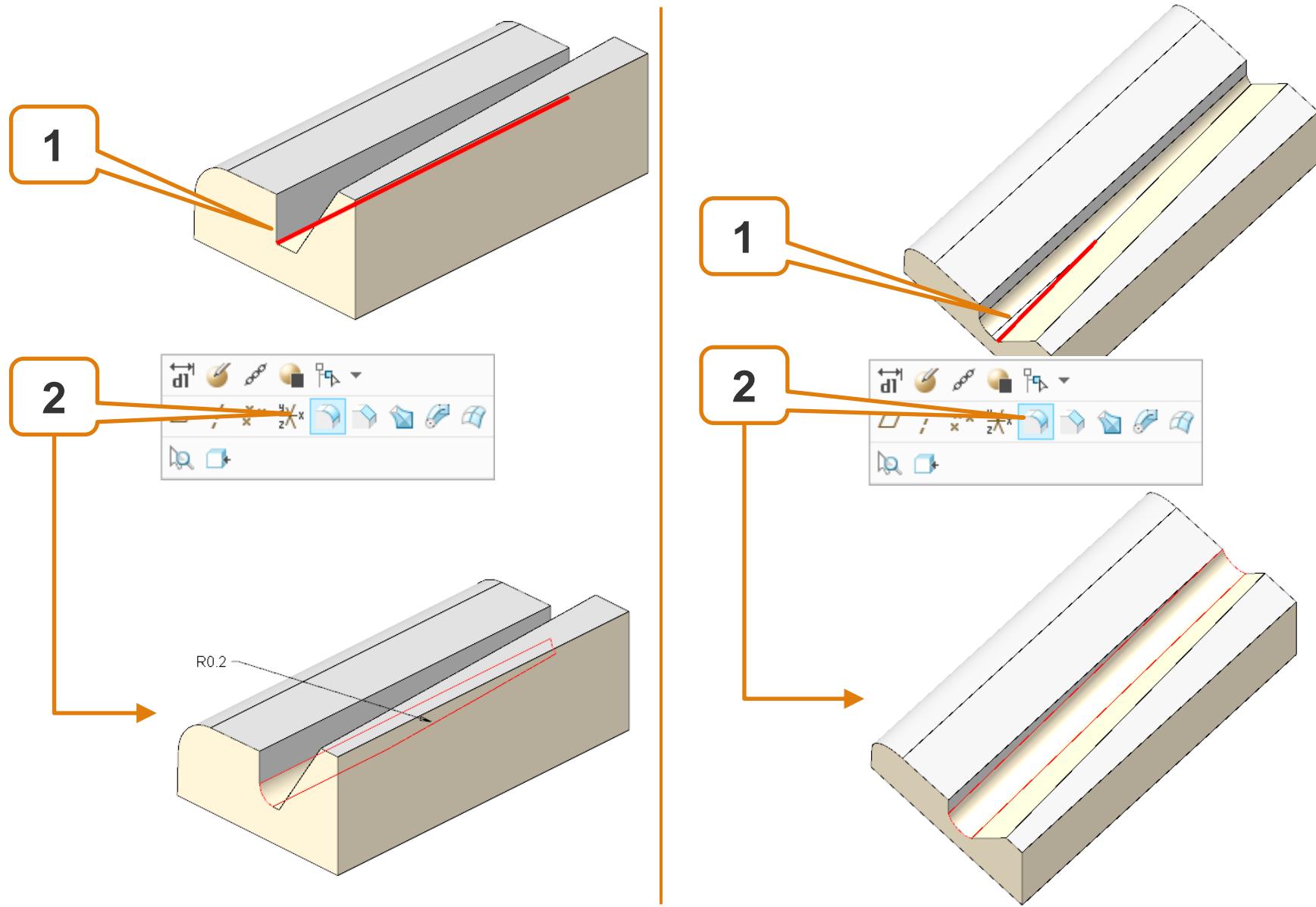
Electrode 7 – Detailing



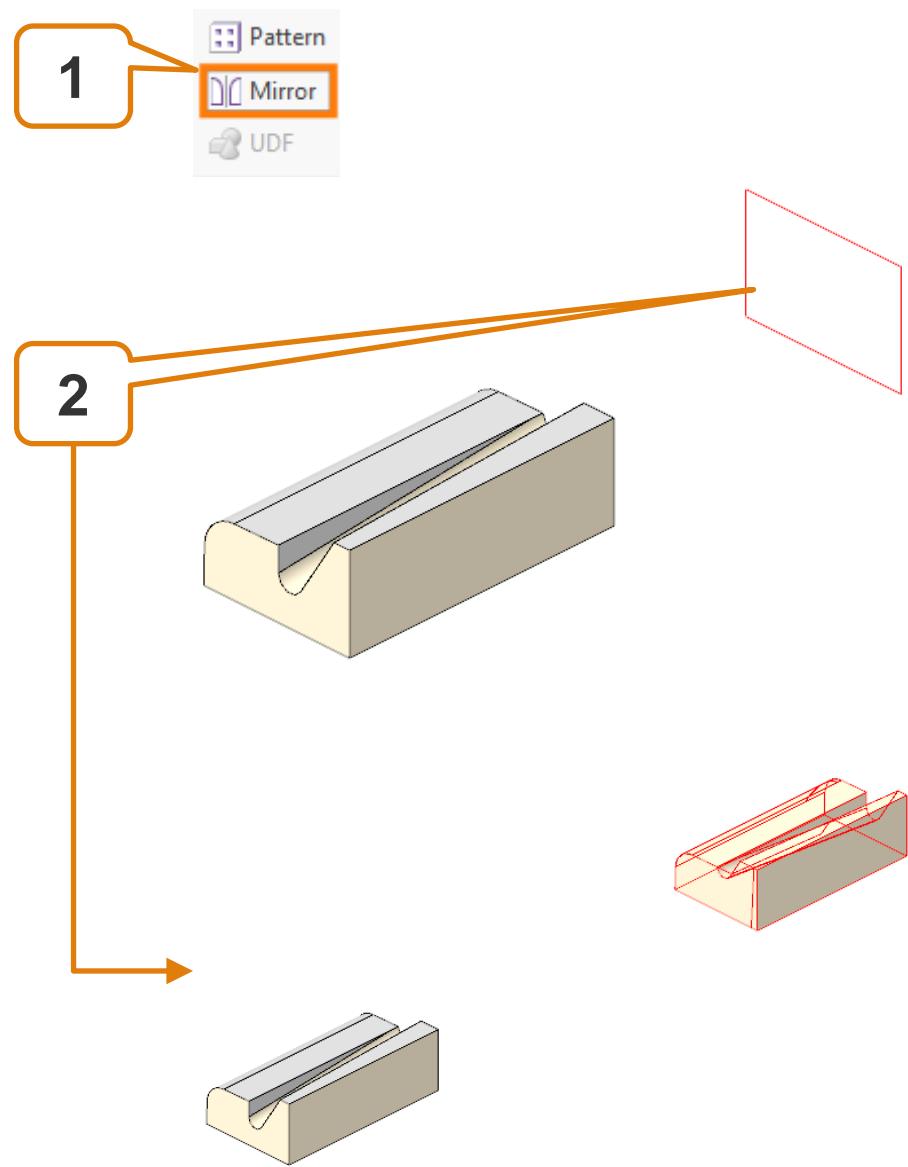
Electrode 7 – Detailing



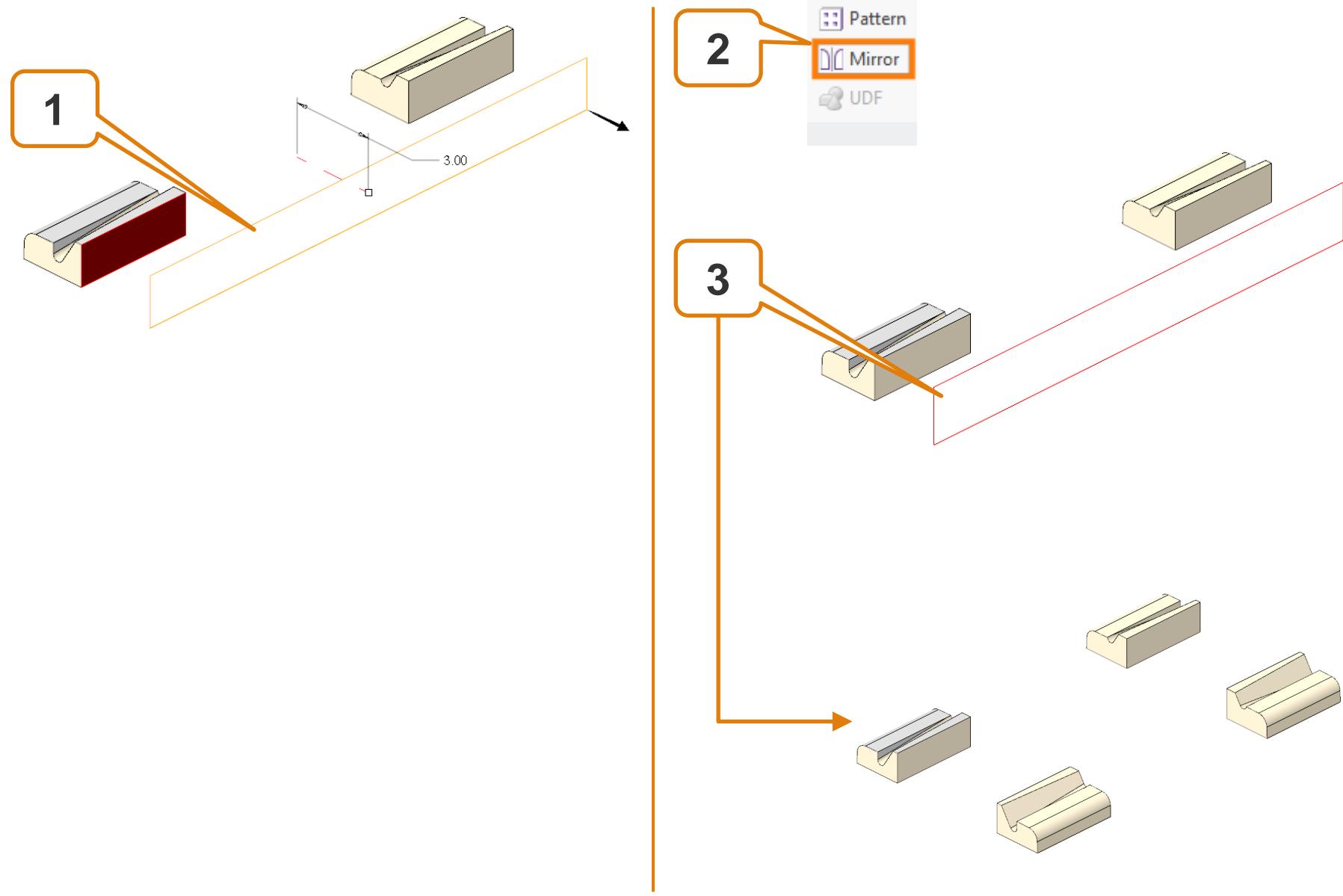
Electrode 7 – Detailing



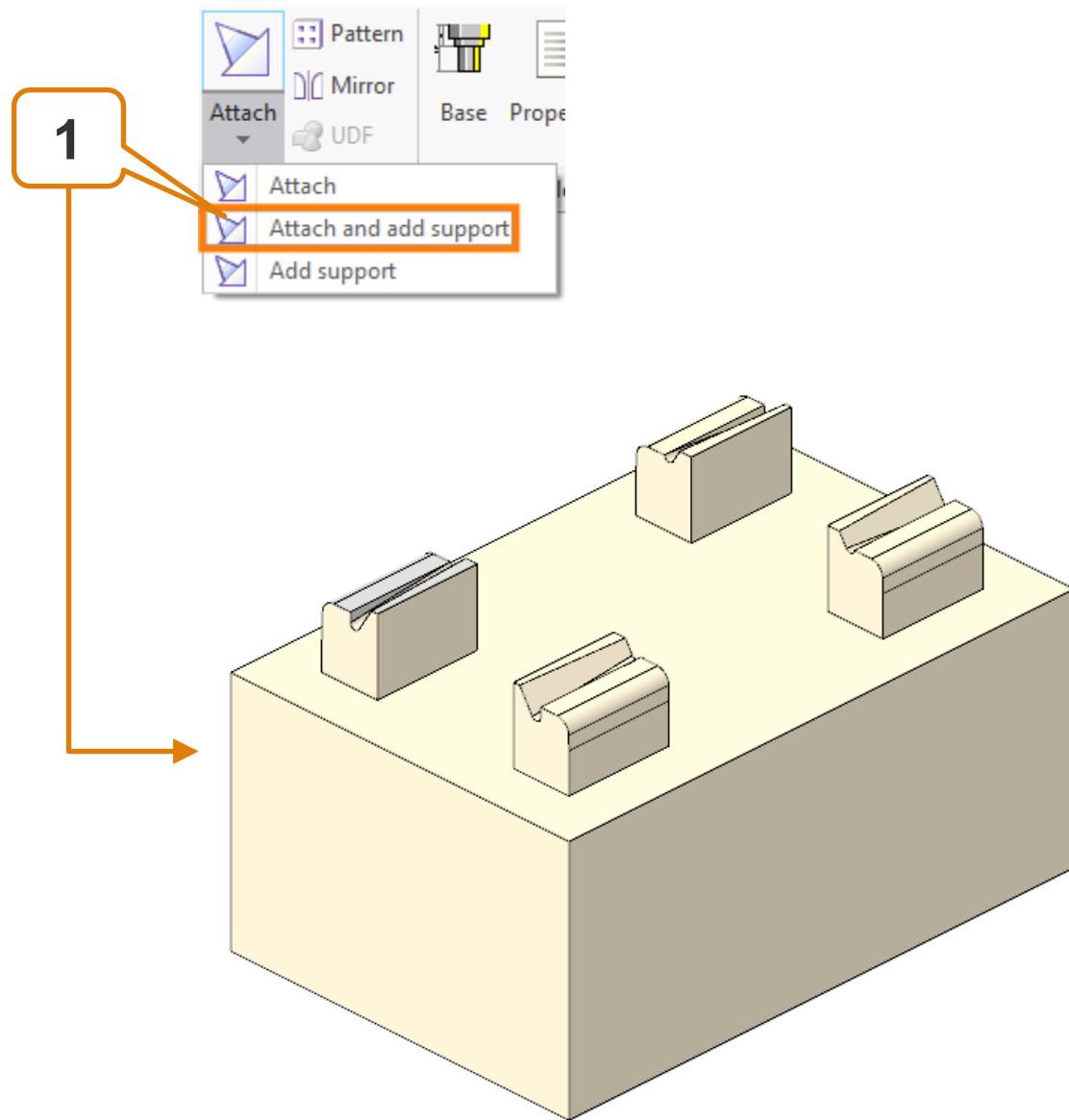
Electrode 7 – Mirror



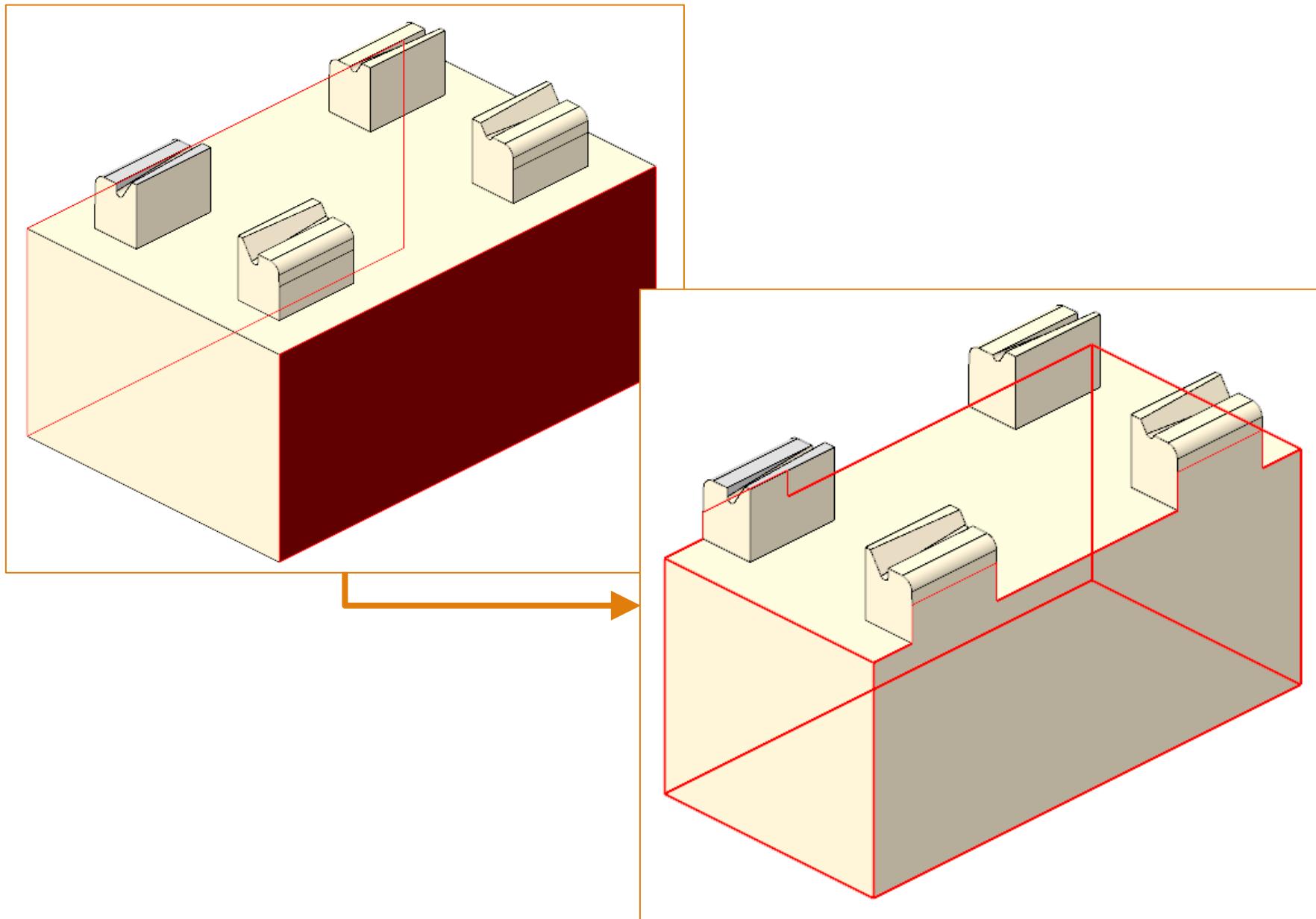
Electrode 7 – Mirror



Electrode 7 – Detailing

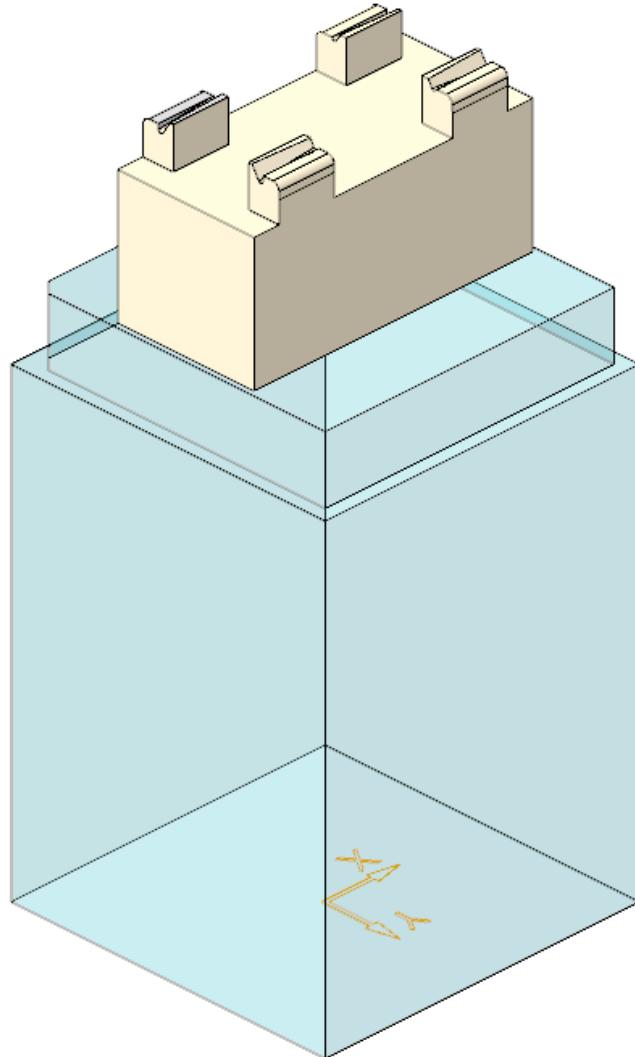


Electrode 7 – Detailing

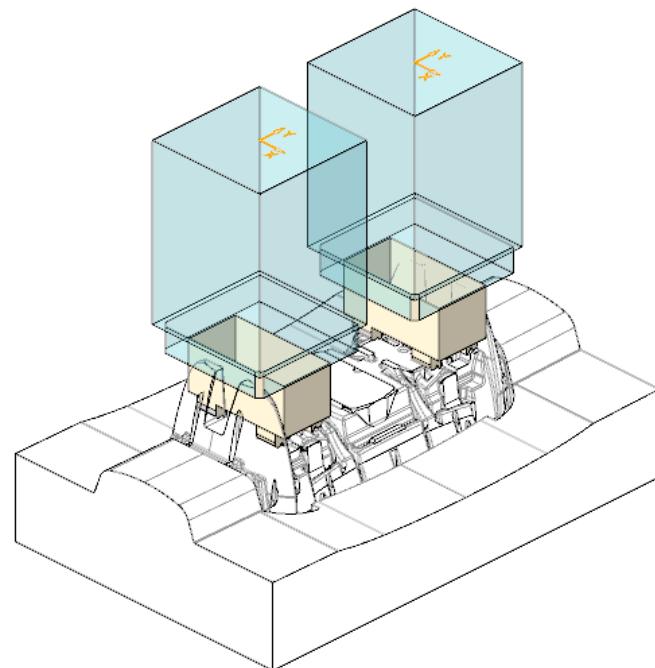
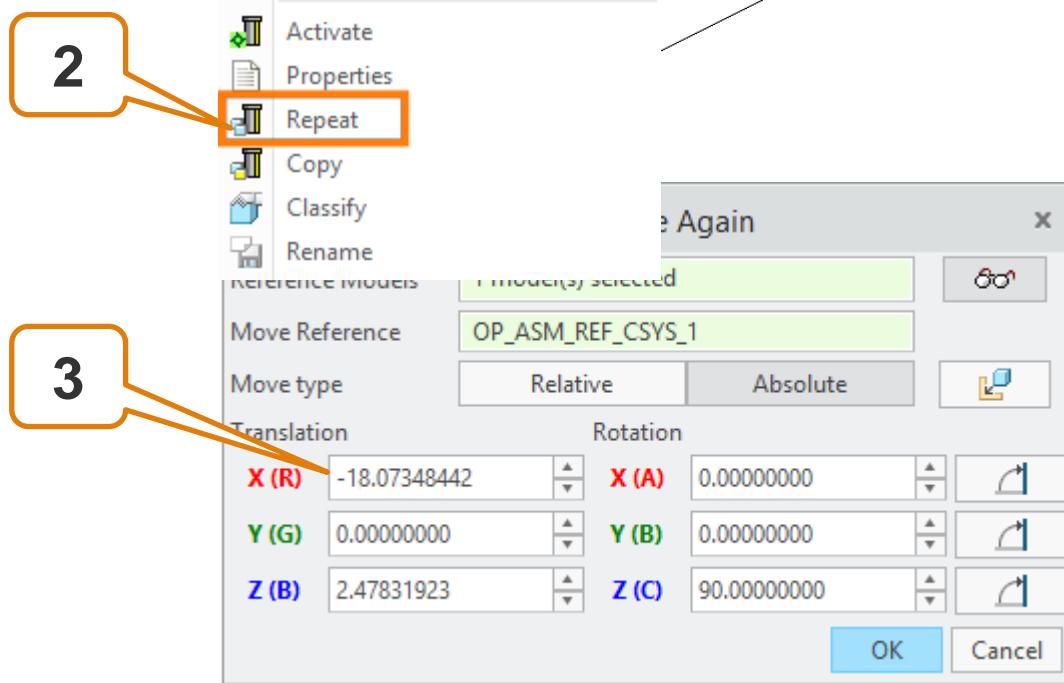
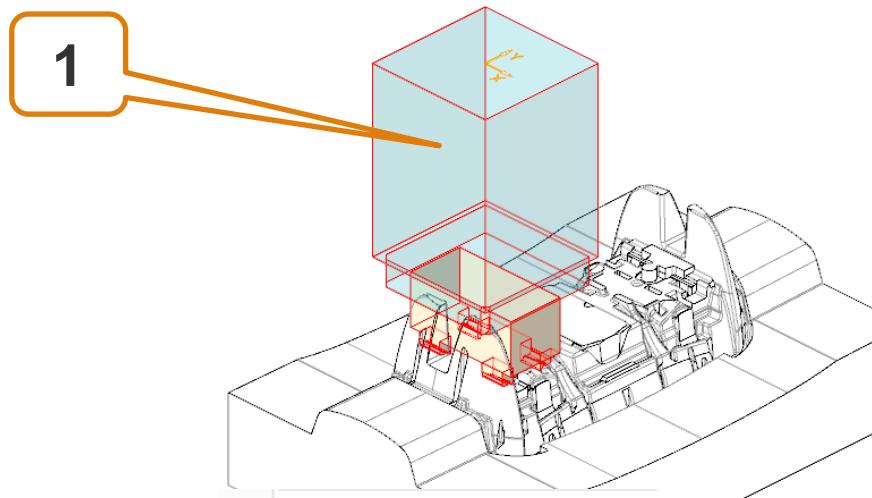


Electrode 7 - Base

- Add Base



Electrode 7 – Assemble Again



Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

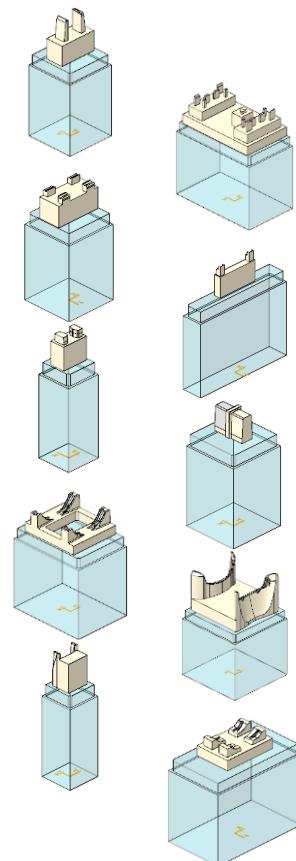
Electrode 10

Electrode 11

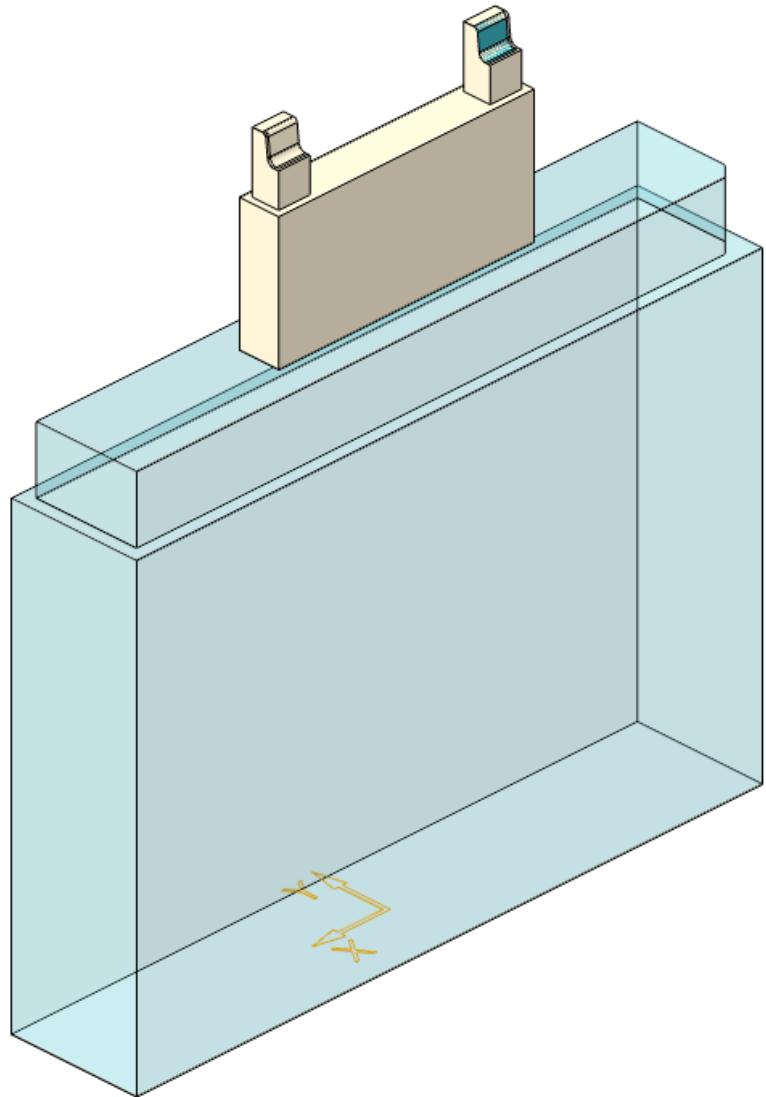
Electrode 12

Electrode 13

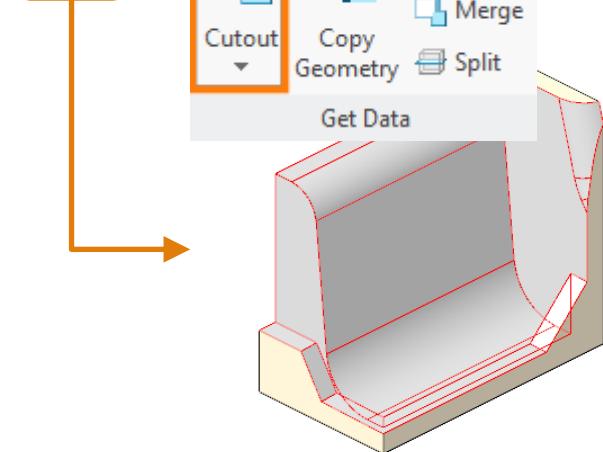
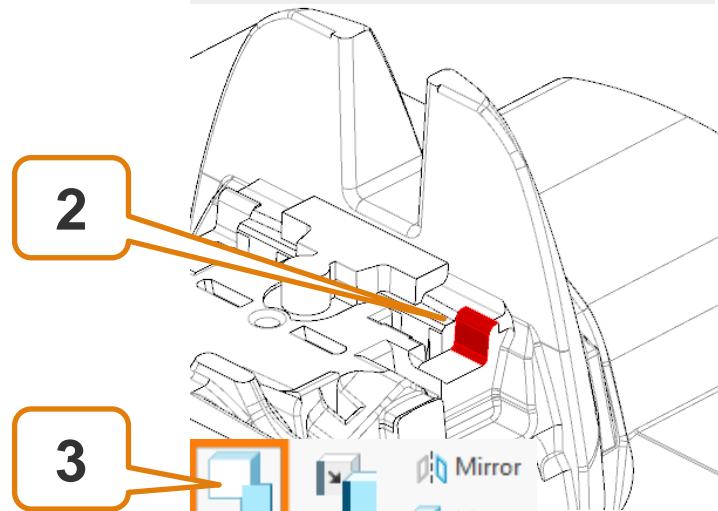
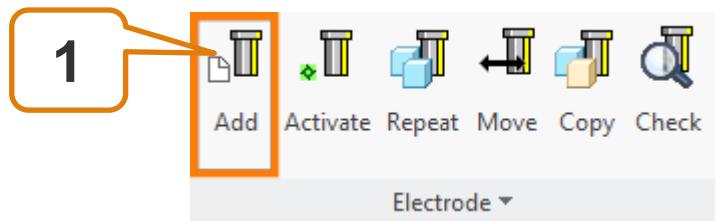
Electrode 14



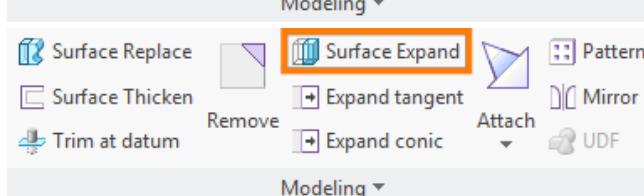
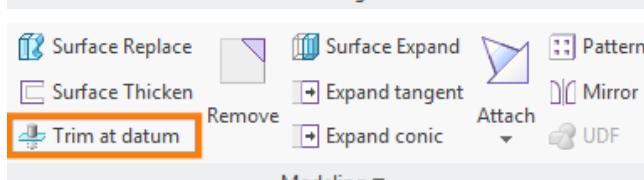
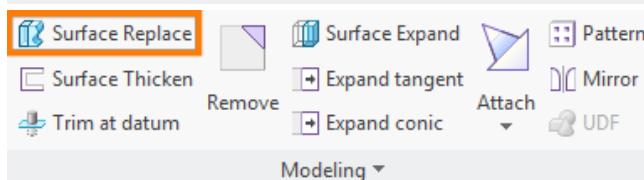
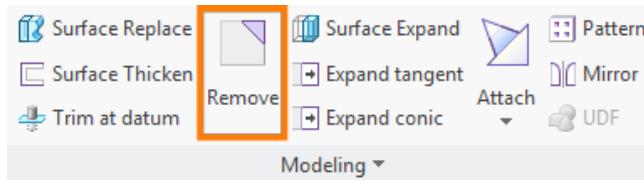
Topics...



Electrode 8 – Get Data

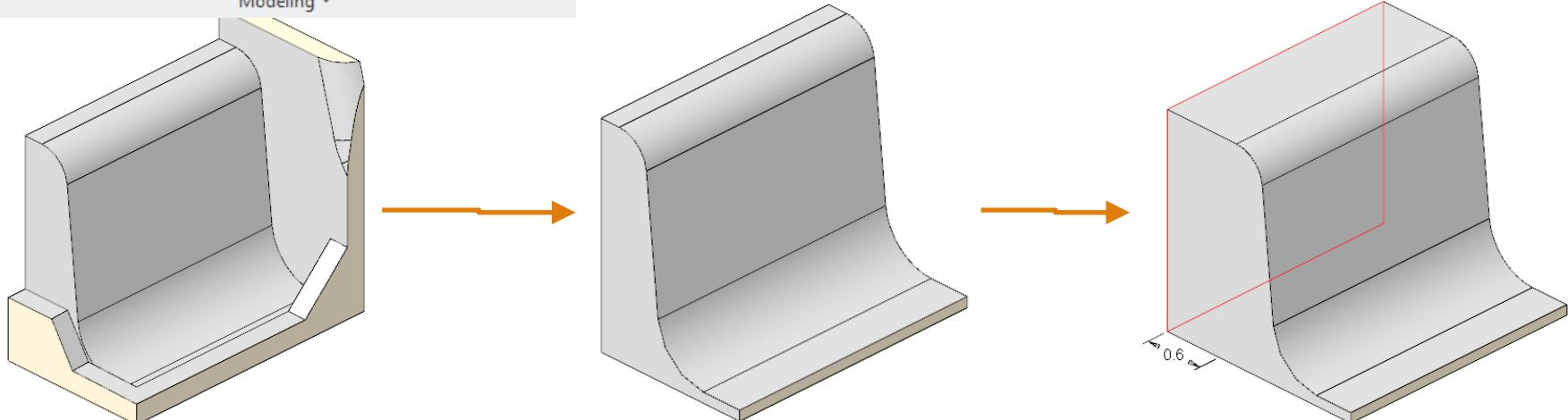


Electrode 8 – Detailing

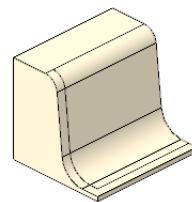
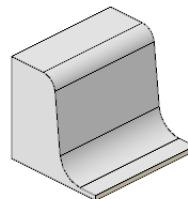
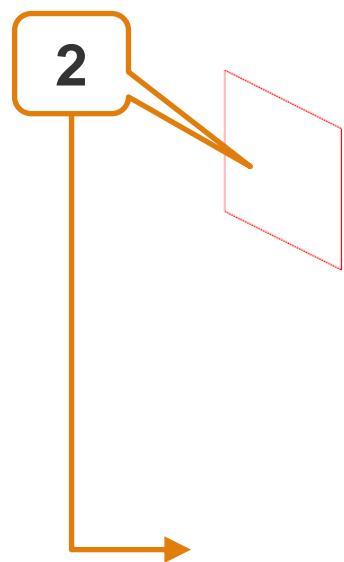
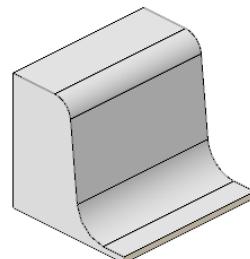


Detailing using...

- Remove
- Replace surface
- Trim at datum
- Expand

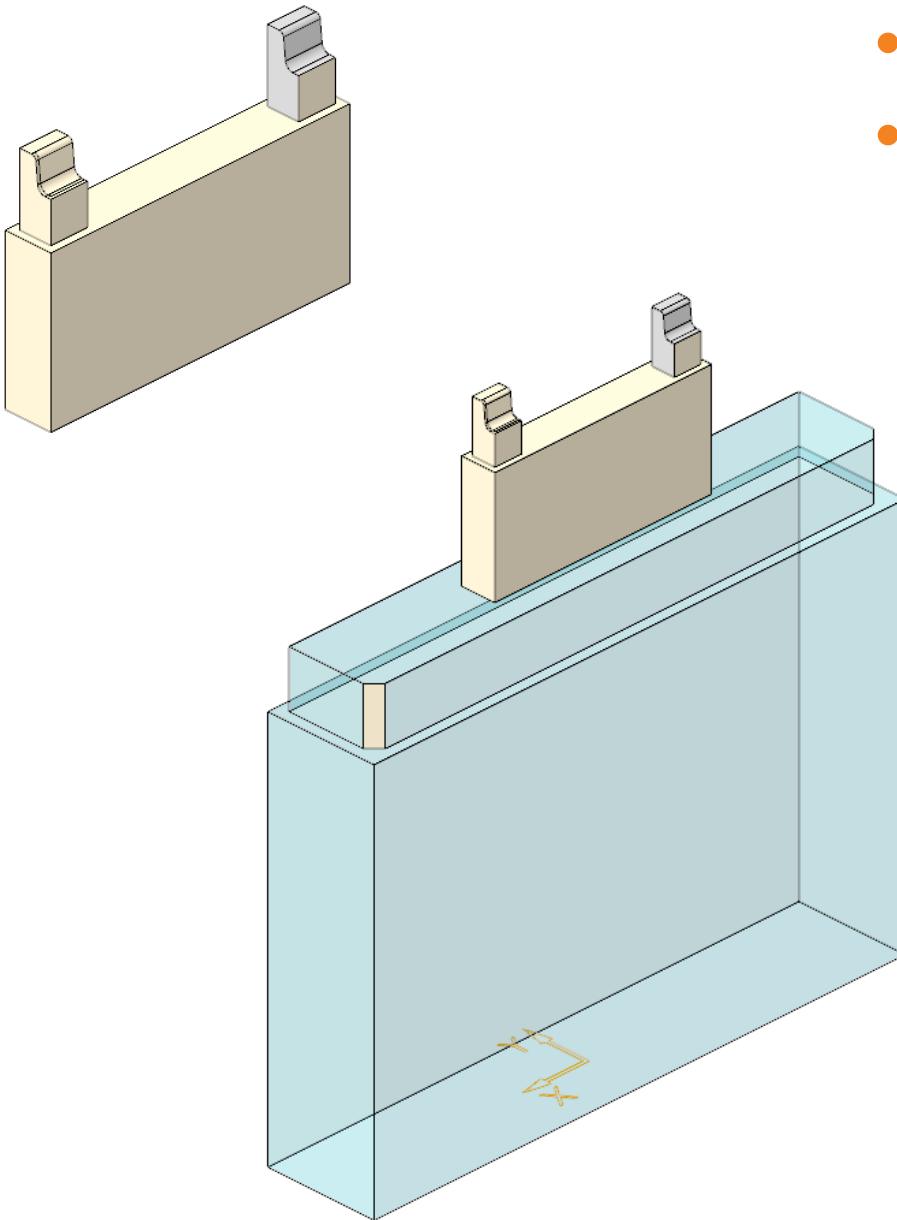


Electrode 8 – Mirror

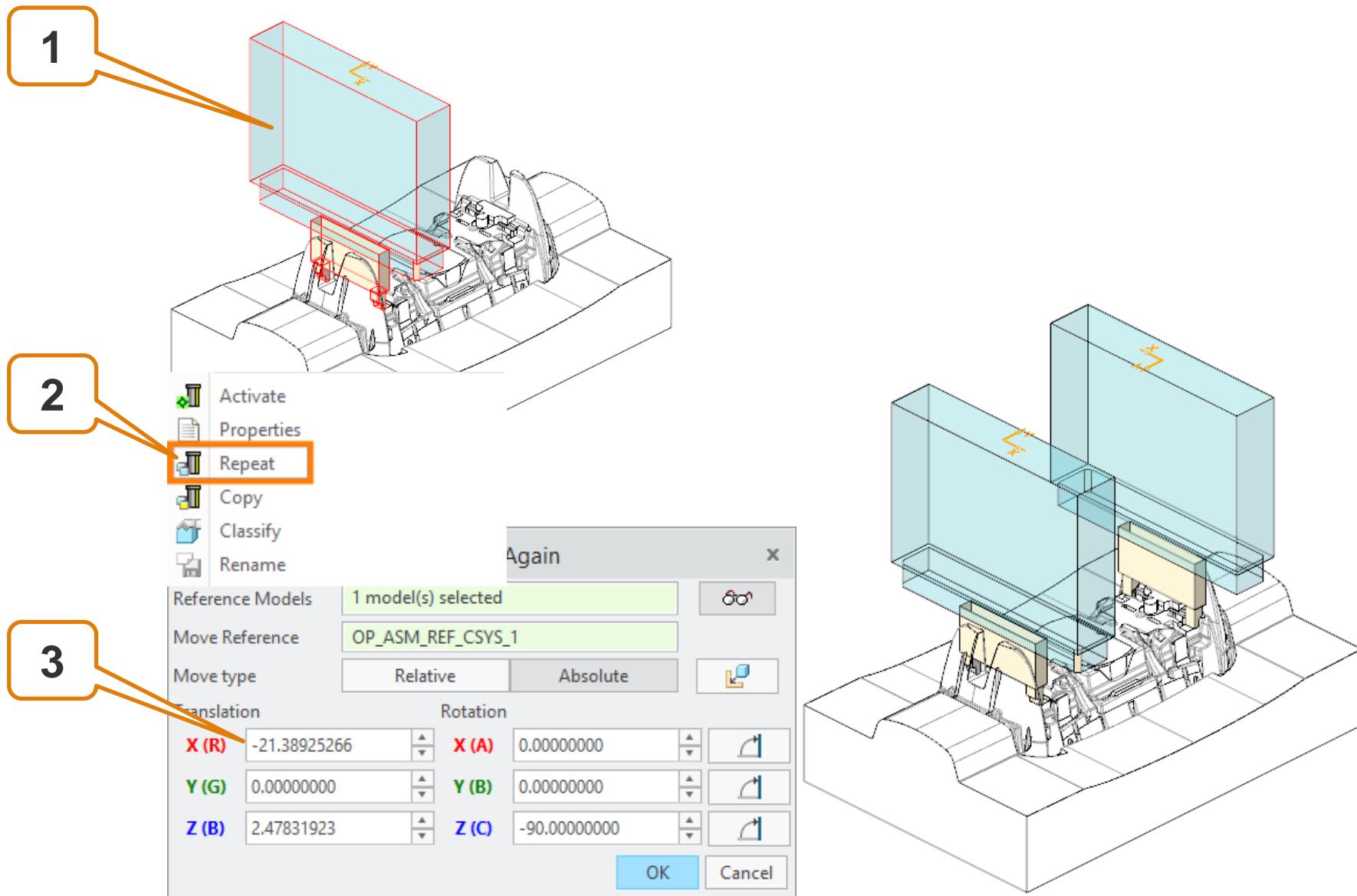


Electrode 8 - Finish

- Create support
- Finish electrode with base



Electrode 8 – Assemble Again



Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

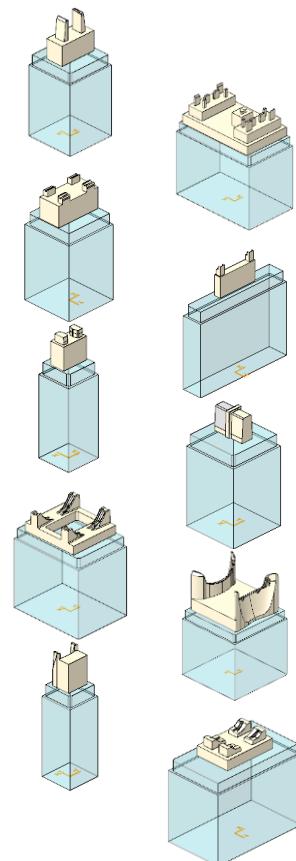
Electrode 10

Electrode 11

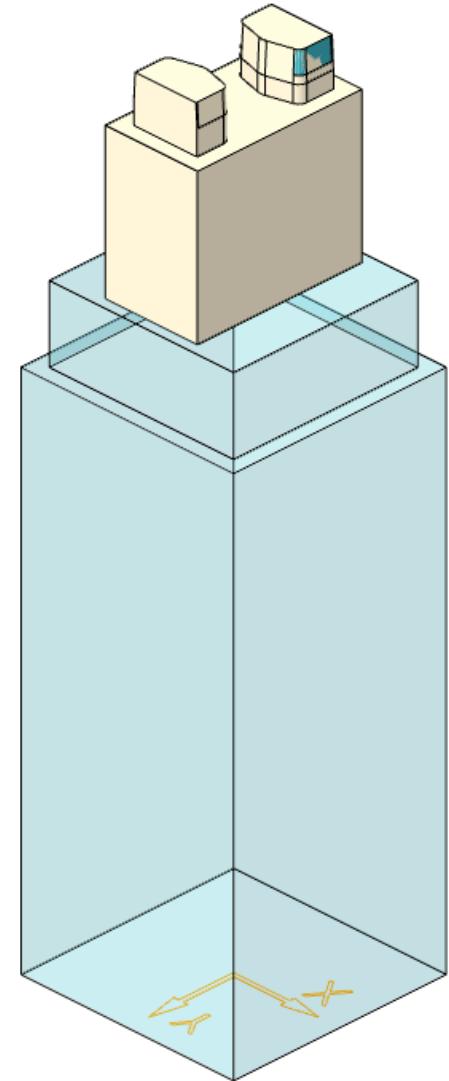
Electrode 12

Electrode 13

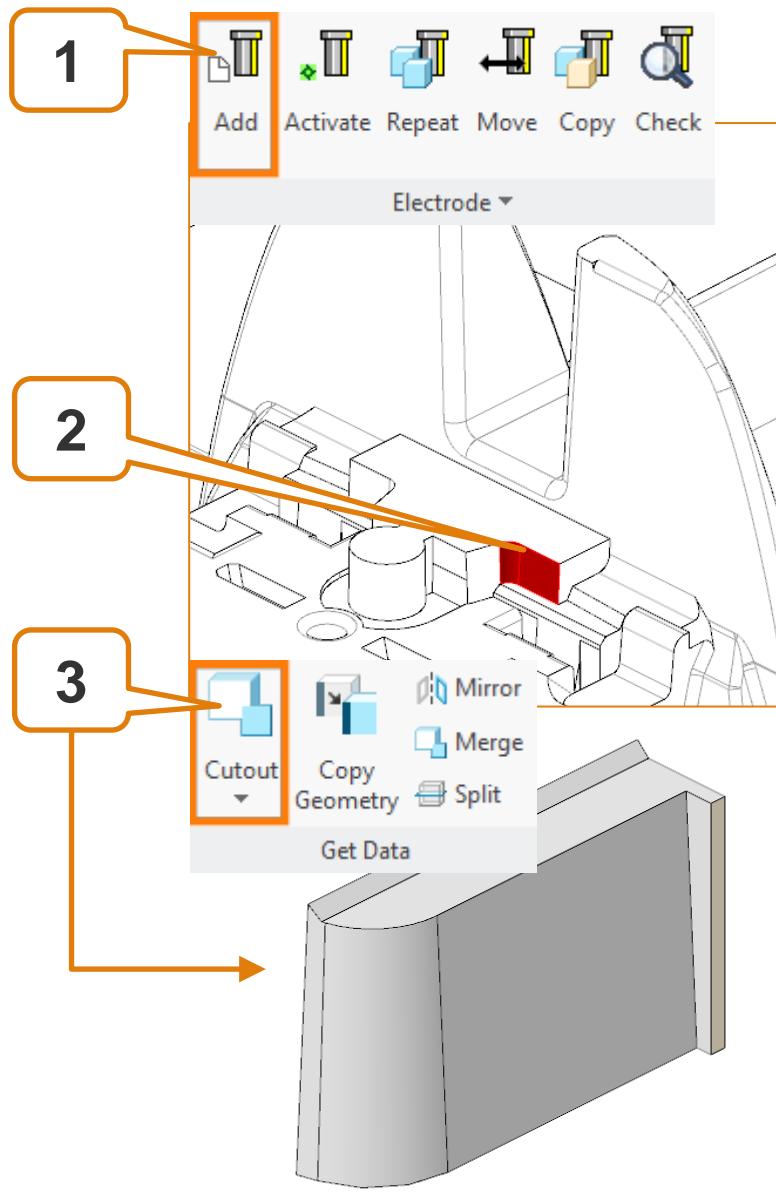
Electrode 14



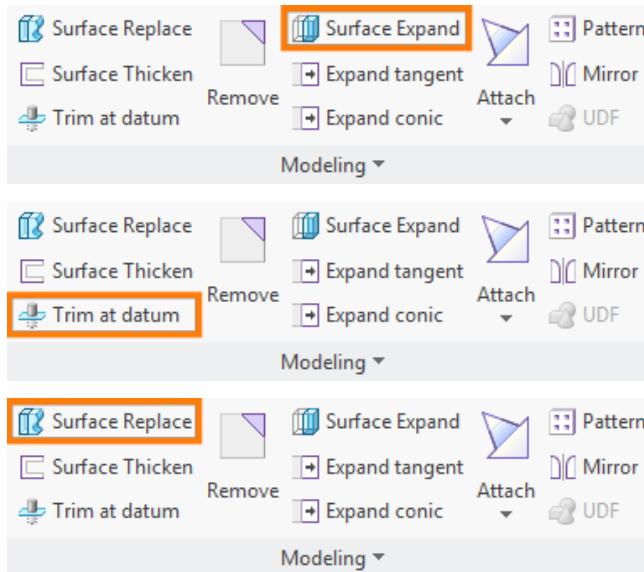
Topics...



Electrode 9 – Get Data

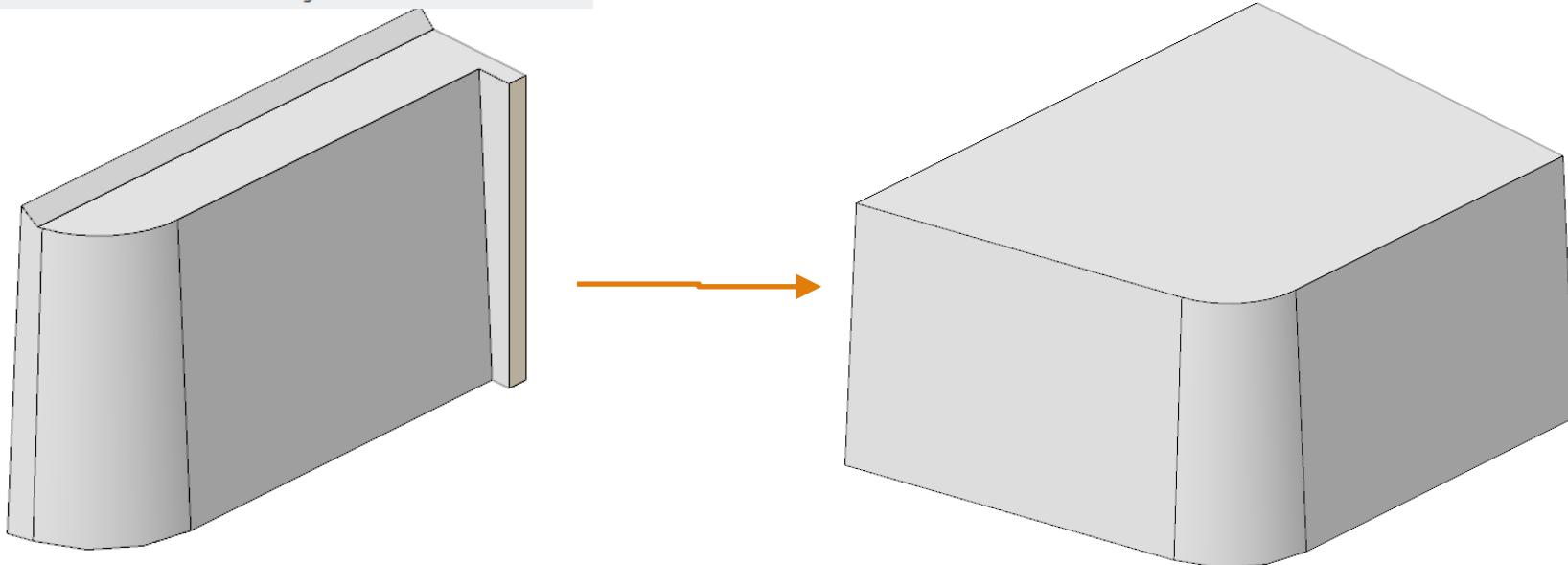


Electrode 9 – Detailing

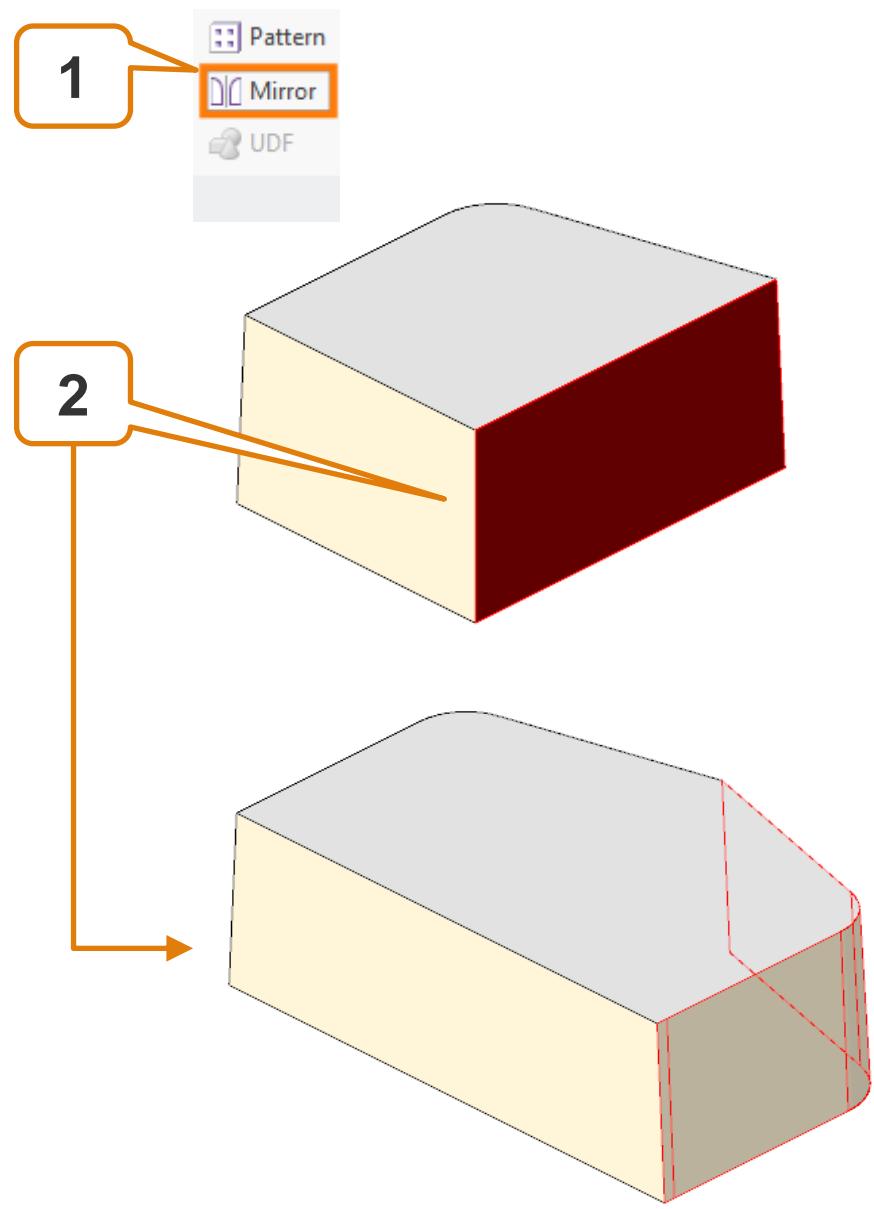


Detailing using...

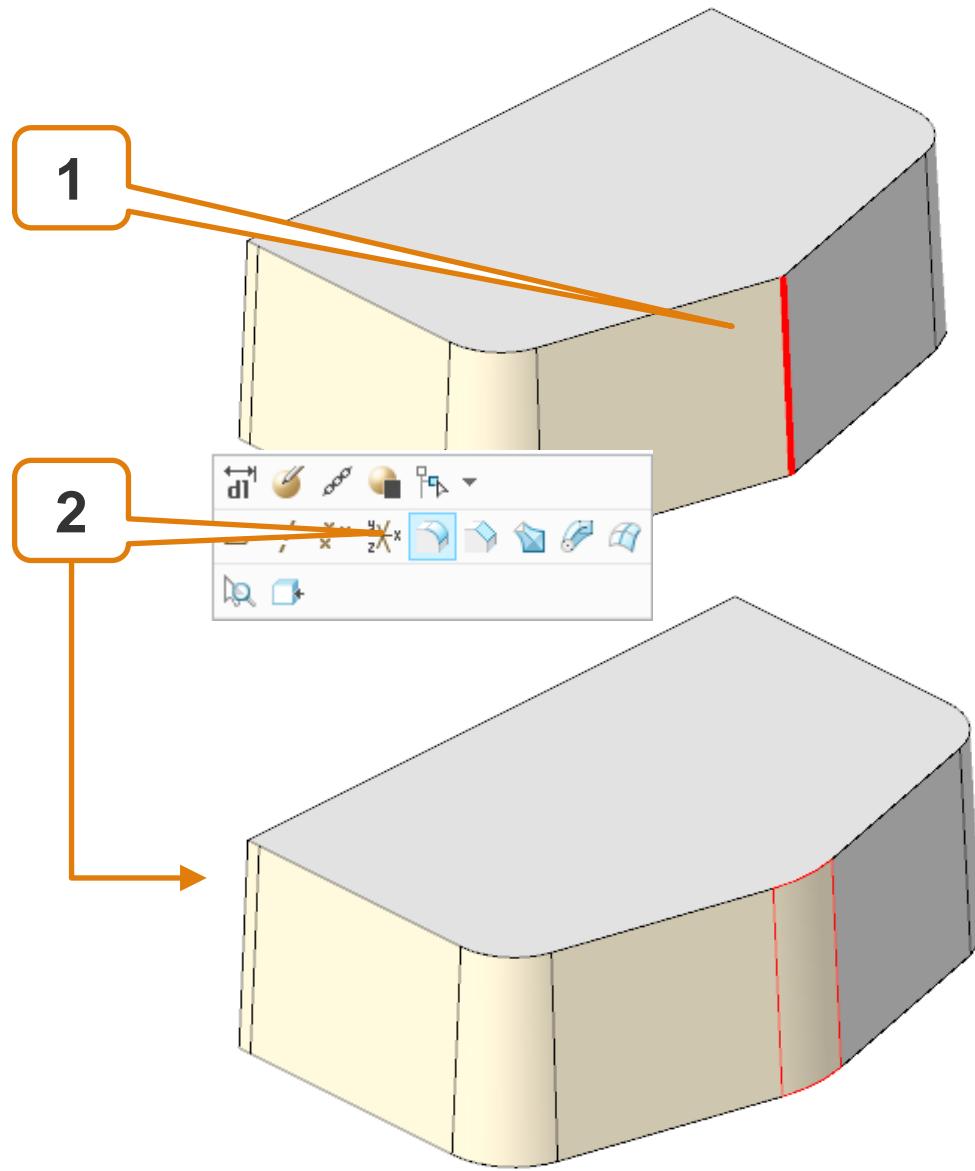
- **Expand**
- **Trim at datum**
- **Replace surface**



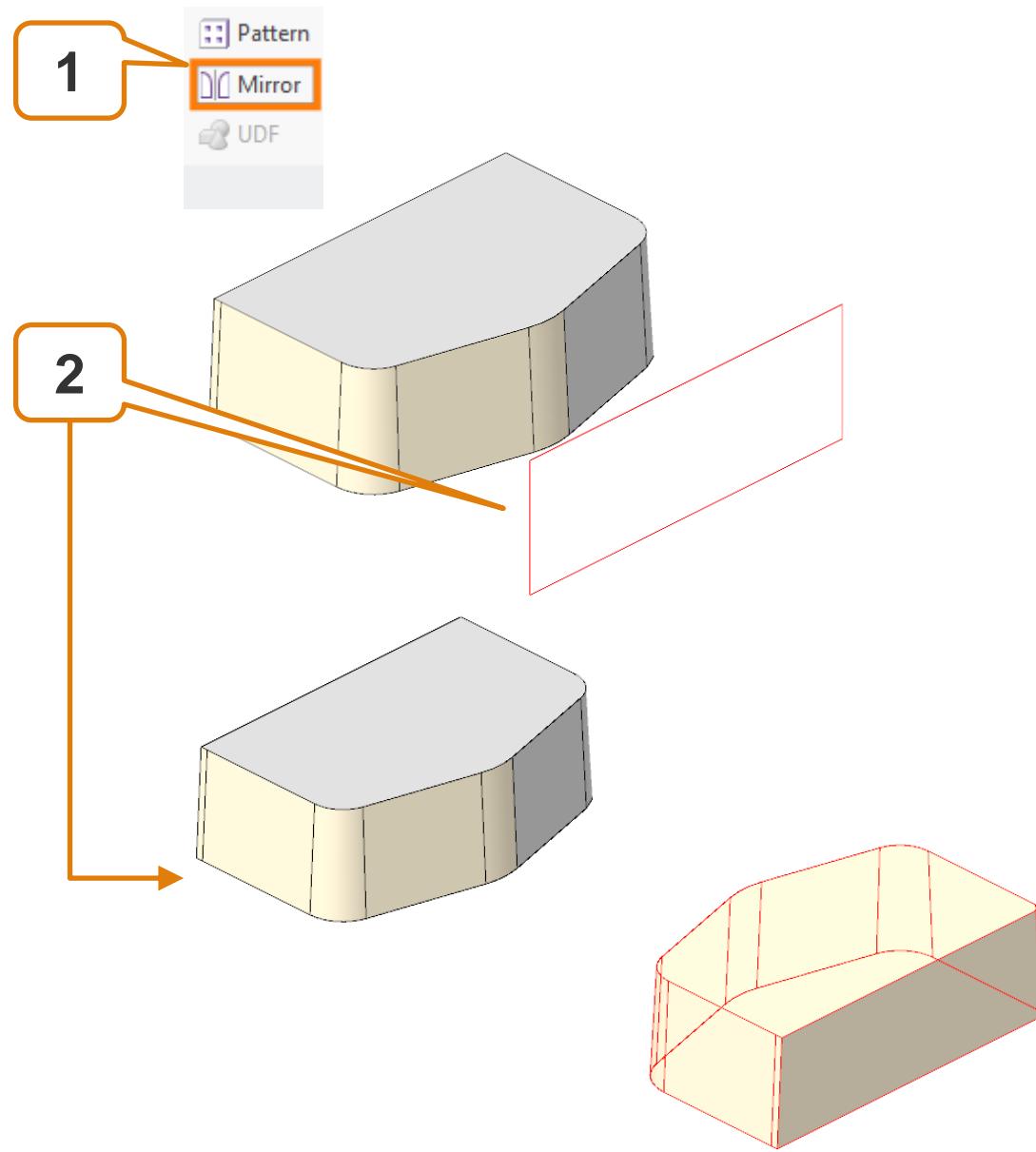
Electrode 9 – Mirror



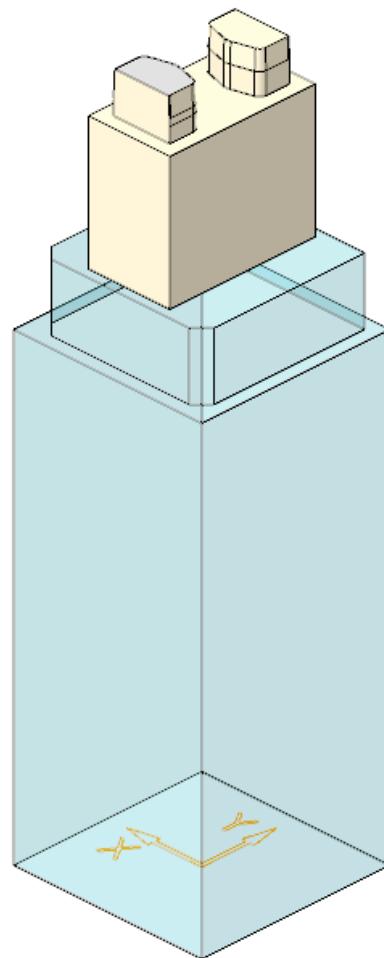
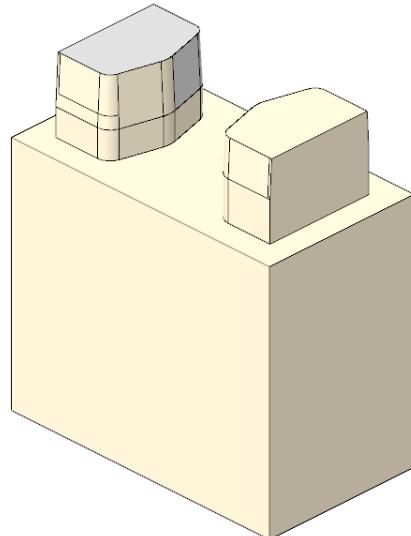
Electrode 9 – Detailing



Electrode 9 – Mirror

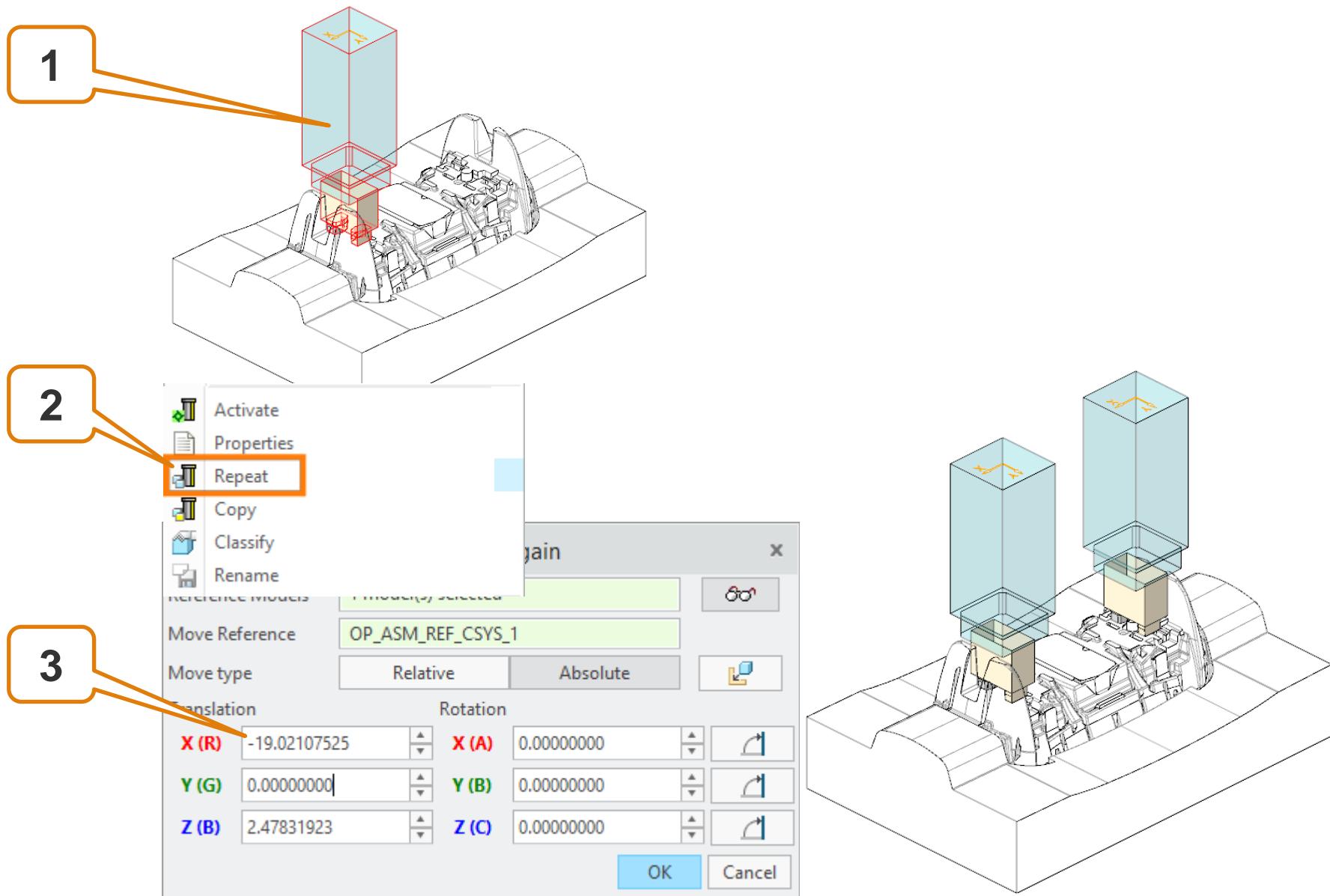


Electrode 9 - Finish



- Create support
- Finish electrode with base

Electrode 9 – Assemble Again



Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

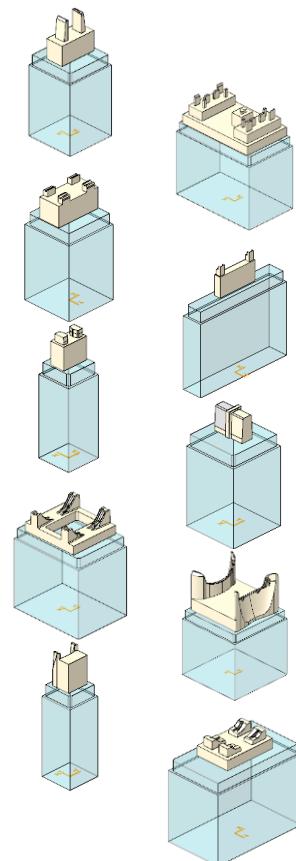
Electrode 10

Electrode 11

Electrode 12

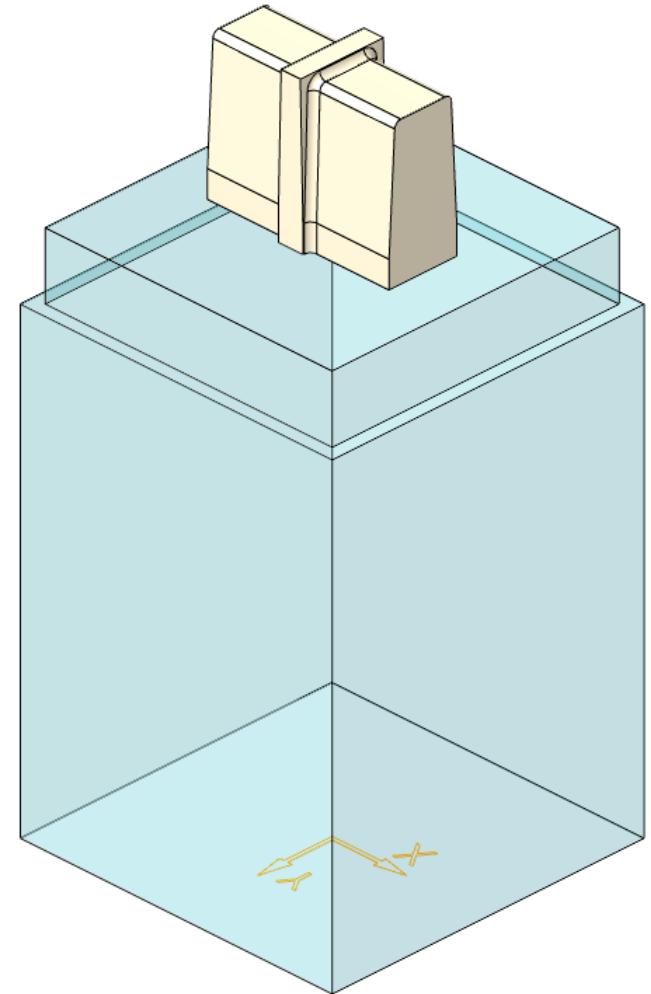
Electrode 13

Electrode 14

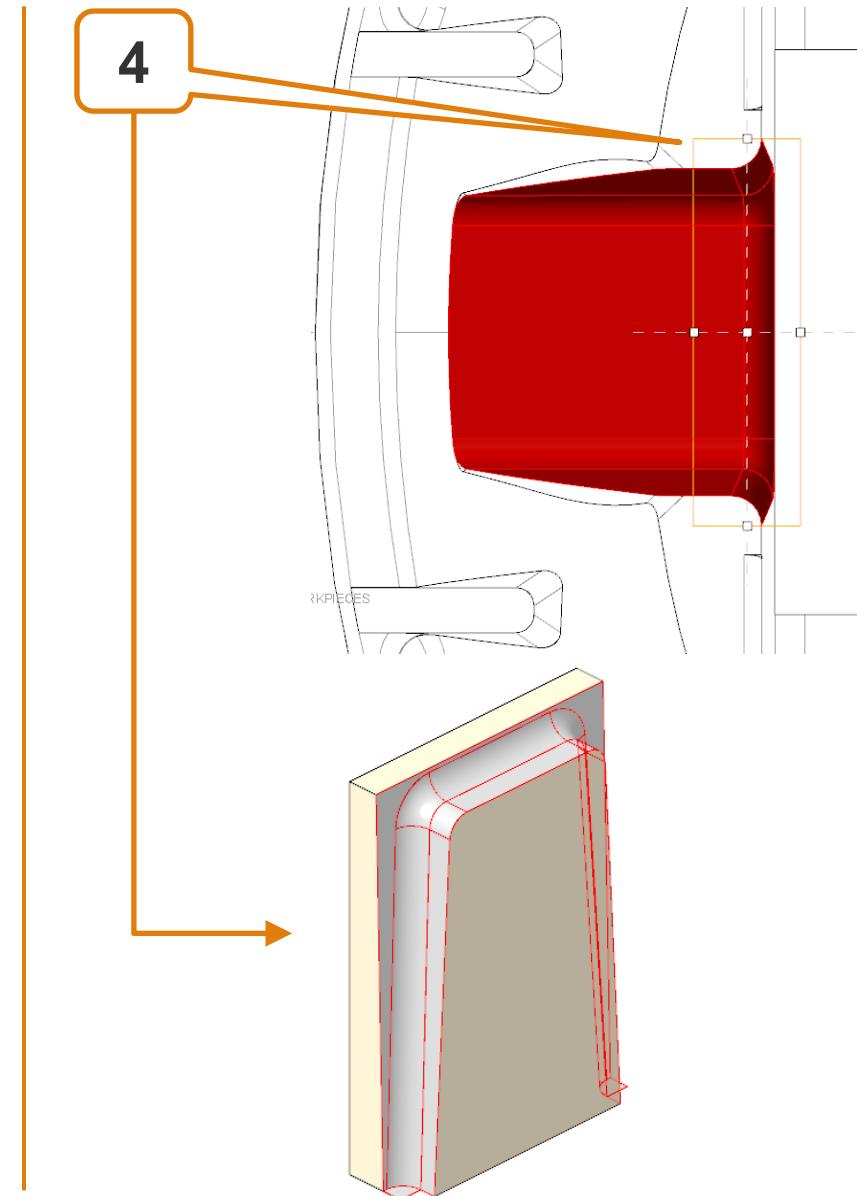
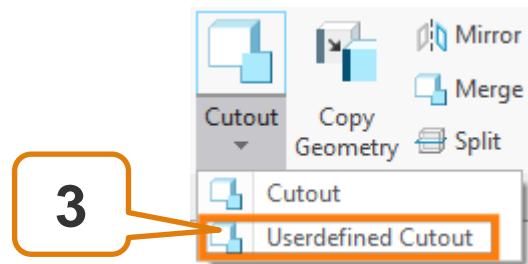
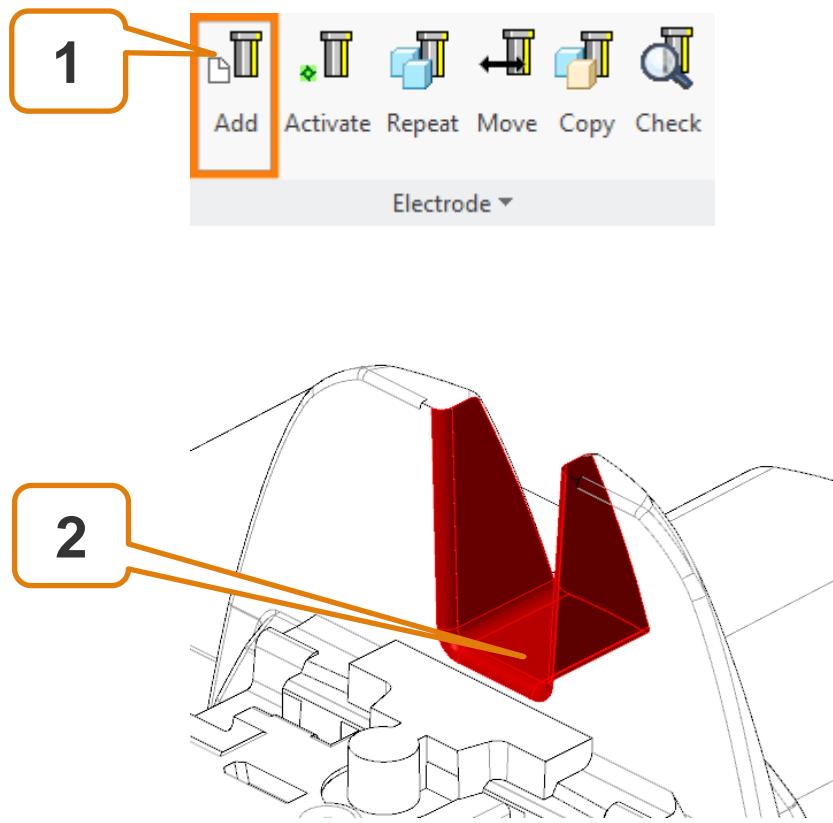


Topics...

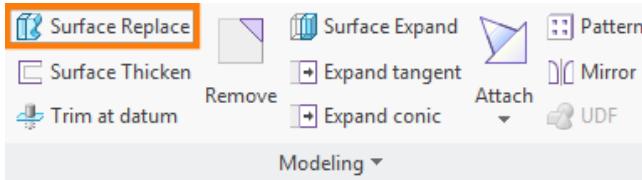
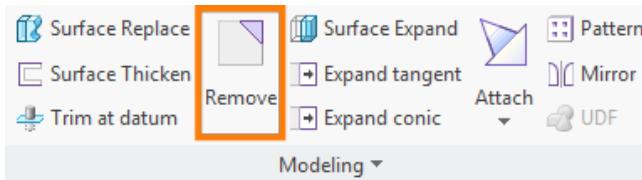
- **Command ,User defined Cutout ‘**



Electrode 10 – Get Data

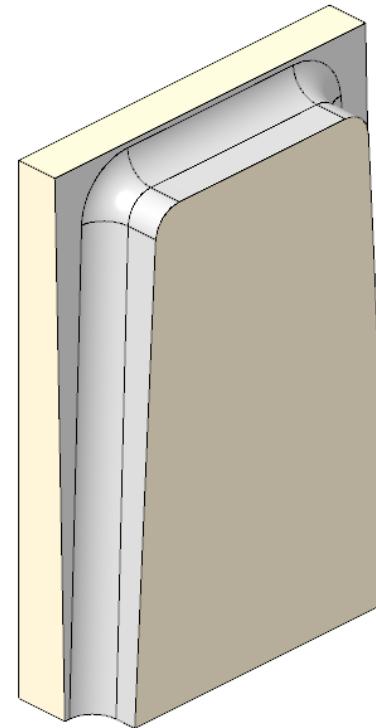
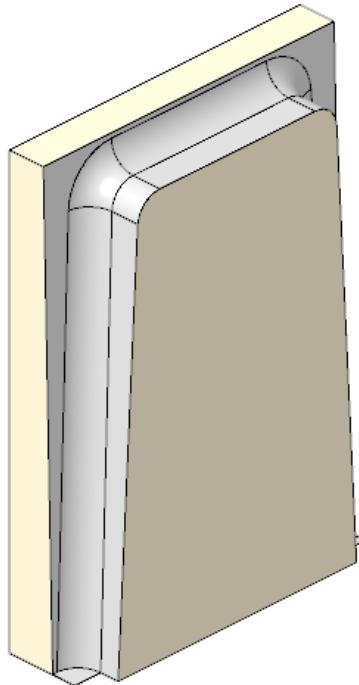


Electrode 10 – Detailing

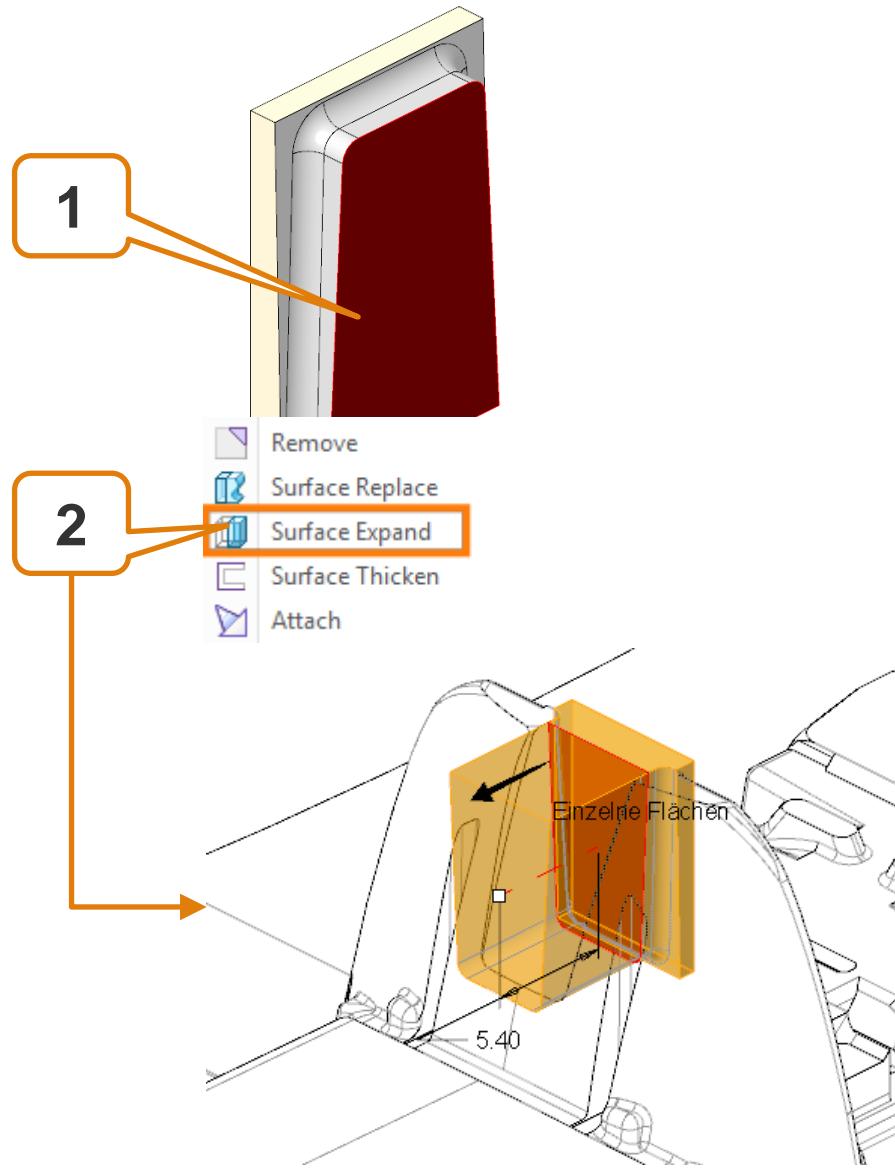


Detailing using...

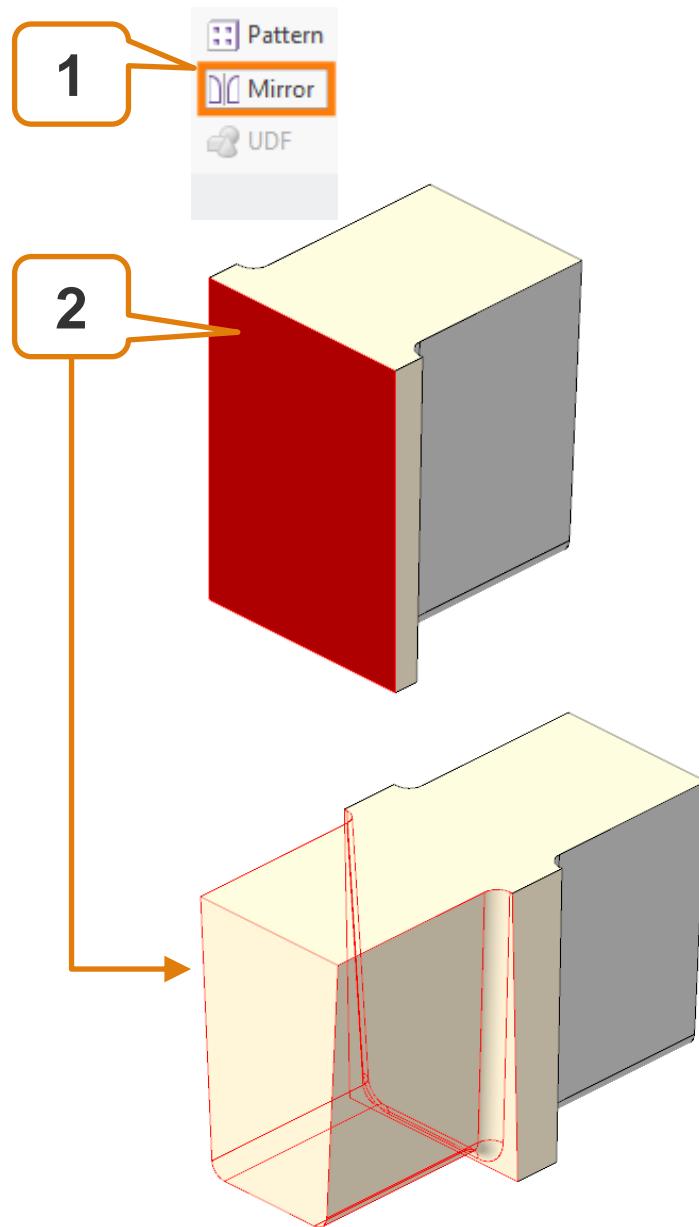
- Replace surface or
- Remove



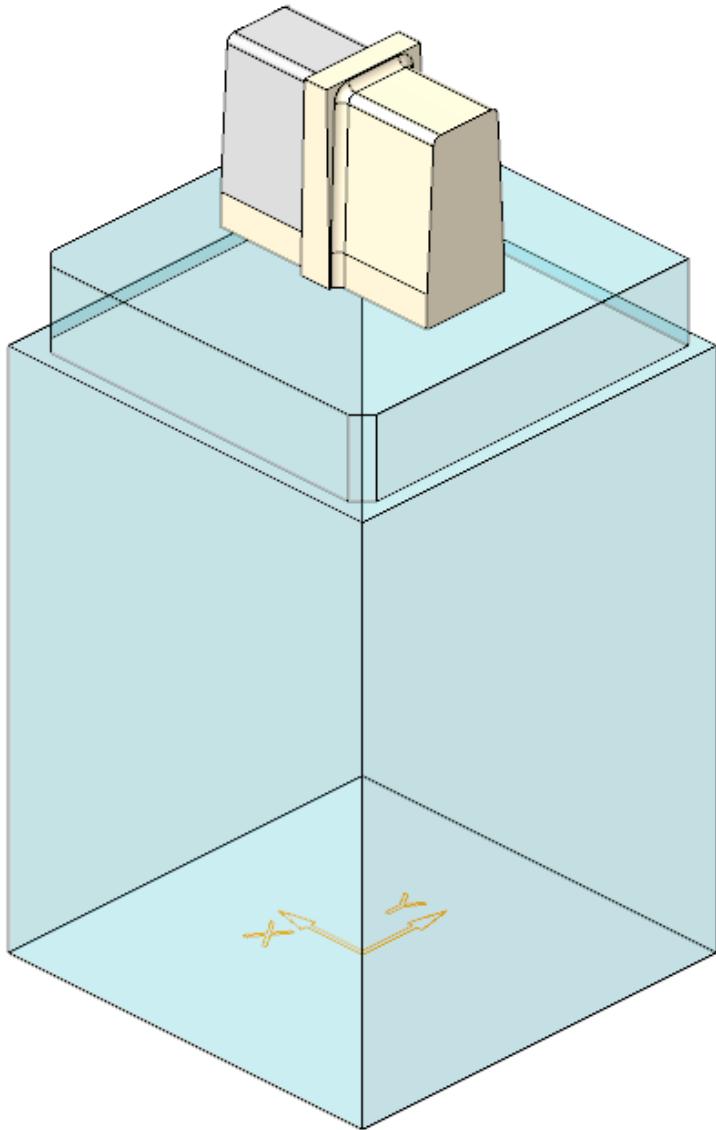
Electrode 10 – Detailing



Electrode 10 – Mirror

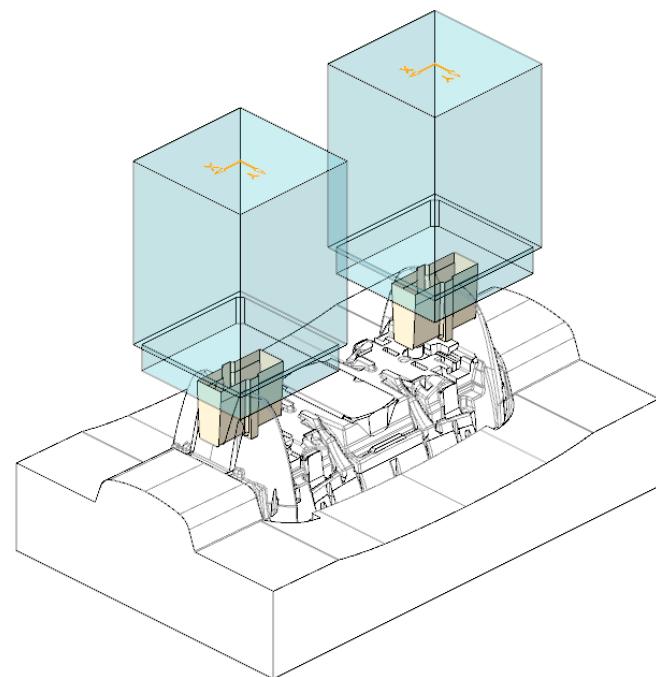
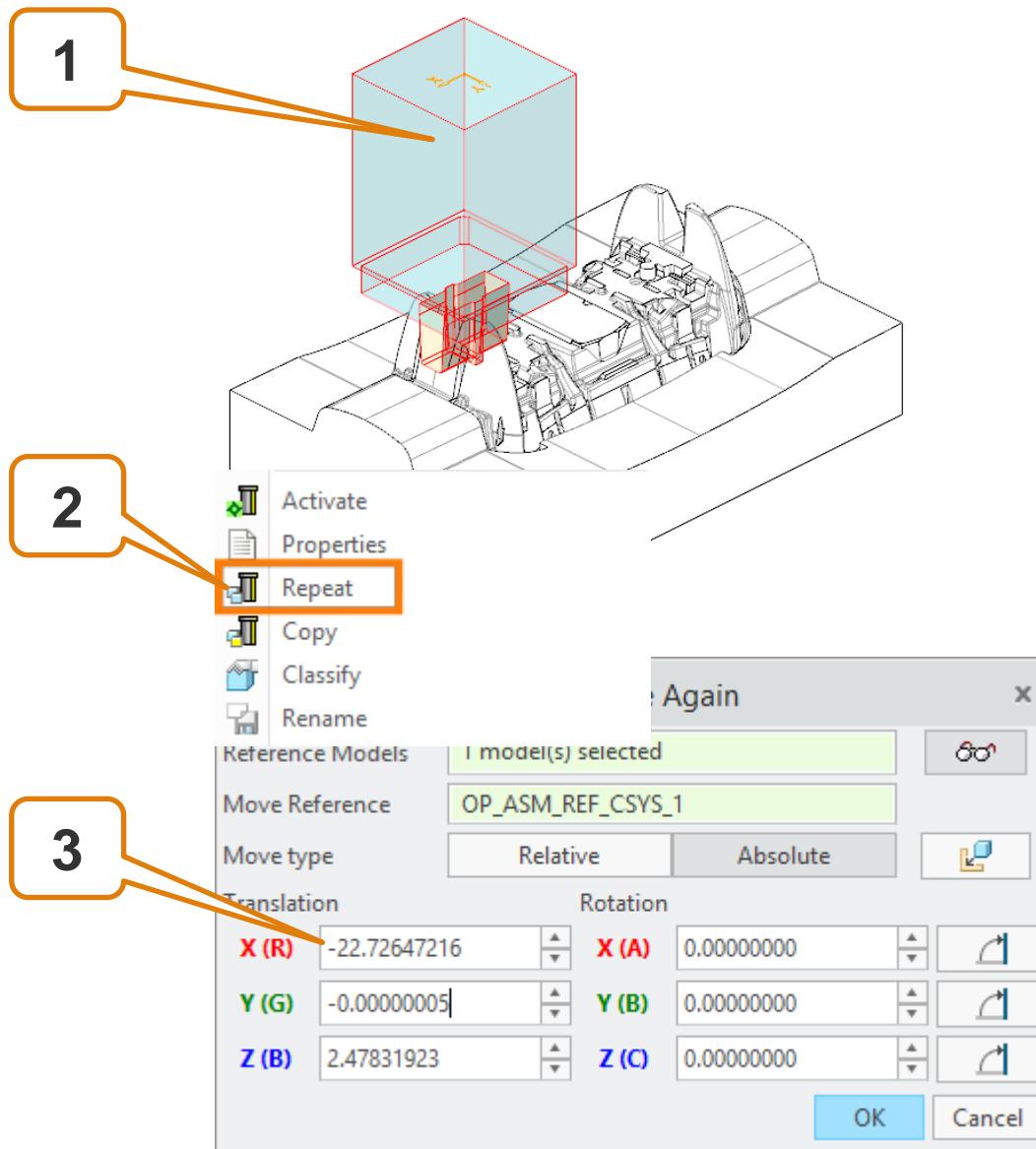


Electrode 10 - Finish



- **Finish electrode with base**

Electrode 10 – Assemble Again



Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

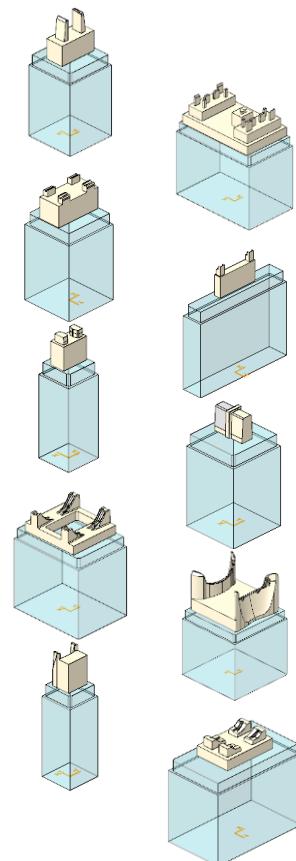
Electrode 10

Electrode 11

Electrode 12

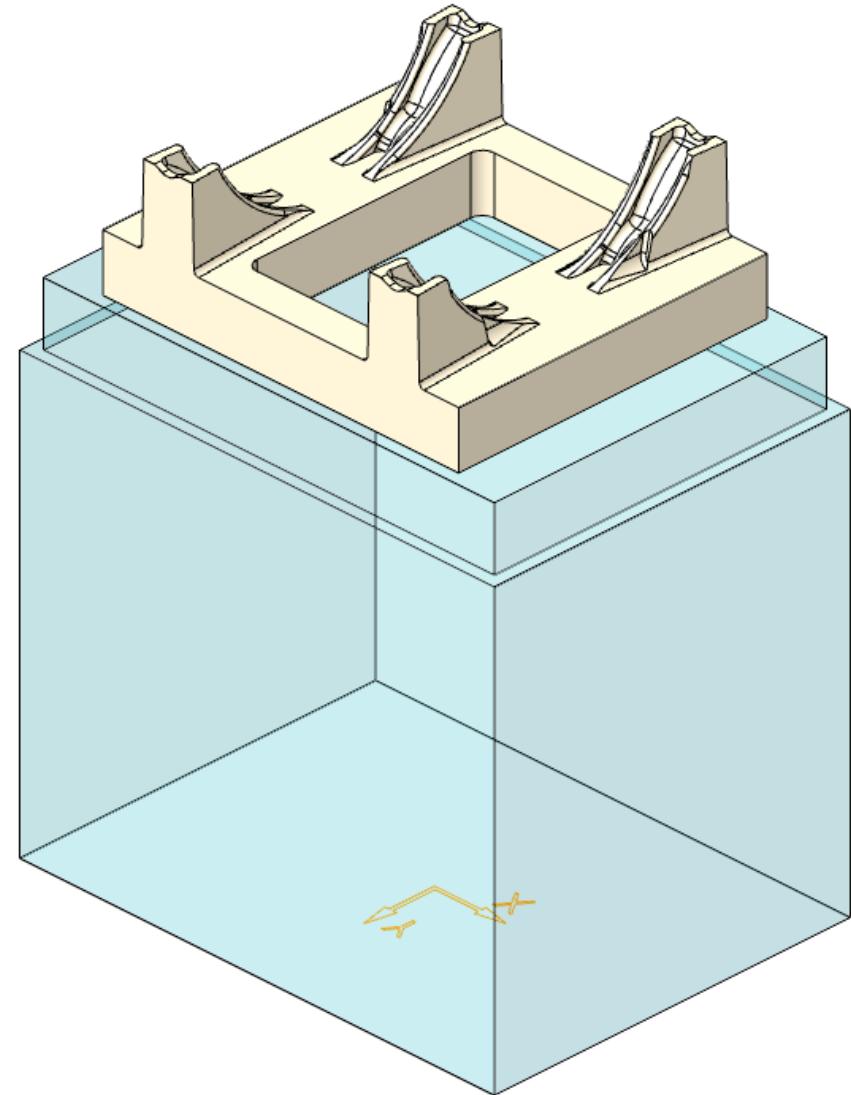
Electrode 13

Electrode 14

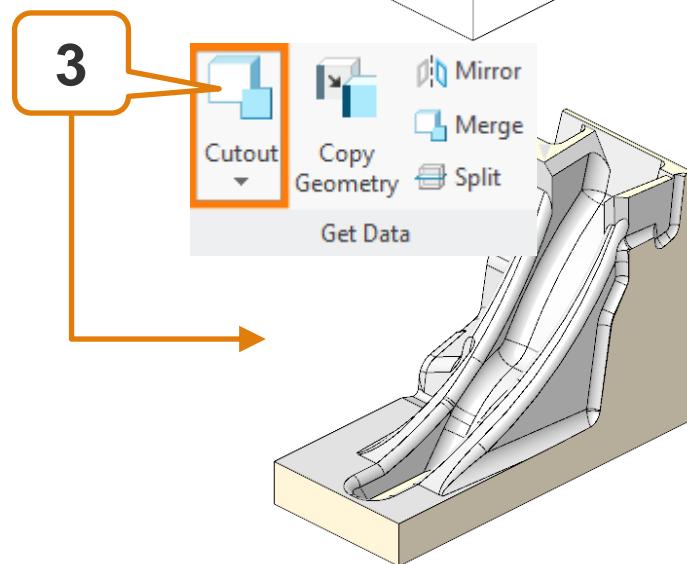
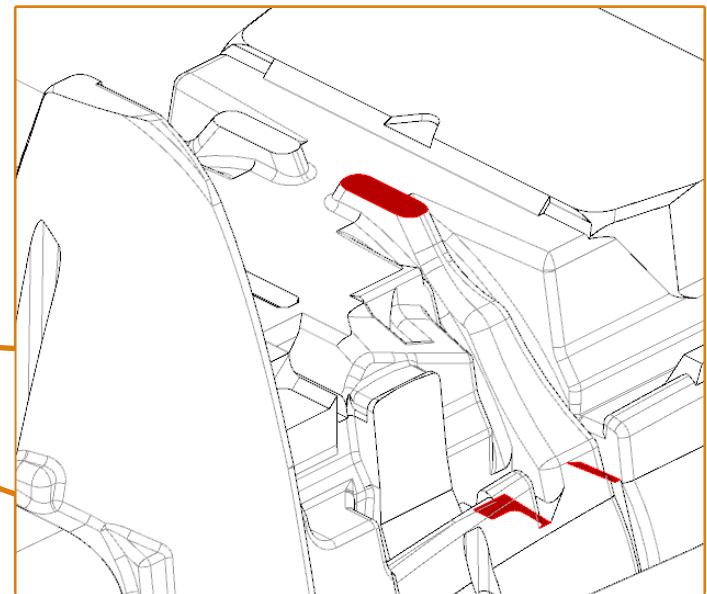
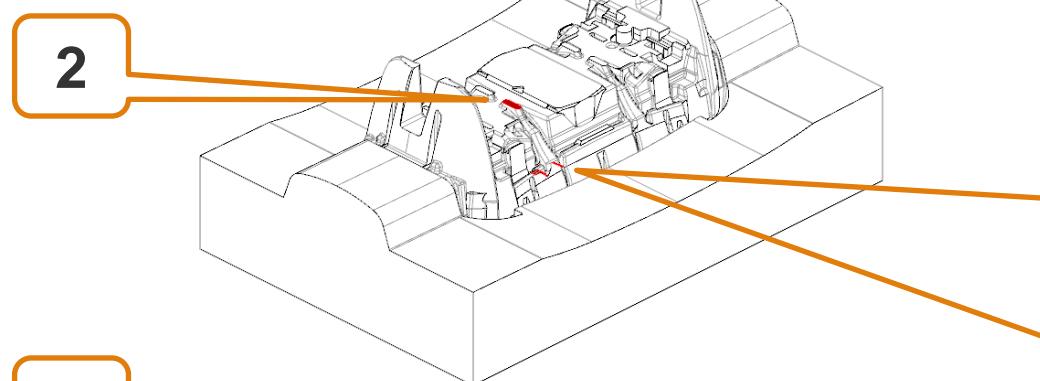


Topics...

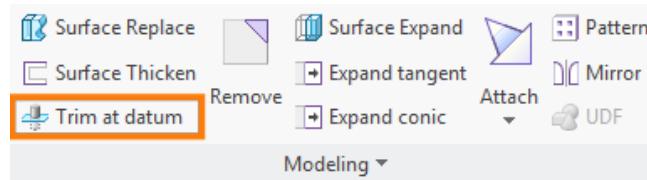
- Cut out with Creo extrude
- user defined FREE_FACE



Electrode 11 – Get Data

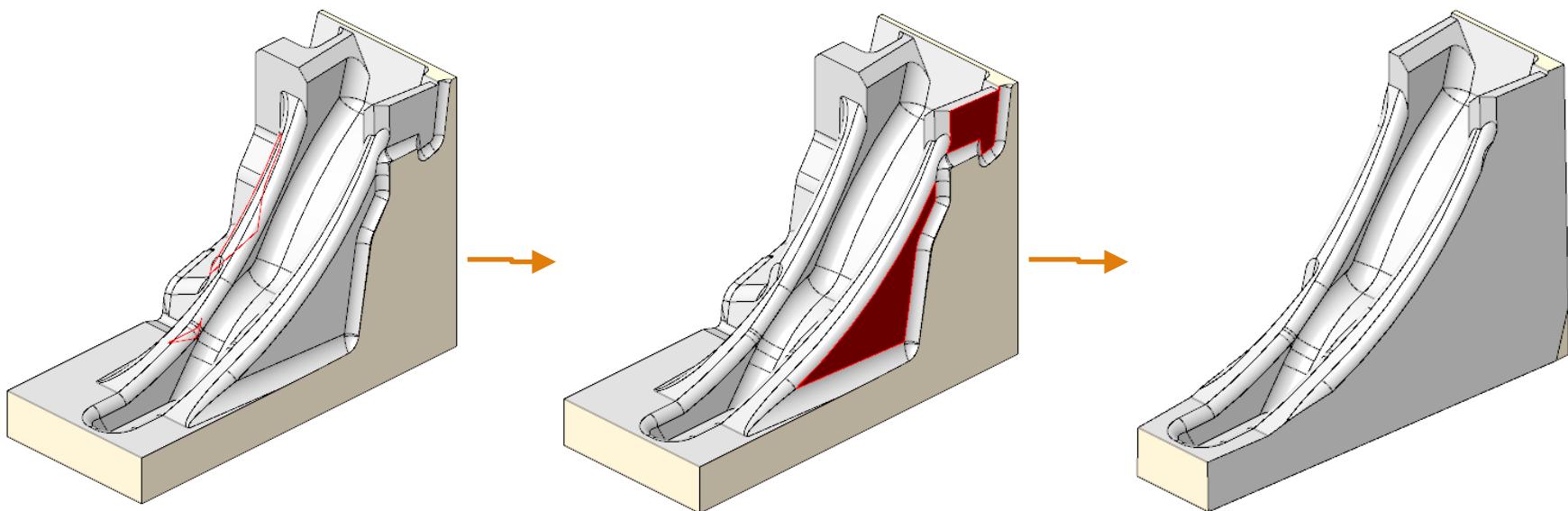


Electrode 11 – Detailing

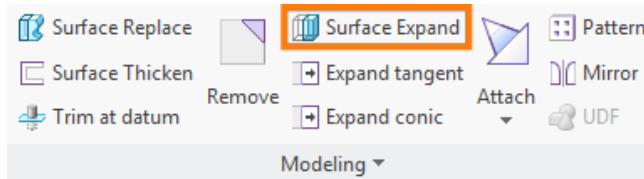
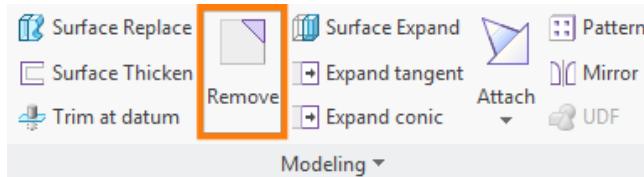


Detailing using...

- **Trim at datum**

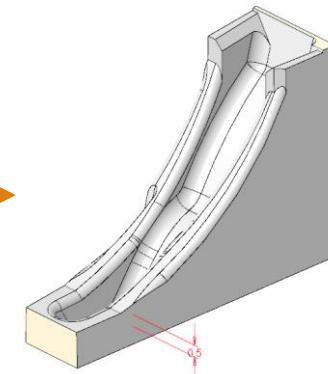
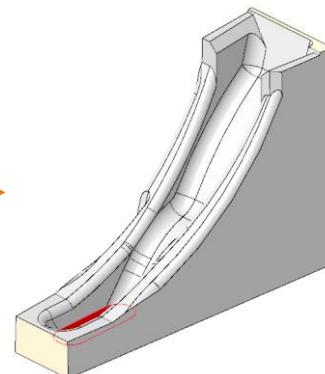
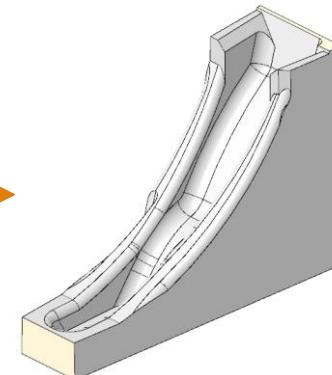
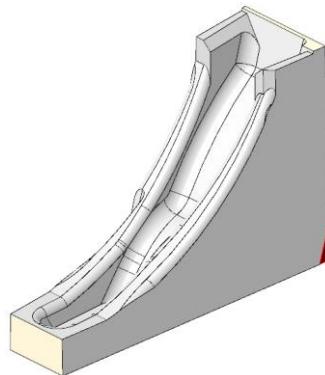


Electrode 11 – Detailing

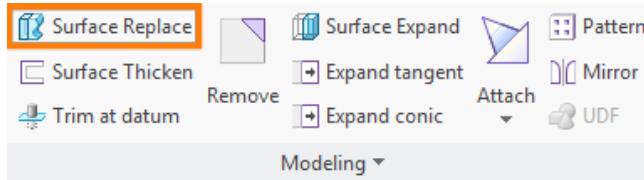
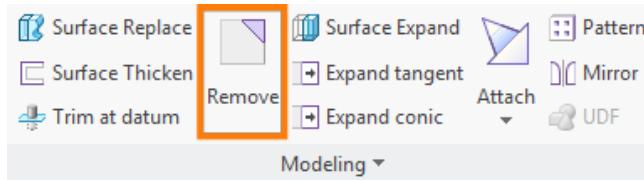


Detailing using...

- Remove
- Fläche Expand

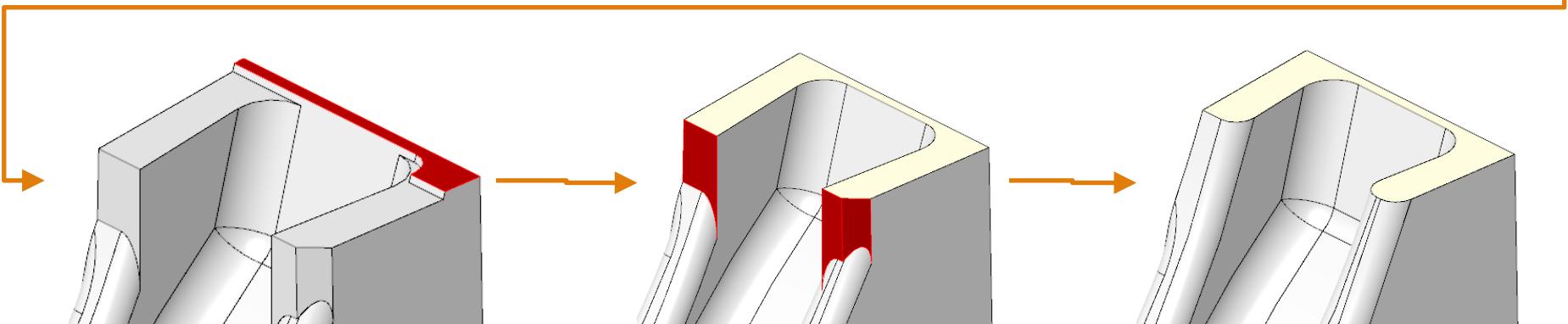
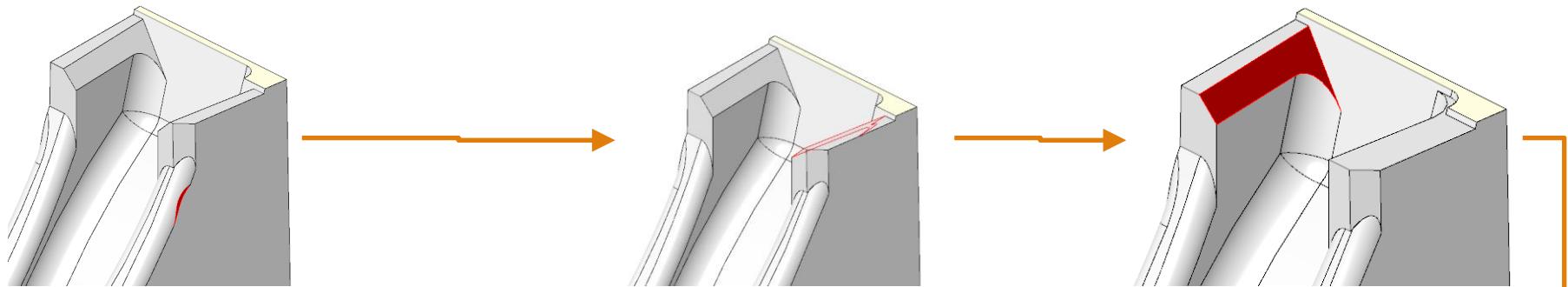


Electrode 11 – Detailing

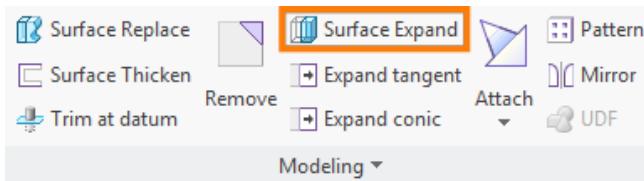


Detailing using...

- Remove
- Replace surface

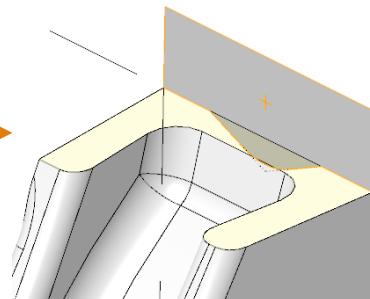
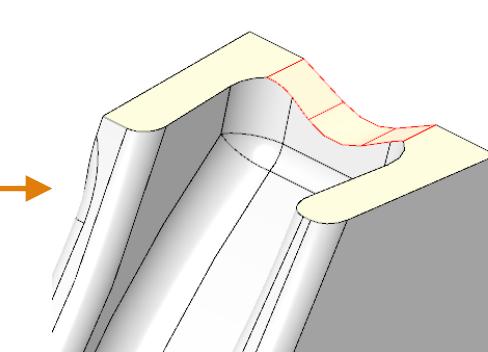


Electrode 11 – Detailing

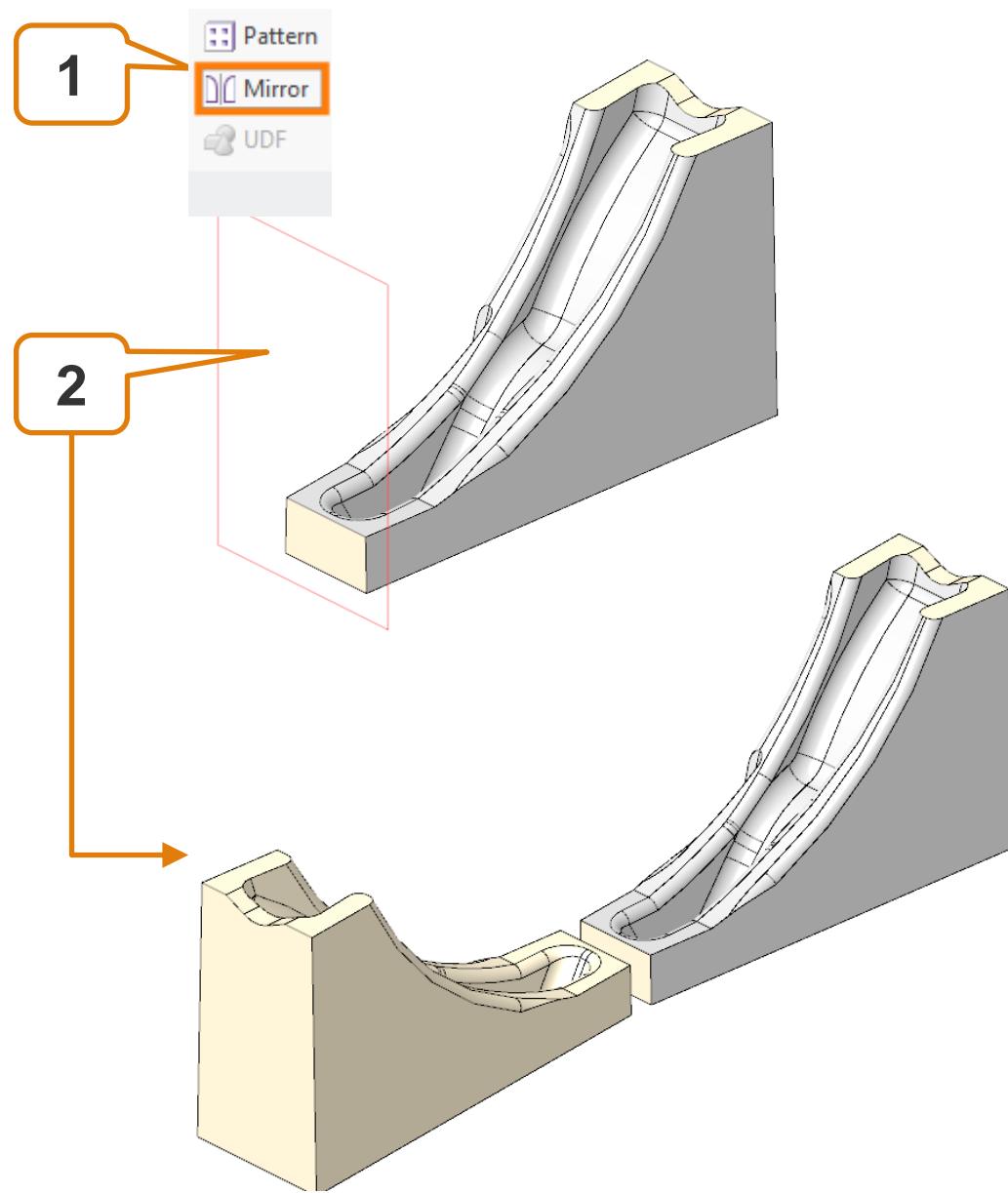


Detailing using...

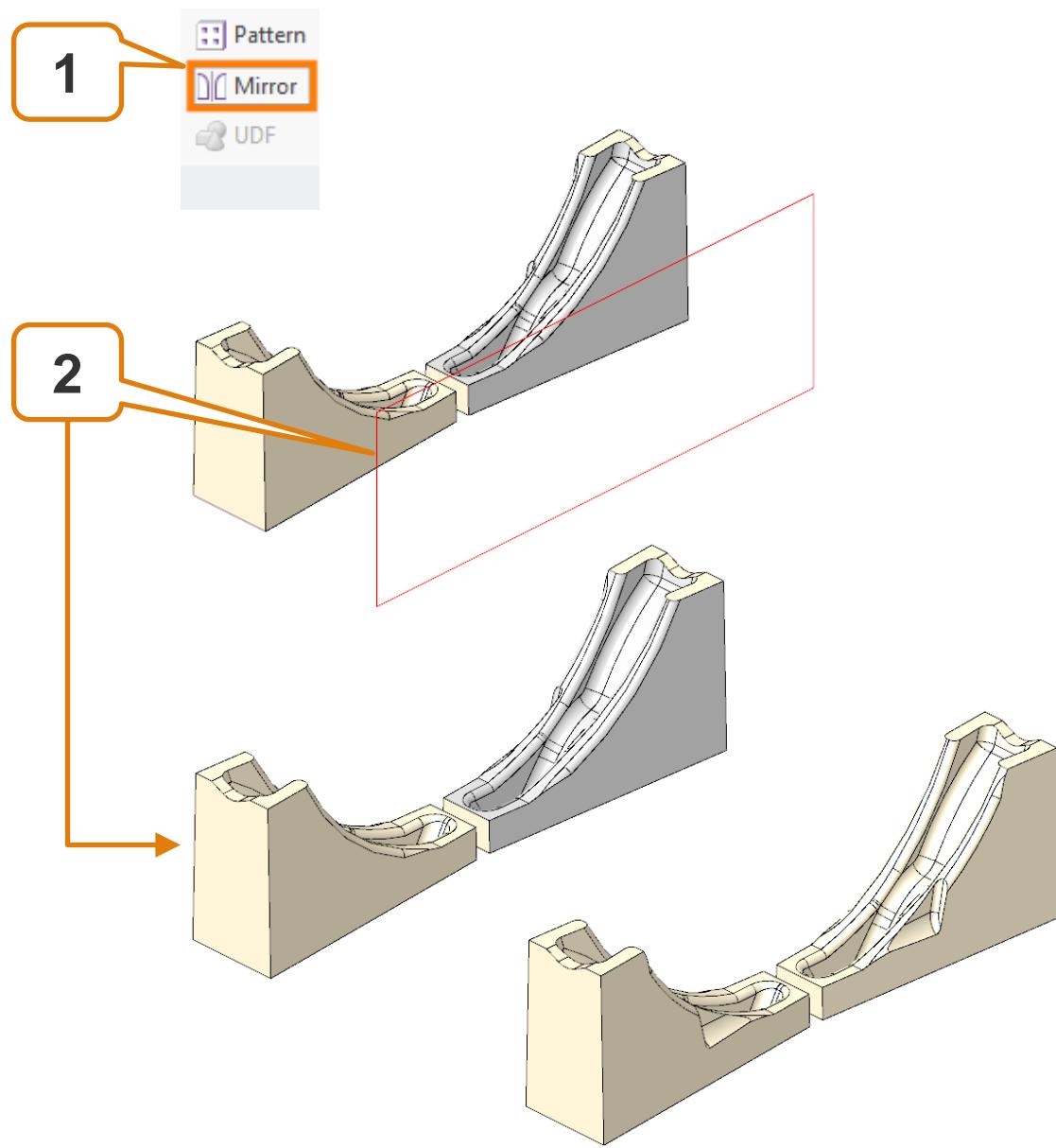
- **Fläche Expand**
- **Extruded cut**



Electrode 11 – Mirror



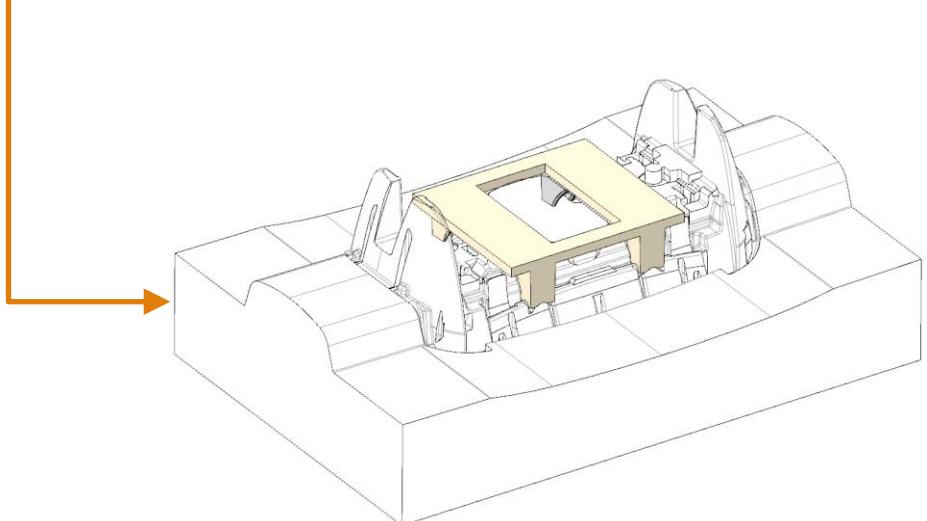
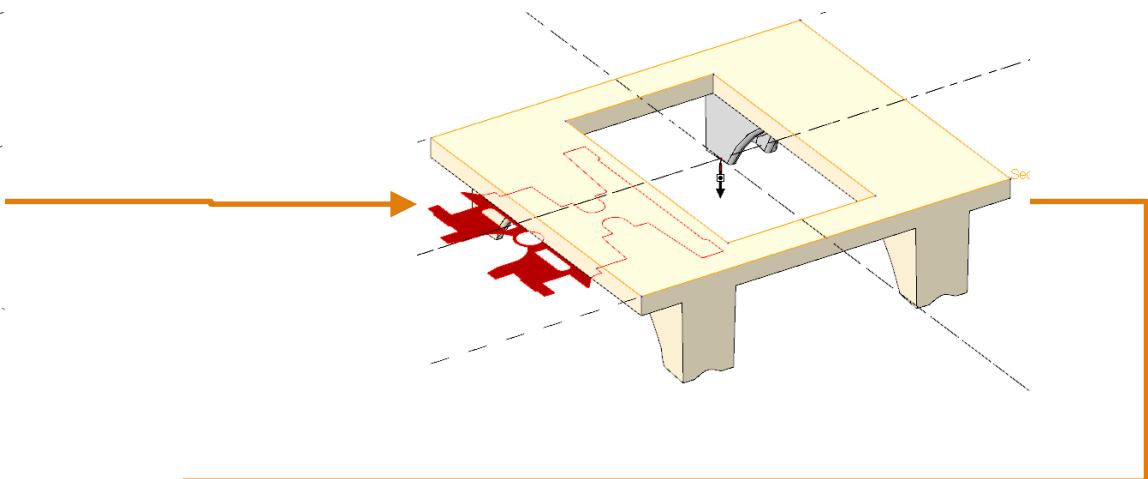
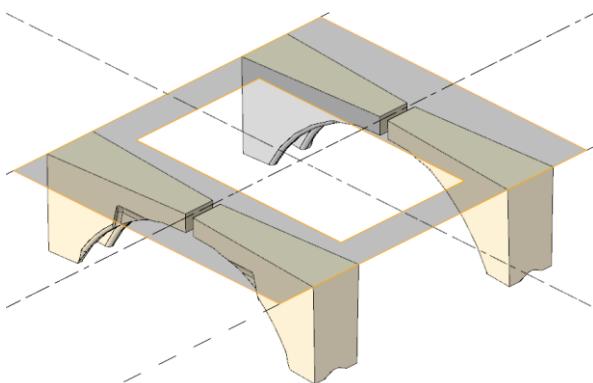
Electrode 11 – Mirror



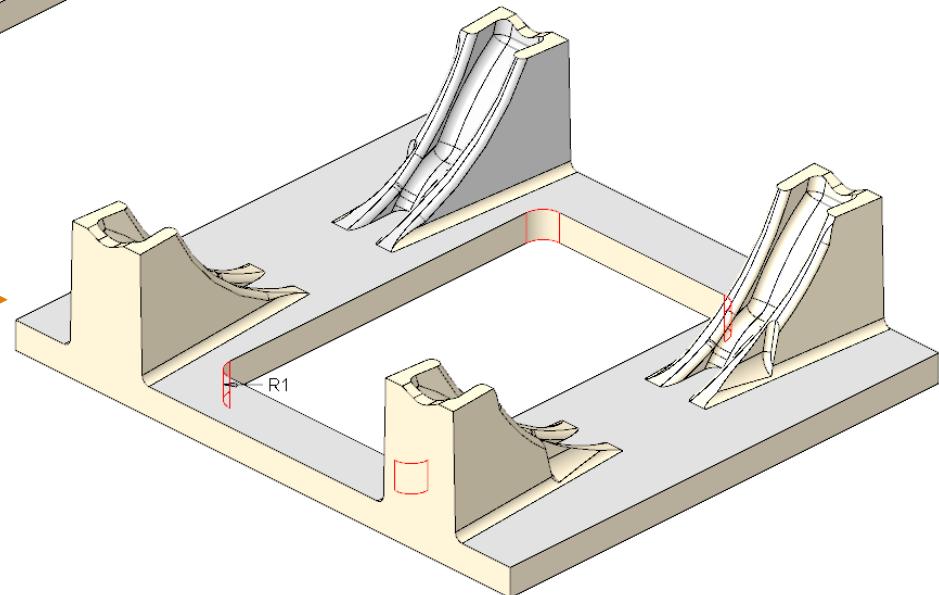
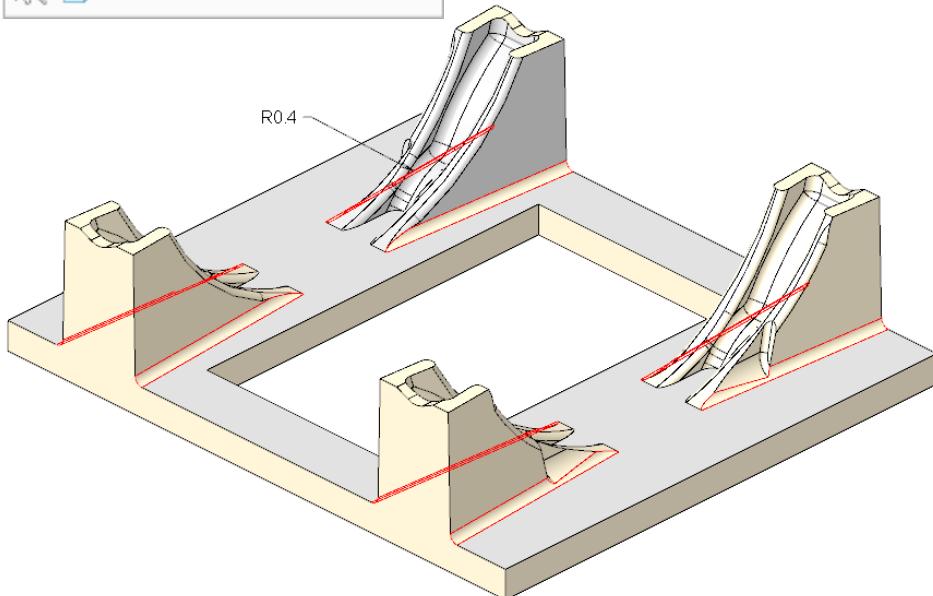
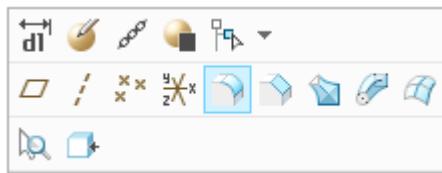
Electrode 11 – Detailing

Detailing using...

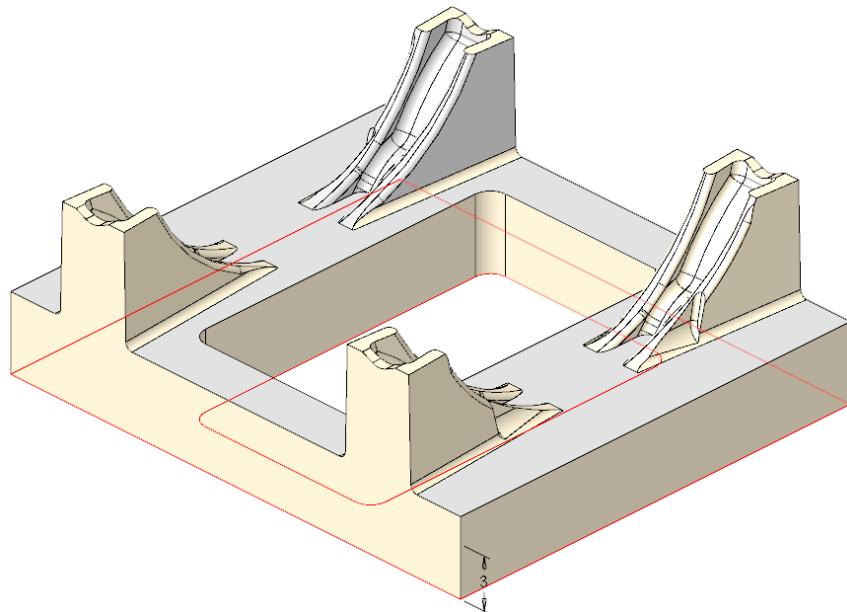
- **Extrude**



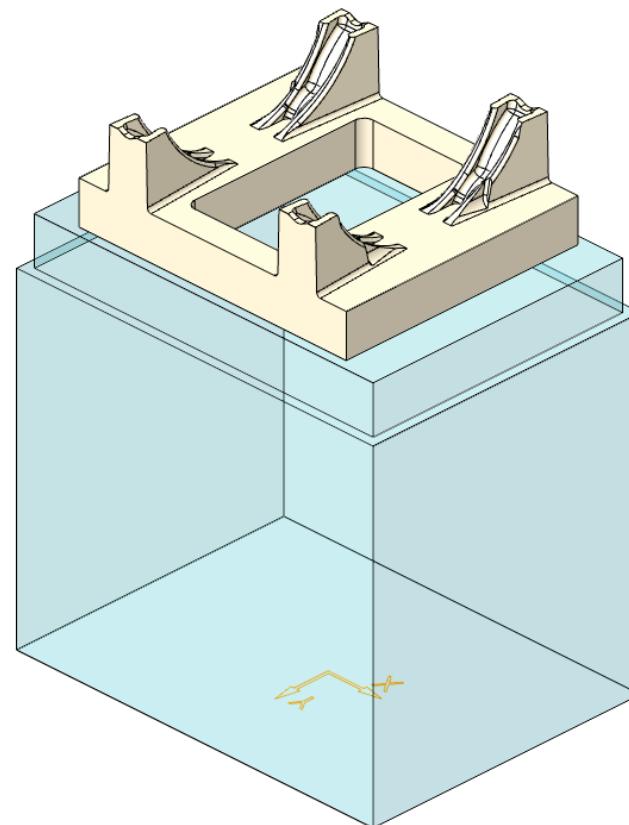
Electrode 11 – Detailing



Electrode 11 - Finish



- Select **FREE_FACE**
- Finish electrode with base



Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

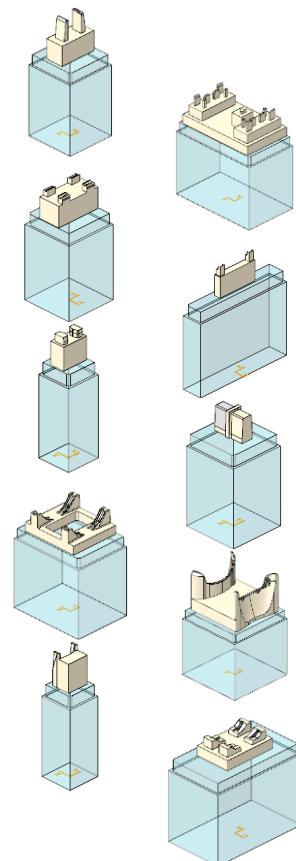
Electrode 10

Electrode 11

Electrode 12

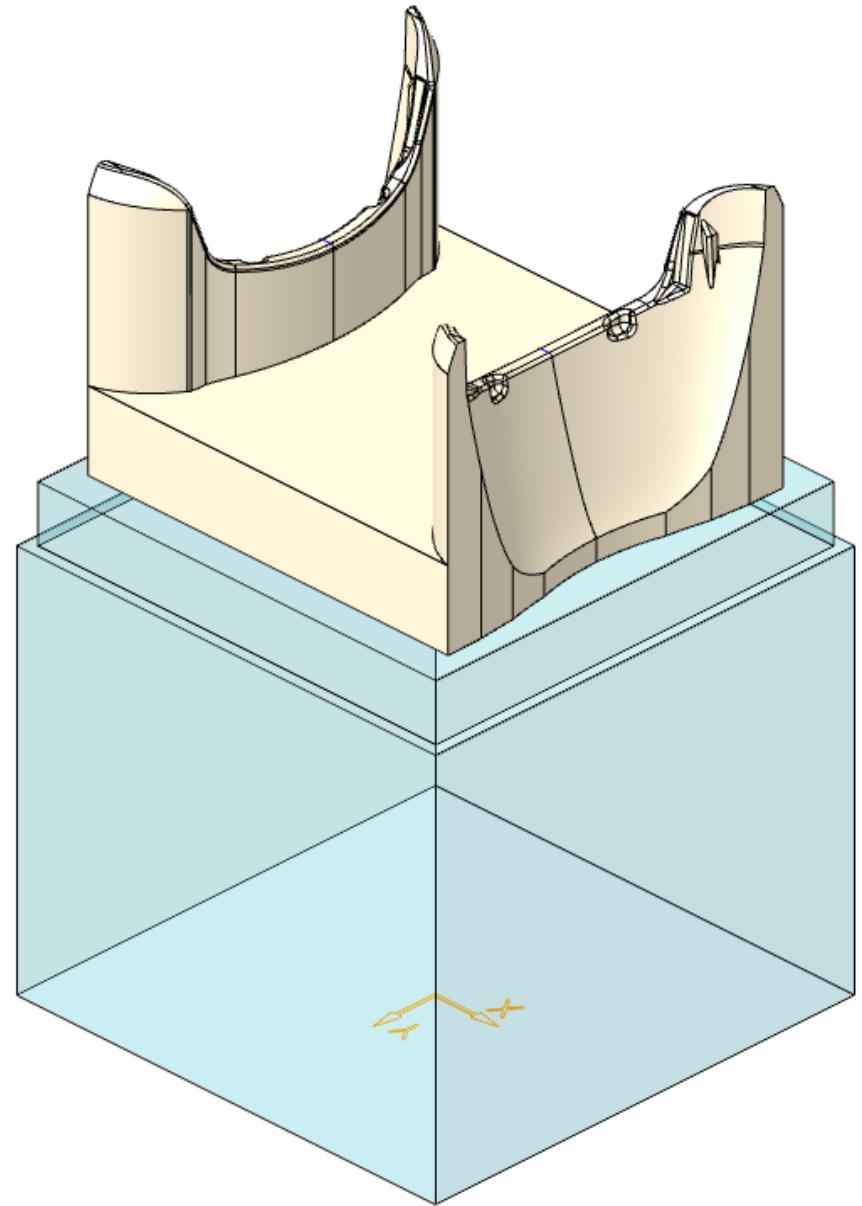
Electrode 13

Electrode 14

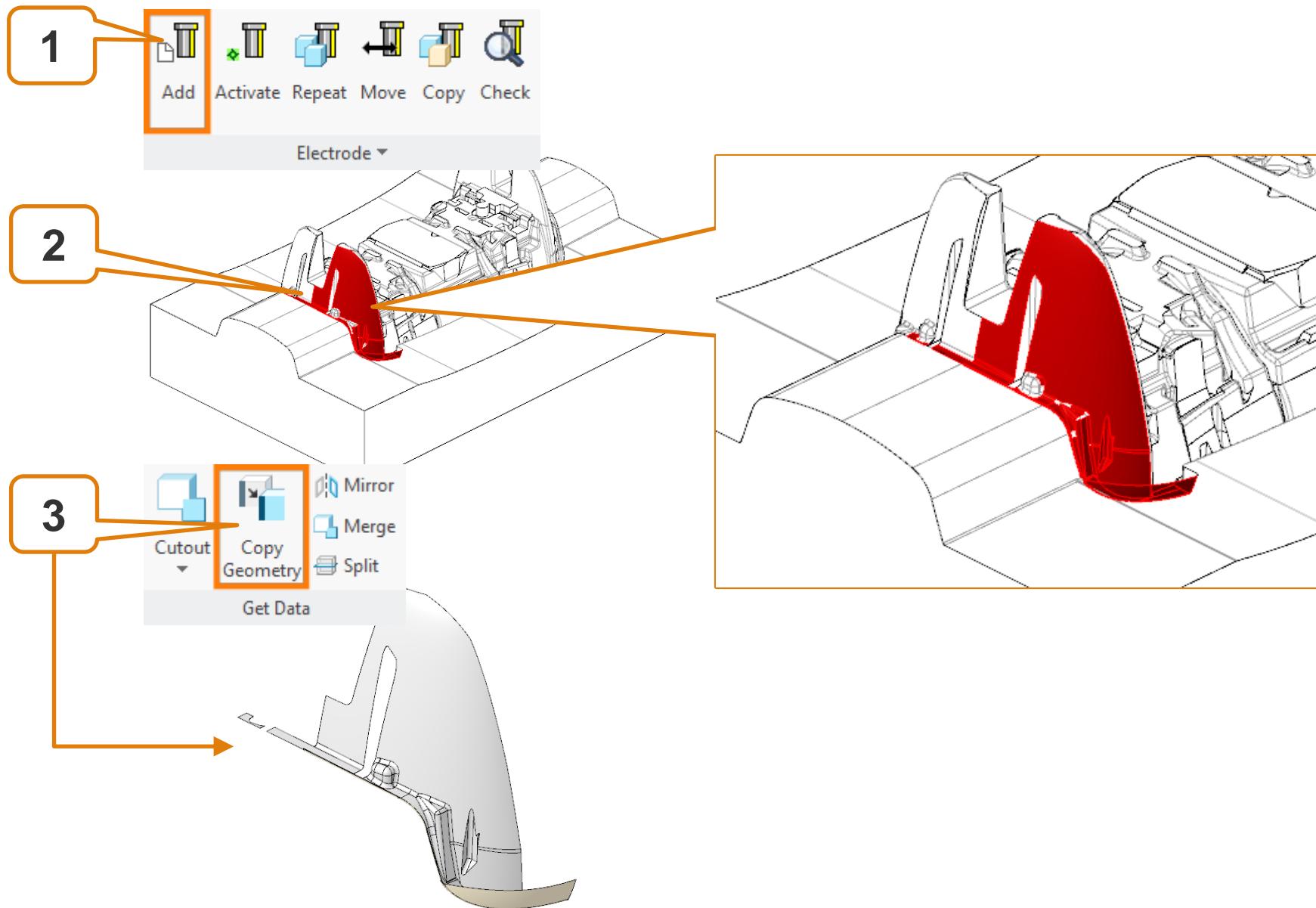


Topics...

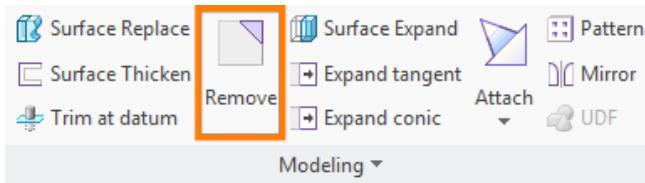
- Working with surfaces



Electrode 12 – Get Data

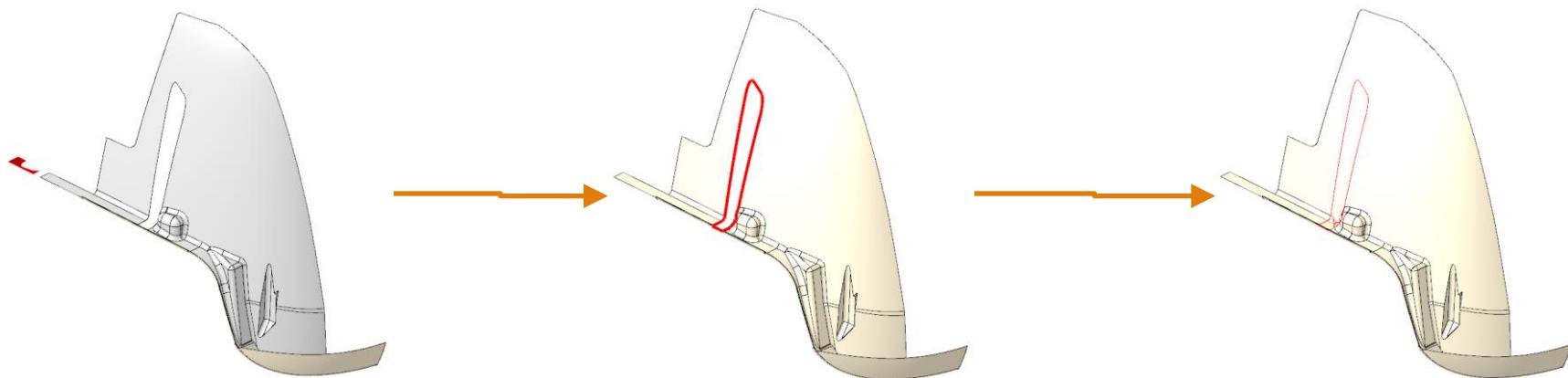


Electrode 12 – Detailing



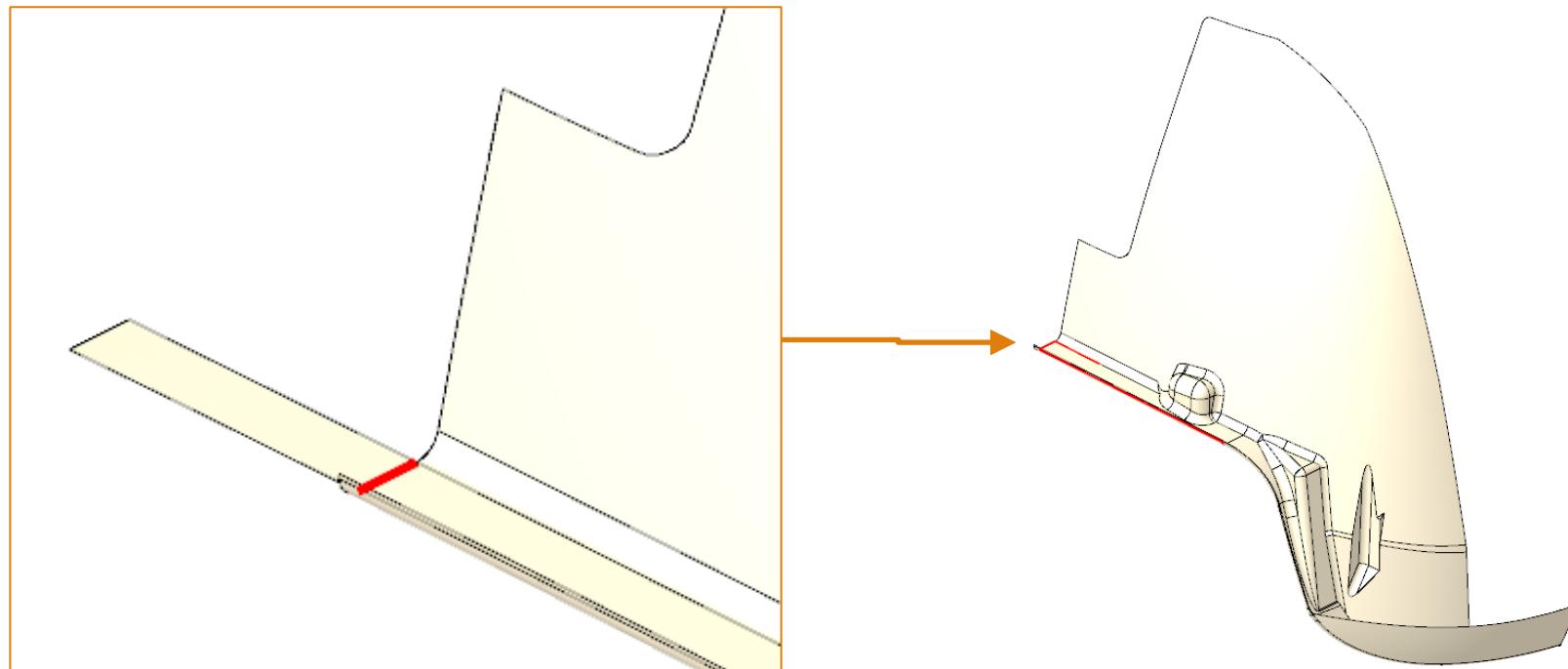
Detailing using...

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

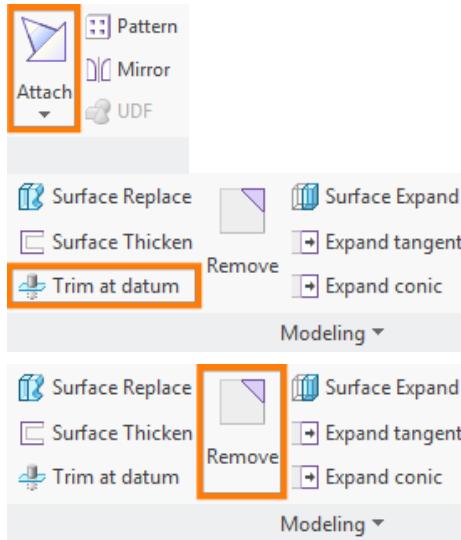


Electrode 12 – Detailing

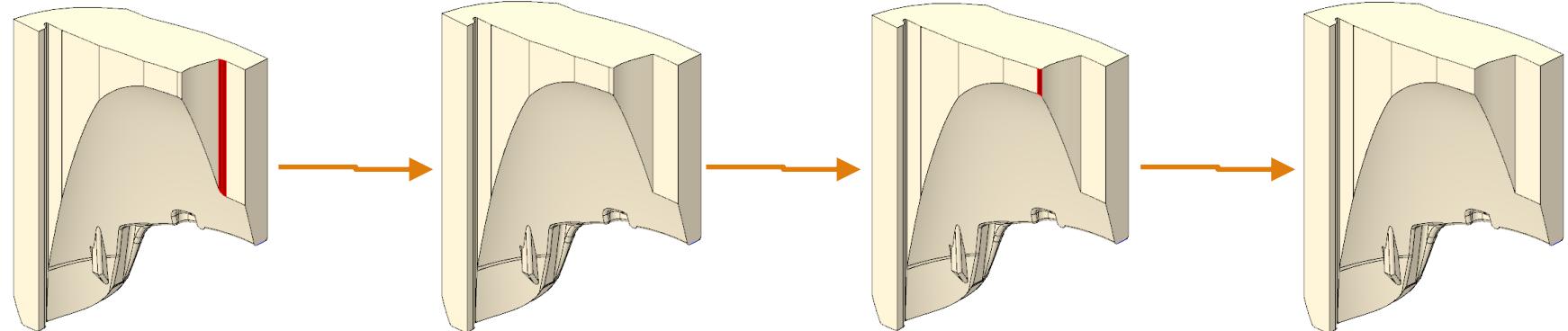
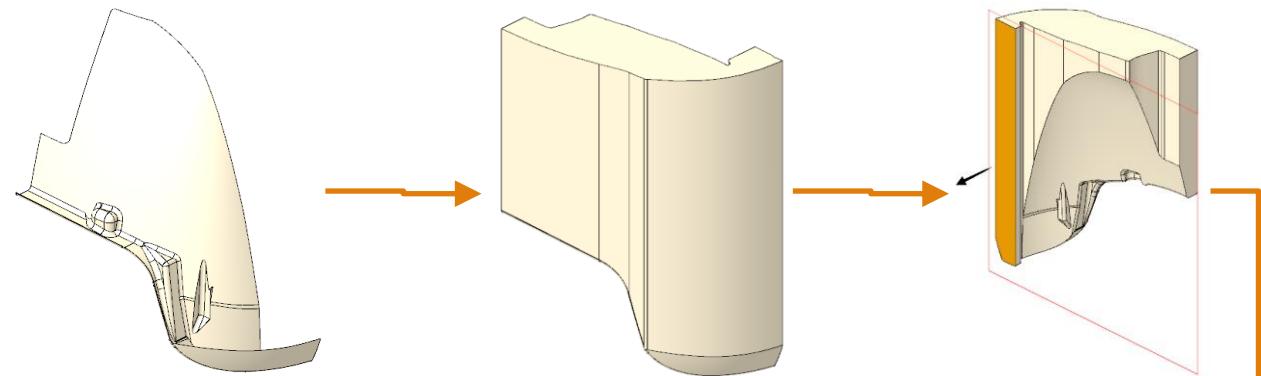
- Trim at created curve



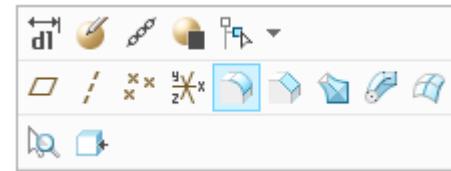
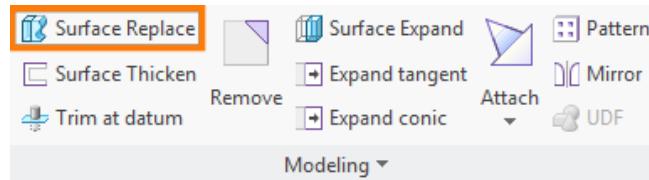
Electrode 12 – Detailing



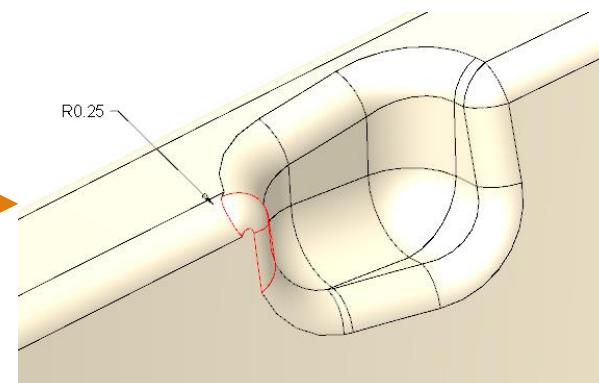
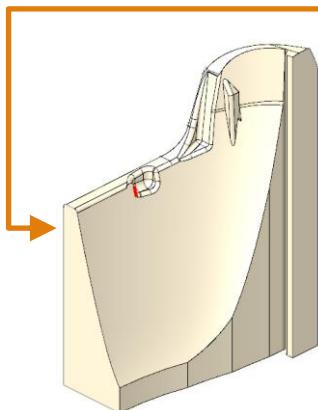
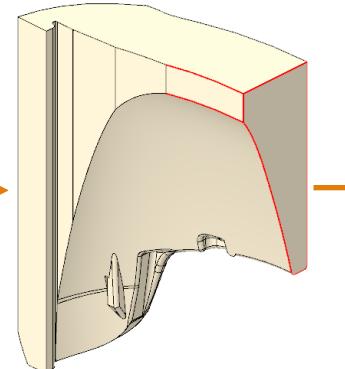
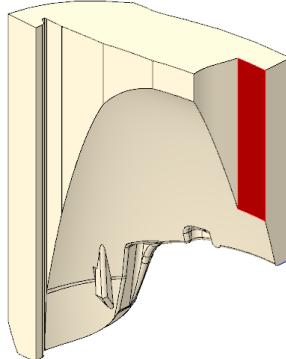
- Attach quilt
- Trim at datum
- Remove



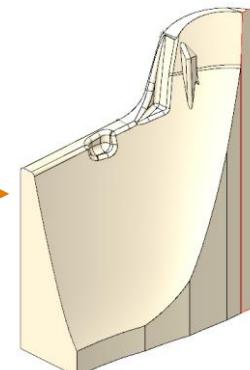
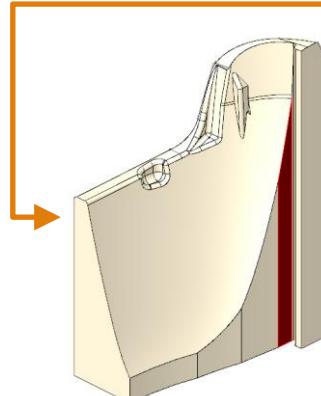
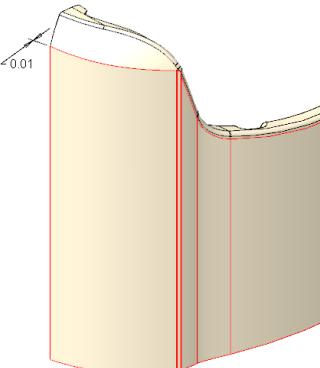
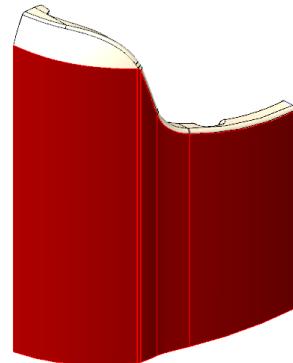
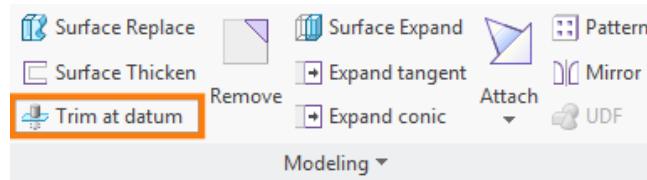
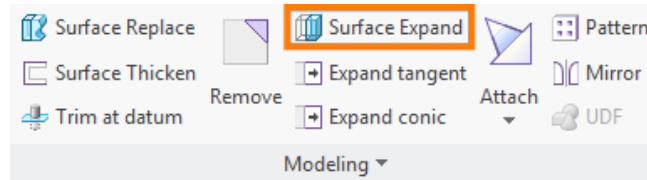
Electrode 12 – Detailing



- Replace surface
- Rundung



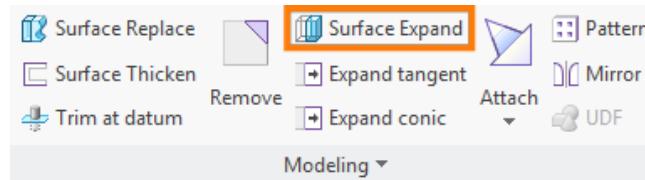
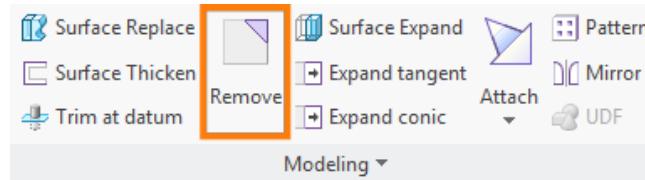
Electrode 12 – Detailing



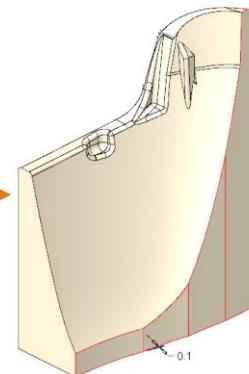
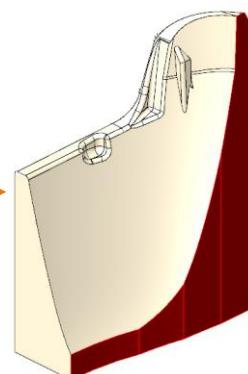
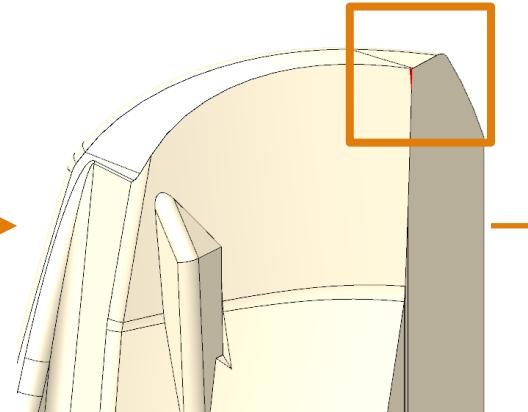
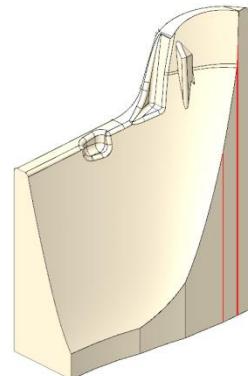
Detailing using...

- **Surface expand (0.01)**
- **Trim at datum**

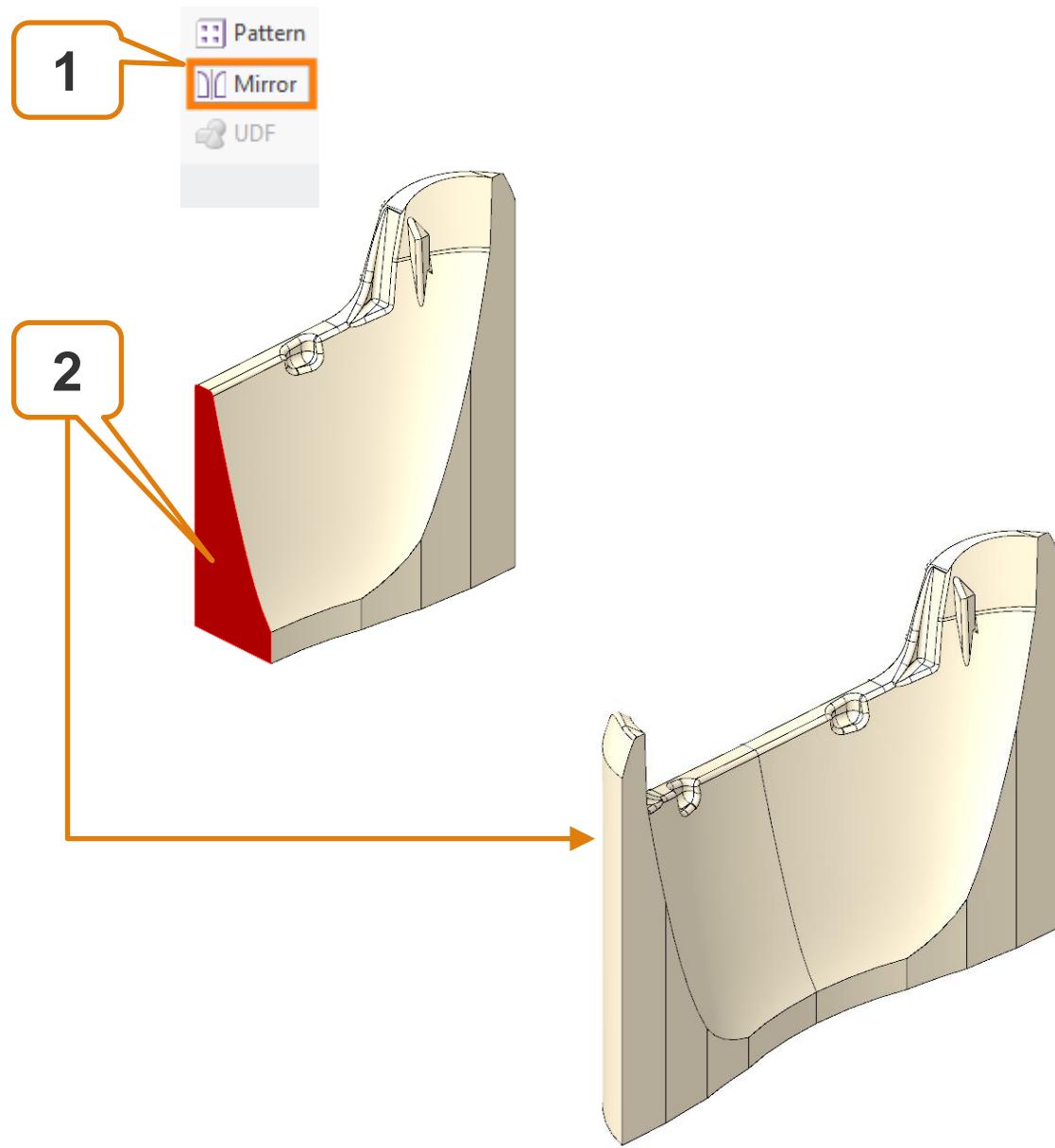
Electrode 12 – Detailing



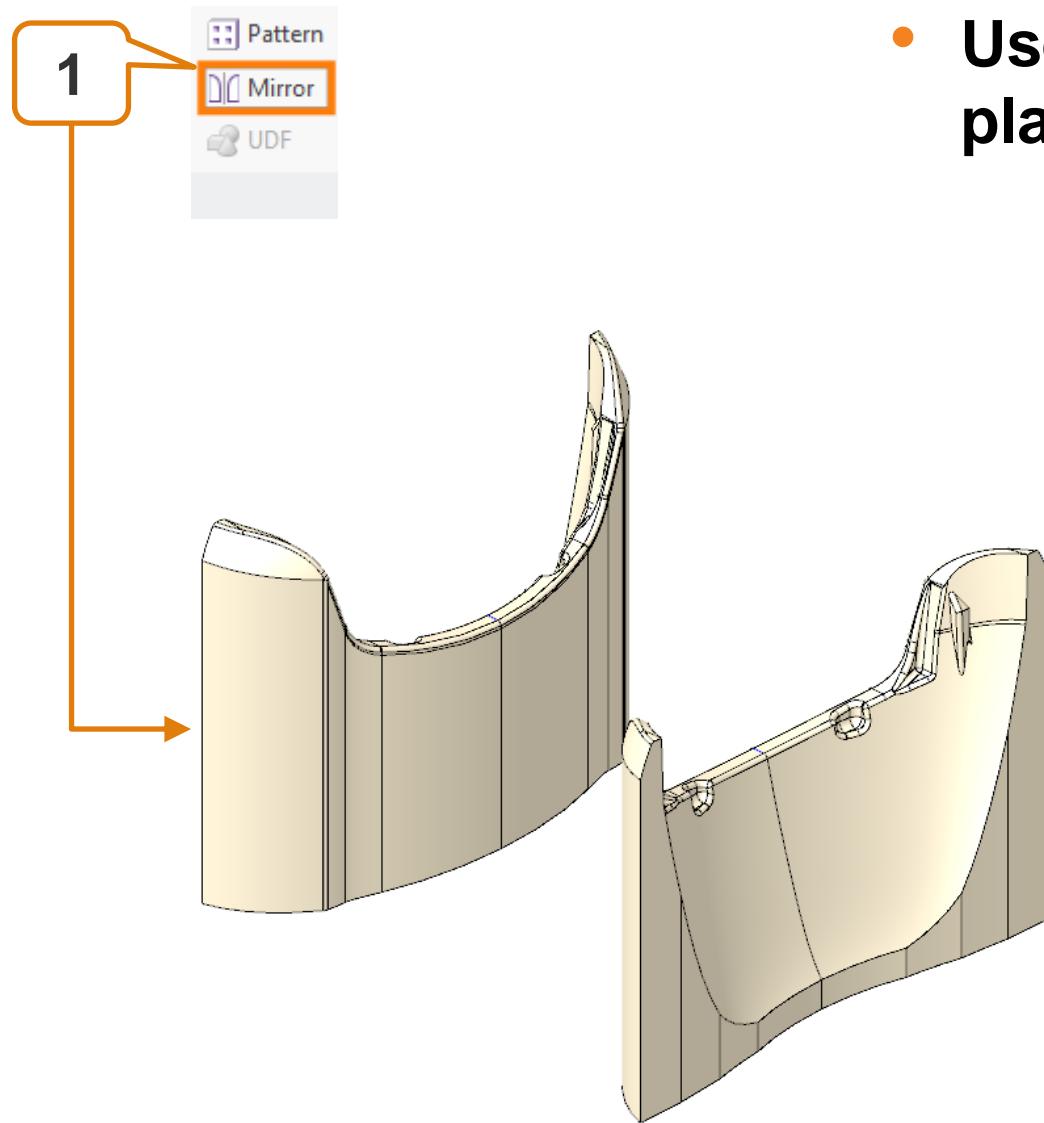
- Remove
- Expand (0.1)



Electrode 12 – Mirror

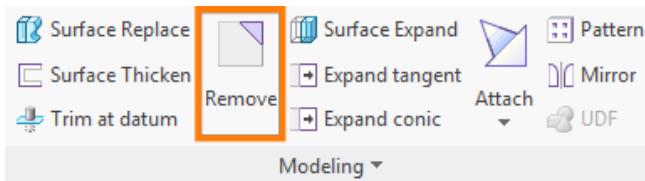


Electrode 12 – Mirror

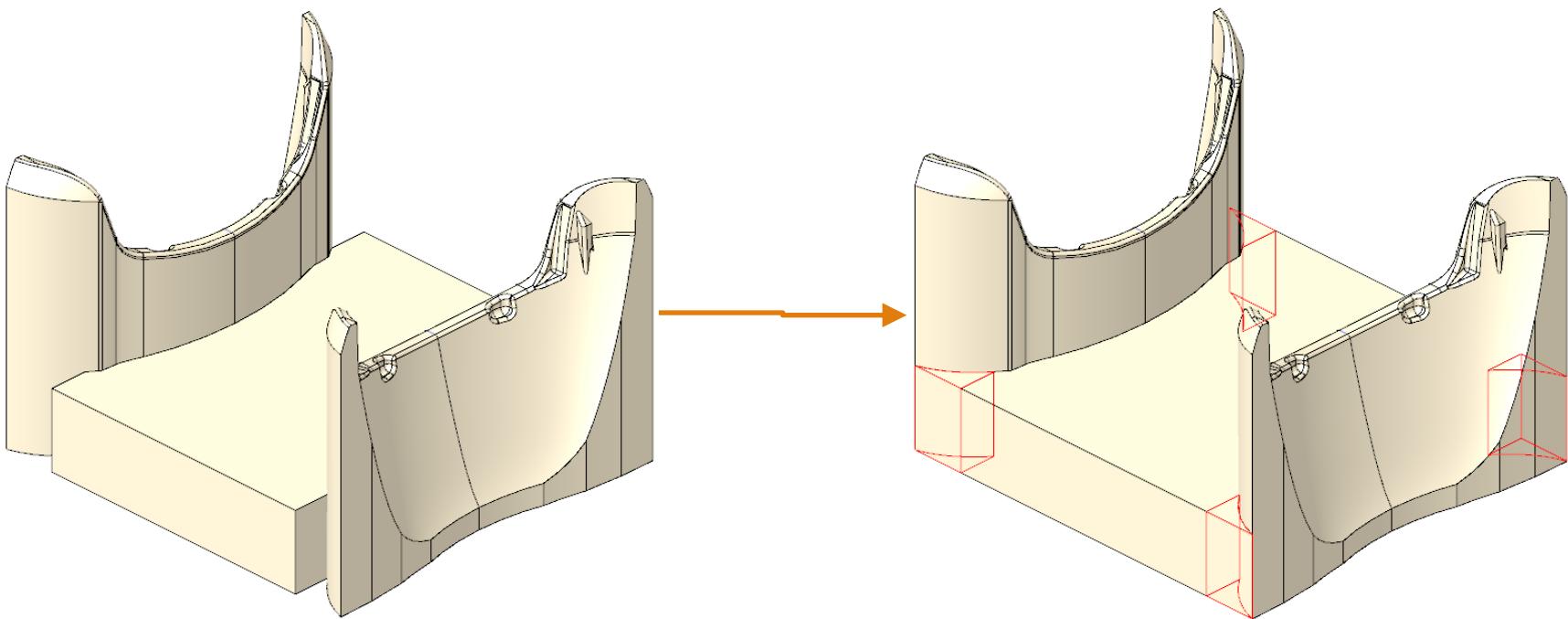


- Use created datum plane for mirror

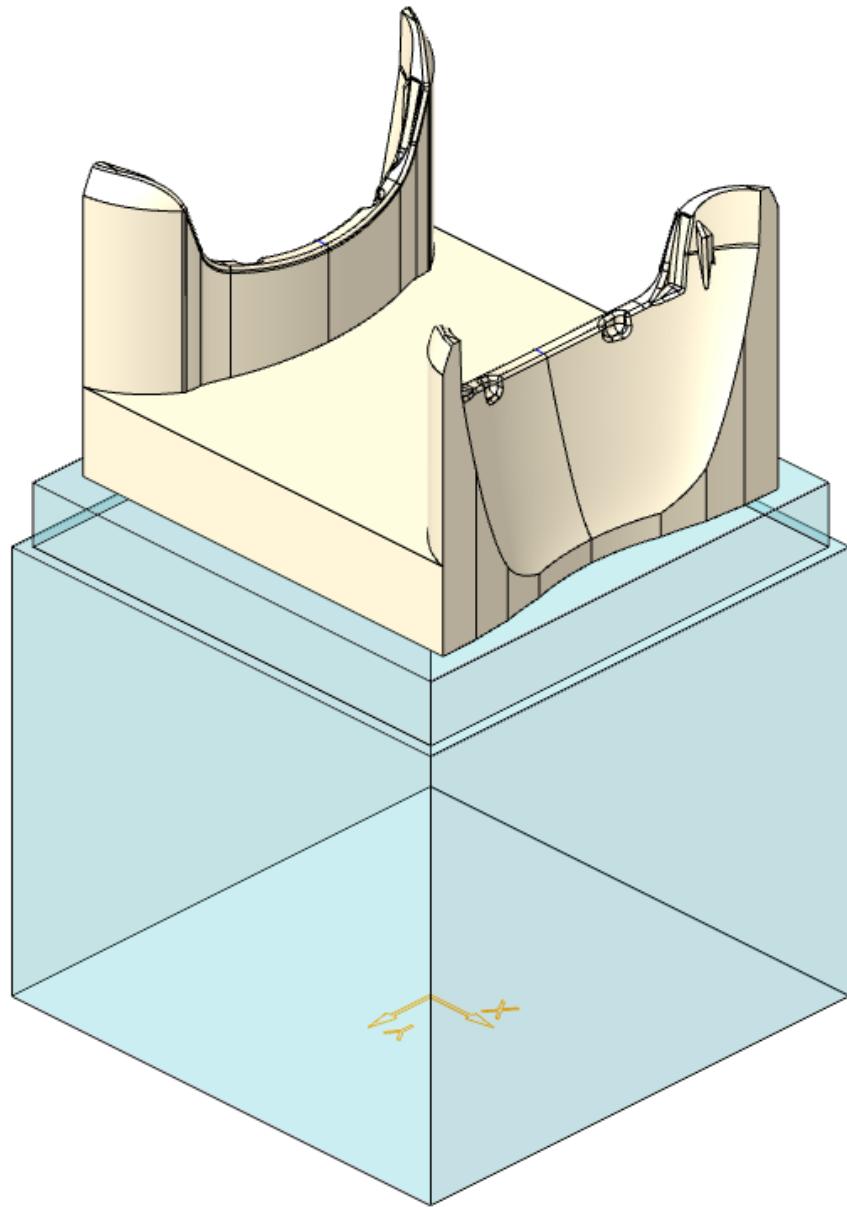
Electrode 12 – Detailing



- Create extrusion to connect solids
- Remove

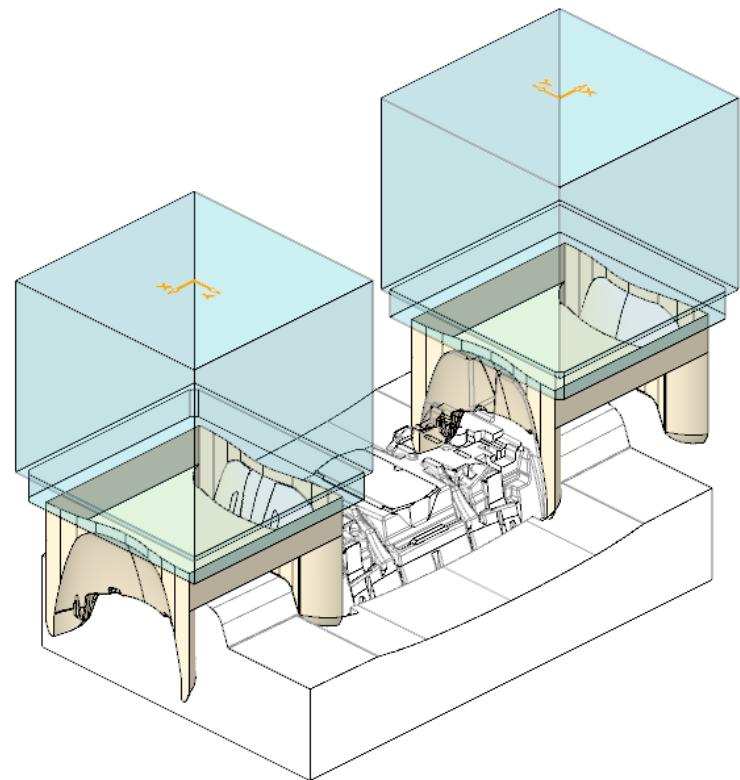
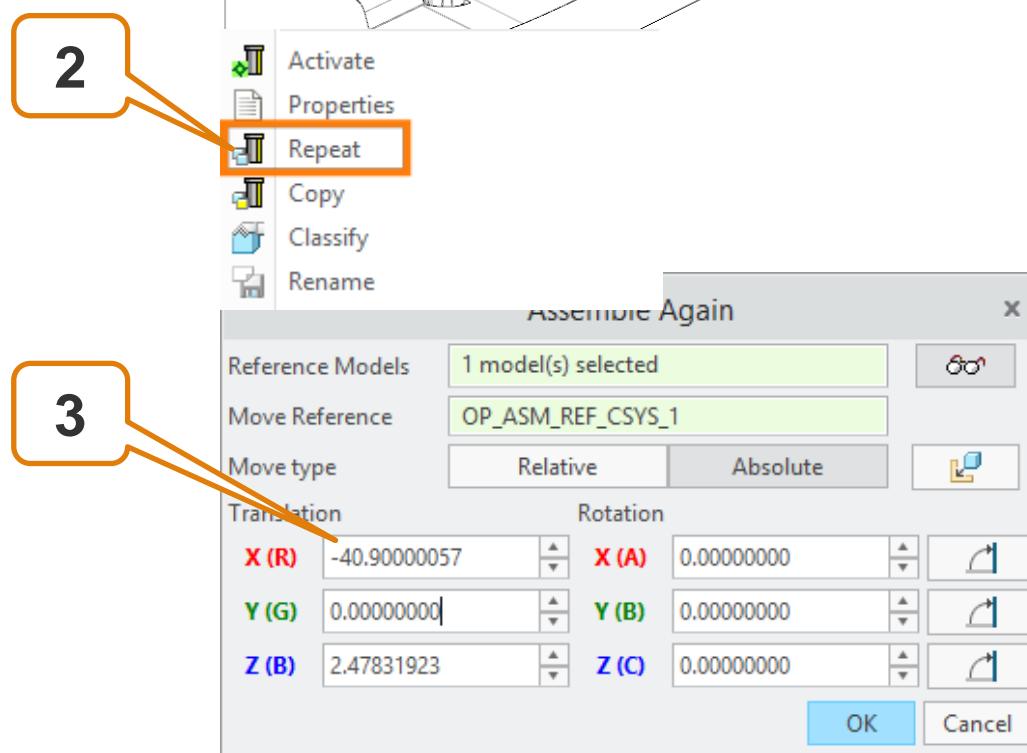
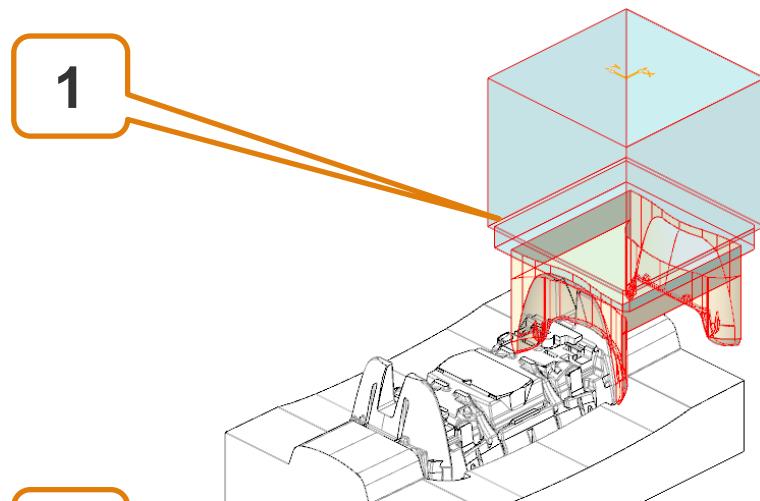


Electrode 12 - Finish



- Create support
- Finish electrode with base

Electrode 12 – Assemble Again



Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

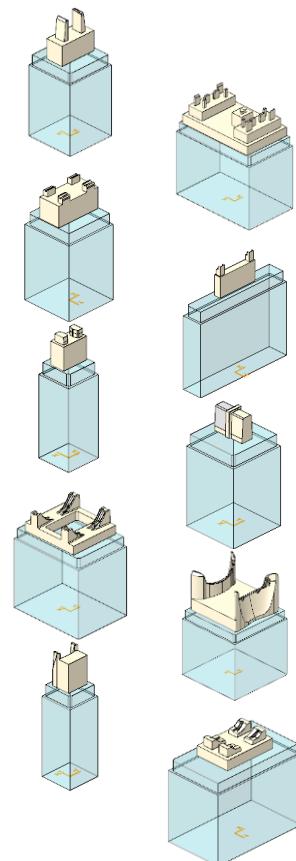
Electrode 10

Electrode 11

Electrode 12

Electrode 13

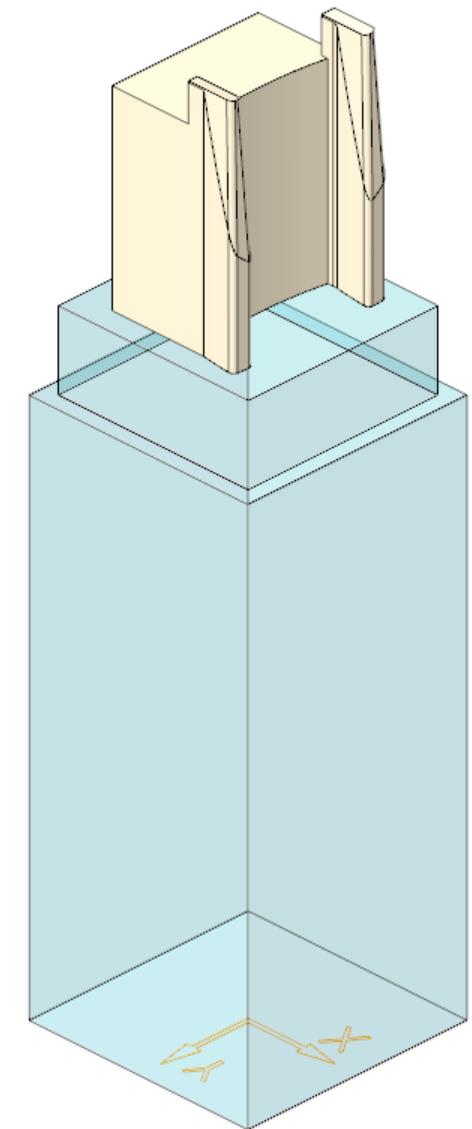
Electrode 14



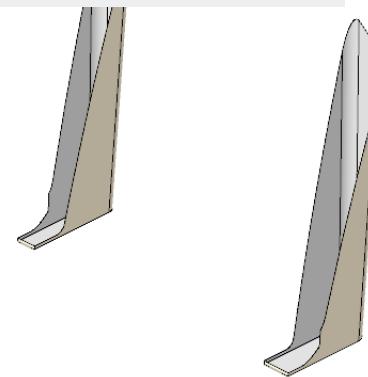
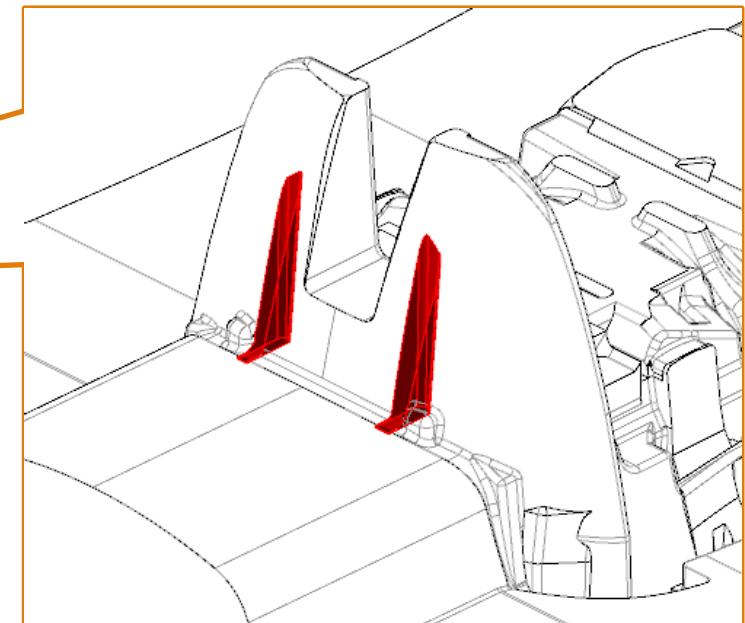
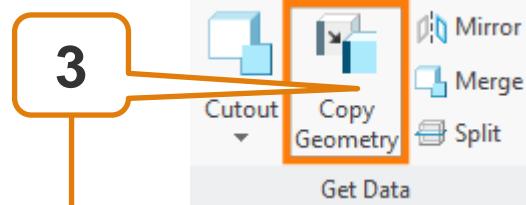
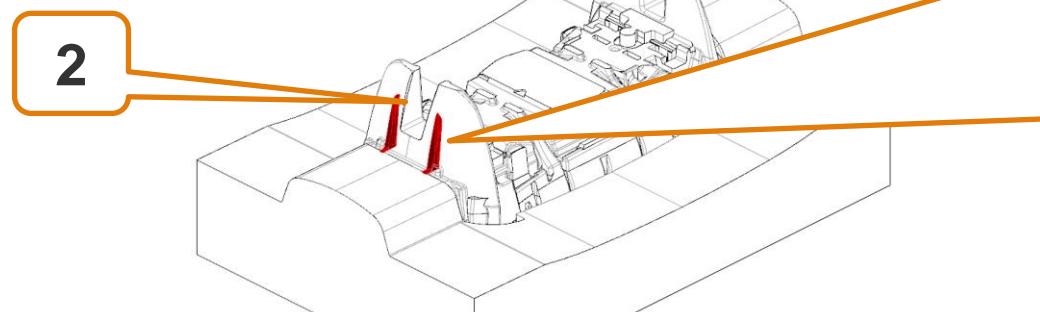
Electrode 13

Topics...

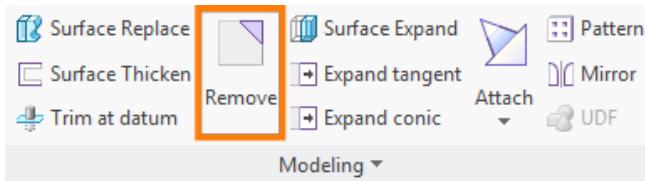
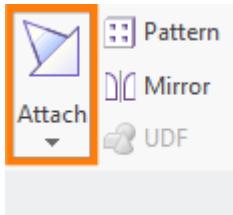
- Working with surfaces



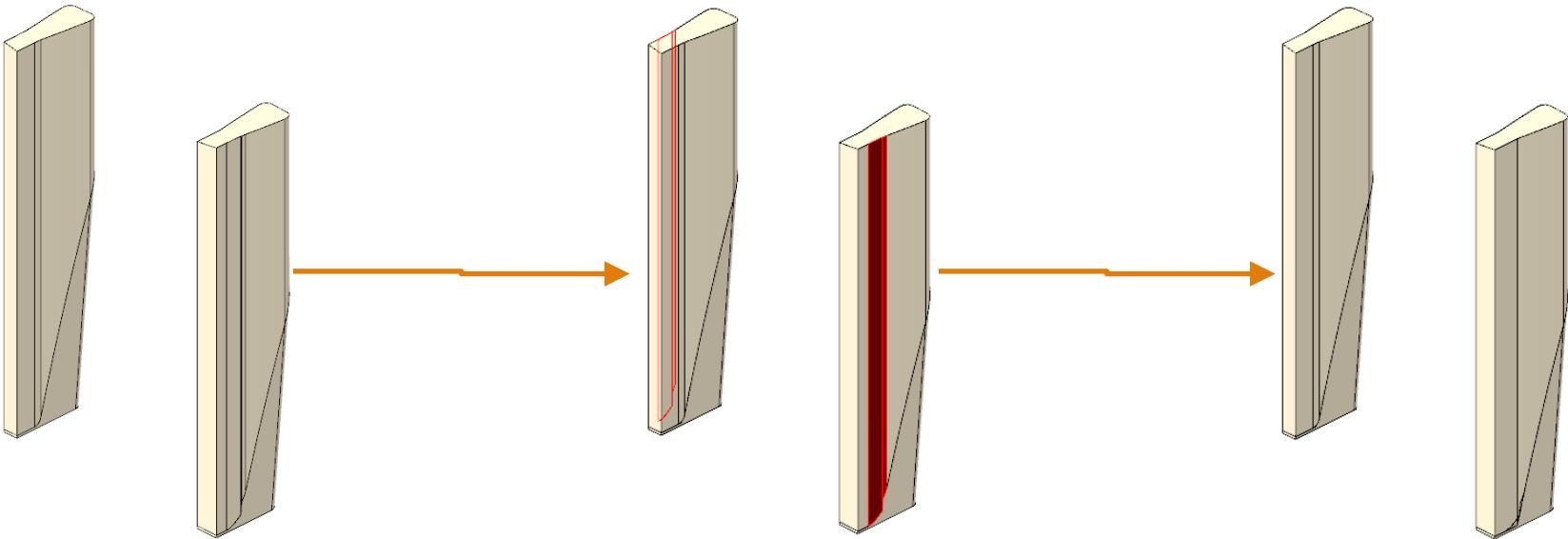
Electrode 13 – Get Data



Electrode 13 – Detailing

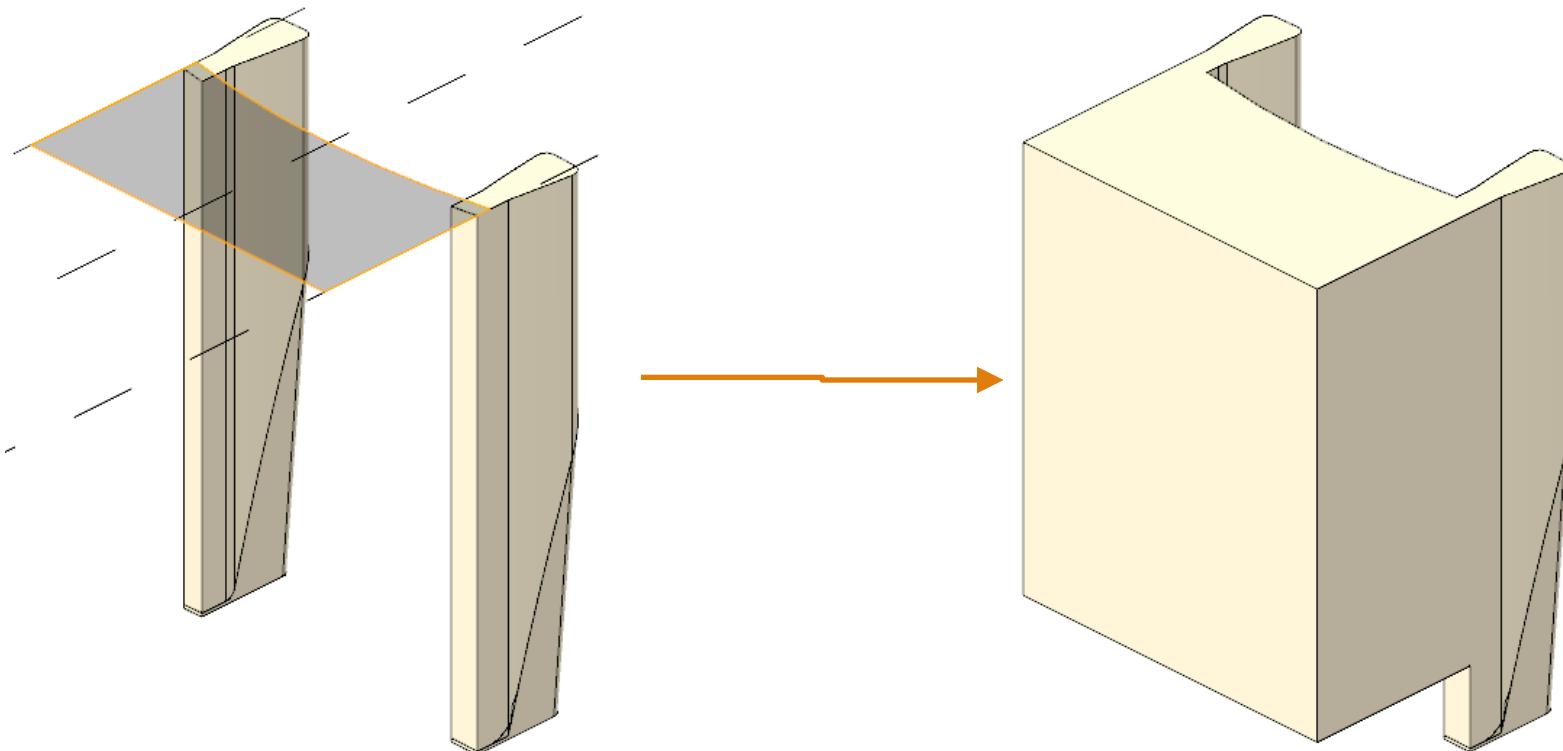


- Attach quilt
- Remove

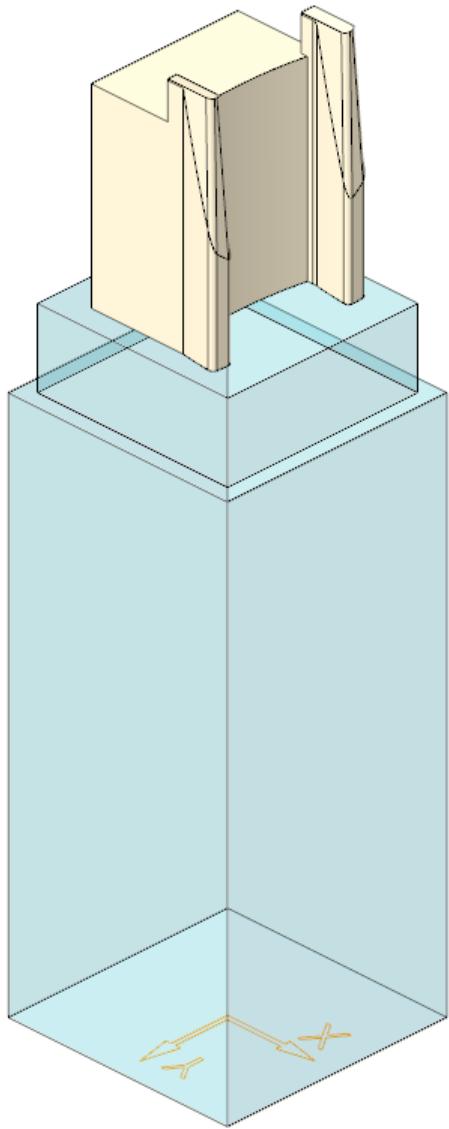


Electrode 13 – Detailing

- Use extrude to create connection



Electrode 13 - Finish



- **Finish electrode with base**

Agenda

Training

Electrode 5

Electrode 6

Electrode 7

Electrode 8

Electrode 9

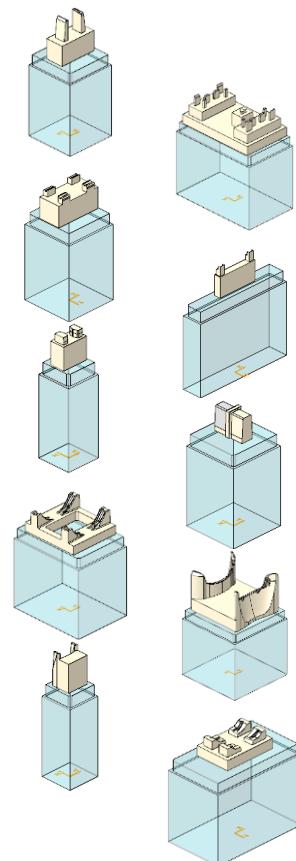
Electrode 10

Electrode 11

Electrode 12

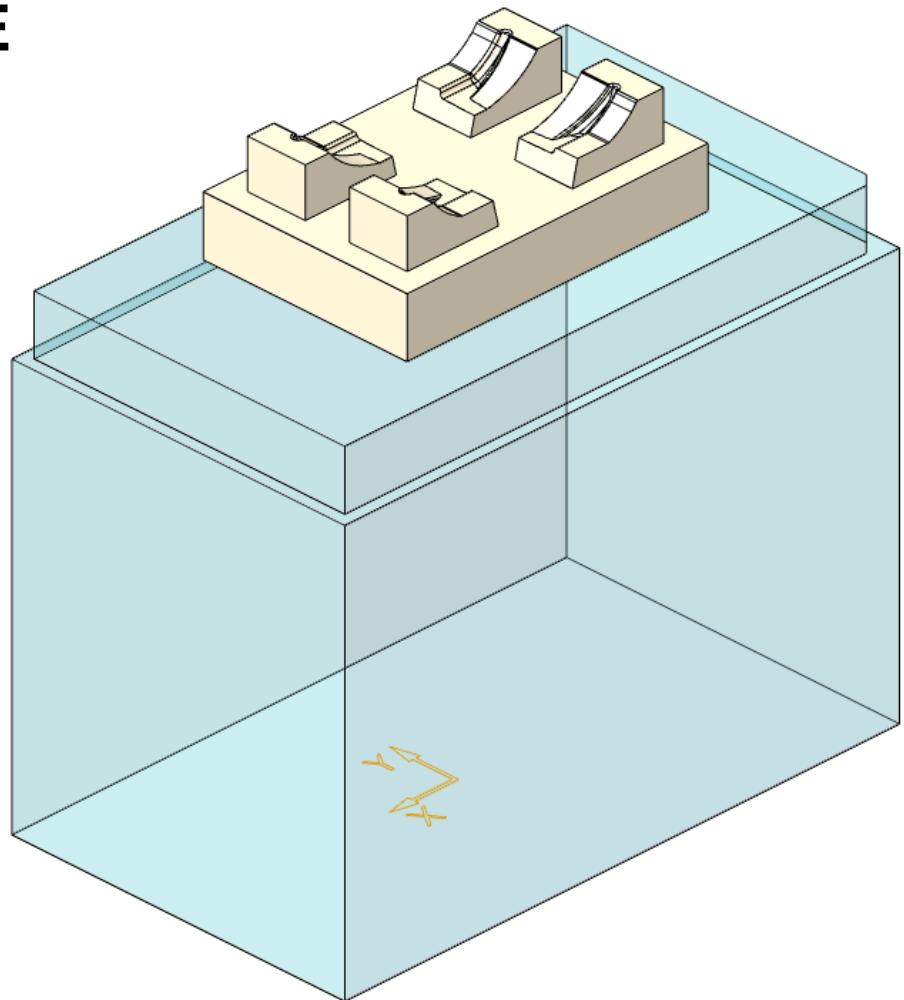
Electrode 13

Electrode 14

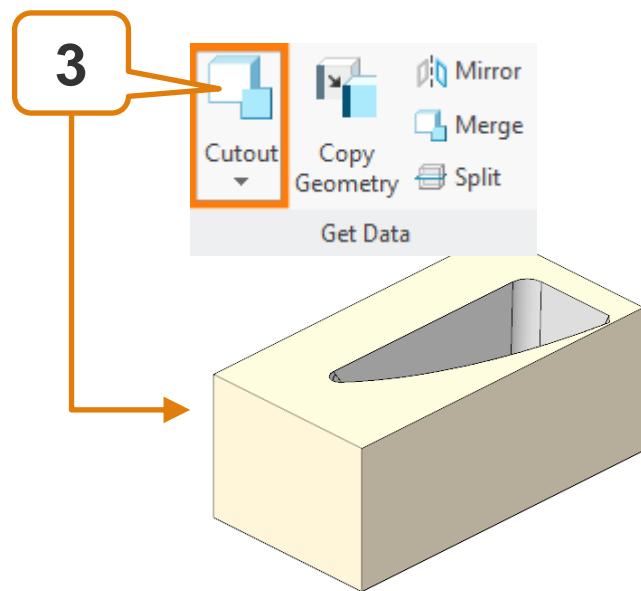
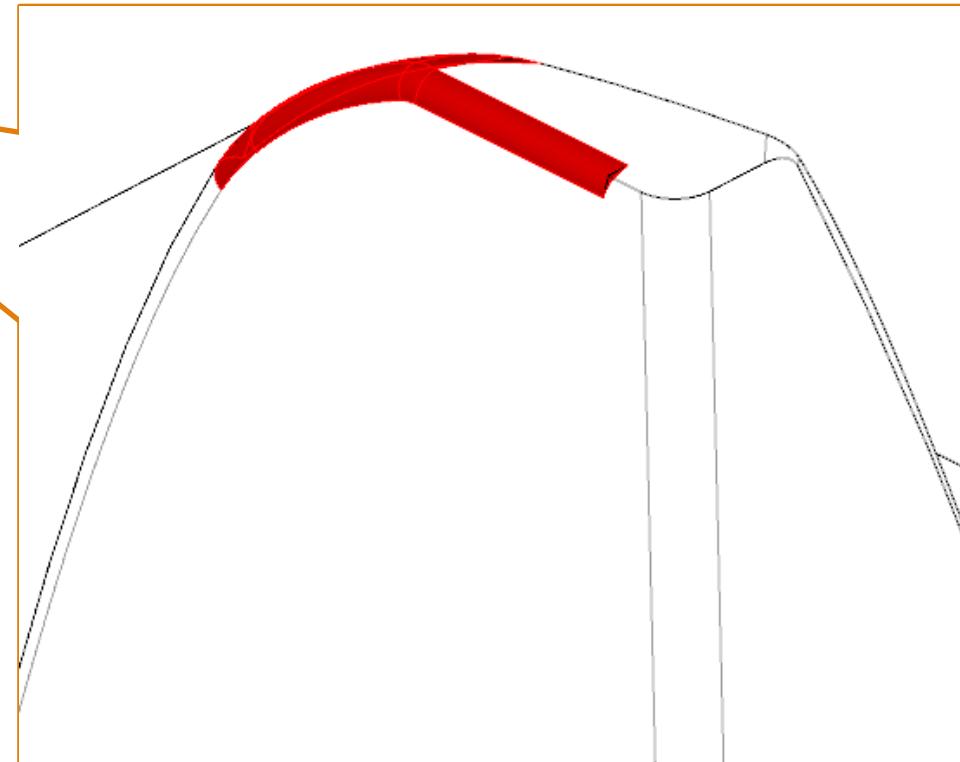
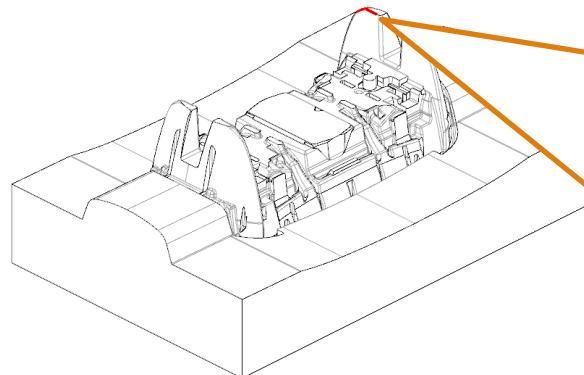
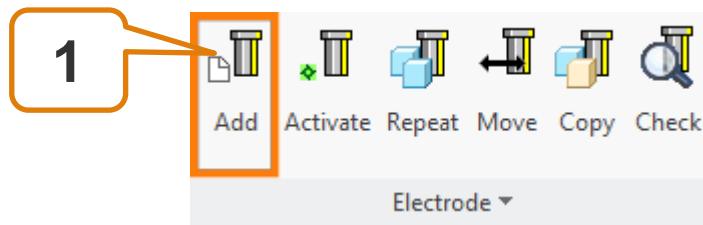


Topics...

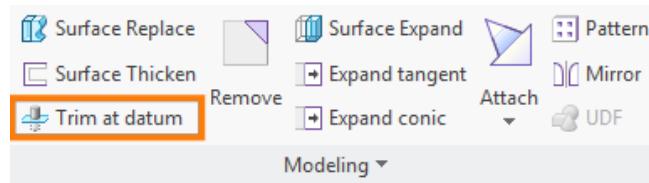
- Cut out with Creo extrude
- User defined FREE_FACE



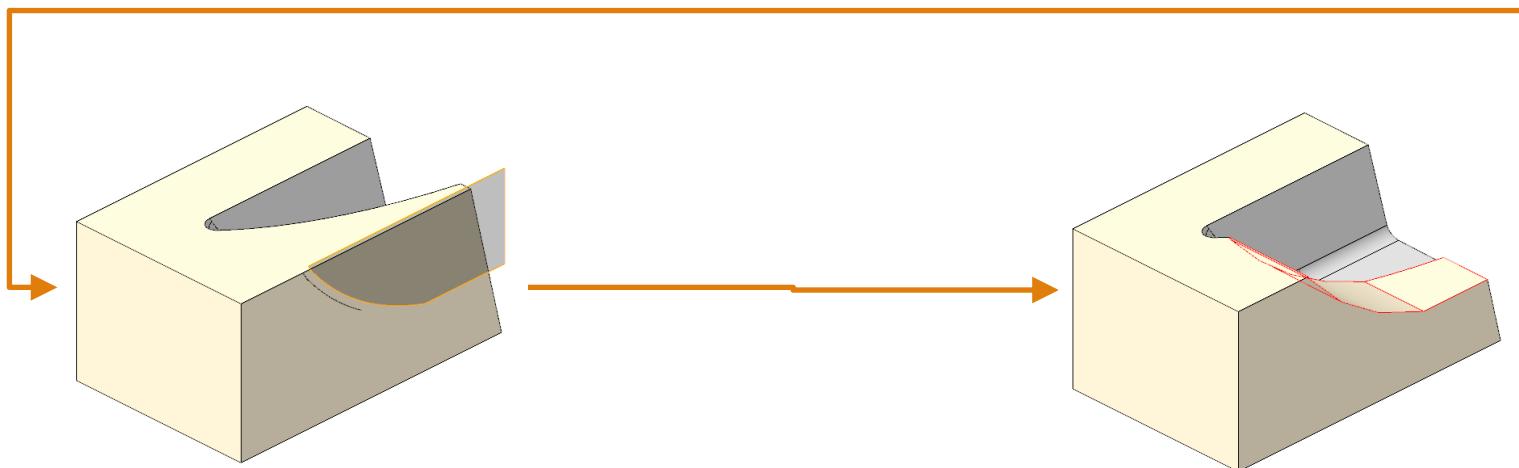
Electrode 14 – Get Data



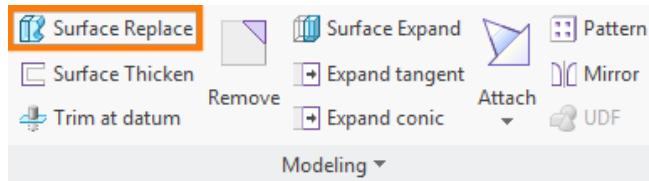
Electrode 14 – Detailing



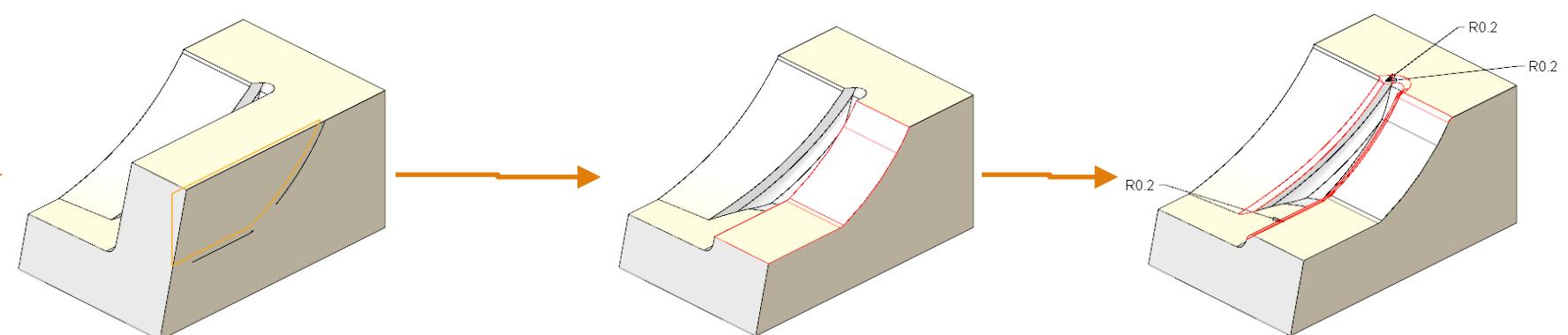
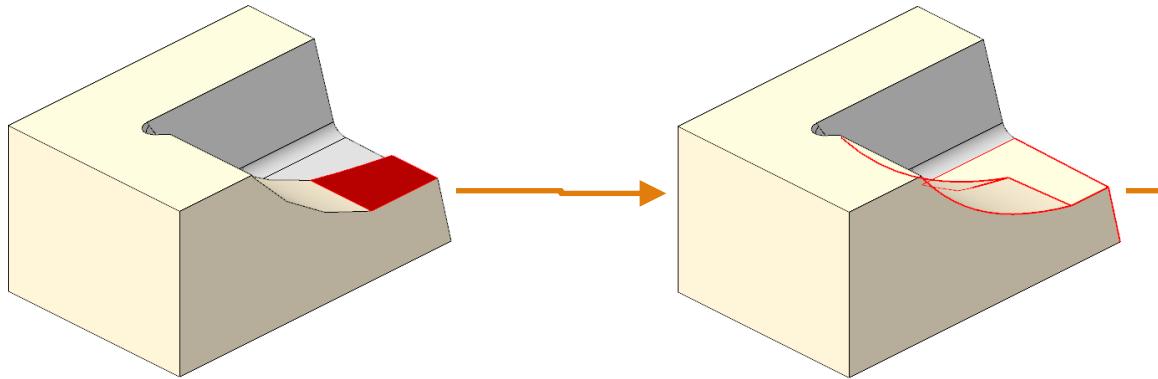
- Trim at datum
- Cut out using Creo extrude



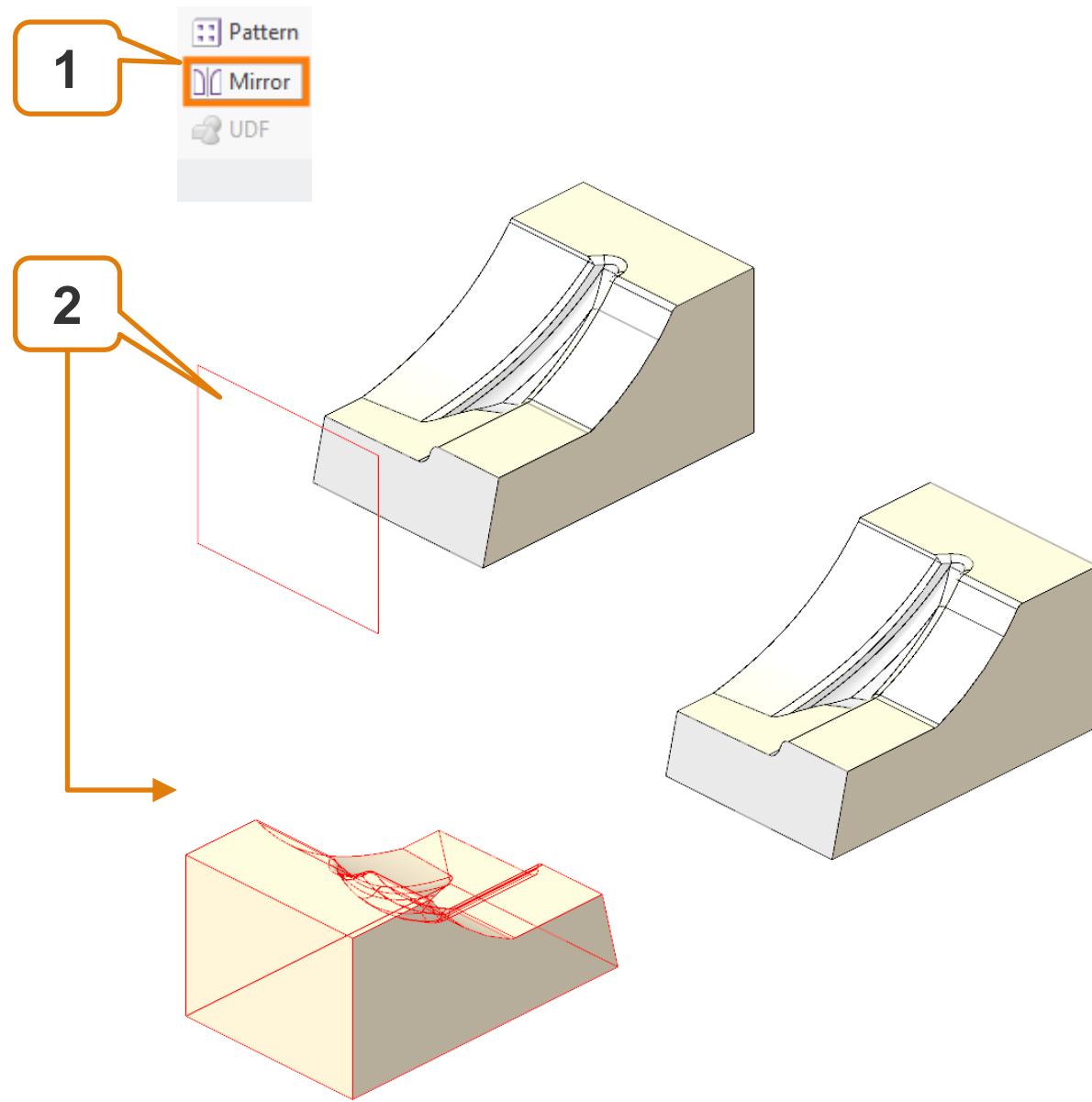
Electrode 14 – Detailing



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

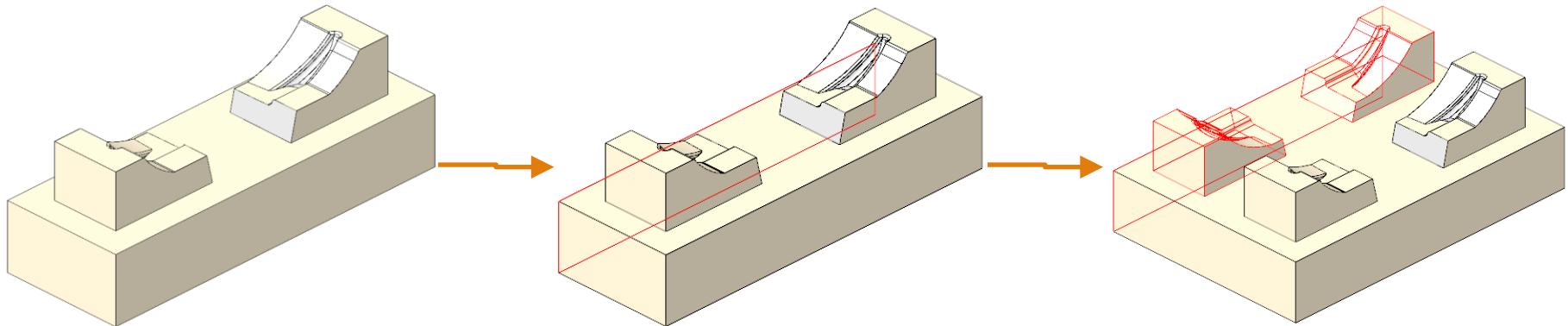
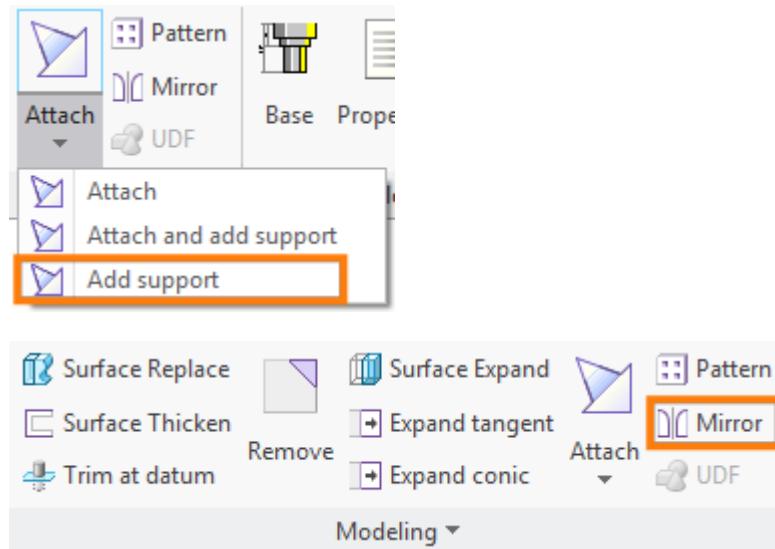


Electrode 14 – Mirror

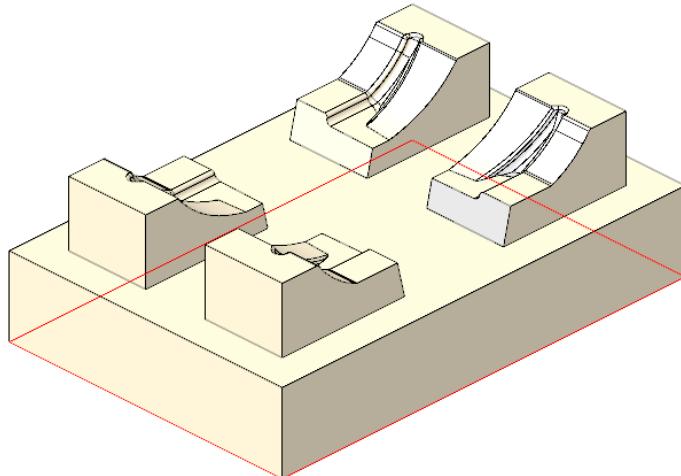


Electrode 14 – Detailing

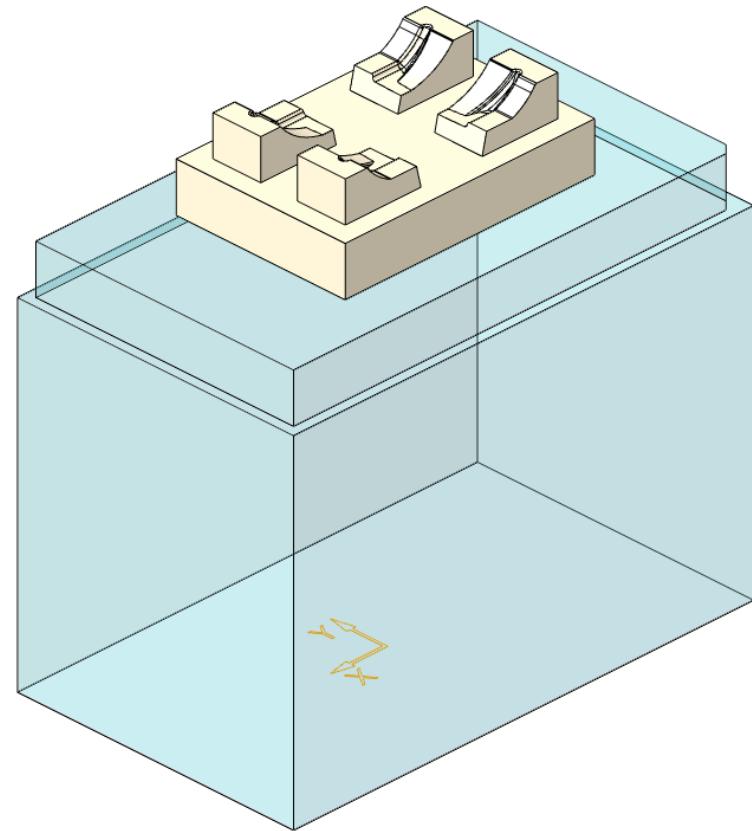
- Create support
- Mirror



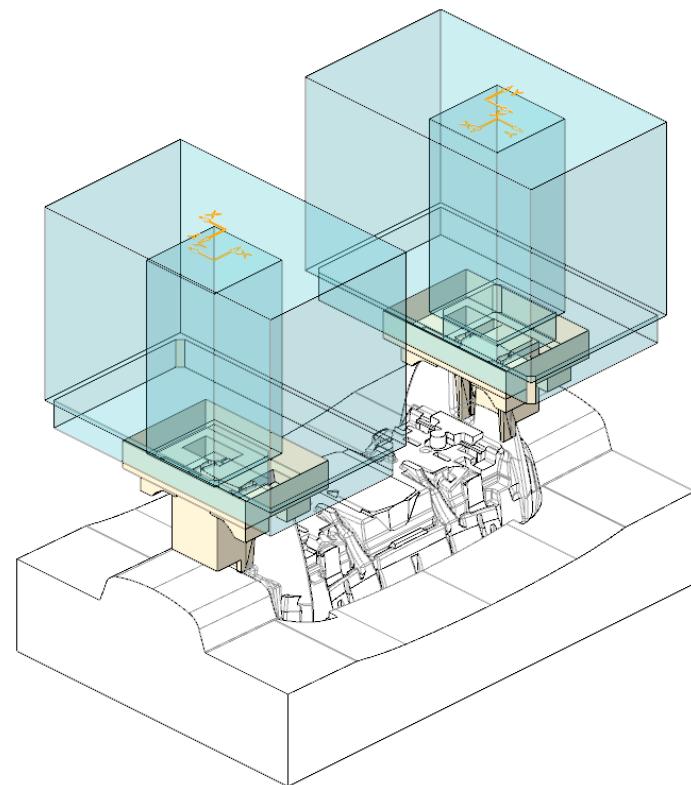
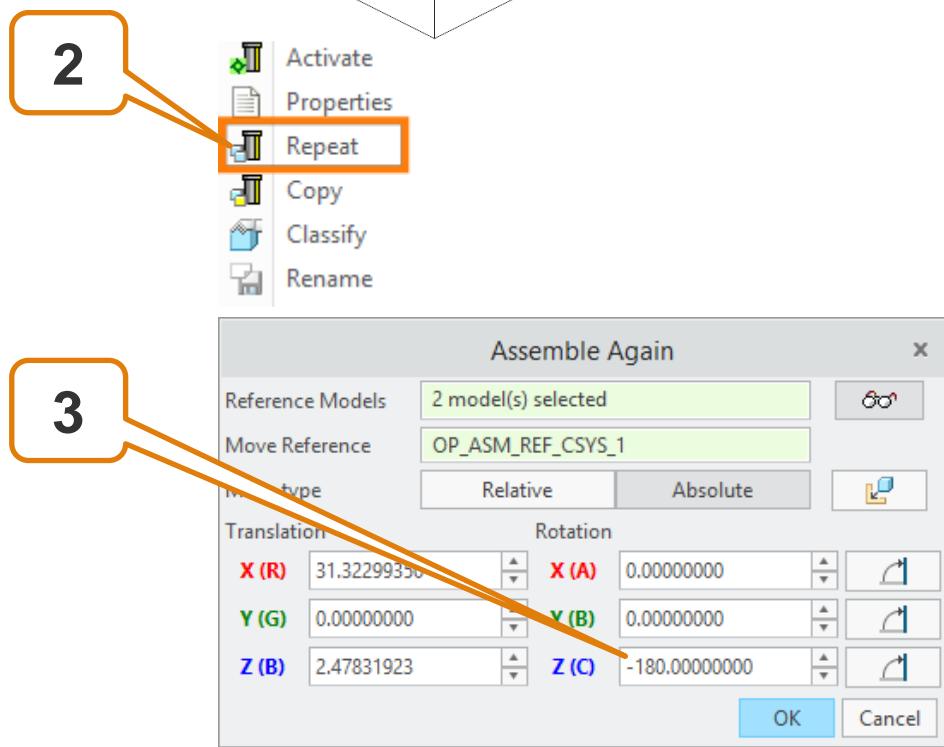
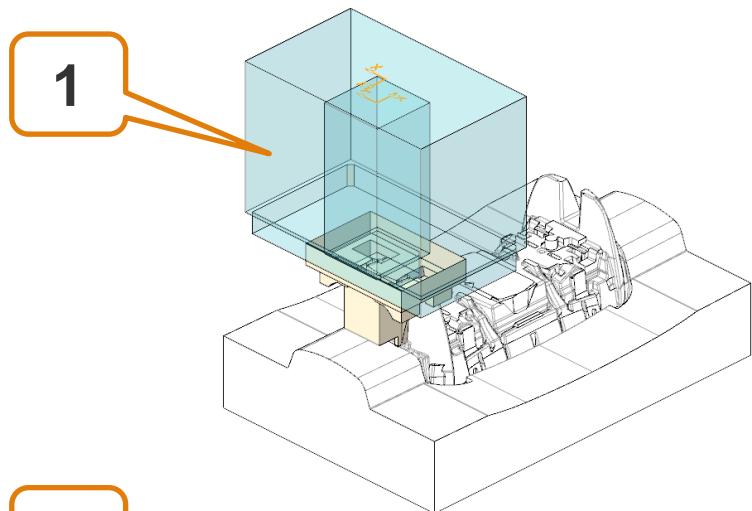
Electrode 14 - Finish



- Select **FREE_FACE**
- Finish electrode with base



Electrodes 13 & 14 – Assemble Again



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

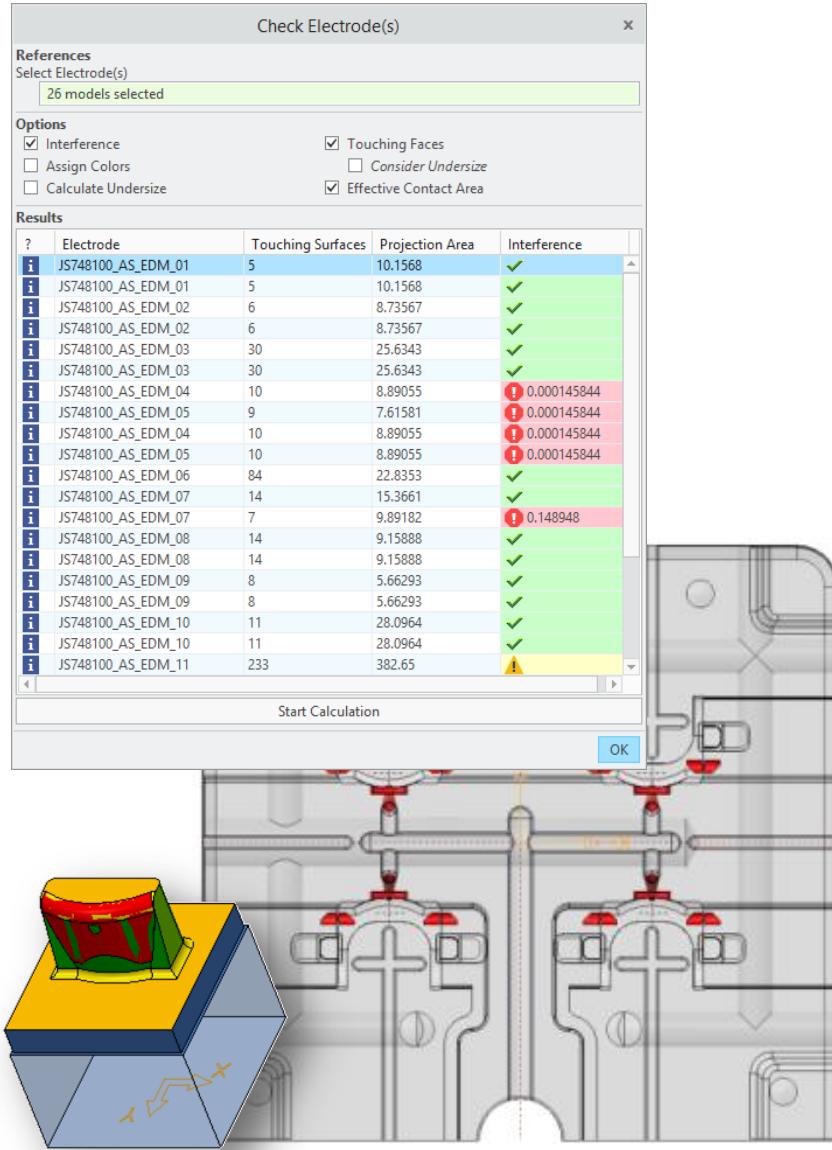
Best Practices

Modeling

Design Changes

Regeneration Behavior in Creo

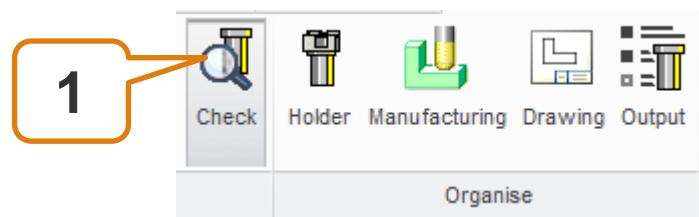
More User Interfaces - Check Electrodes



Use Check UI to...

- find interferences
- assign color formats
- burn-faces
(touching surface analysis not available in Creo Parametric)
- Calculate effective burn-area
- Calculate undersize using projection and surface quality

More User Interfaces - Check Electrodes



- Open UI (1)

Electrode	Touching Surfaces	Projection Area	Interference
JS748100_AS_EDM_01	5	10.1568	✓
JS748100_AS_EDM_01	5	10.1568	✓
JS748100_AS_EDM_02	6	8.73567	✓
JS748100_AS_EDM_02	6	8.73567	✓
JS748100_AS_EDM_03	30	25.6343	✓
JS748100_AS_EDM_03	30	25.6343	✓
JS748100_AS_EDM_04	10	8.89055	⚠ 0.000145844
JS748100_AS_EDM_04	10	8.89055	⚠ 0.000145844
JS748100_AS_EDM_05	10	8.89055	⚠ 0.000145844
JS748100_AS_EDM_06	84	22.8353	✓
JS748100_AS_EDM_07	14	15.3661	✓
JS748100_AS_EDM_07	7	9.89182	⚠ 0.148948
JS748100_AS_EDM_08	14	9.15888	✓
JS748100_AS_EDM_08	14	9.15888	✓
JS748100_AS_EDM_09	8	5.66293	✓
JS748100_AS_EDM_09	8	5.66293	✓
JS748100_AS_EDM_10	11	28.0964	✓
JS748100_AS_EDM_10	11	28.0964	✓
JS748100_AS_EDM_11	233	382.65	⚠

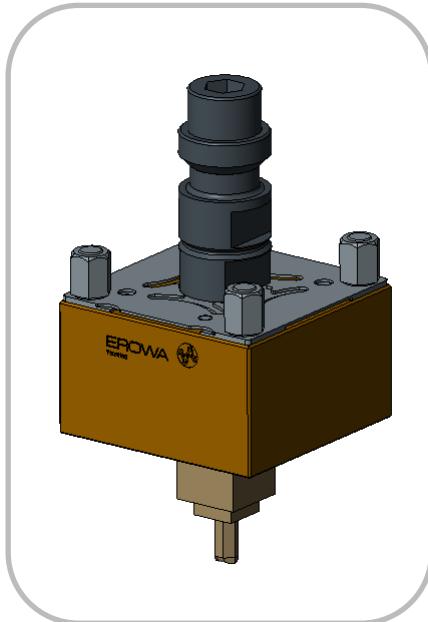
- Select electrodes (2)
- Choose from analysis options (3)
- 'Start Calculation' (5)
- List view with results (4)

More User Interfaces – Electrode Holder

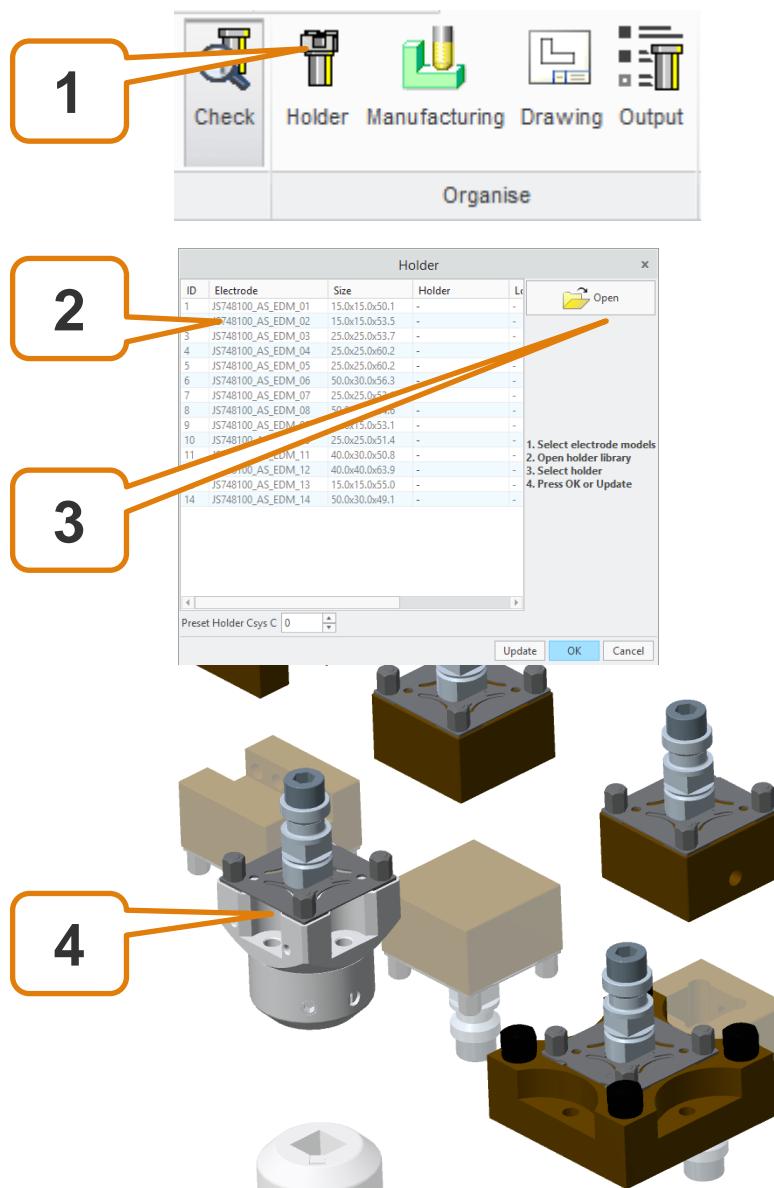
ID	Electrode	Size	Holder	Loc
1	JS748100_AS_EDM_01	15.0x15.0x50.1	-	-
2	JS748100_AS_EDM_02	15.0x15.0x53.5	-	-
3	JS748100_AS_EDM_03	25.0x25.0x53.7	-	-
4	JS748100_AS_EDM_04	25.0x25.0x60.2	-	-
5	JS748100_AS_EDM_05	25.0x25.0x60.2	-	-
6	JS748100_AS_EDM_06	50.0x30.0x56.3	-	-
7	JS748100_AS_EDM_07	25.0x25.0x53.1	-	-
8	JS748100_AS_EDM_08	50.0x10.0x54.6	-	-
9	JS748100_AS_EDM_09	15.0x15.0x53.1	-	-
10	JS748100_AS_EDM_10	25.0x25.0x51.4	-	-
11	JS748100_AS_EDM_11	40.0x30.0x50.8	-	-
12	JS748100_AS_EDM_12	40.0x40.0x63.9	-	-
13	JS748100_AS_EDM_13	15.0x15.0x55.0	-	-
14	JS748100_AS_EDM_14	50.0x30.0x49.1	-	-

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



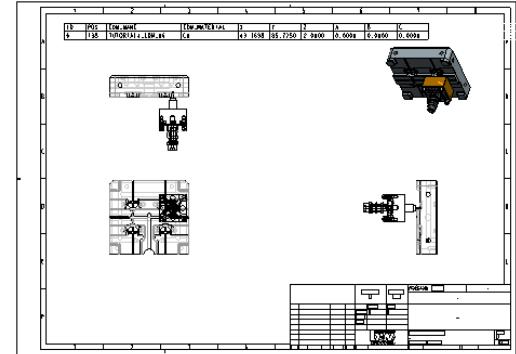
- **Open UI (1)**
- **Select electrodes (2)**
- **Open library (3)**
- **Select holder (4)**

More User Interfaces - Drawings

SE creates two types of drawings:

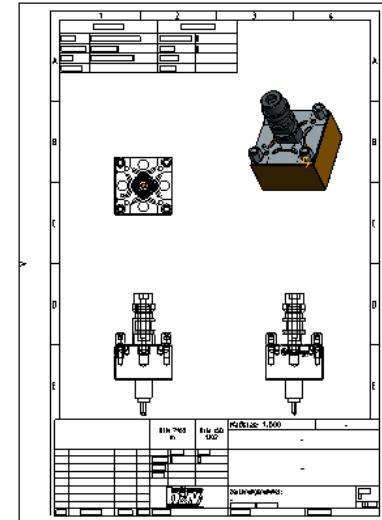
- **Assembly drawing sheets to show *all data related to EDM***

- Positions
- Technology

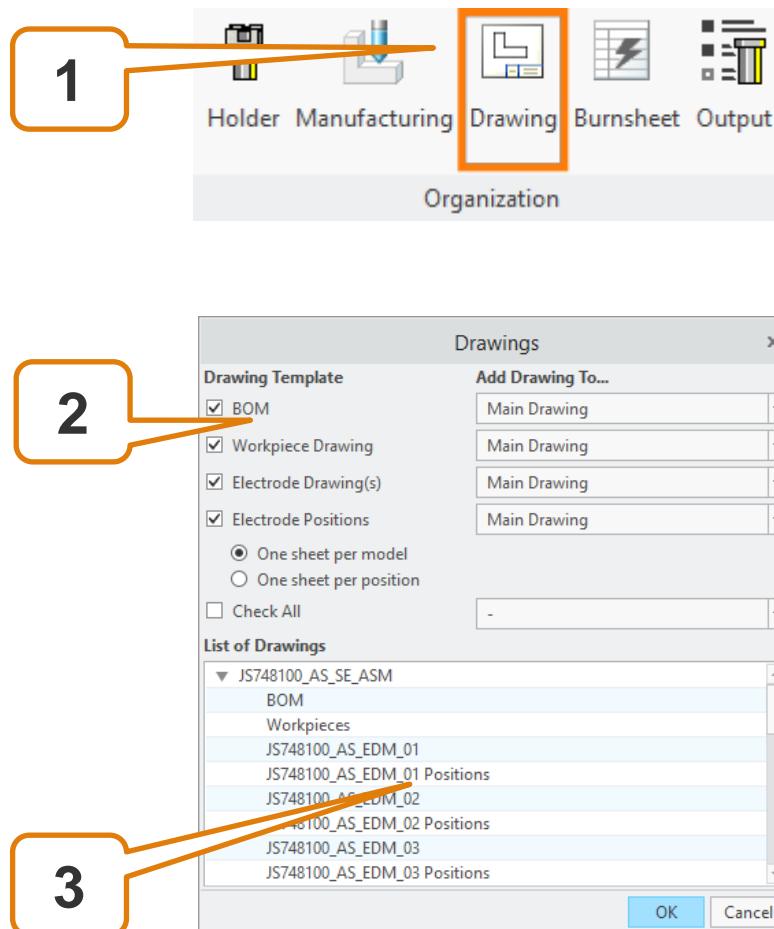


- **Part drawing sheets to show *all data related to manufacturing of electrode***

- Material
- Blank size



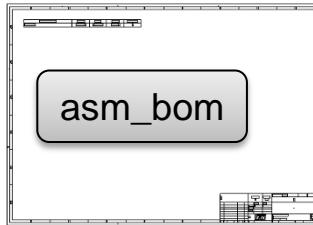
More User Interfaces - Drawings



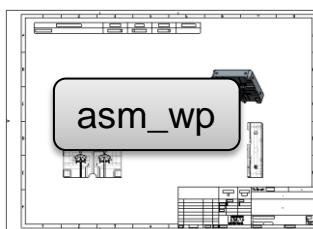
- Open UI (1)
- Select drawing templates to use (2)
- Preview of drawings that will be created (3)

Drawing Templates

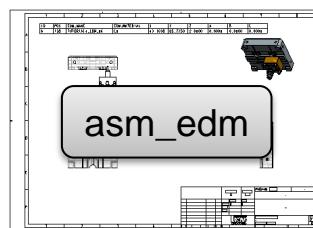
- There are 4 Creo drawing templates available:



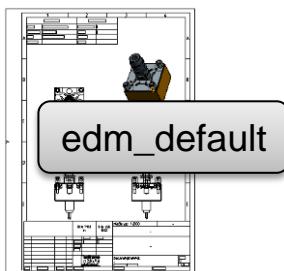
- Shows all electrodes in assembly



- All workpieces will be shown on one sheet

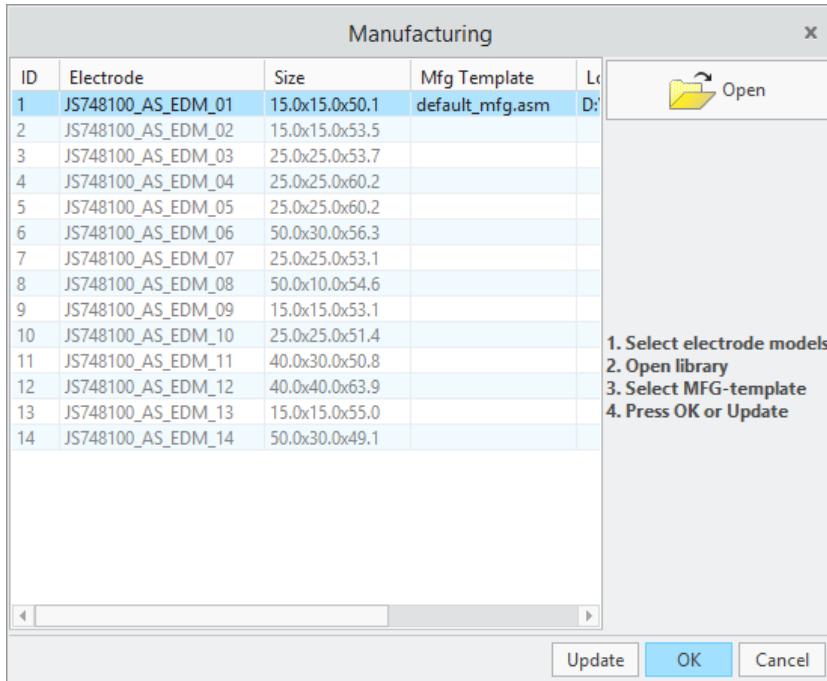


- Template for electrode assembly sheet



- Template for electrode part drawing

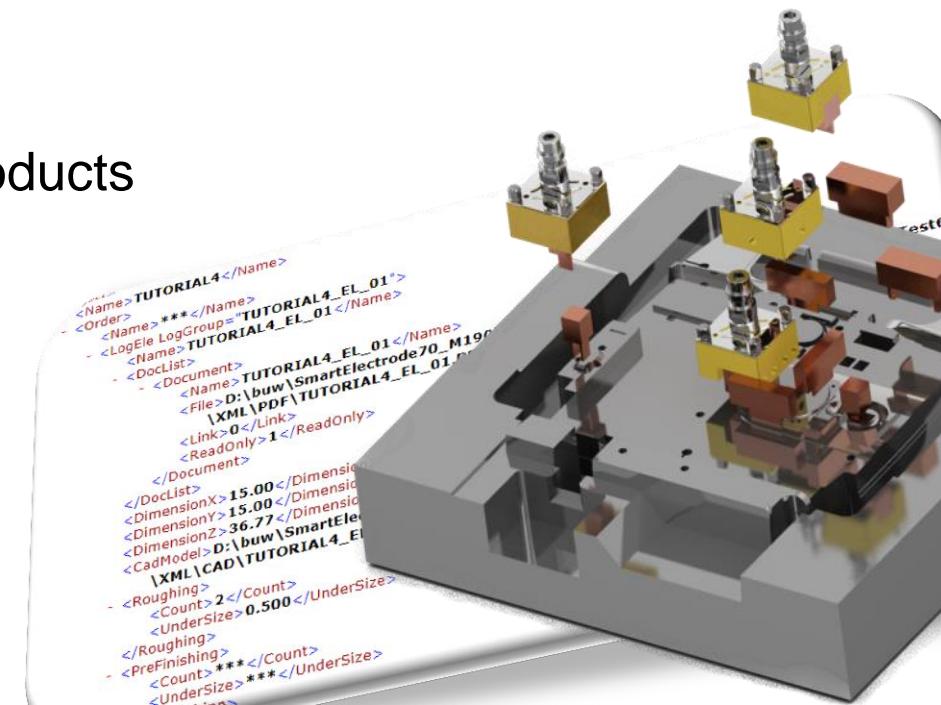
More User Interfaces – Manufacturing UI



- **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



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More User Interfaces - Output UI



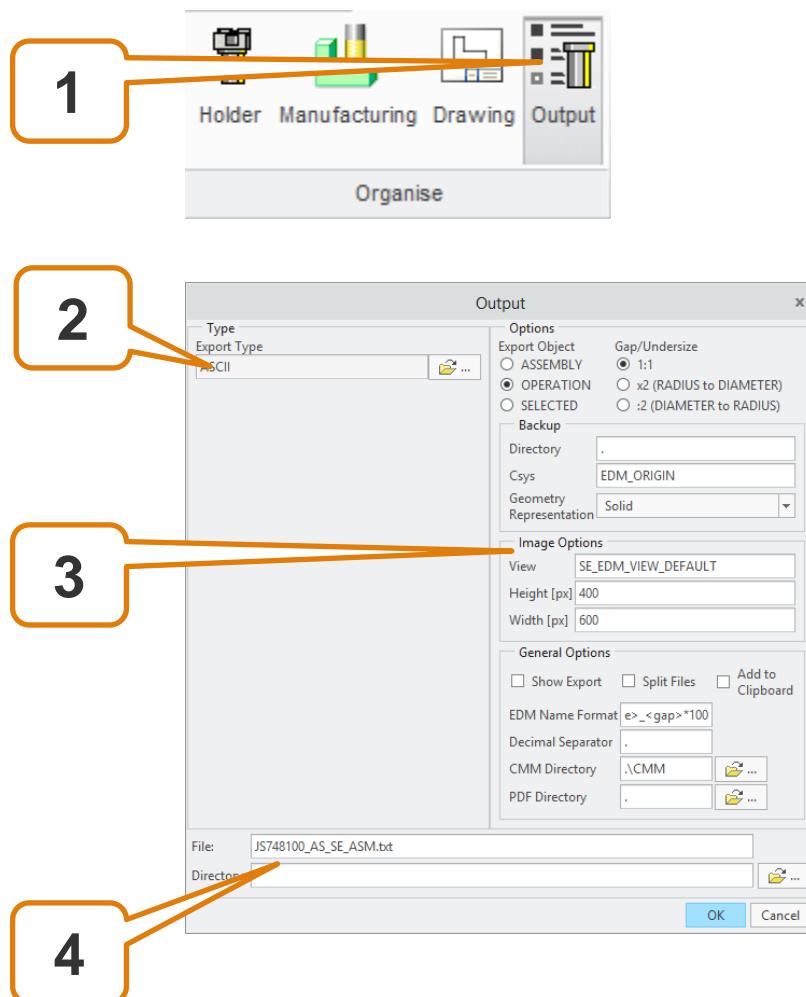
INTEGRATED FORMATS

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

CUSTOMIZED FORMATS

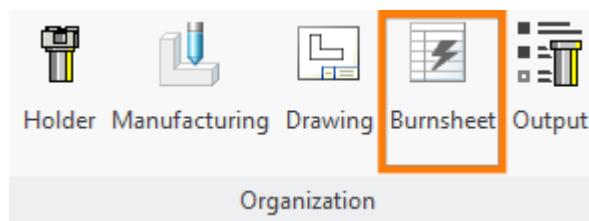
- **TXT**
- **XML**
- **HTML**
- **CSV**
- **STEP**
- **IGES**
- **CAQ / CMM**
- **CAM**

More User Interfaces – Output UI



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

More User Interfaces – Burnsheet UI

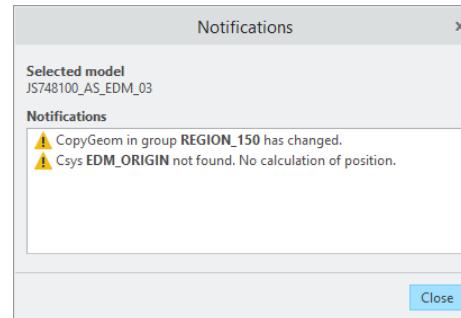


Burnsheet					
Project			Status	ID	EDM_NAME
JS748100_AS_SE_ASM	<input type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_REF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_01	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_02	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_03	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_04	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_05	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_06	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓	6	JS748100_AS_EDM_06
JS748100_AS_EDM_07	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_08	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_09	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_11	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓	11	JS748100_AS_EDM_11
JS748100_AS_EDM_12	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_13	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		
JS748100_AS_EDM_14	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	✓		

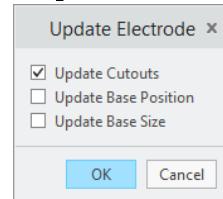
Burnsheet shows all visible parameters.

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

Best Practices

Modeling

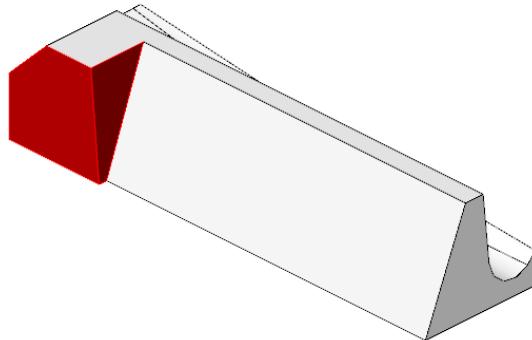
Design Changes

Regeneration Behavior in Creo

Best Practices - Modeling

Problem

- Problems with remove of Material



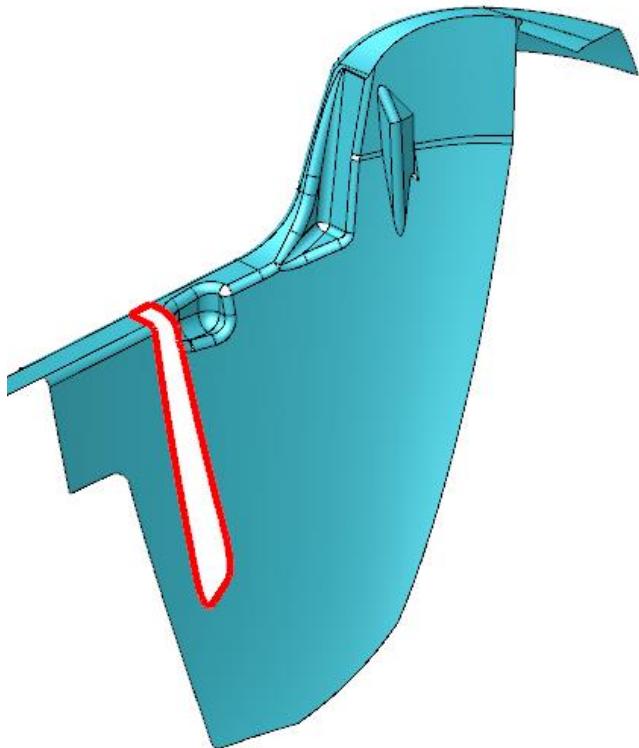
Solutions

- Use various features...
- Remove
- Replace surface
- Cut Block
- Thicken as cut
- Creo extrude

Best Practices - Modeling

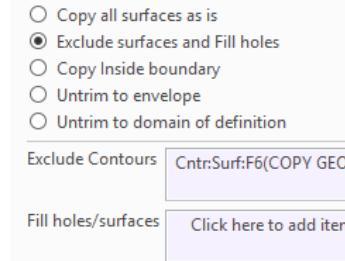
Problem

- Close holes in quilts

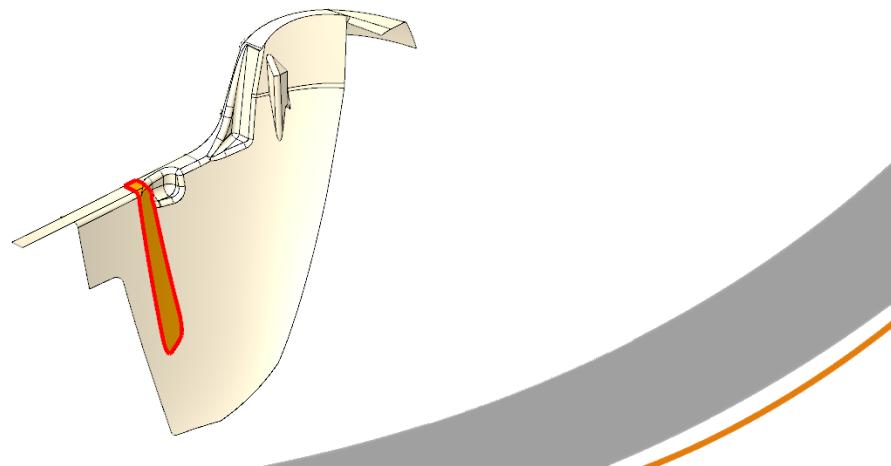


Solutions

- Copy with option „Fill holes/surfaces“



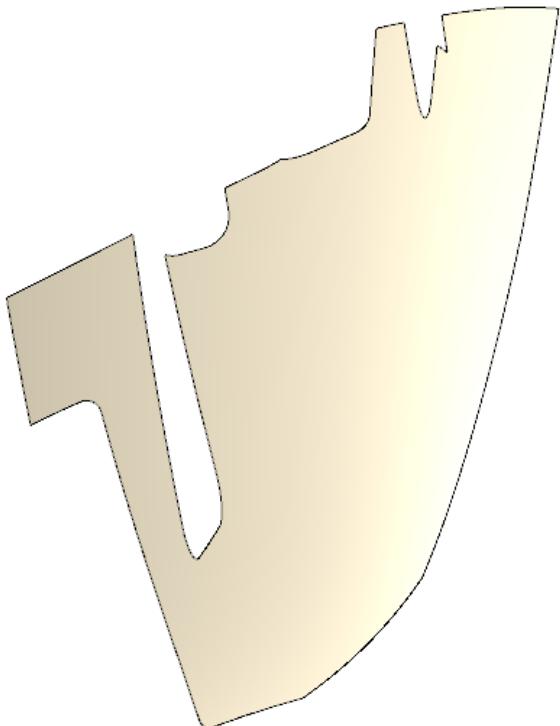
- Remove feature with option „Edges to remove“



Best Practices - Modeling

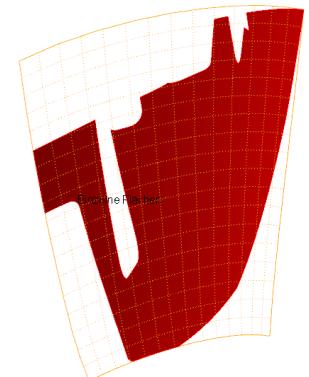
Problem

- Cleanup contour of surface

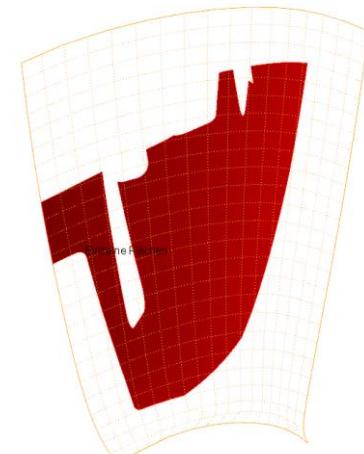


Solutions

- Copy with option „Untrim to envelope“



- Copy with option „Untrim to domain of definition“

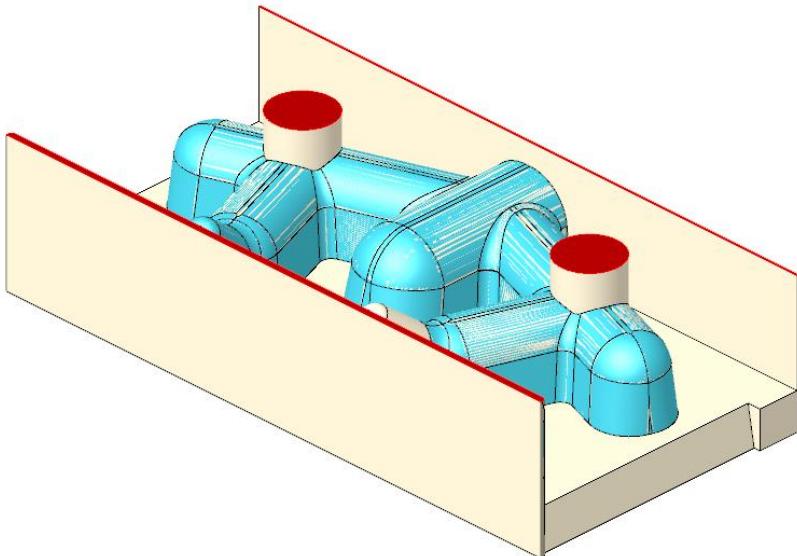


- Trim and/or merge may be necessary afterwards

Best Practices - Modeling

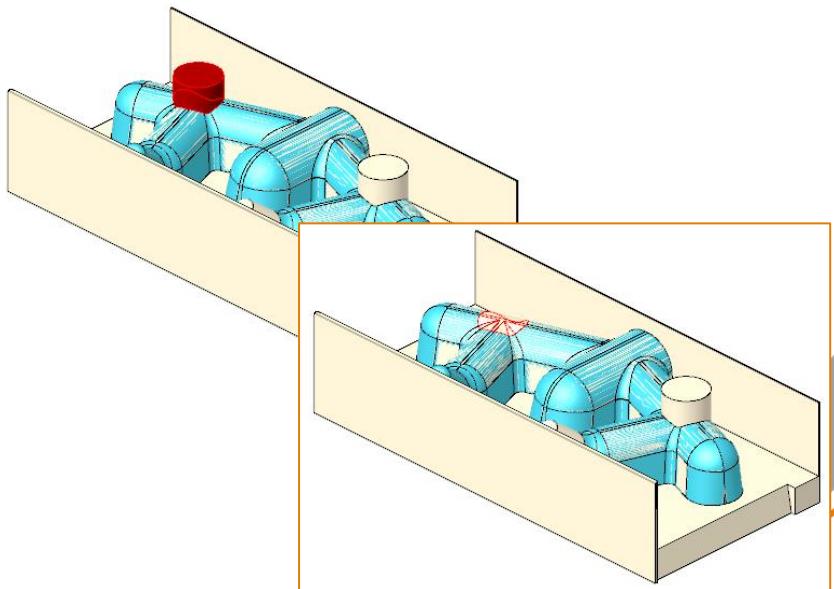
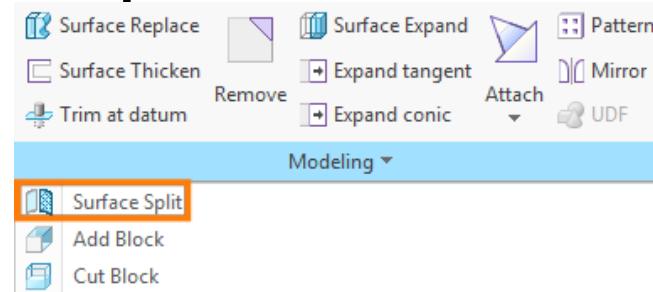
Problem

- Surfaces with several contours can't be removed or replaced



Solutions

- Separate contours into unique surfaces



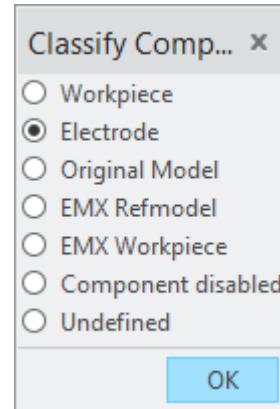
Best Practices - Design Changes

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

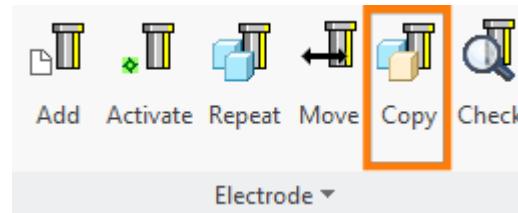
Best Practices - Design Changes

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

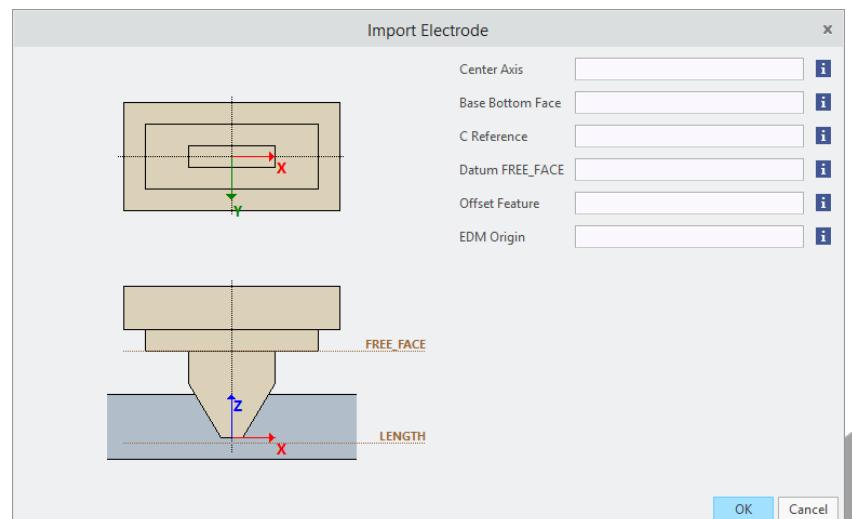
Best Practices - Design Changes

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 regeneration for assembly/electrodes

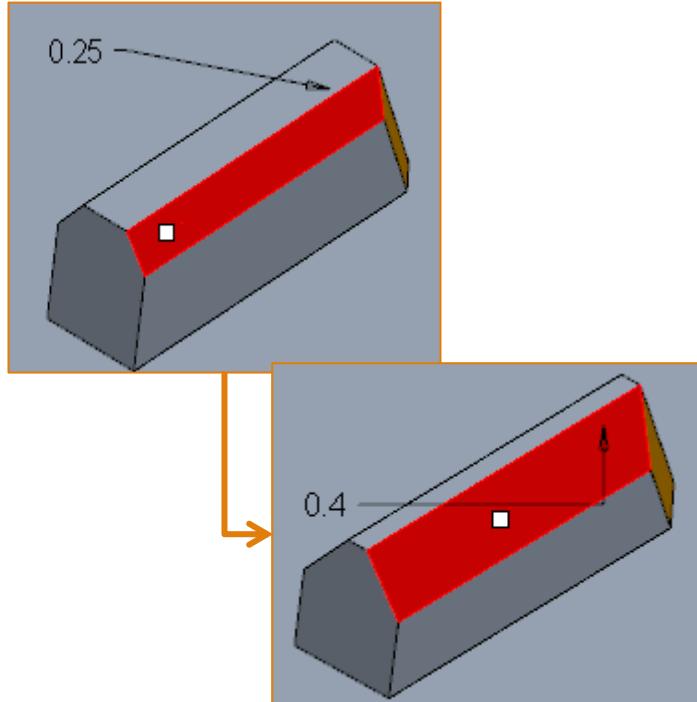
Solution

- 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 Burnsheets UI
-
- **Note**
Ctrl+C and Ctrl+V creates dependent copies without reference control

Reason	Possible results
<ul style="list-style-type: none">• Baugruppe wird aufgrund Design Changes durchregeneriert	<ol style="list-style-type: none">1. Assembly regenerates without error, electrodes are up-to-date and geometrically <u>correct</u>2. Assembly regenerates without error, electrodes are up-to-date and geometrically <u>wrong</u>3. Regeneration error in Creo electrodes are not up-do-date and geometrically <u>wrong</u>

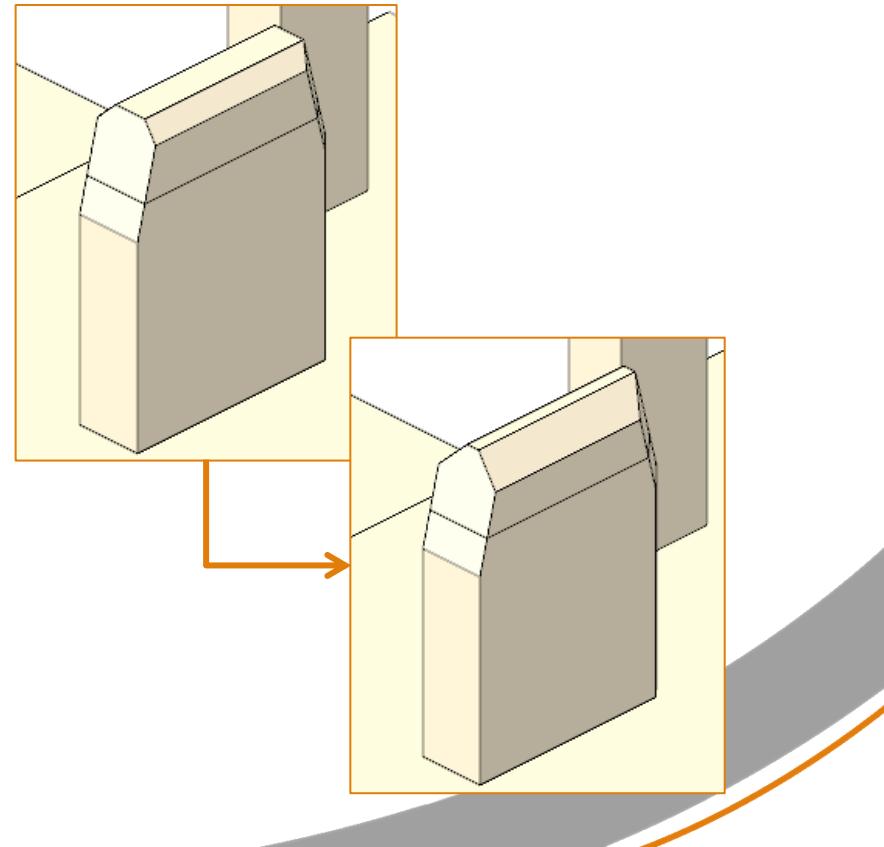
Result

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



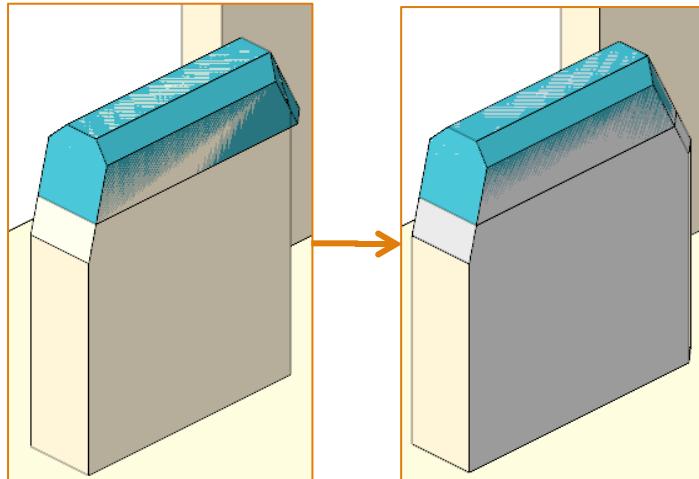
Necessary Action

- No action necessary!



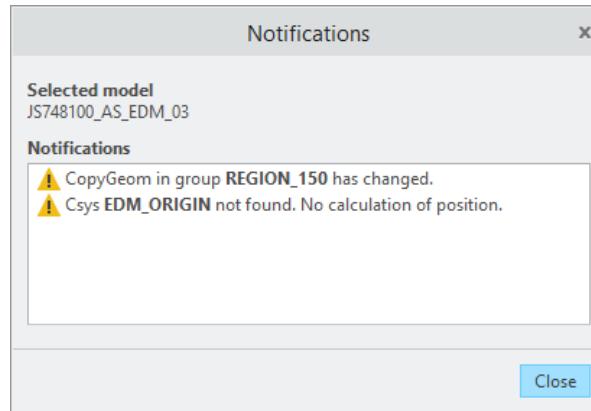
Result

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

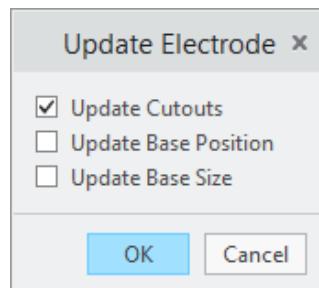


Necessary Action

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

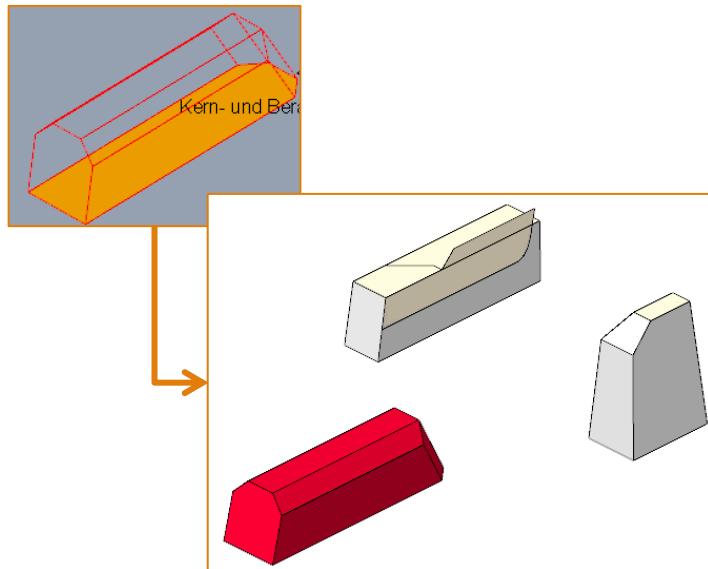


- Use context menu to update cutouts



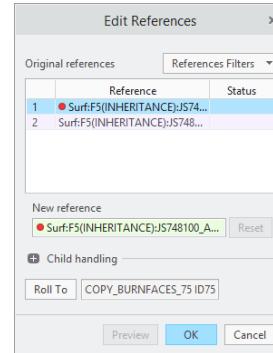
Result

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



Necessary Action

- Solve regeneration errors in Creo



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

