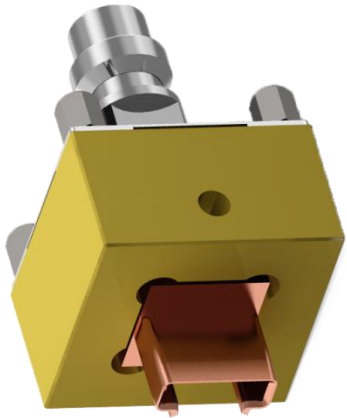


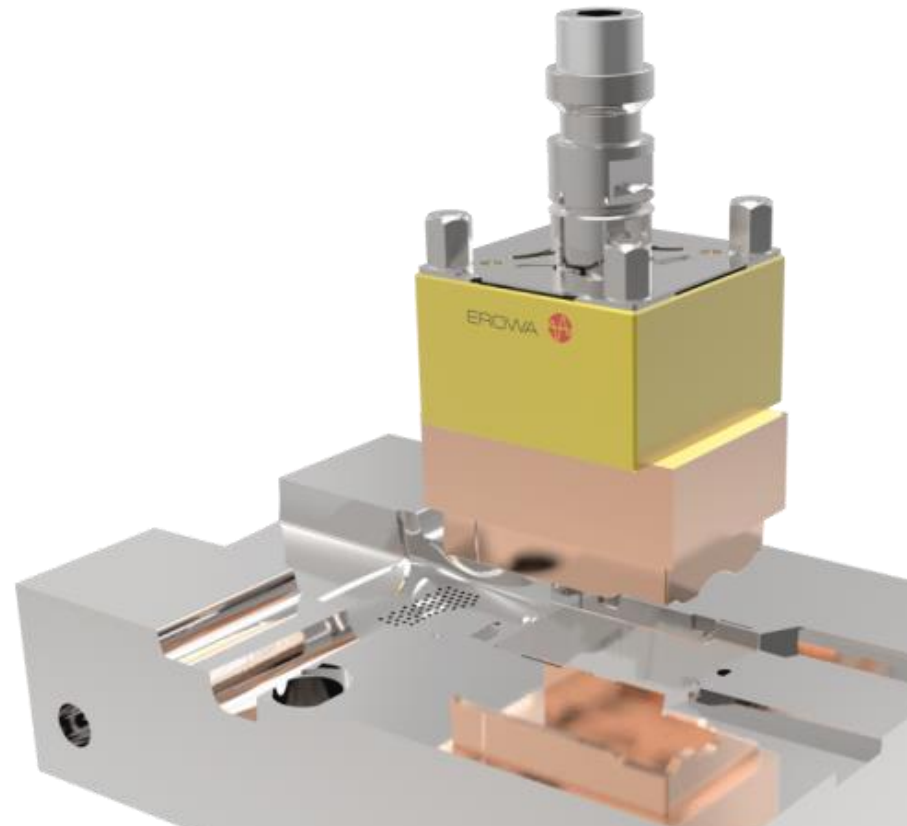
# SMARTElectrode

*Training*



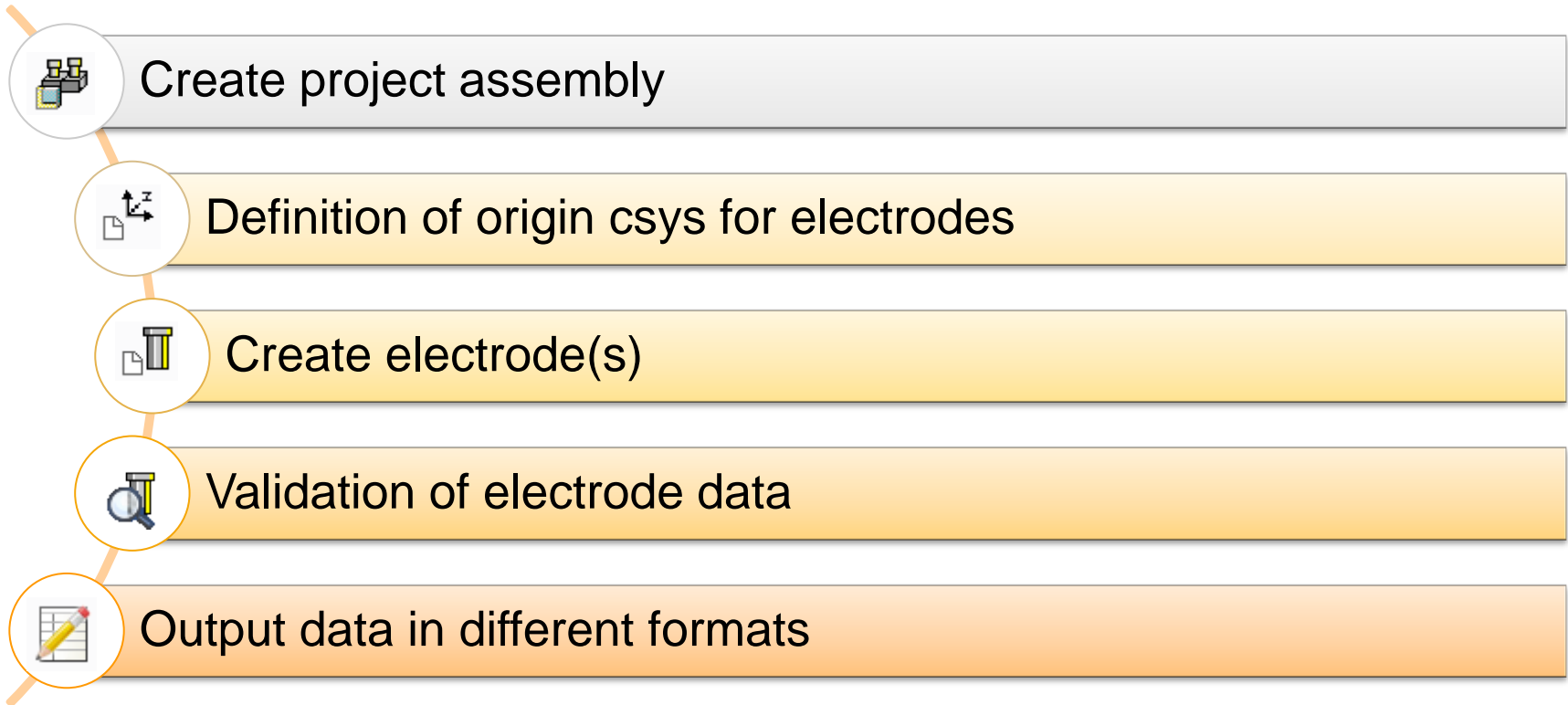
**SMARTElectrode 8.0**  
is an auxiliary application for PTC Creo  
Parametric that automates the design of  
sinking electrodes

- **Concept**
- **Workflow**
  1. Create Project Assembly
  2. Preparation *[optional]*
  3. Set Operation Origin
  4. Add New Electrode
  5. Detail Solid
  6. Add Base Feature
  7. Set Properties
  8. Check Electrode
  9. Create Drawings
  10. Create Output
- **Tutorial**



- **SME 8.0**
  - Is especially designed for new customers using PTC Creo Parametric 3.0!
- **SME 8.0 separates designer tasks into easy steps!**
  - Creation of geometry
  - Attach all necessary data as parameters
  - Output geometric and additional information in different formats





# Workflow II

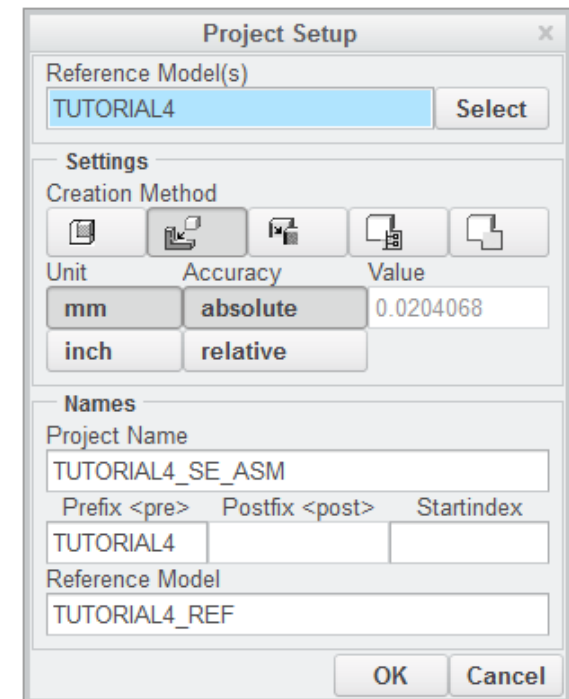
This image shows a CAD software ribbon with ten callout boxes pointing to specific icons. The callouts are numbered 1 through 10. The ribbon is organized into several groups: Project, Operation, Electrode, Organise, and View.

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>8</b>	<b>9</b>	<b>10</b>	Toggle cores	Toggle base								
New	Prepare	Create	Add	Activate	Properties	Assemble again	Transform position	Copy	Check	Holder	Manufacturing	Drawing	Output	Isolate	Toggle holders	Toggle analysis
Project ▾	Operation	Electrode						Organise				View				

This image shows a CAD software ribbon with three callout boxes pointing to specific icons. The callouts are numbered 5, 6, and 7. The ribbon is organized into several groups: Select, Data, Modeling, Electrode, and View.

<b>5</b>															<b>6</b>	<b>7</b>	Toggle cores	Toggle base								
Solid faces	Datum faces	Quilts	Same ▾	Edges	Loops	All ▾	Cutout ▾	Copy Surfaces	Surface Replace	Surface Thicken	Trim at datum	Surface Expand	Expand tangent	Expand conic	Surface Remove	Attach	Pattern	Mirror	UDF	Base	Properties	Check	Isolate	Toggle holders	Toggle analysis	Toggle surfaces
Select			Data			Modeling						Electrode ▾				View										

- **The Project-assembly is the compilation of workpieces, a zero point and electrodes**
- **Assemble workpieces**
  - As original part
  - As reference part (copy of original)
- **Inheritance for native models**
- **Start from part or assembly**
- **Use of surface or solid models**



# 1/10 – Create project assembly

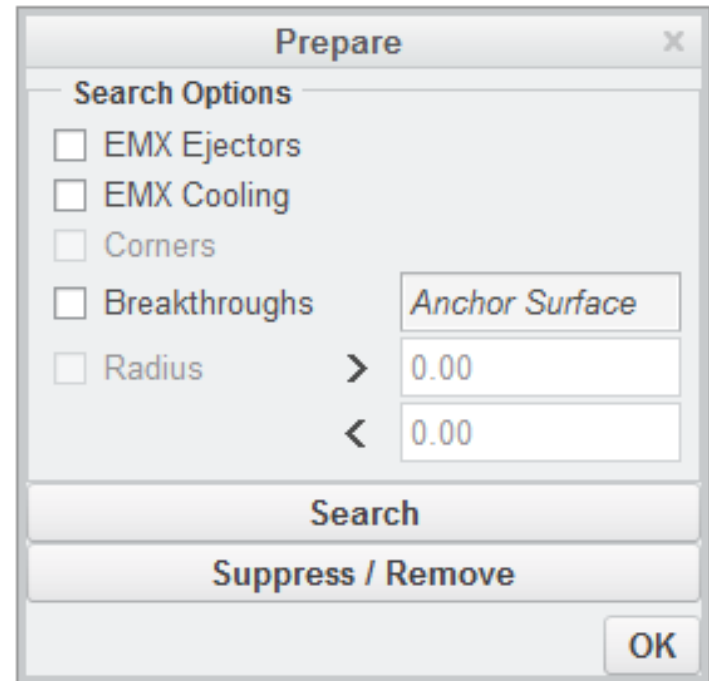
The screenshot shows the 'Project Setup' dialog box with the following fields and annotations:

- Reference Model(s):** TUTORIAL4 (Annotated as **Workpieces (cores)** - Current model or selected)
- Settings:**
  - Creation Method:** (Annotated as **Method** - Original, Merge, Inherit, CopyGeom, Current Model (Only for assemblies))
  - Unit:** mm (Annotated as **Units** - workpiece/assembly, mm/mm, mm/inch, inch/inch, inch/mm)
  - Accuracy:** absolute (Annotated as **Accuracy type and value** - Use consistent accuracy throughout the whole assembly!)
  - Value:** 0.0204068 (Annotated as **Accuracy type and value** - Use consistent accuracy throughout the whole assembly!)
- Names:**
  - Project Name:** TUTORIAL4\_SE\_ASM (Annotated as **Project name** - From naming format)
  - Prefix <pre>:** TUTORIAL4 (Annotated as **Name of Ref.-Assembly** - Only needed for ref-models)
  - Postfix <post>:** (Empty)
  - Startindex:** (Empty) (Annotated as **Startindex**)
  - Reference Model:** TUTORIAL4\_REF (Annotated as **Name of Ref.-Assembly** - Only needed for ref-models)

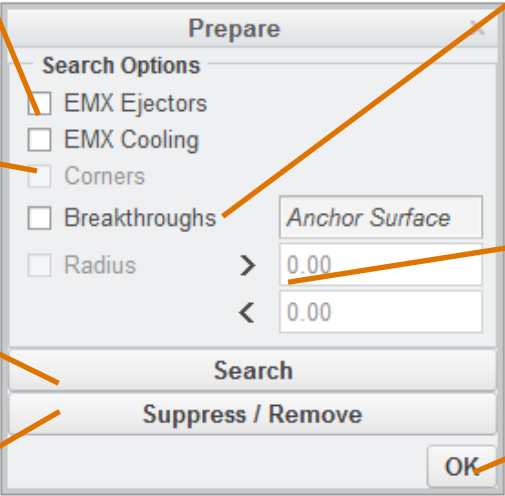
Buttons: OK, Cancel



- **Prepare geometry in core or reference model by suppressing or removing:**
  - EMX Ejectors
  - EMX Cooling
  - Breakthroughs
  - Rounds within min or max radius



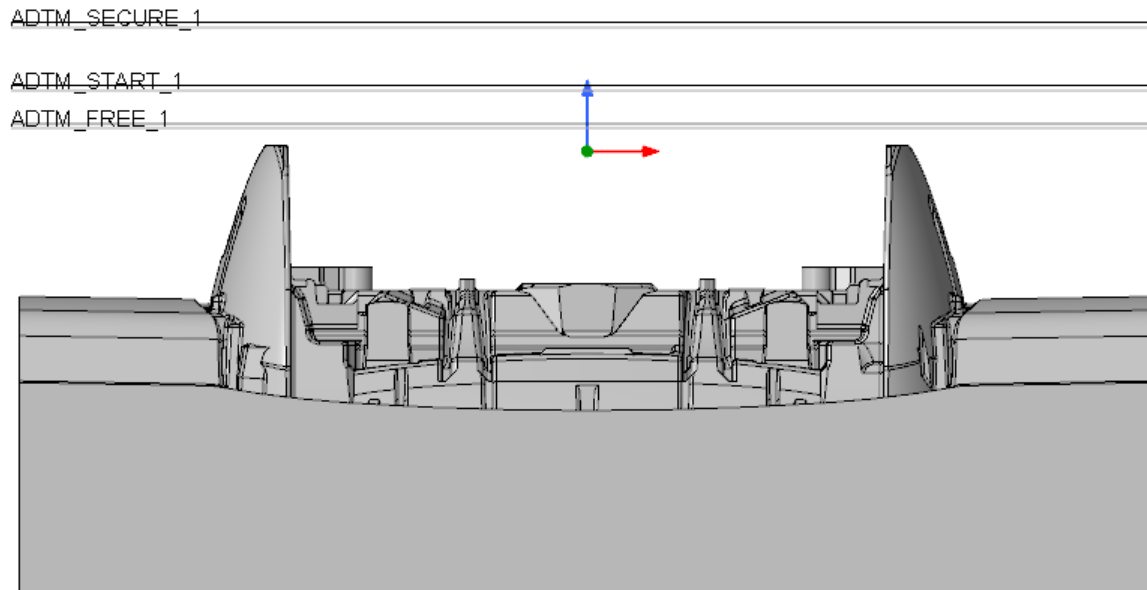
# 2/10 – Preparation



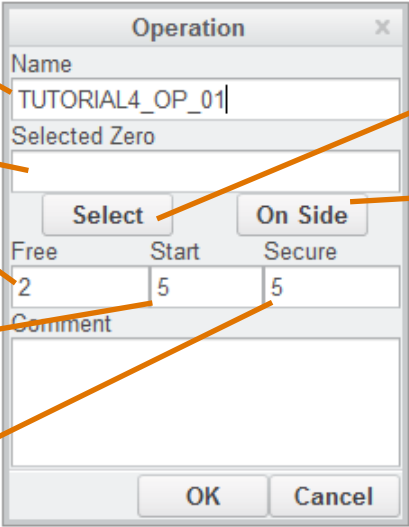
The image shows a 'Prepare' dialog box with several sections and options. Annotations with orange lines point from descriptive text to specific parts of the dialog:

- EMX**  
Search EMX-ejectors and cooling groups  
Use in ref.-parts with inheritance  
Points to the 'EMX Ejectors' checkbox.
- Corners**  
Search by sharp transitions  
Points to the 'Corners' checkbox.
- Search**  
Start Search  
Points to the 'Search' button.
- Suppress / Remove**  
Confirm and select action  
Also RMB (right mouse button)  
Points to the 'Suppress / Remove' button.
- Breakthroughs**  
Search ejector holes in imports  
Choice of anchor surface necessary  
Points to the 'Breakthroughs' checkbox and the 'Anchor Surface' dropdown menu.
- Radius**  
Search for min and max radii  
Points to the 'Radius' checkbox and the two numerical input fields.
- OK**  
Close dialog  
Points to the 'OK' button.

- **Defines origin for electrodes**
- **One origin in one project assembly**
- **Is a group of features in project assembly**
  - Operation CSYS
  - Csys on default position with orientation of operation CSYS
  - FREE\_FACE datum for electrode base feature with offset from origin
  - START default start position for electrode
  - SECURE default retreat plane



# 3/10 – Operation Csys



**Name**  
From naming format

**Selected CSYS**

**FREE\_FACE**  
Distance above zero plane

**Start**  
Default for start plane

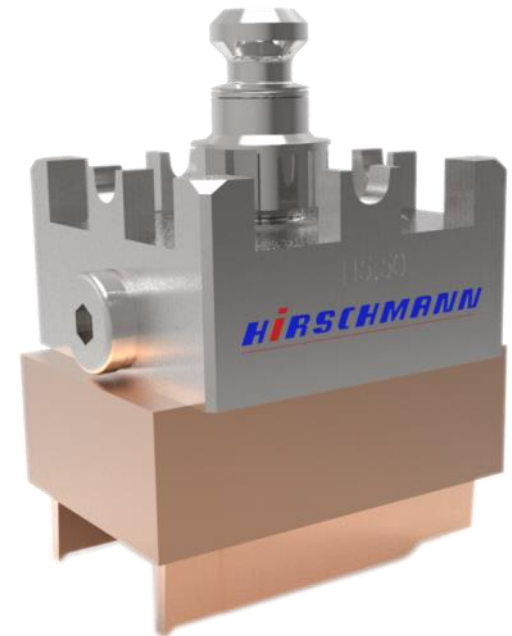
**Secure**  
Default for retreat plane

**Select CSYS**  
Or create on-the-fly

**Create CSYS**  
On side of model

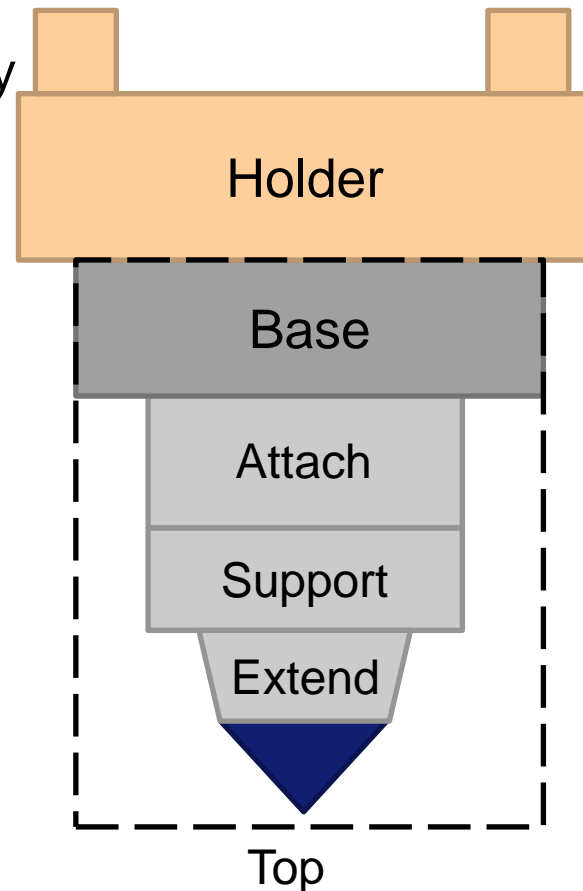
Free	Start	Secure
2	5	5

- **A new electrode is...**
  - An empty part from default template
  - Assembled on default position in assembly
  - Named by naming format  
(the counter will be updated automatically; gaps will be closed)
- **Activate component in assembly to start detailing mode!**



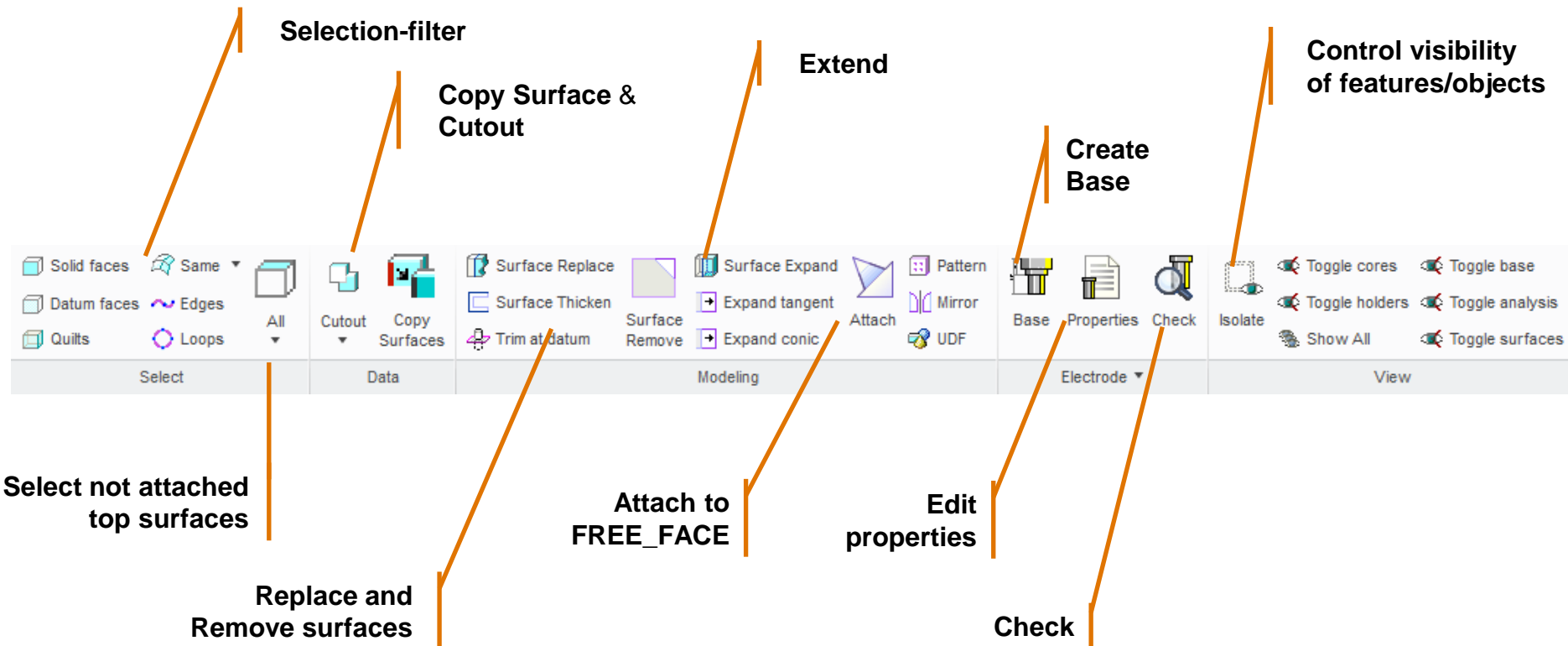
- **Activate component in assembly to start detailing mode**

- Create burn geometry
- Extend geometry
- Create support geometry
- Attach solid or surfaces to FREE\_FACE
- Add base group



# 5/10 – Detailing

- Activate component to show detailing Ribbon
- Switch between electrodes whenever necessary
- Use visibility commands to focus on electrode



- Add base feature

**Preview**  
Preview of template with dimensions

**Position**

**Template**  
Section and dimensions

**Detailing**  
Position of origin  
Frame and chamfers

OK Cancel



- **Set Properties of**

- Project
- Workpieces
- Operation
- Electrodes

**Lock state**  
Is value editable  
Or driven by  
**Parametername**  
From  
configuration

**Adopt**  
Copy values from  
another electrode  
model

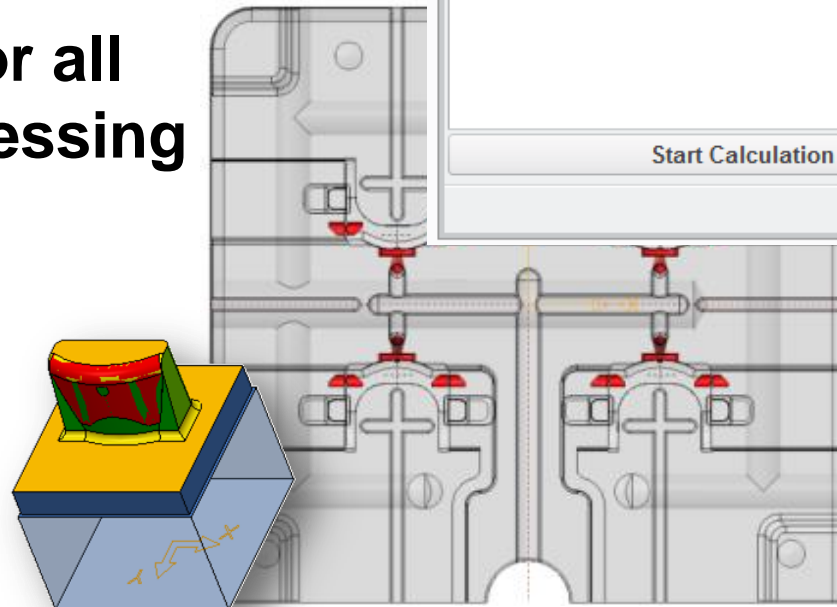
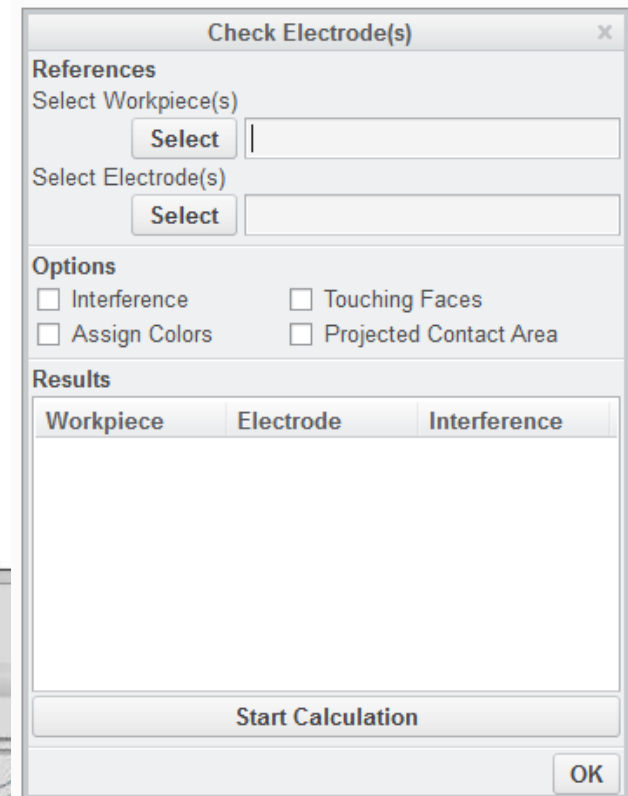
Property	Value	Internal Value
ID	1	1
POS	57	57
EDM_NAME	TUTORIAL4_EDM_01	TUTORIAL4_EDM_01
SUPPLIER	-	-
TYPE	-	-
SIZE	31.30x4.13x2.95	31.30x4.13x2.95
EDM_MATERIAL	CU	CU
PROJECT	A123	A123
PROCESSOR	-	-
ORBIT	-	-
QUALITY	-	-
STANDARD	-	-
BURNAREA	0.000	-
UNDERSIZE1	-	-

**Current value**

**Internal value**  
From software or  
options

**Save/Load**  
Userdefined  
template  
and data

- **Check electrodes to...**
  - get interferences
  - assignment a prepared color format
  - get touching surfaces (analysis not available in normal Creo)
  - calculate burn-area projection
  
- **Select single, active or all components for processing**



# 8/10 – Check

**Core Models/workpieces**  
Selection of workpieces

**Electrodes**  
Selection of electrodes

**Interference**  
Check interference

**Assign colors**  
Map color format

The screenshot shows a dialog box titled "Check Electrode(s)". It contains the following sections:

- References:** "Select Workpiece(s)" with a "Select" button and an empty text field; "Select Electrode(s)" with a "Select" button and an empty text field.
- Options:** Four checkboxes: "Interference", "Assign Colors", "Touching Faces", and "Projected Contact Area".
- Results:** A table with three columns: "Workpiece", "Electrode", and "Interference". The table is currently empty.
- Buttons:** "Start Calculation" at the bottom center and "OK" at the bottom right.

Orange arrows from the surrounding text point to the "Select" buttons, the checkboxes, the "Start Calculation" button, and the "OK" button.

**Touching surfaces**  
Get touching surfaces between workpieces and electrodes

**Projected touching area**  
Calculate projected area. Only accessible if touching surfaces analysis is active

**Start calculation**  
Process activated analysis

**OK**  
Close dialog

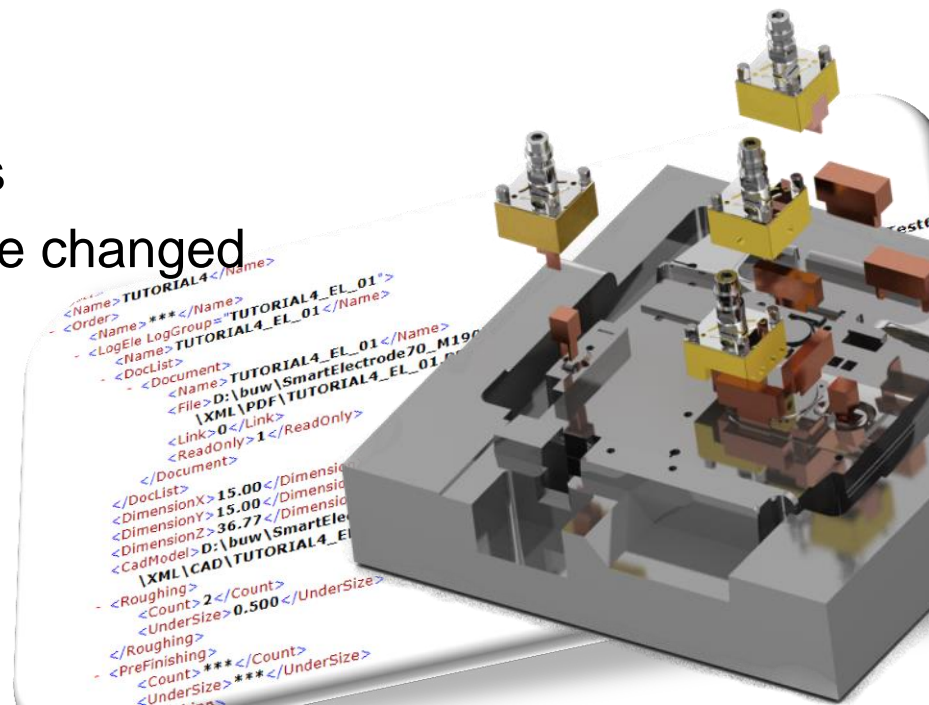
- **Drawings are created from templates**
  - Asm\_bom.drw / asm\_bom.tbl  
Template for sheet -1- of assembly drawing
  - Asm\_wp.drw / asm\_wp.tbl  
Template for sheet -2- of assembly drawing
  - Asm\_edm.drw / asm\_edm.tbl  
Template for electrode sheets
  - Edm\_default.drw  
Template for single part drawings
- **Drawing creation can take place at any time**

The screenshot shows a 'Drawing' dialog box with a list of objects and checkboxes for drawing types. Annotations with orange lines point to specific elements:

- List of object**: Points to the list of object names.
- Main assembly**: Points to 'JS748100\_AS'.
- Workpieces**: Points to 'JS748100\_AS\_EDM\_01' through '06'.
- Electrodes**: Points to 'JS748100\_AS\_EDM\_07' through '11'.
- Check / uncheck all**: Points to the 'Check/Uncheck All' checkbox.
- Create part drawing**: Points to the 'Part Drawing' checkbox.
- Create assembly sheet**: Points to the 'Assembly Sheet' checkbox.
- OK**: Points to the 'OK' button.

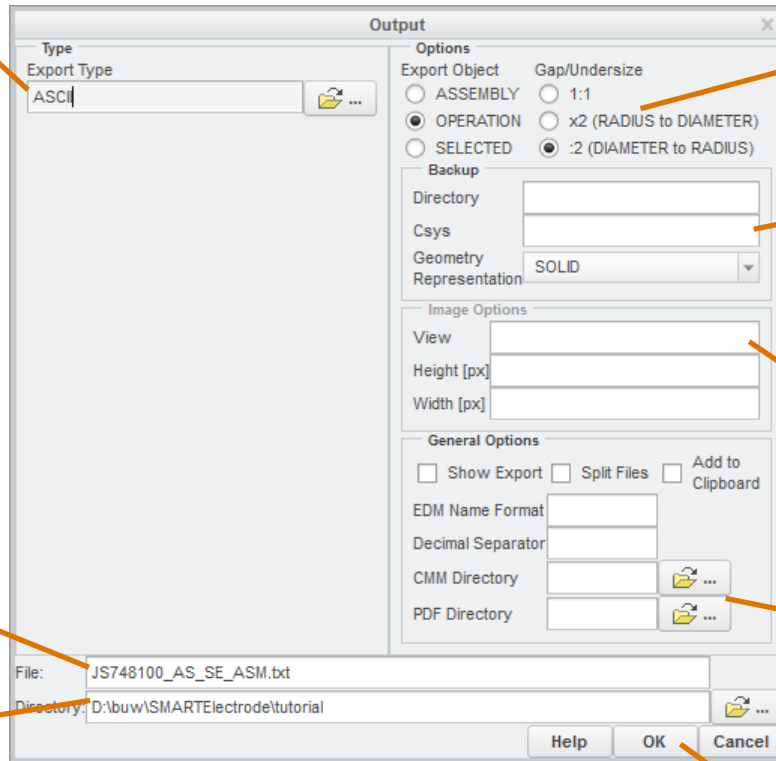
**OK**  
Close dialog and create drawings

- Options for every export can be changed
- Automated data transfer to different formats:
  - 2d and 3d design data
  - EDM programming systems
  - CMM data
  - CAM data
  - Microsoft Office Products
  - XML or HTML format
  - Manufacturing control systems
  - Options for every export can be changed



# 10/10 – Data Output

**Selected format  
Processor**



**Export object**

**3d-Export  
Directory  
Alternative Csys**

**Image settings  
For HTML-export**

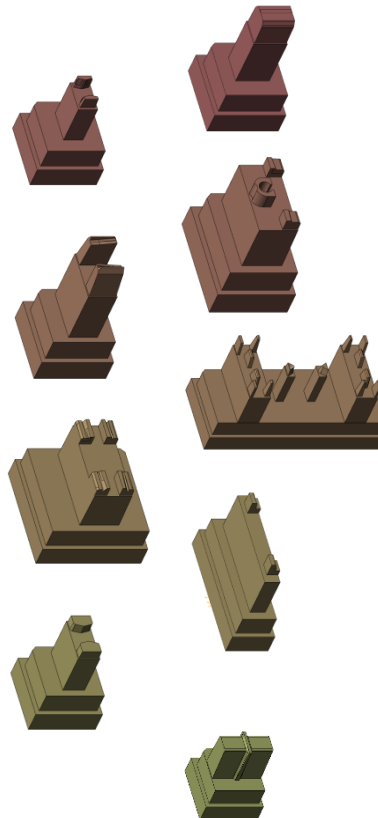
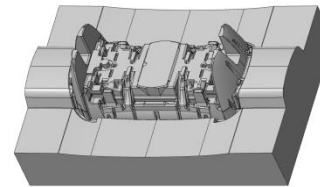
**Subdirectories  
For measuring points  
PDF files**

**OK  
Close dialog and  
start export**

**File name for export**

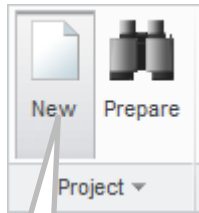
**Directory for export**

- **Start New Project**
- **Set Operation Origin**
- **Electrode 1**
- **Electrode 2**
- **Electrode 3**
- **Electrode 4**
- **Electrode 5**
- **Electrode 6**
- **Electrode 7**
- **Electrode 8**
- **Electrode 9**





# Create Project Assembly



1

Project Setup

Reference Model(s)  
JS748100\_AS Select

Settings  
Creation Method

Unit Accuracy Value

mm	absolute	0.0048
inch	relative	

Names  
Project Name  
JS748100\_AS\_SE\_ASM

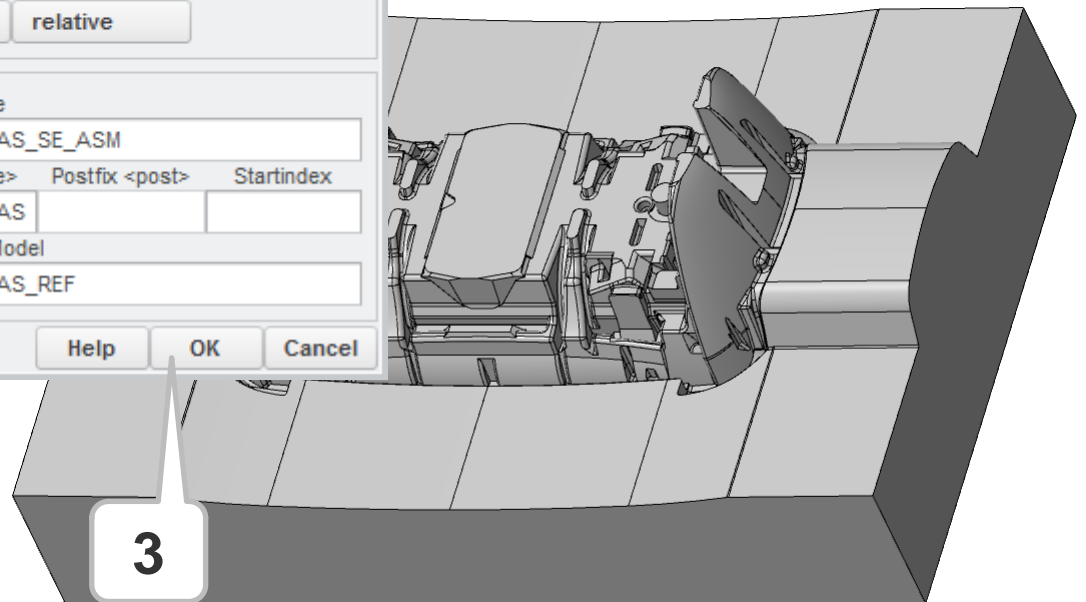
Prefix <pre>	Postfix <post>	Startindex
JS748100_AS		

Reference Model  
JS748100\_AS\_REF

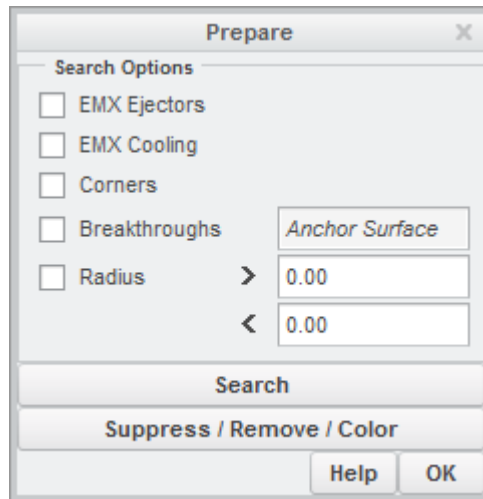
Help OK Cancel

2

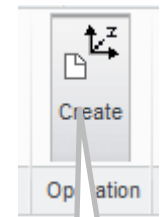
3



- **Nothing to prepare in tutorial part**



# Set Operation Origin



Operation

Name  
JS748100\_AS\_OP\_01

Selected Zero

Select On Side

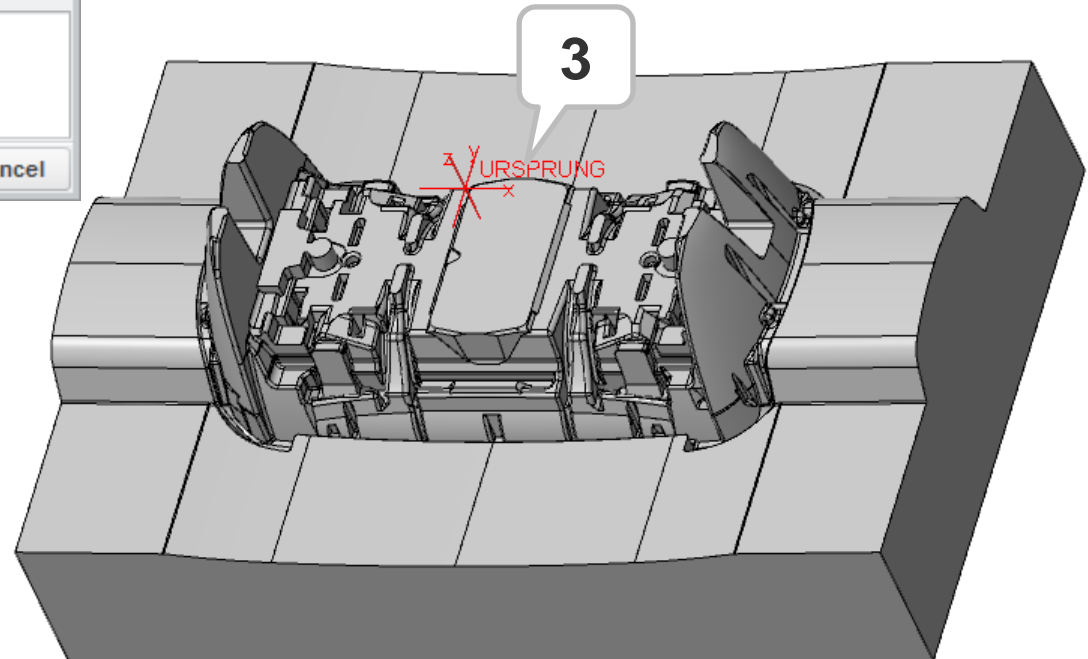
Free	Start	Secure
2	5	5

Comment

Help OK Cancel

2

The 'Operation' dialog box contains a 'Name' field with 'JS748100\_AS\_OP\_01', a 'Selected Zero' field, and a table with columns 'Free', 'Start', and 'Secure'. The 'Free' column has the value '2', 'Start' has '5', and 'Secure' has '5'. There are 'Select' and 'On Side' buttons above the table. A callout box with the number '2' points to the 'Select' button. At the bottom are 'Help', 'OK', and 'Cancel' buttons. A callout box with the number '4' points to the 'OK' button.

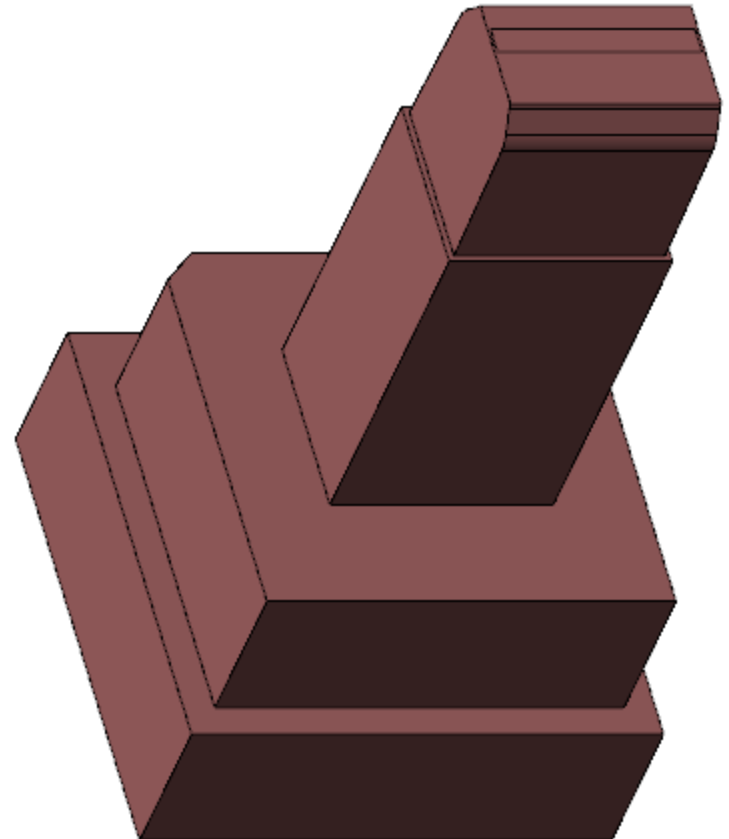


# Electrode 1

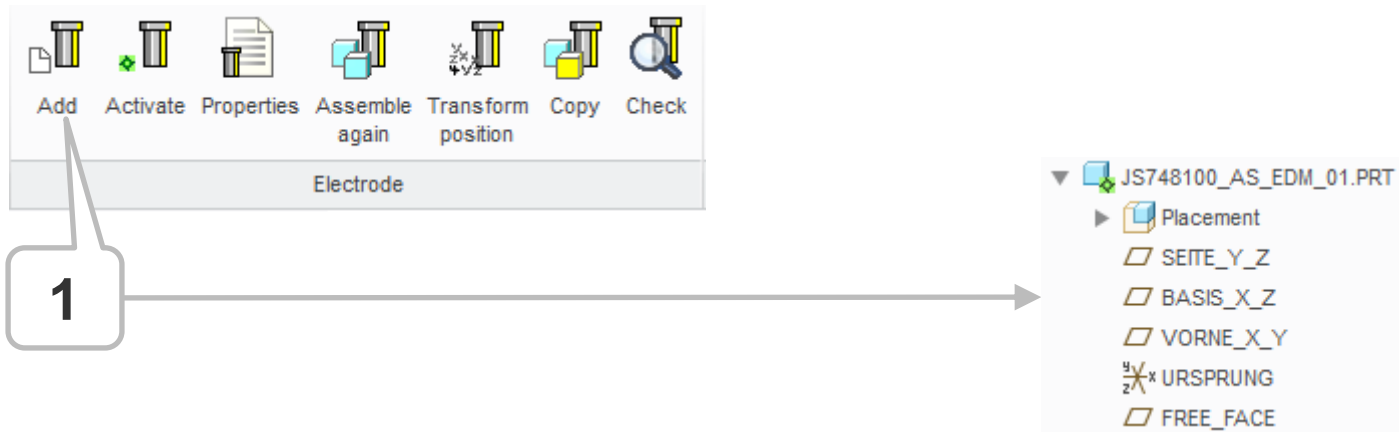
---

## Topics of this exercise

- Add new electrode
- Copy burn-faces
- Cleanup solid
- Mirror solid
- Attach to FREE\_FACE
- Add base
  
- Assemble electrode 2nd time



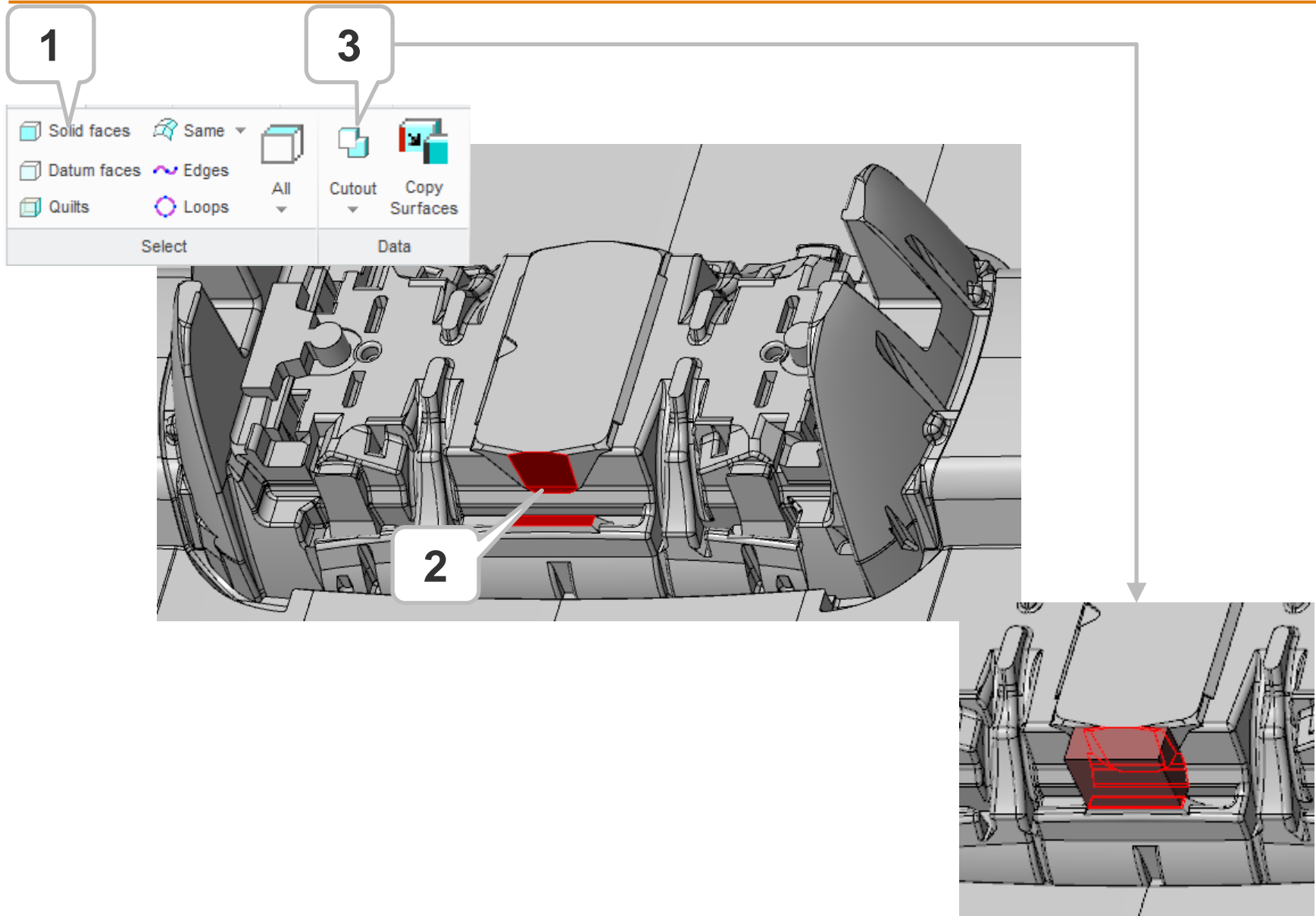
# Electrode 1 – Add New Electrode



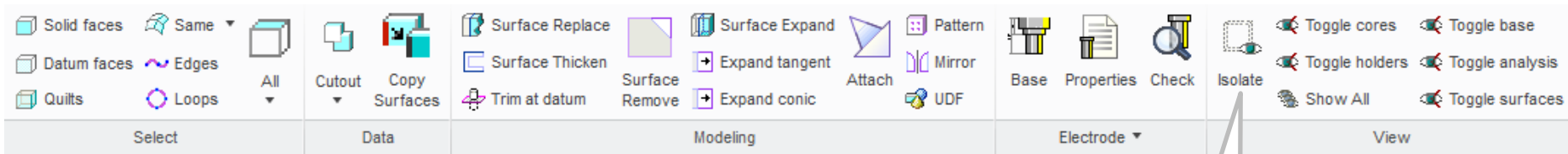
## Command ,Add‘ performs some subsequent tasks

- **Copies a new, empty part from default template** (Creo option ,TEMPLATE\_SOLIDPART ‘)
- **Sets the name following the naming format** (SME option ,ELECTRODE\_NAME\_FORMAT‘)
- **Assembles the model on operation default**
- **Copies FREE\_FACE to the model**

# Electrode 1 – Add Solid To Electrode

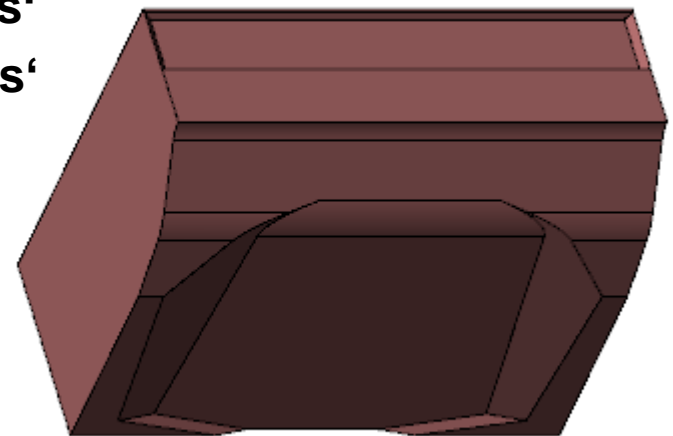


# Electrode 1 – Set View

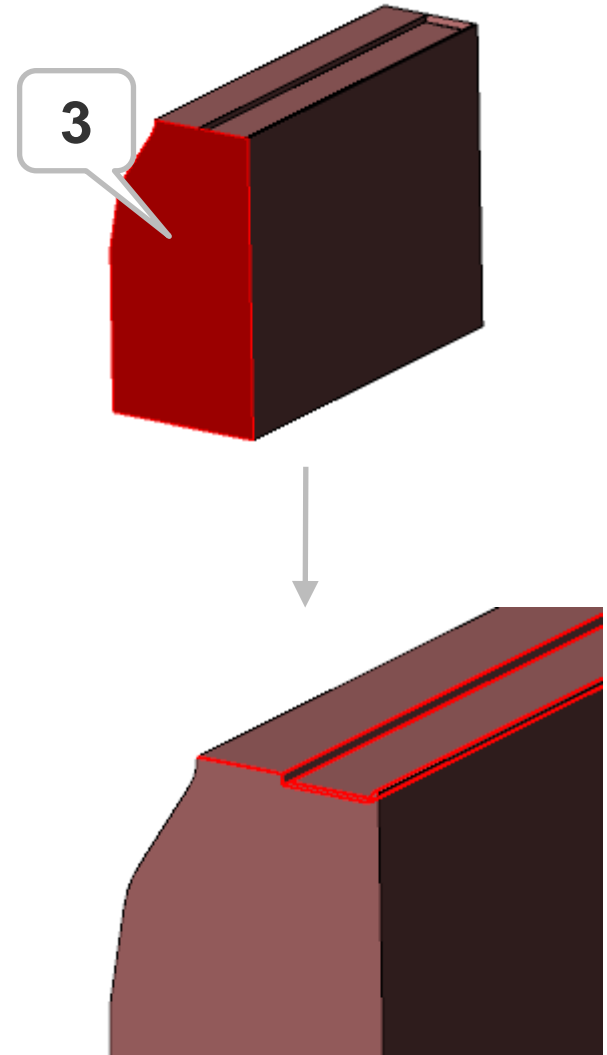
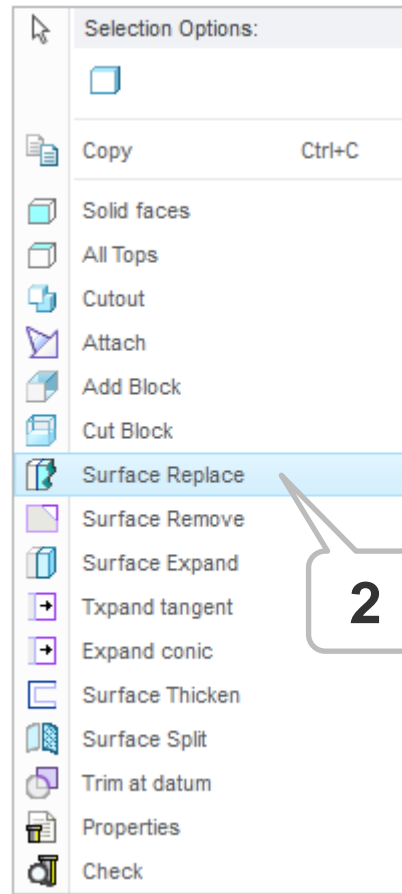
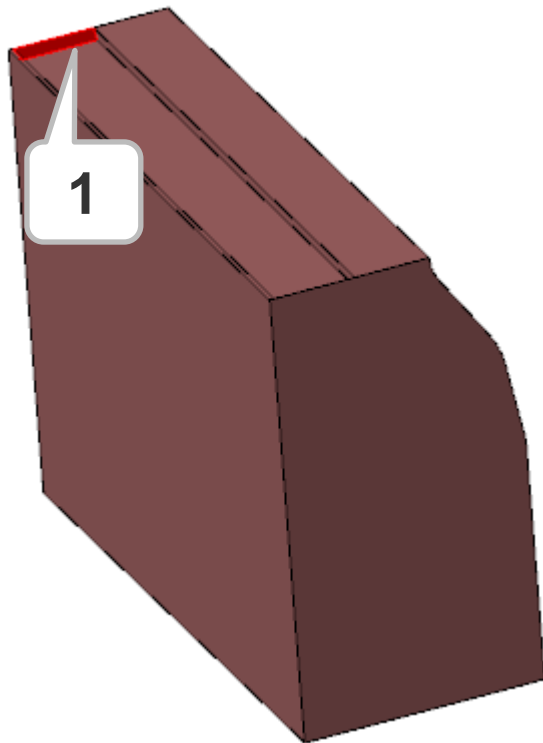
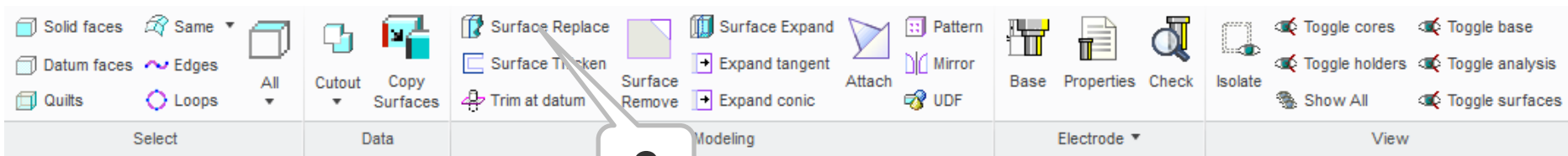


Use view control commands to...

- Show only activated component → ,Isolate‘
- Show/hide workpieces → ,Toggle cores‘
- Show/hide holders → ,Toggle holders‘
- Show all
- Show/hide base groups → ,Toggle base‘
- Show/hide analysis results → ,Toggle analysis‘
- Show/hide datum surfaces → ,Toggle surfaces‘

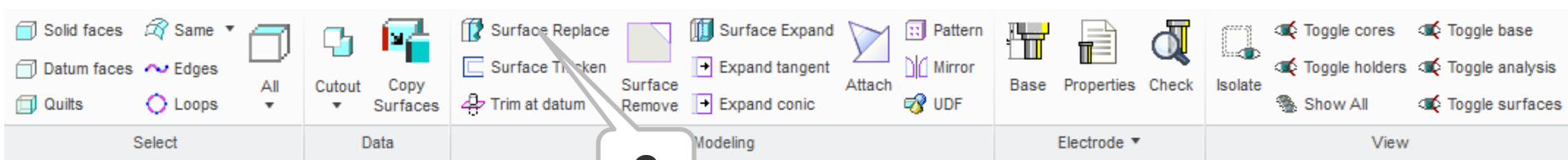


# Electrode 1 – Cleanup



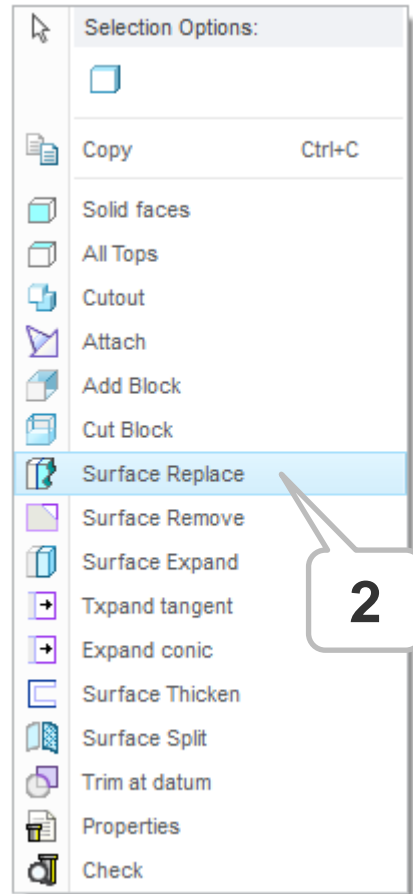
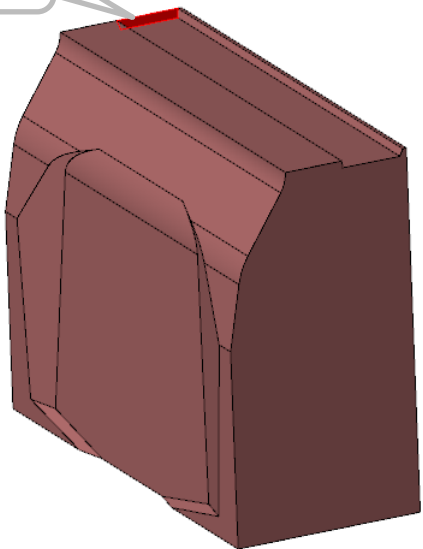


# Electrode 1 – Cleanup



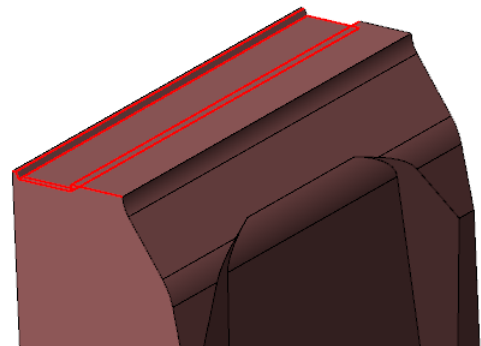
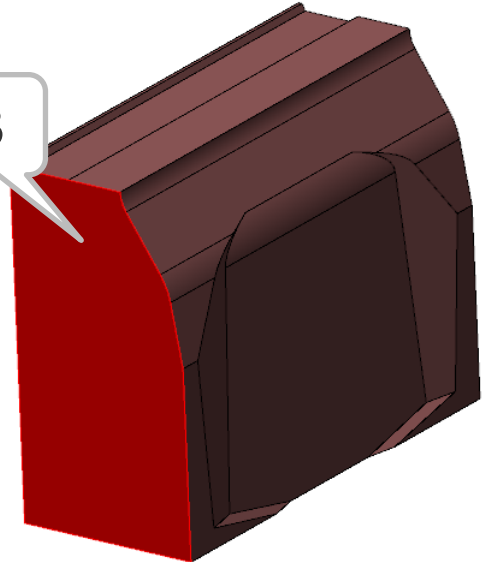
2

1

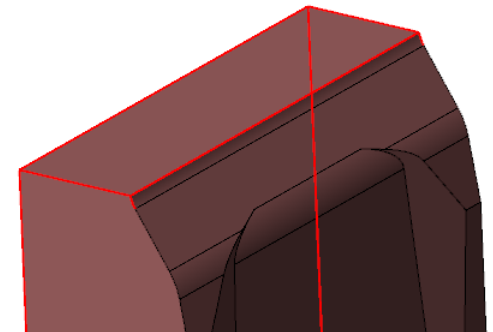
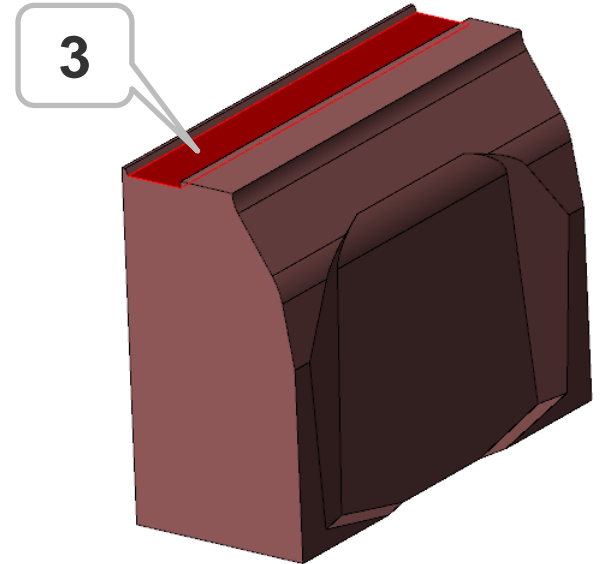
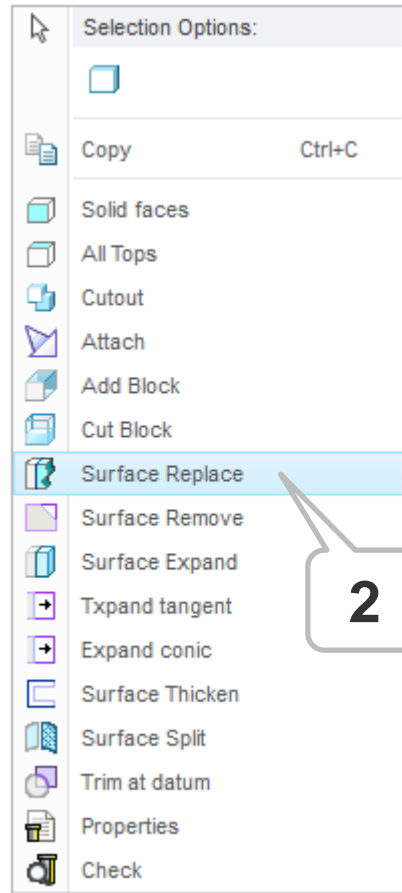
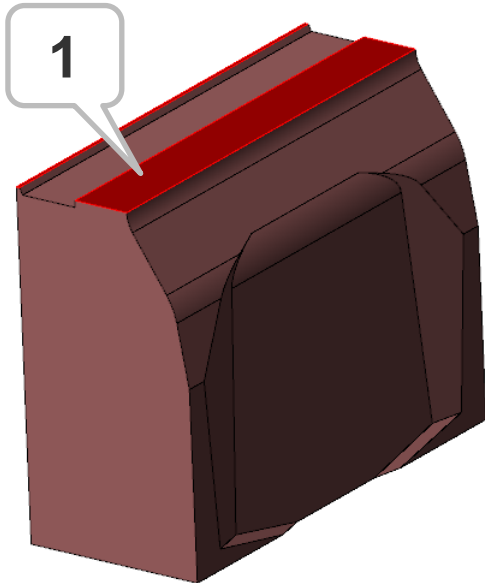
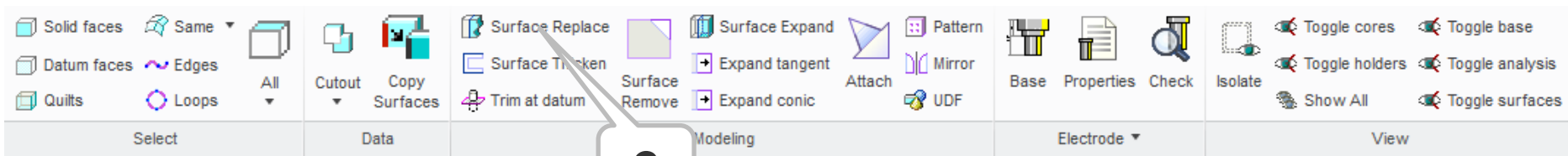


2

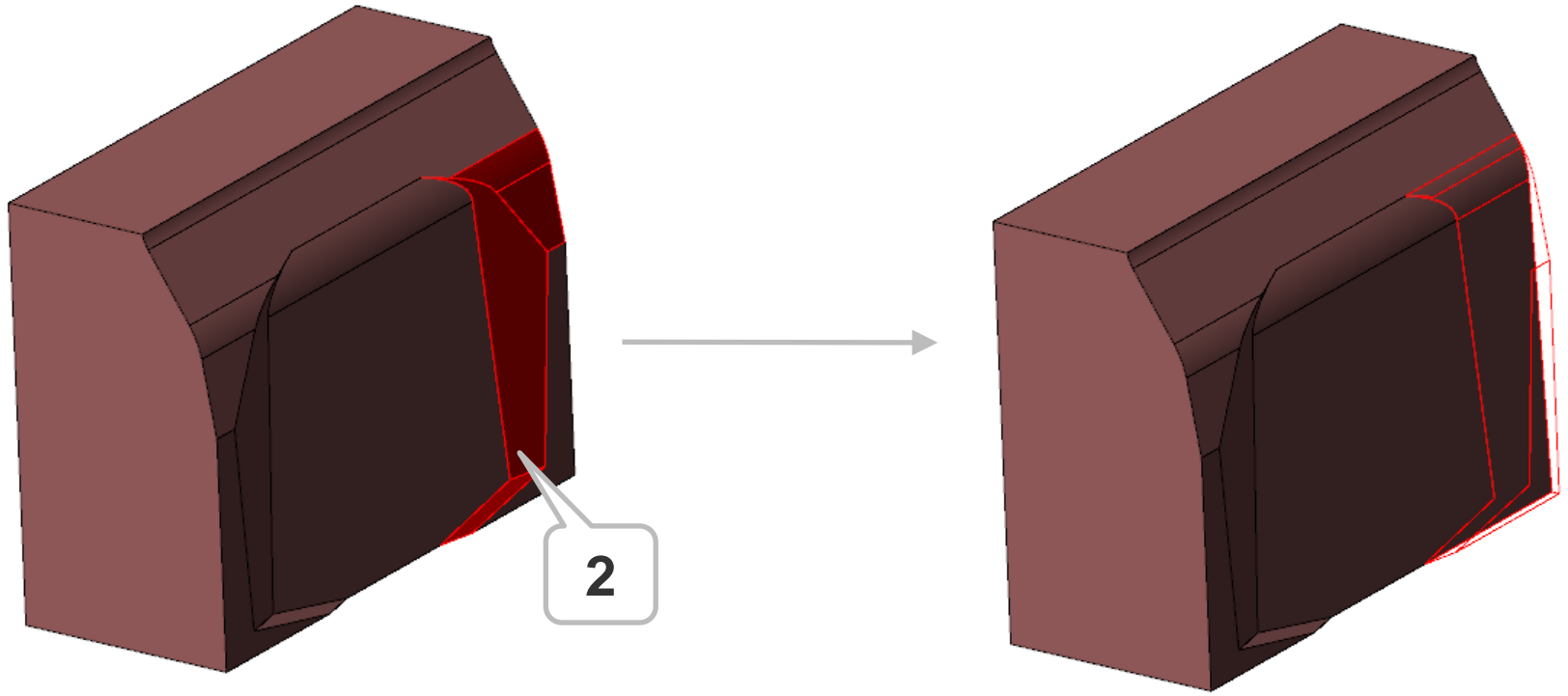
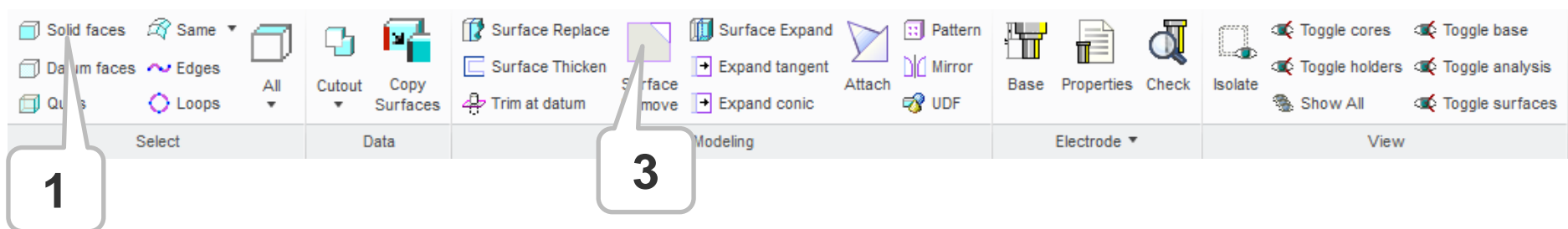
3



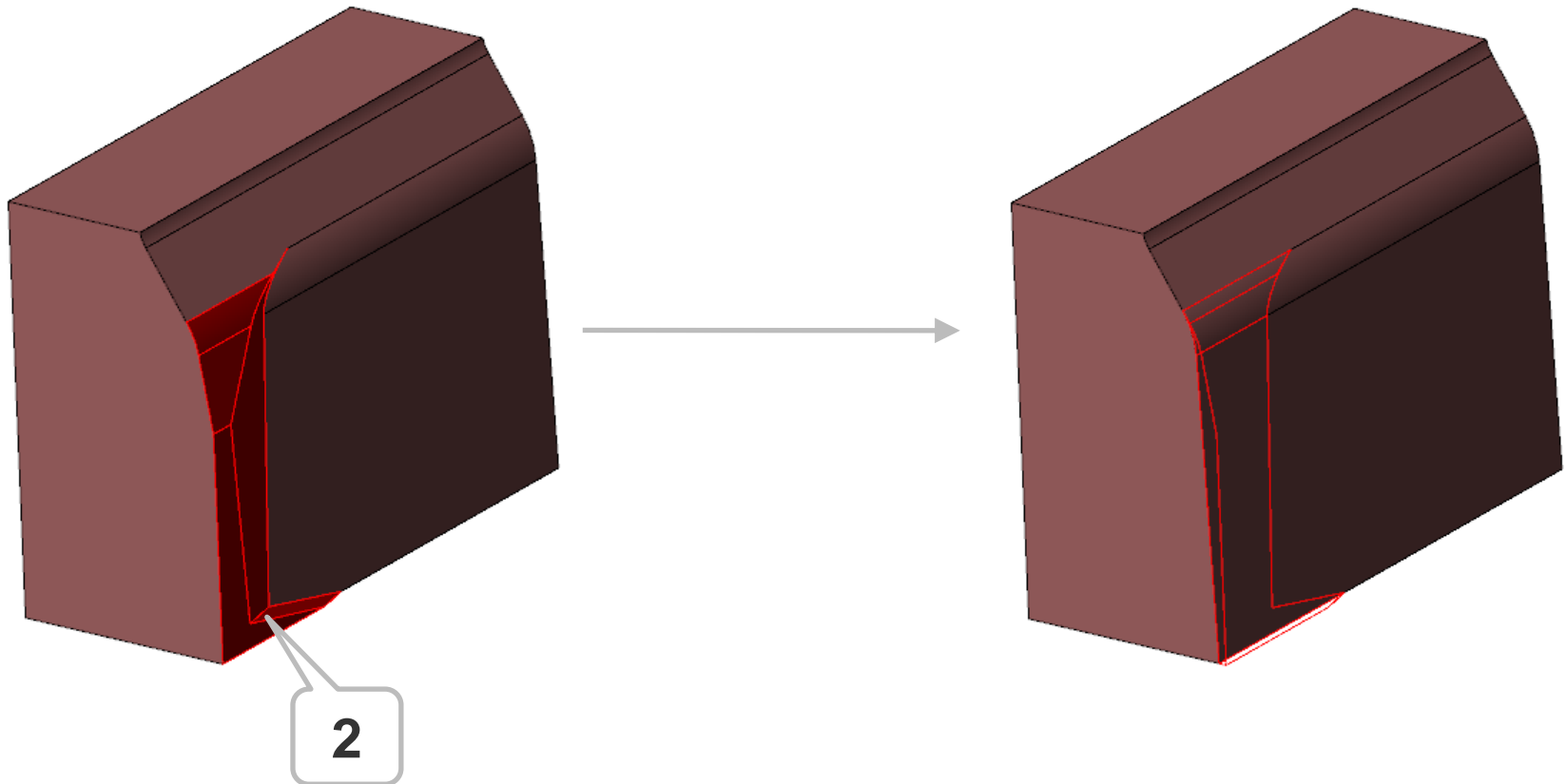
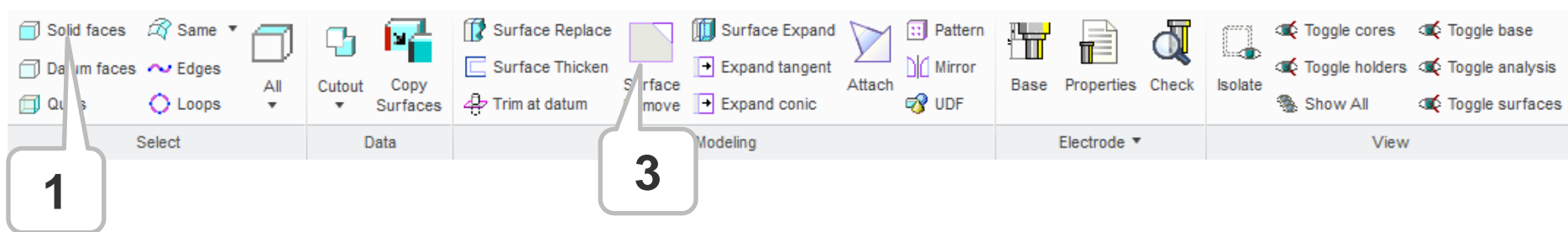
# Electrode 1 – Cleanup



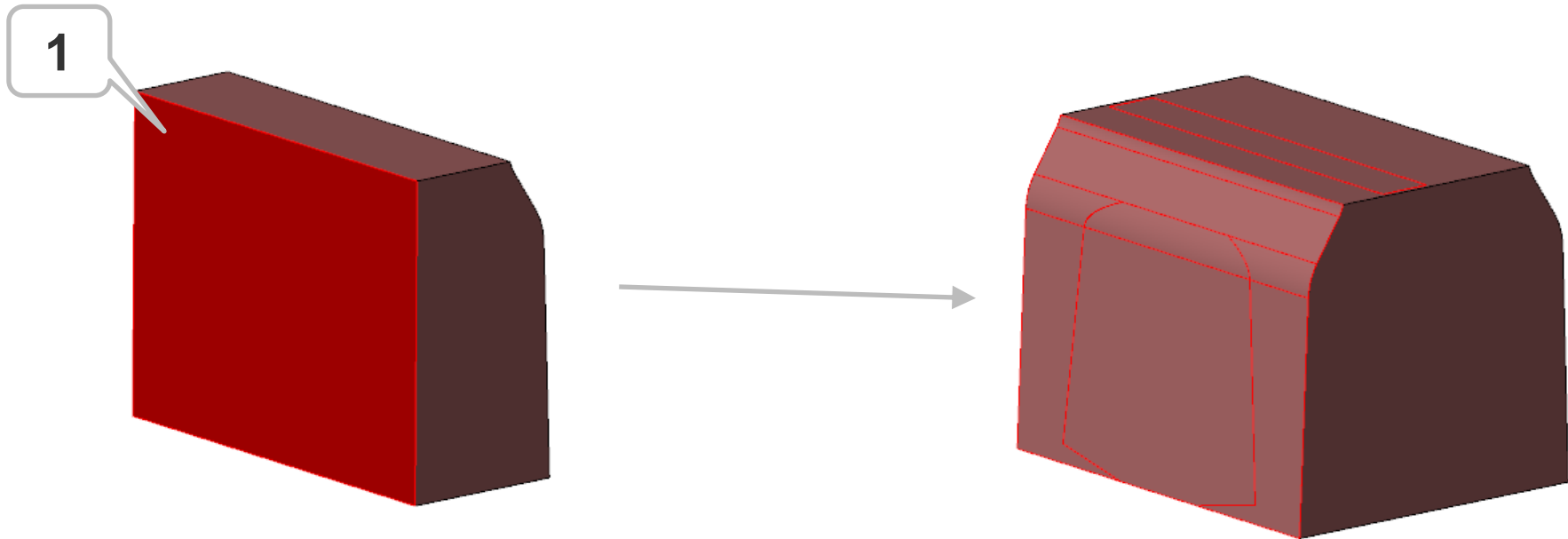
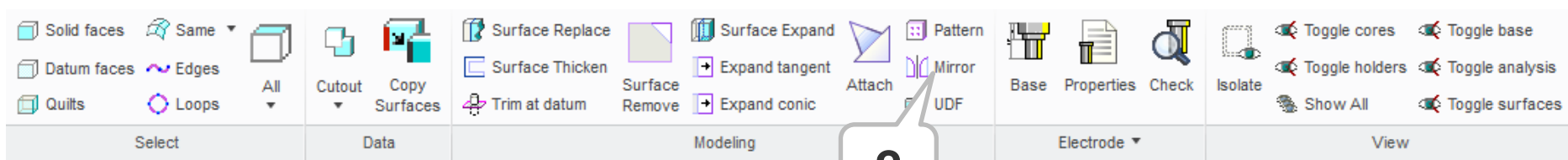
# Electrode 1 – Cleanup



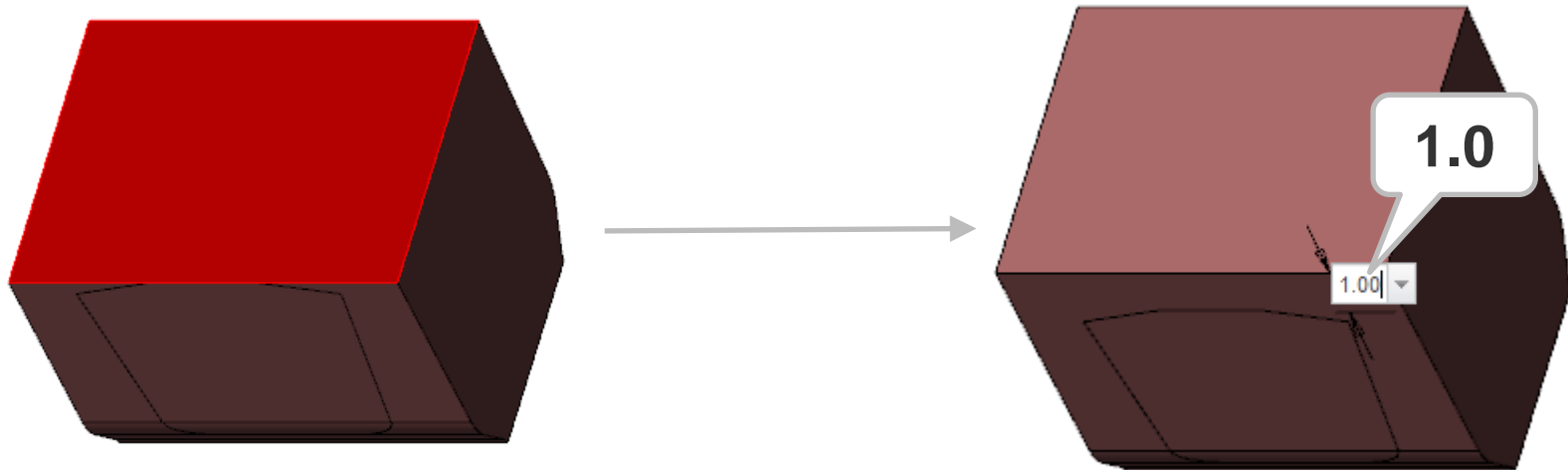
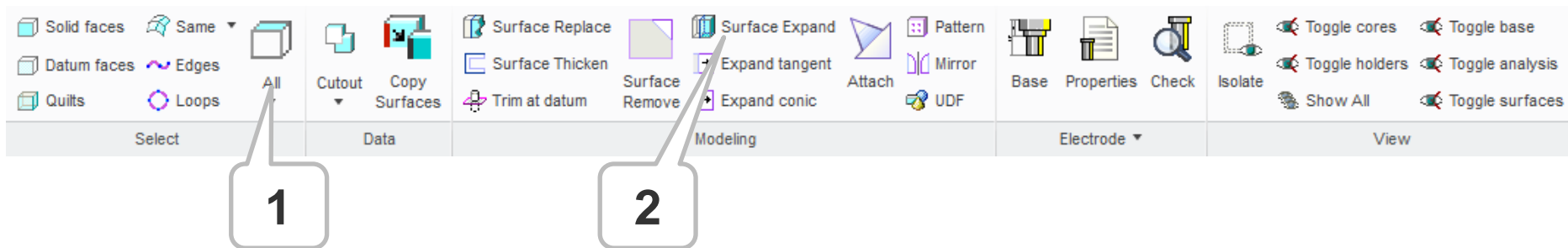
# Electrode 1 – Cleanup



# Electrode 1 – Cleanup

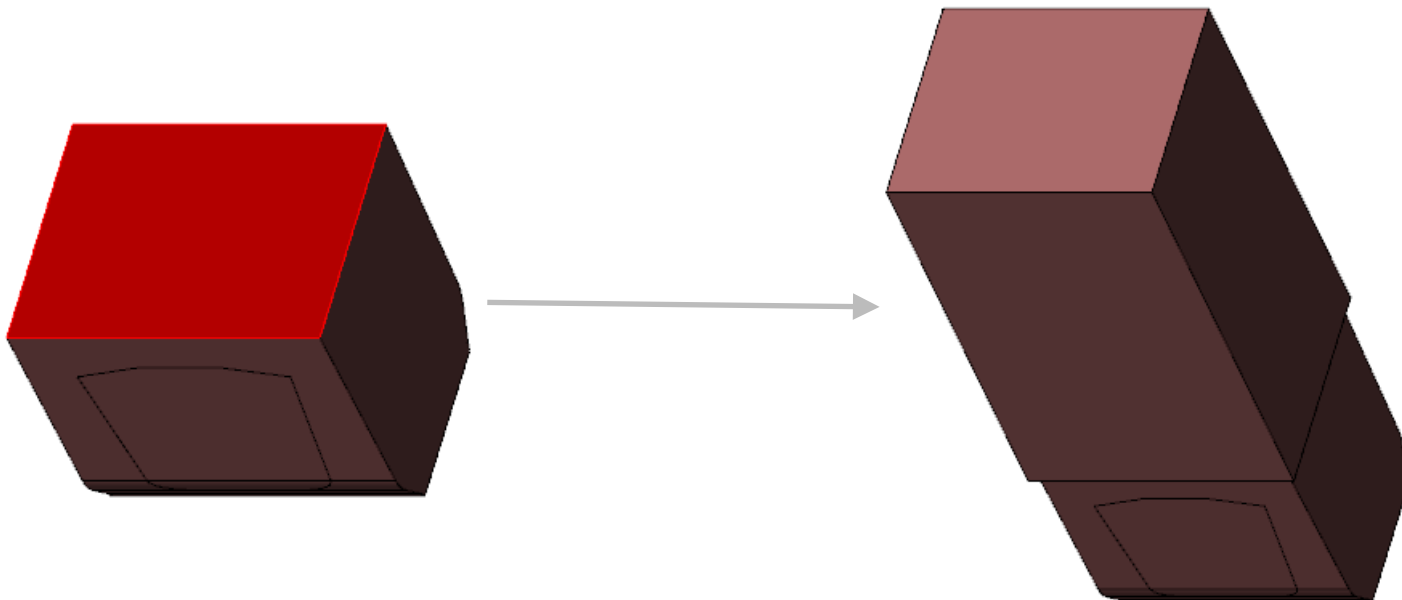
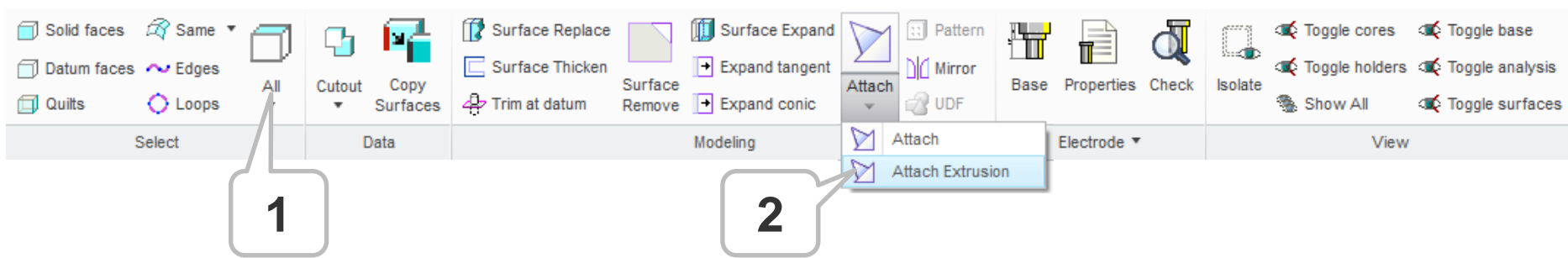


# Electrode 1 – Cleanup

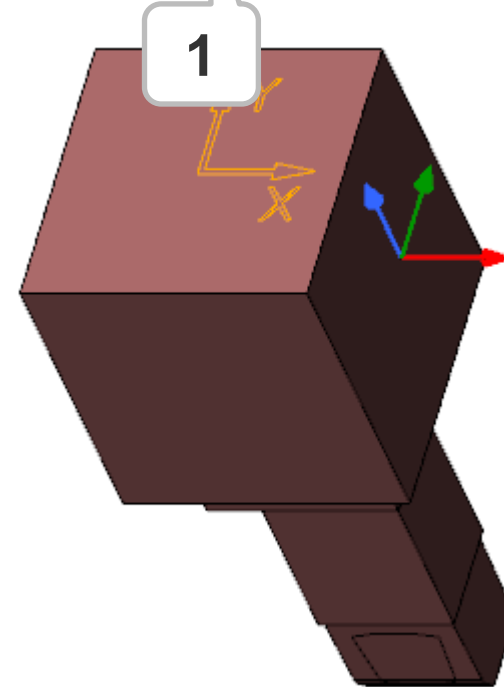
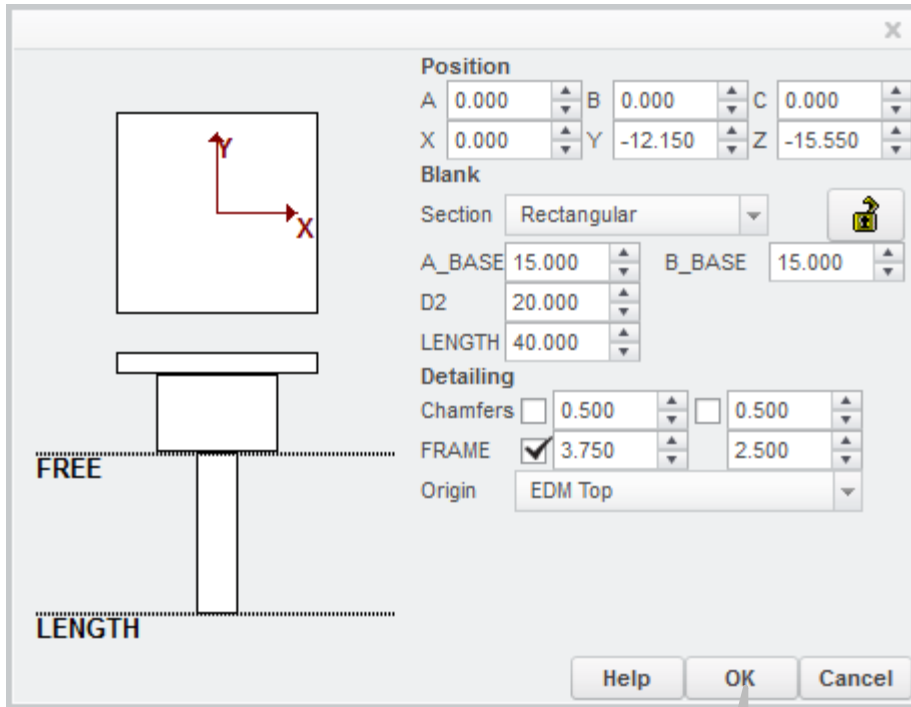
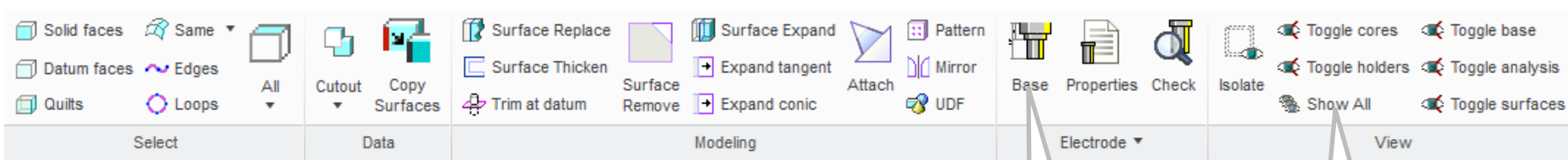


- **Filter command ,All Top Surfaces‘ selects all plane, top surfaces that are NOT attached to FREE\_FACE**

# Electrode 1 – Cleanup



# Add Base



- Press *Ctrl+A* to activate main assembly again



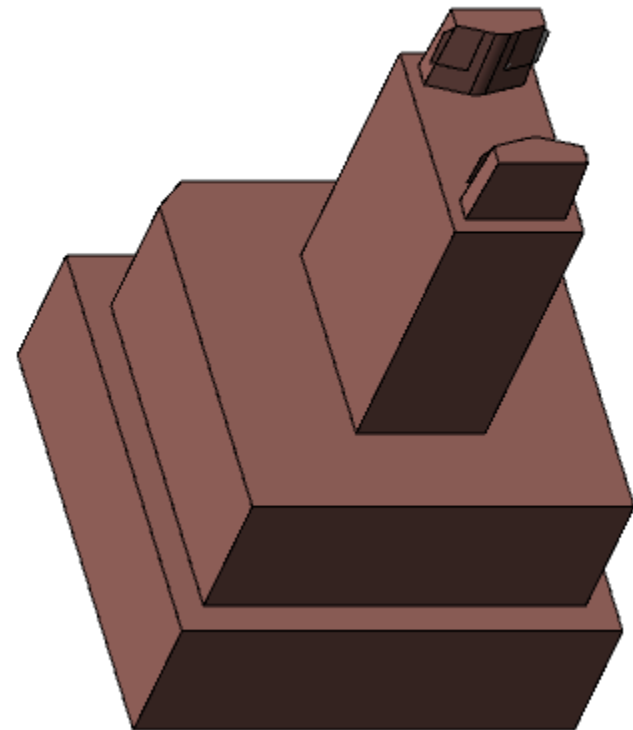
# Electrode 2

## Topics of this exercise

- Add new electrode
- Copy burn-faces
- Cleanup solid
- Mirror solid
- Attach to FREE\_FACE
- Assemble electrode 2<sup>nd</sup> time
- Add base

### Note:

*2<sup>nd</sup> position is added before  
the electrode get's a base feature*



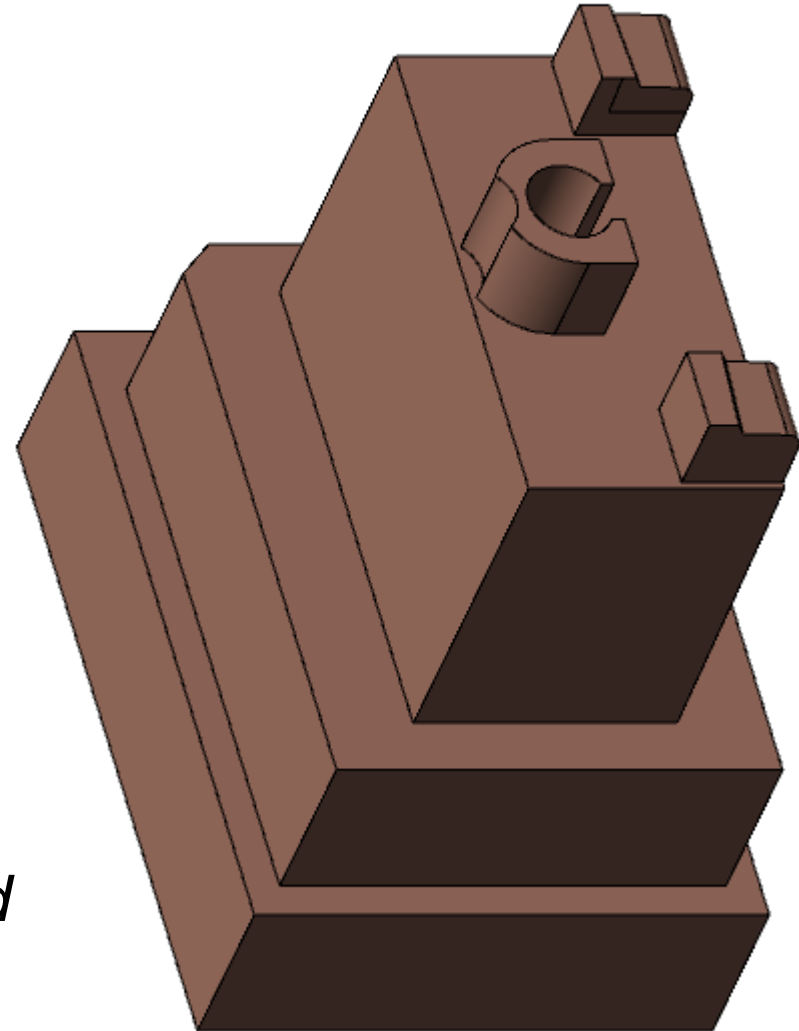
# Electrode 3

## Topics of this exercise

- Add new electrode
- Copy burn-faces
- Cleanup solid
- Create another solid cutout
- Cleanup solid
- Mirror solid
- Attach to FREE\_FACE
- Add base
- Assemble electrode 2<sup>nd</sup> time

Note:

*Multiple solid cutouts are permitted*

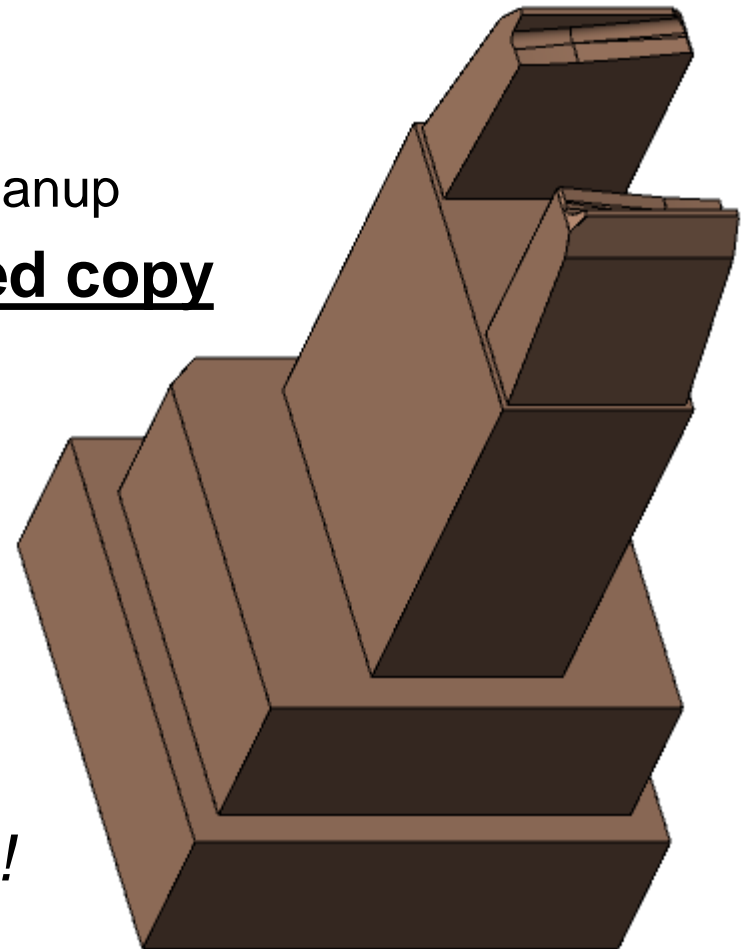


## Topics of this exercise

- Add new electrode
- Copy burn-faces
- Cleanup solid
  - Use of surface copy & solidify for cleanup
- Geometry pattern & transformed copy
- Finish electrode
  - Attach to FREE\_FACE
  - Add base
  - Assemble electrode 2<sup>nd</sup> time

### Note:

*It's ok to mix Creo features and SMARTElectrode cleanup functions!*

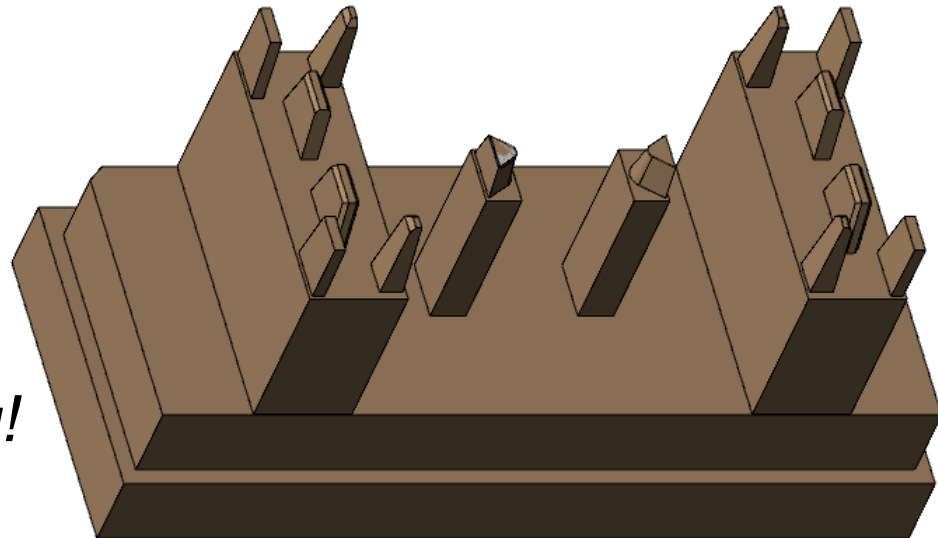


## Topics of this exercise

- Add new electrode
- Create several solid bodies
- Usage of RMB (context menu) for cleanup
- Finish electrode
  - Attach to FREE\_FACE
  - Add base

### Note:

*Most used cleanup functions  
are available in context menu!*

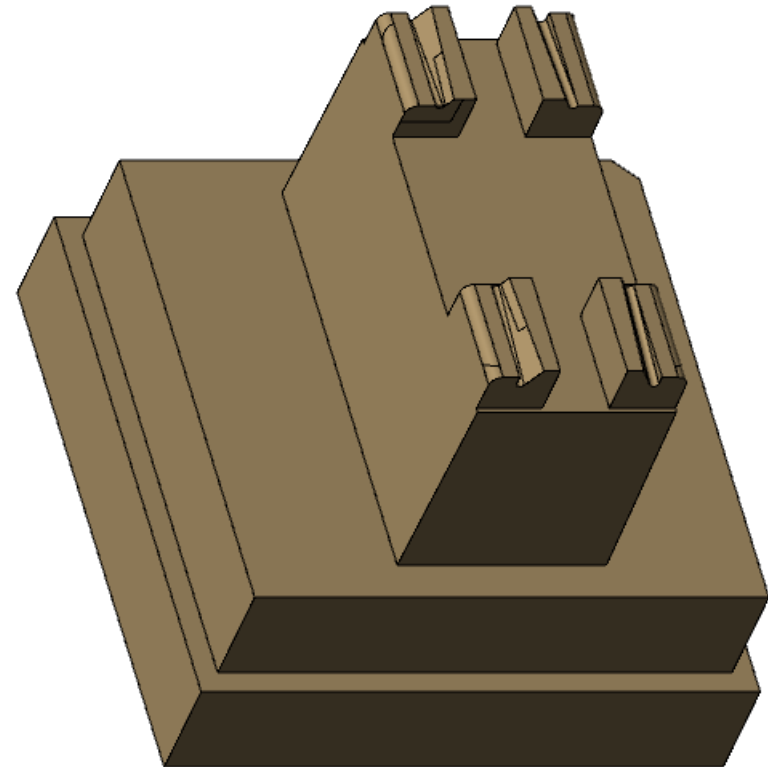


# Electrode 6

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## Topics of this exercise

- Add new electrode
- Add & cleanup solid
- Mirror at On-the-fly datum plane
- Finish electrode



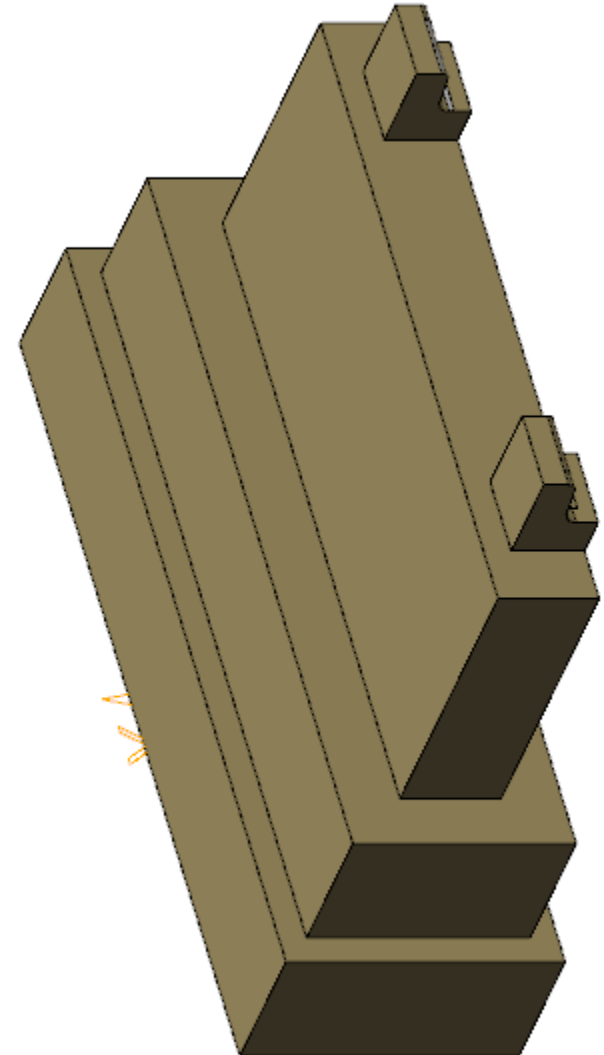
# Electrode 7

## Topics of this exercise

- Add new electrode
- Add & cleanup solid
- Finish electrode
  - Attach to FREE\_FACE
  - Add base
- Assemble electrode 2<sup>nd</sup> time
  - 1<sup>st</sup> step rotate 180°
  - 2<sup>nd</sup> step transform position

### Note:

*Use ,Transform position' to move selected electrode component!*

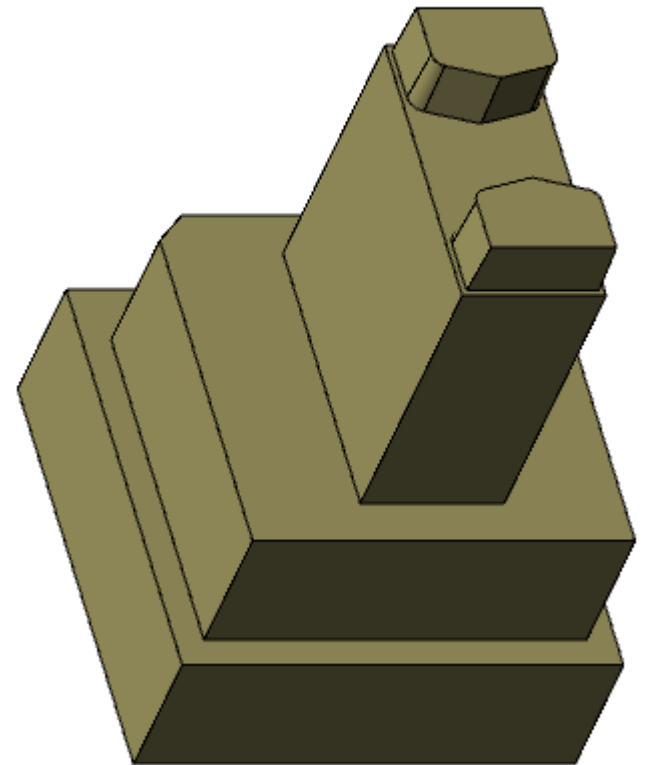


# Electrode 8

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## Topics of this exercise

- Add new electrode
- Add & cleanup solid
- Finish electrode
- Assemble electrode 2<sup>nd</sup> time

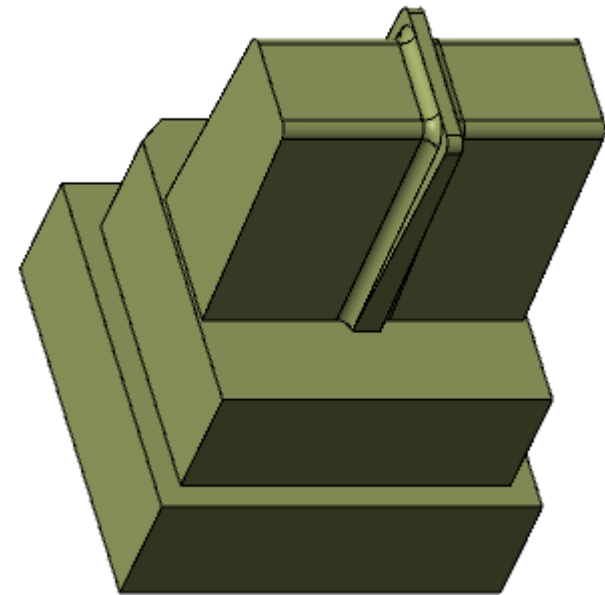


## Topics of this exercise

- Add new electrode
- Add solid
- Cleanup solid with alternative commands
  - ,Replace' if ,Remove' fails
  - ,Cut block' if ,Remove' fails
- Finish electrode
- Assemble electrode 2<sup>nd</sup> time

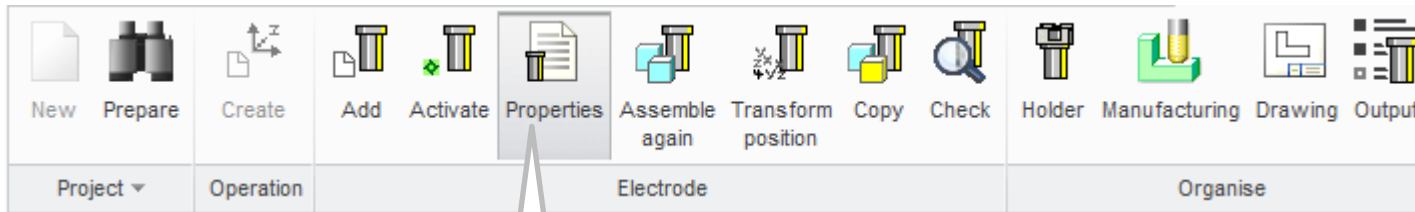
Note:

*Different ways lead to success!*





# Set Electrode Properties



1

2

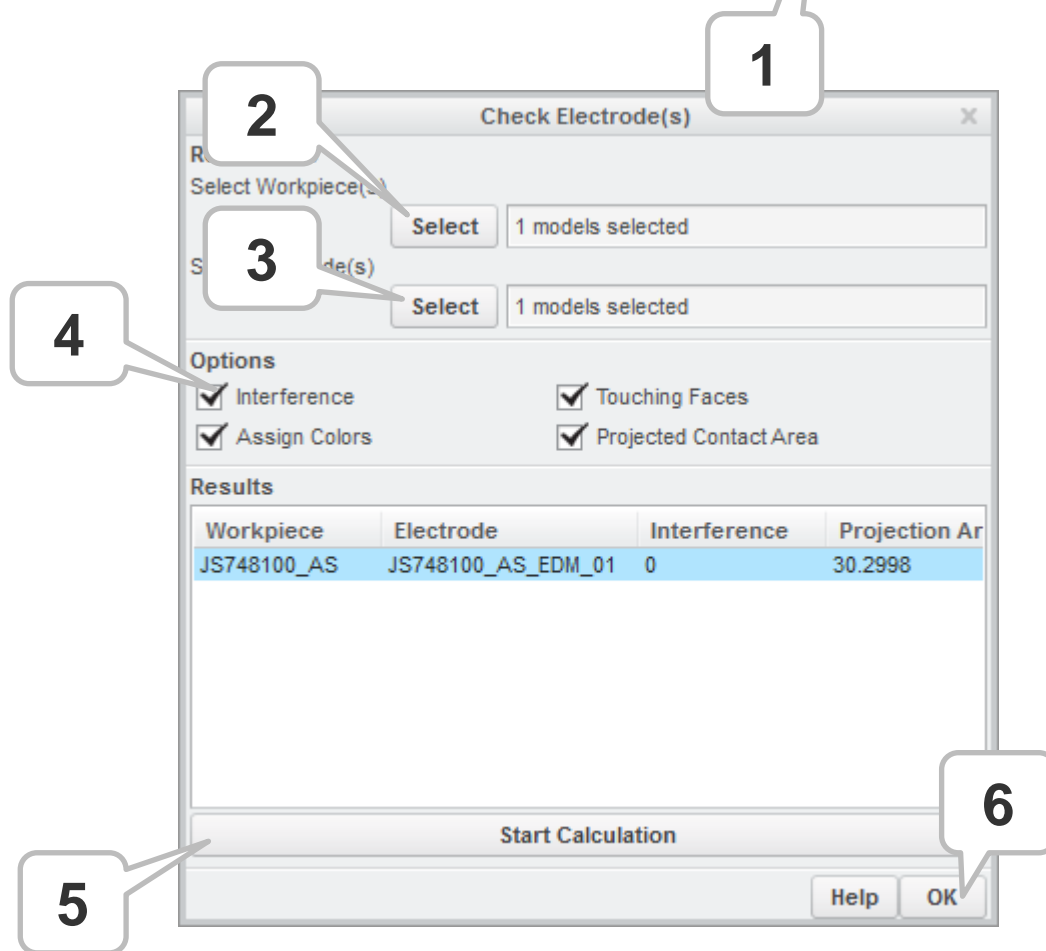
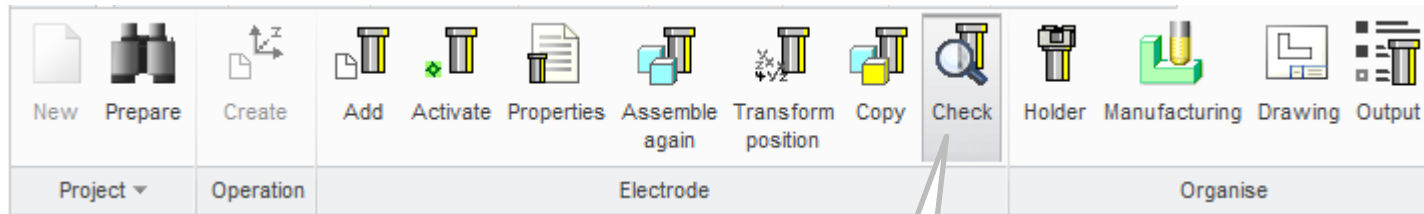
Property	Value	Internal Value
ID	1	1
POS	50	50
EDM_NAME	JS748100_AS_EDM_01	JS748100_AS_EDM_01
EDM_MATE...	CU	CU
SUPPLIER	default_mm	default_mm
TYPE	15x15x30	15x15x30
SIZE	15.00x15.00x40.00	15.00x15.00x40.00
HOLDER	-	-
PROJECT	A123	A123
PROCESSOR	DEFAULT	DEFAULT
ORBIT	Spheric	Spheric
QUALITY	-	-
STANDARD	-	-
BURNAREA	30.300	30.300
UNDERSIZE1	0.1	0.1
QTY1	1	1
UNDERSIZE2	0.07	0.07
QTY2	1	1
UNDERSIZE3	0.05	0.05
QTY3	1	1
UNDERSIZE4	0.02	0.02
QTY4	1	1
CURRENT_D...	01.01.2000	01.01.2000
INITIAL_DATE	-	-
USER_NAME	-	-
COMMENT	-	-

Buttons: Adopt, Speichern, Load, Help, OK, Cancel

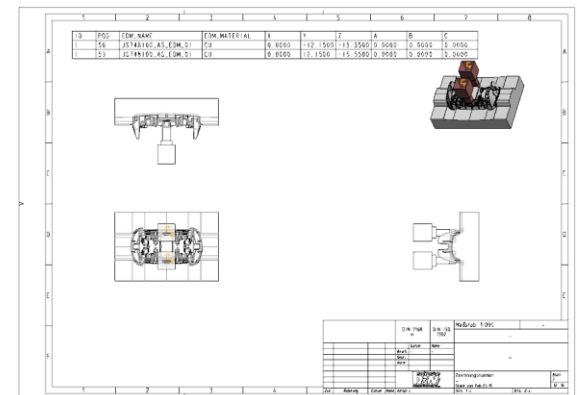
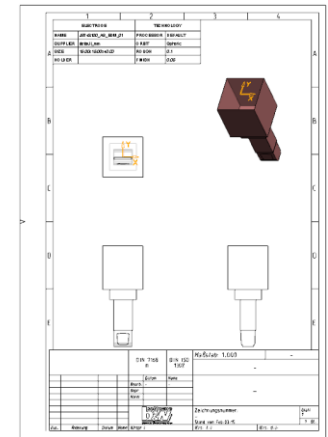
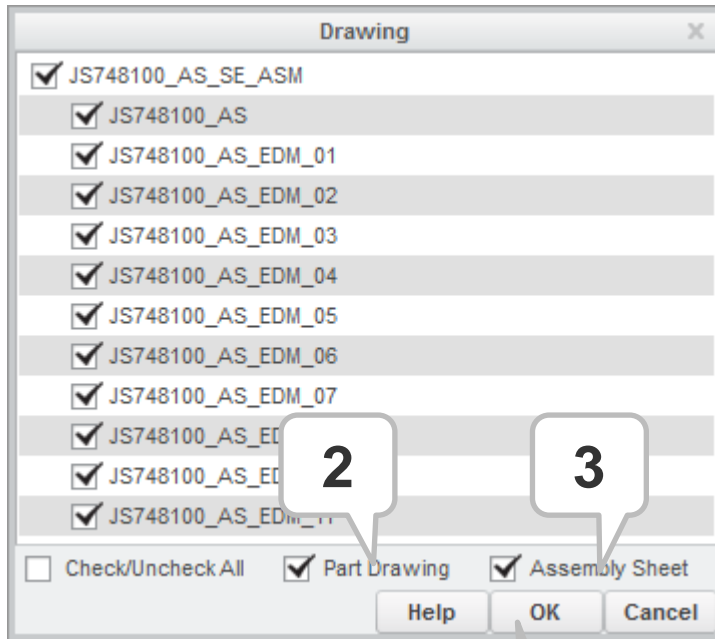
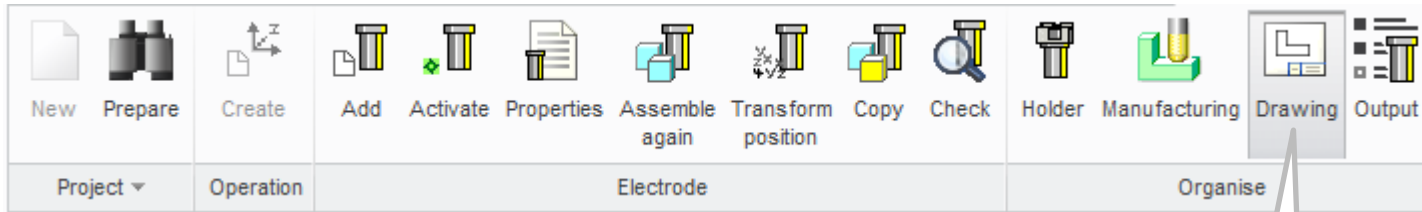
System parameters

3

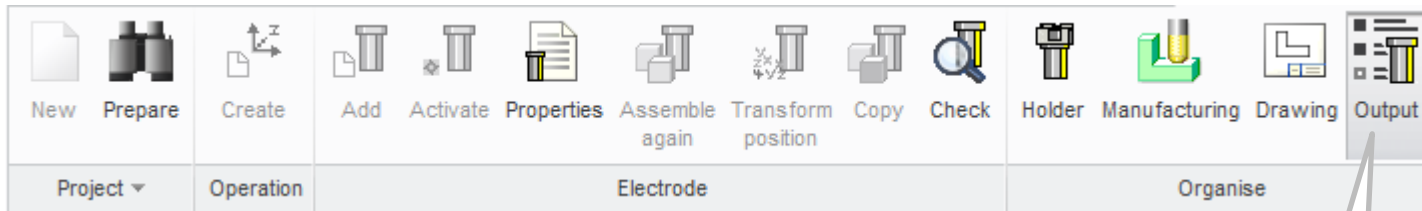
# Check Electrodes



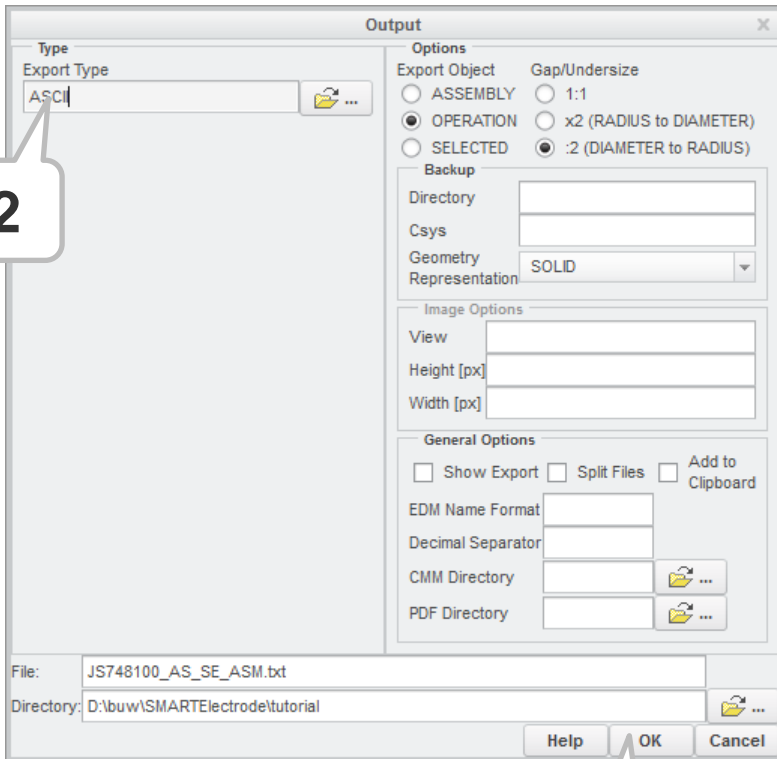
# Drawings



# Data Output



1



2

3

