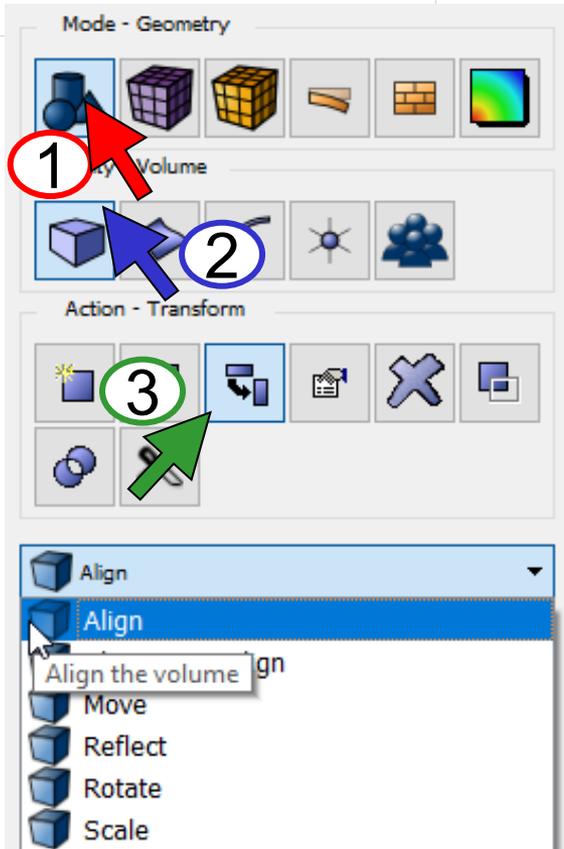


# **CUBIT Fast-Start Tutorial**

## **6. Geometry Tools**

# Geometry Transformations

Simulation Modeling Sciences



① Click *Mode-Geometry*

② Click *Entity-Volume*

③ Click *Action-Transform*

**Align** Move the volume to align with another entity

**Three-step Align** Align the volume using the 3-step method

**Move** Translate the volume a specified distance and direction

**Reflect** Reflect the volume about a specified plane

**Rotate** Rotate the volume about a specified axis

**Scale** Scale the volume by a factor in x, y and/or z

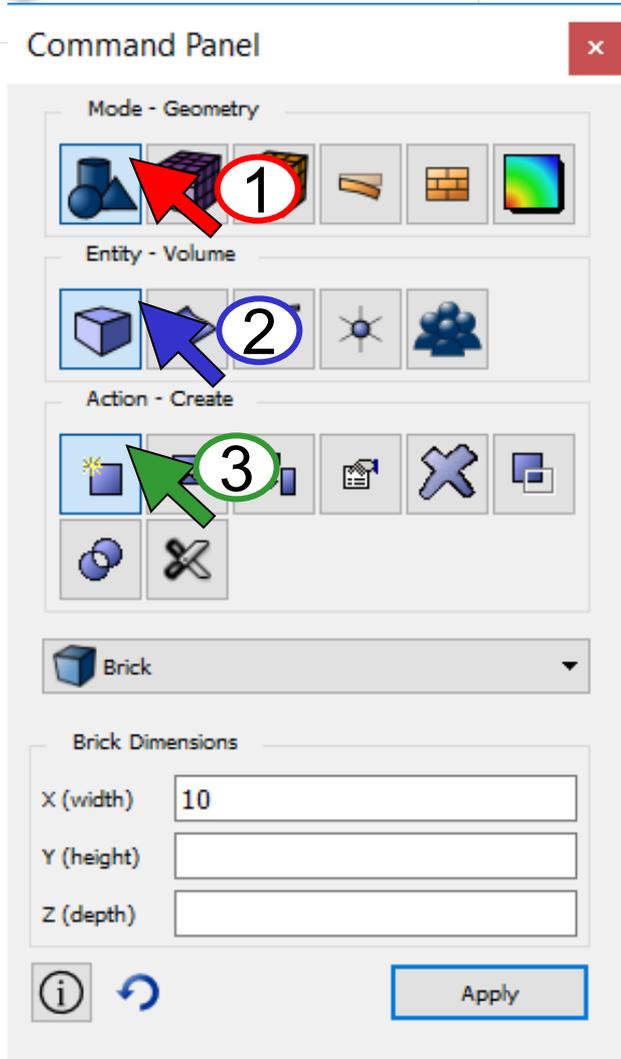
CUBIT is *Unit-less*

*Hint:*

Use **Scale** to change Units

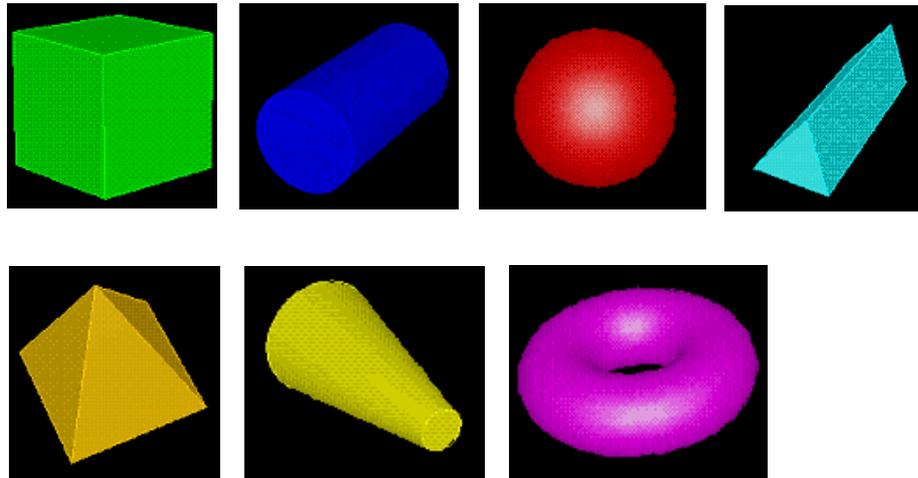
# Geometry Creation

Simulation Modeling Sciences



- 1 Click *Mode-Geometry*
- 2 Click *Entity-Volume*
- 3 Click *Action-Create*

## Geometry Primitives



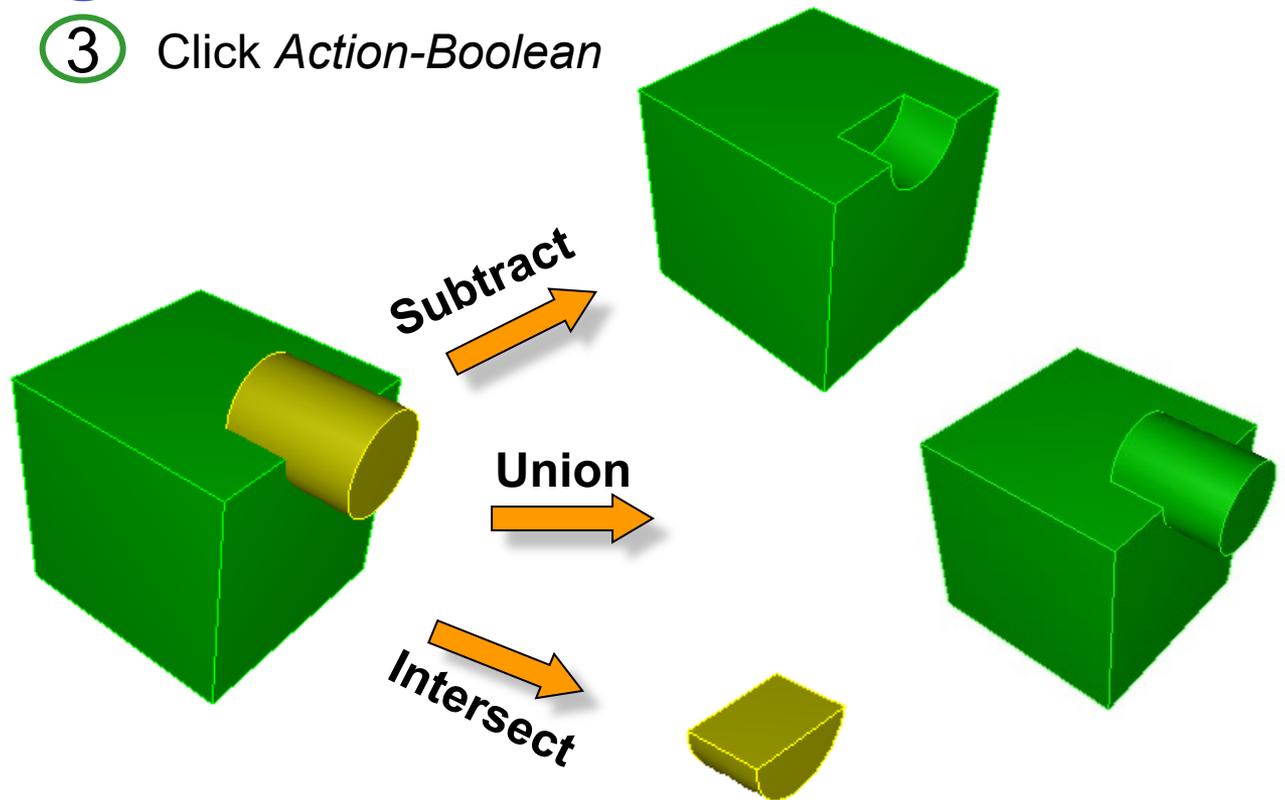
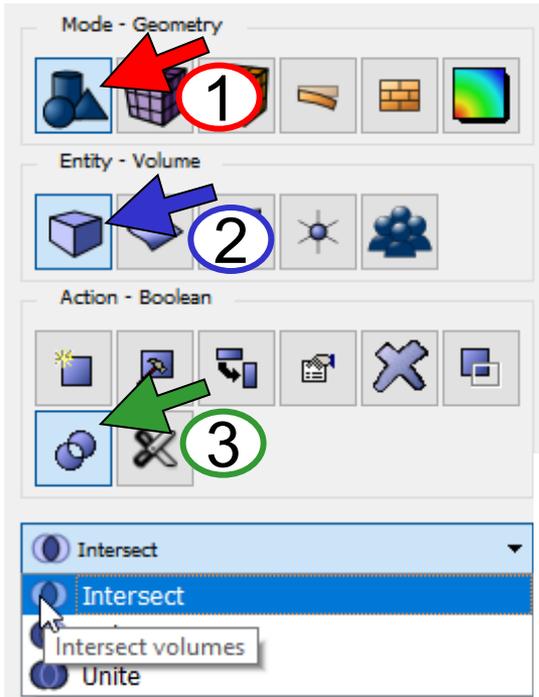
Created centered at origin  
Use transformations to position

# Geometry Booleans

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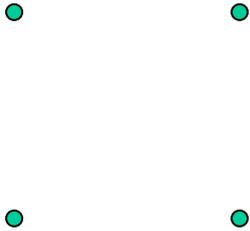
Perform Boolean operations between volumes

- 1 Click *Mode-Geometry*
- 2 Click *Entity-Volume*
- 3 Click *Action-Boolean*

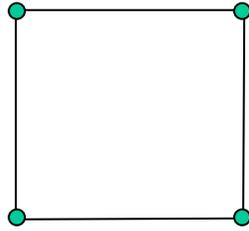


# Bottom-Up Geometry Creation

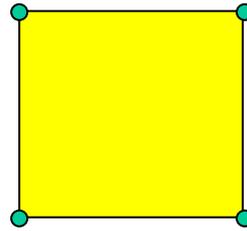
Simulation Mode



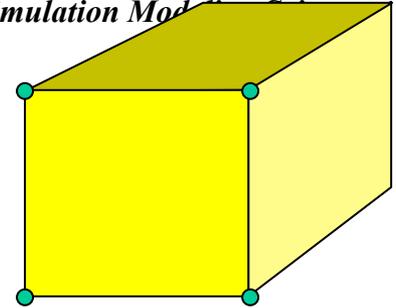
1 Start by defining vertices



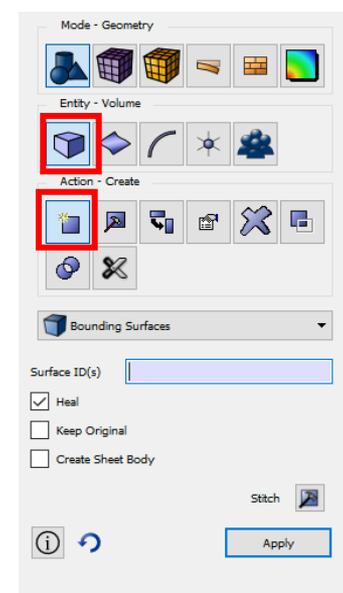
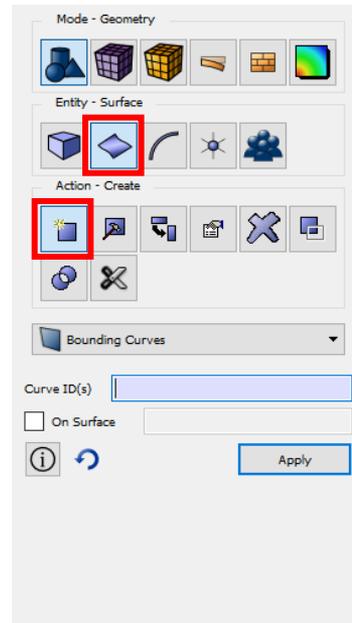
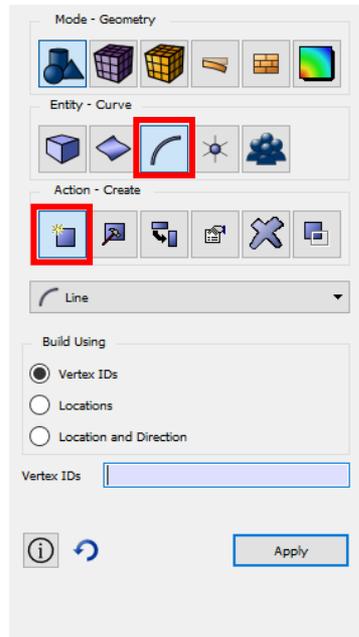
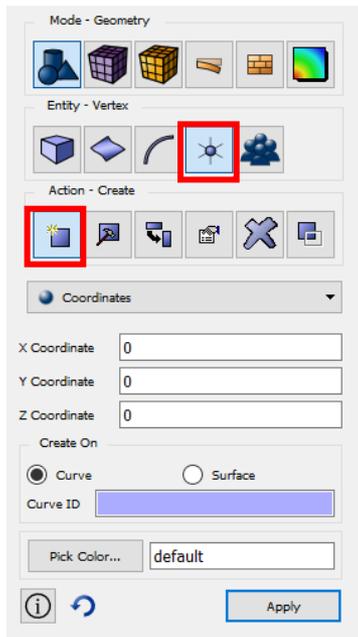
2 Connect them with curves



3 Create a surface from a loop of curves



4 Create a volume from a closed set of surfaces

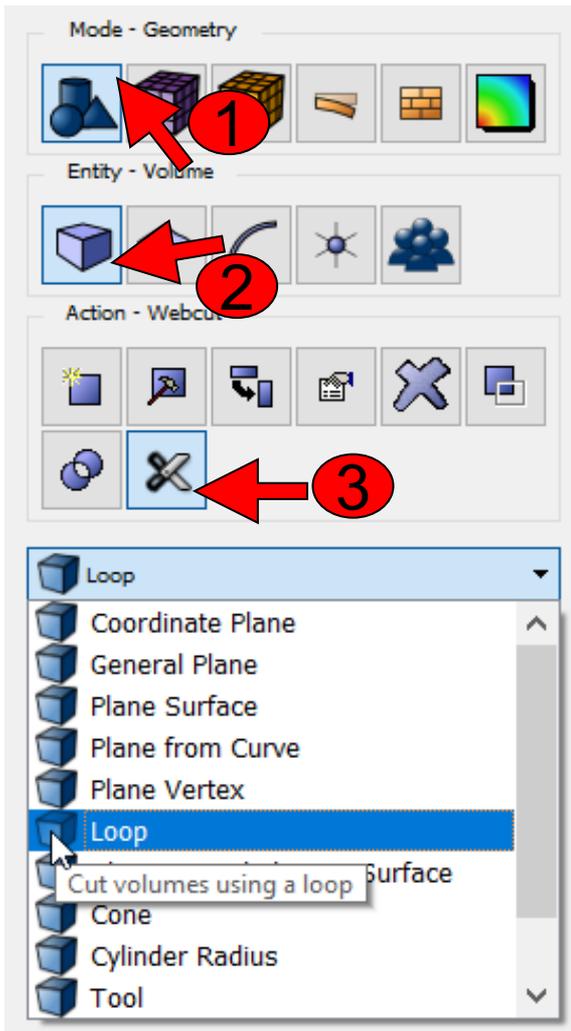


# Web Cutting

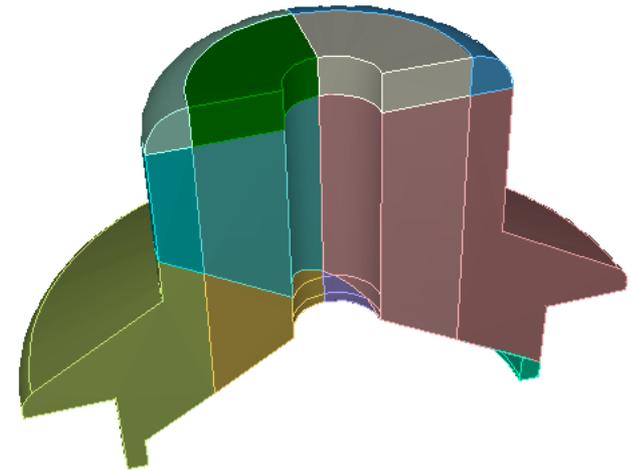
*Simulation Modeling Sciences*

Web-cutting slices through your geometry creating additional volumes

- ① Mode - Geometry
- ② Entity-Volume
- ③ Action-Webcut



Many different options for web-cutting  
Each brings up a separate command panel



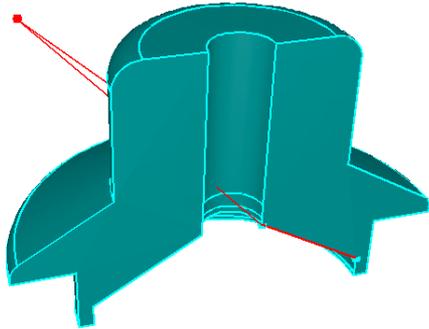
Web-cutting is most often used to enable sweeping



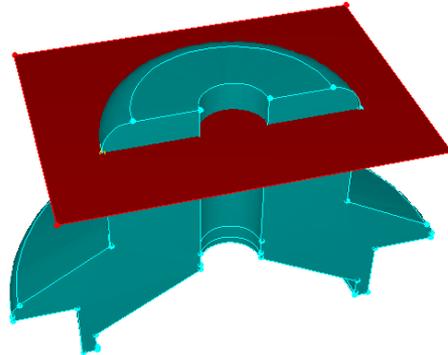
# Web Cutting

*Simulation Modeling Sciences*

**Plane from vertices:**

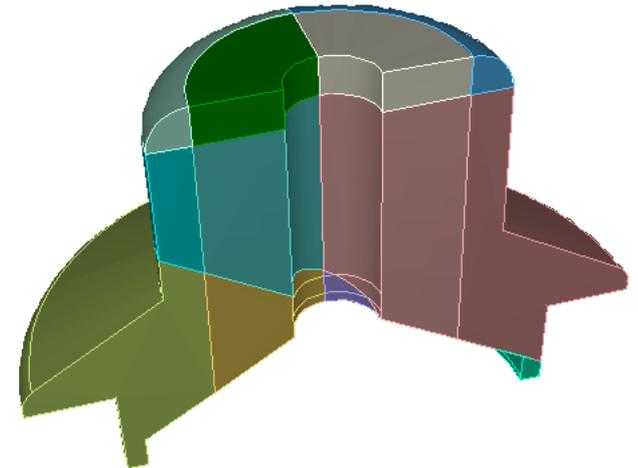


**Coordinate plane:**

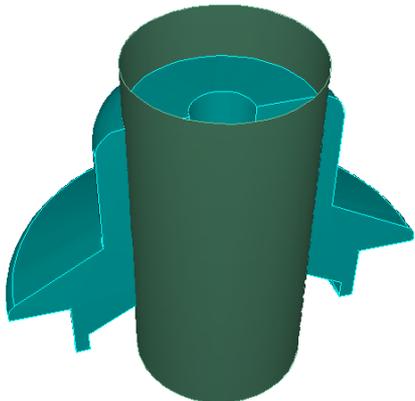


## Example Webcuts

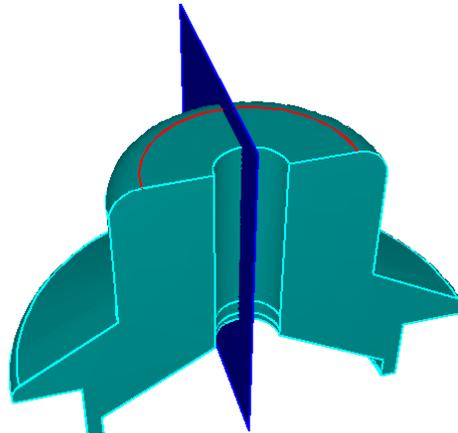
**Result:**



**Cylindrical surface:**



**Plane normal to curve:**



# Virtual Geometry

*Simulation Modeling Sciences*

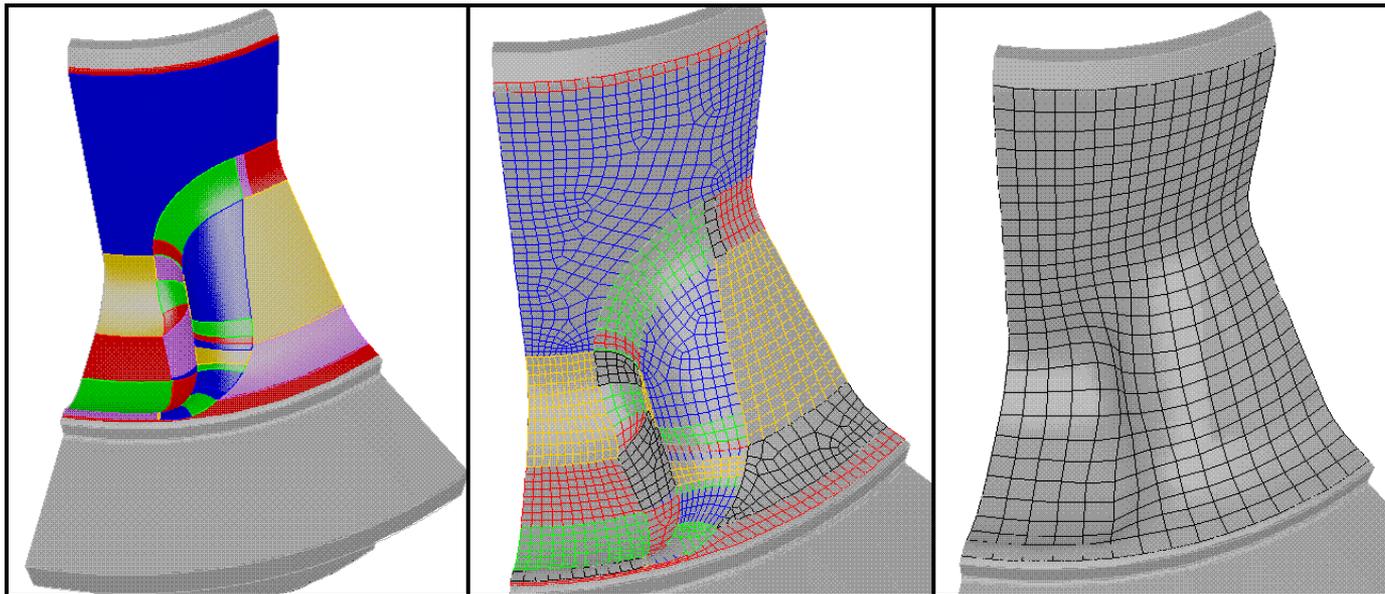
## Composite Operation:

Combines surfaces together

Mesh is not constrained to intermediate curves

Used to improve mesh quality

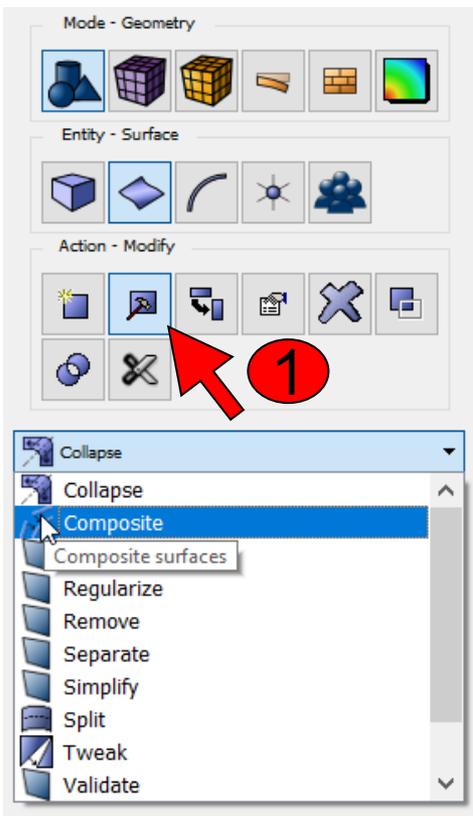
Does not change the CAD model



# Creating a Composite Surface

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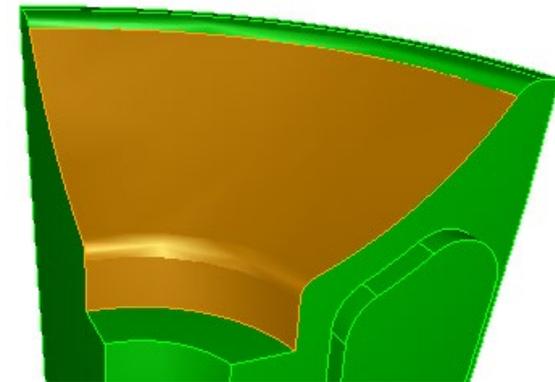
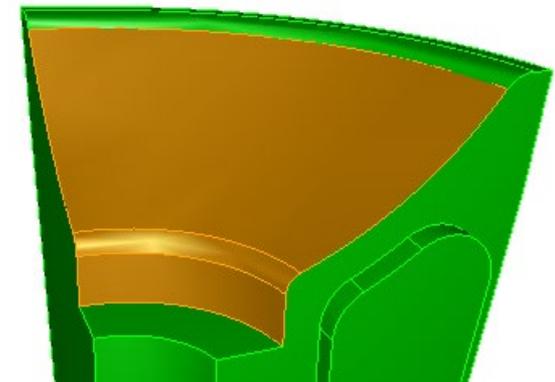
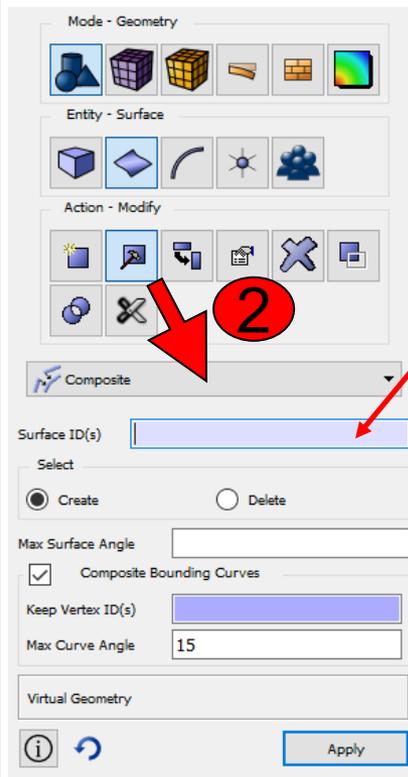
① Goto Geometry:Surface:Modify



② Select Composite

③ Select Surfaces

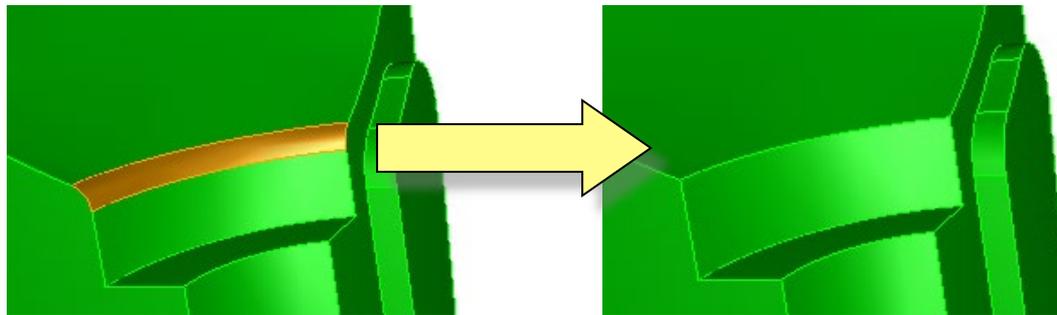
④ Click *Apply*



# Geometry Tweaking

*Simulation Modeling Sciences*

- **Surfaces** can be moved or replaced
- **Adjacent geometry** is modified as needed
- **Useful for**
  - Fixing problems such as gaps
  - Feature removal
  - To make sweepable
- **“Real” Operation**
  - Changes the CAD Model Definition

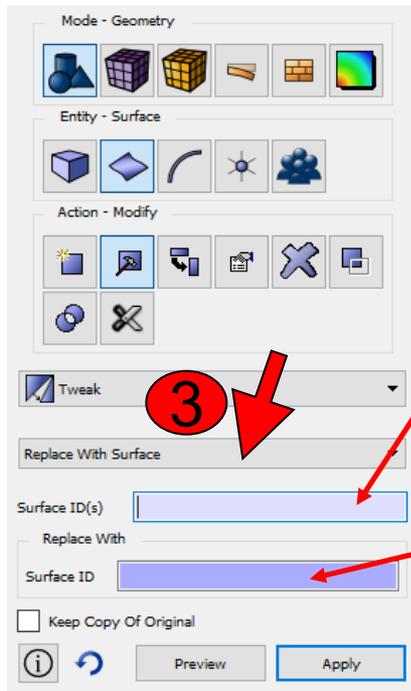
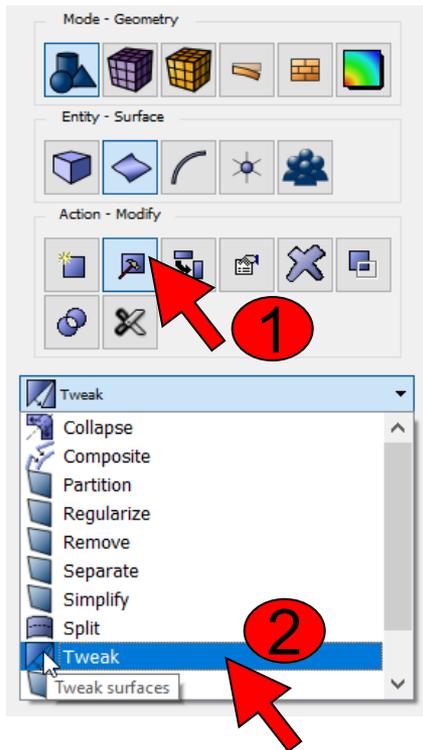


Fillet Removed

# Replace Surface

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① Go to Geometry:Surface:Modify



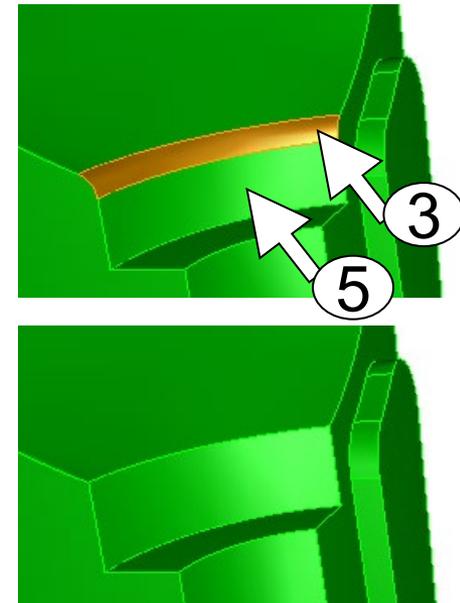
② Select *Tweak*

③ Select *Replace With Surface*

④ Pick Surfaces to remove

⑤ Pick an adjacent Surface

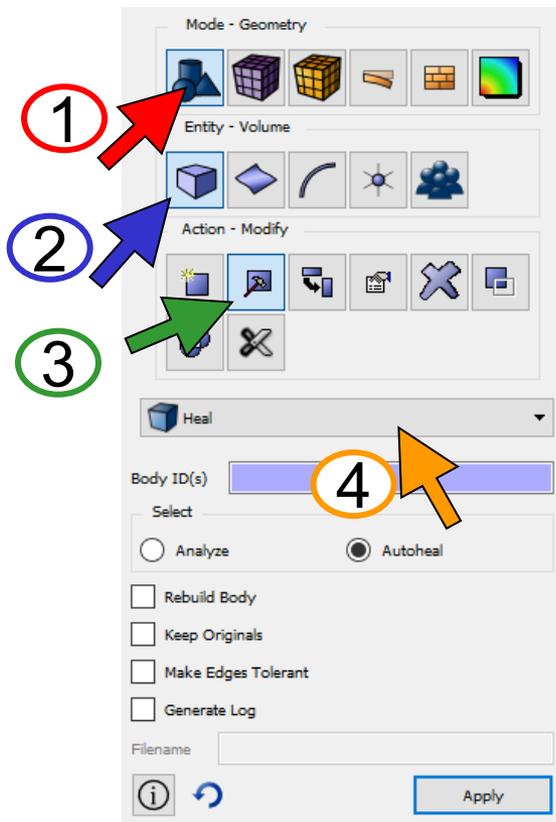
⑥ Click *Apply*



# Healing

*Simulation Modeling Sciences*

- **Translating geometry into the ACIS format can be often problematic**
  - Pro/E is less accurate than ACIS if you use the default tolerances
  - Gaps, overlaps, and internal inconsistencies are common
- **The ACIS Healing Husk may fix many problems**



- 1 Click *Mode-Geometry*
- 2 Click *Entity-Volume*
- 3 Click *Action-Modify*
- 4 Choose *Heal* from the dropdown menu

**Analyze**

Lists problems with the selected volumes

**AutoHeal**

Attempts to fix the problems

# Exercise - Knuckle

*Simulation Modeling Sciences*

## Steps:

1. Import “knuckle.sat”
2. Heal the Model
3. Remove details around holes
4. Webcut, where necessary
5. Imprint and Merge
6. Mesh with a size of 1.5

