Dummy Finger Positioning

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What is the Dummy Finger Positioning Script?

- The purpose of this script is to allow the user to split the hand assembly of a dummy model into individual parts/assemblies.

- The splitting up of the fingers will allow the user to position the fingers independently of the hands. This means the fingers can be positioned around a steering wheel.

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Loaction of script in PRIMER

Slide 3

Finger Split Menu

1. Select whether the part is a Right or Left hand.
2. Type into the box the assembly number of the hand part.
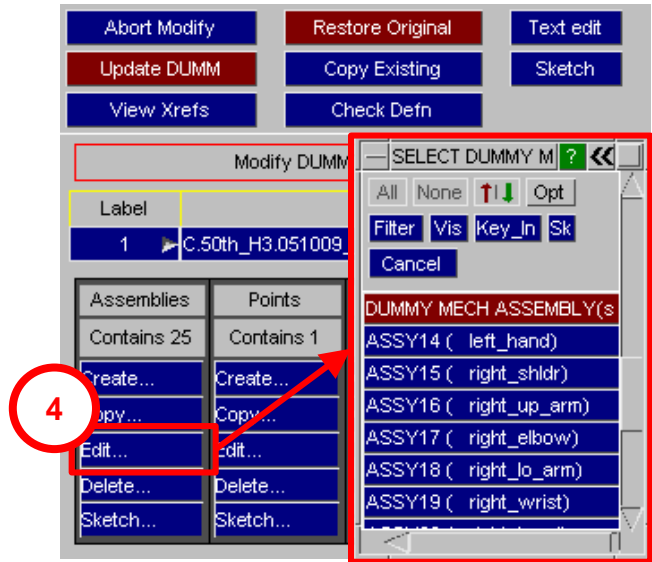3. Select the length units system used in this model.
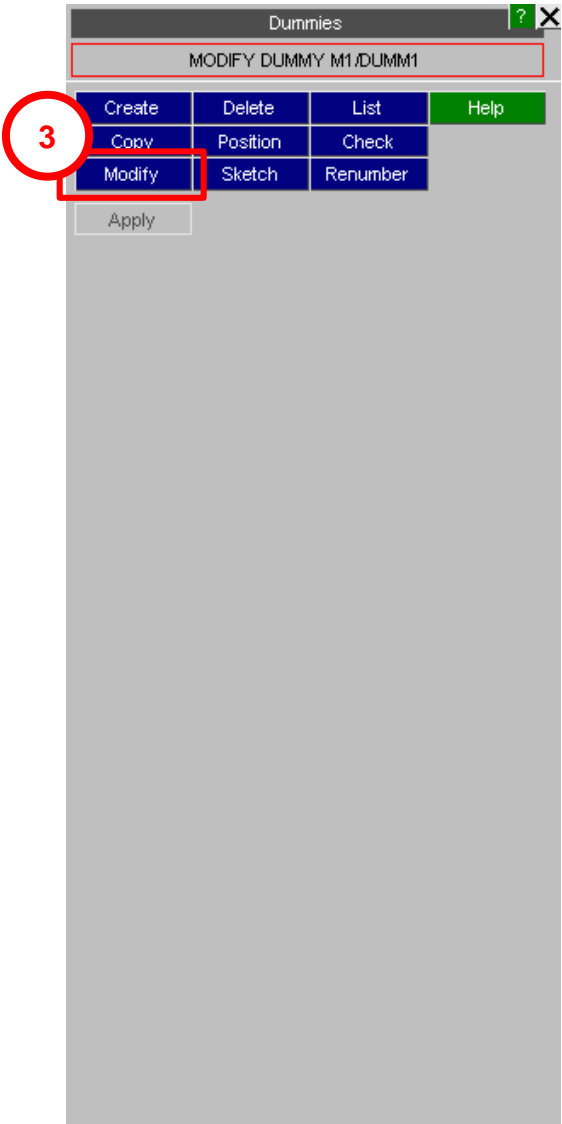
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How to find the assembly numbers of each hand.

Slide 5

Step 1 – Palm nodes

Select the 2 nodes for the palm, with node 1 being the node near the thumb and node 2 being near the last finger.
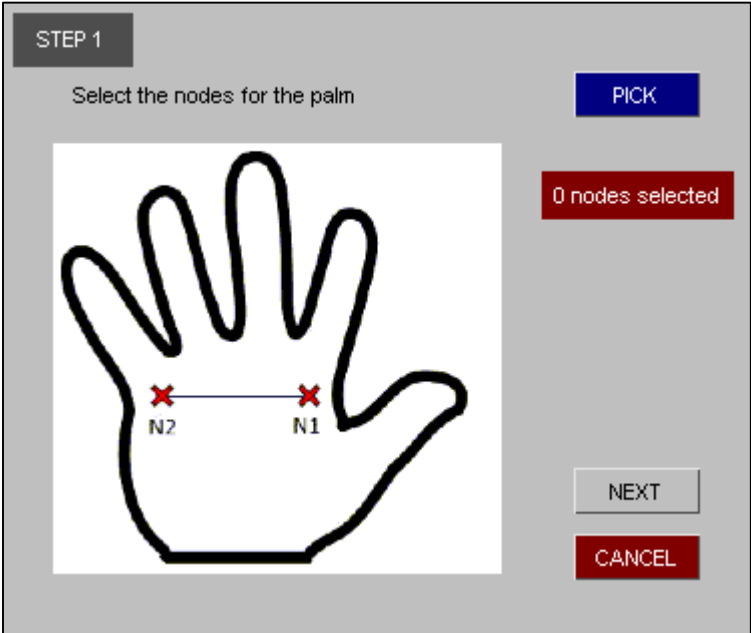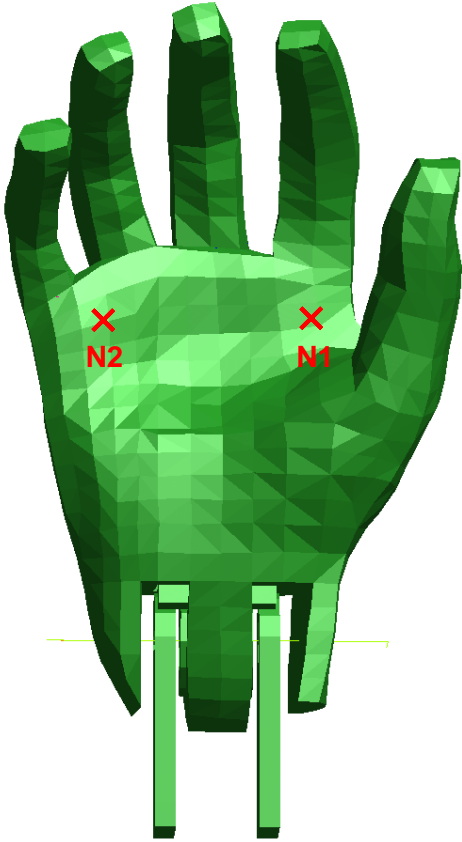
Step 2 – Thumb nodes

Select the 2 nodes for the thumb, with node 1 being the node at the top of the thumb and node 2 being at the bottom.

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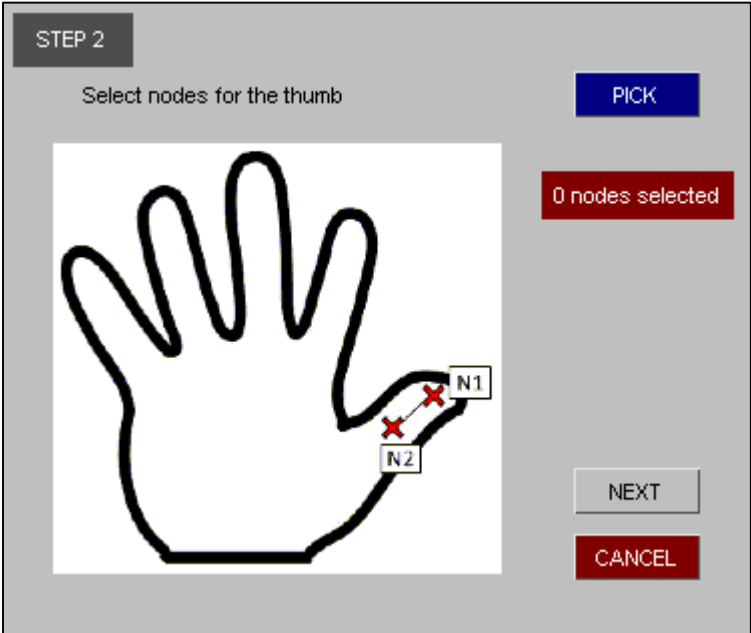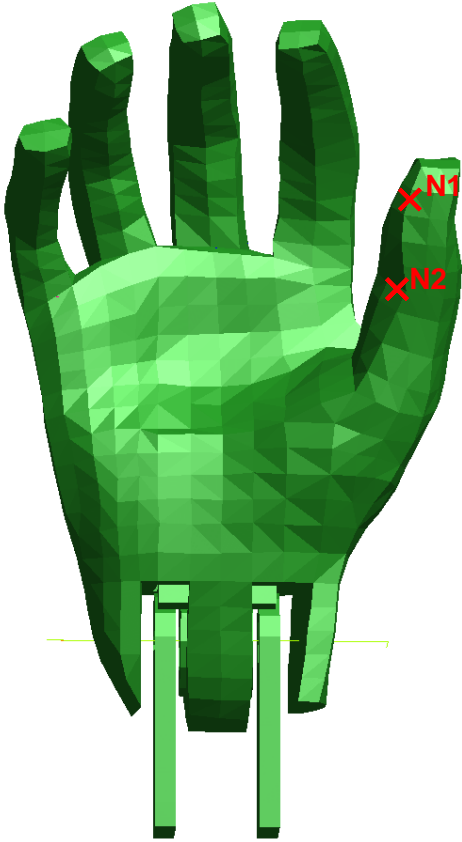
Step 3 – Wrist Rigid Part

Select a rigid part within the wrist, this is used for connections/joints

STEP 3

Select the rigid part for the wrist

SELECT

no rigid part selected

NEXT

CANCEL

Wrist Rigid Part.

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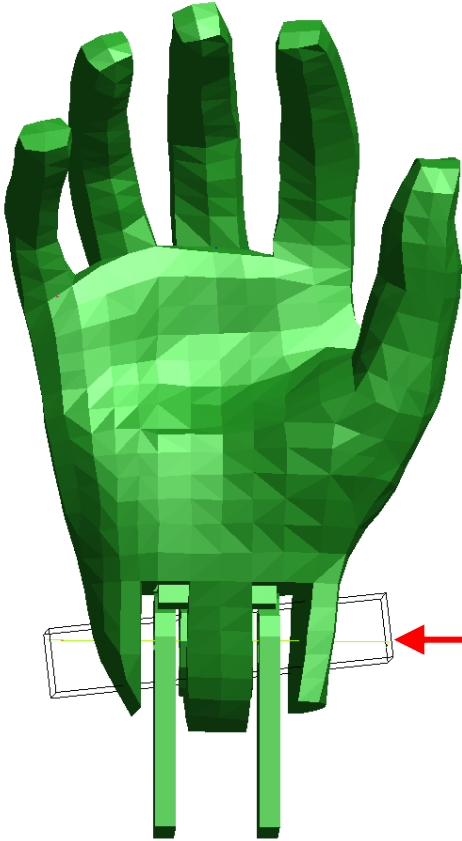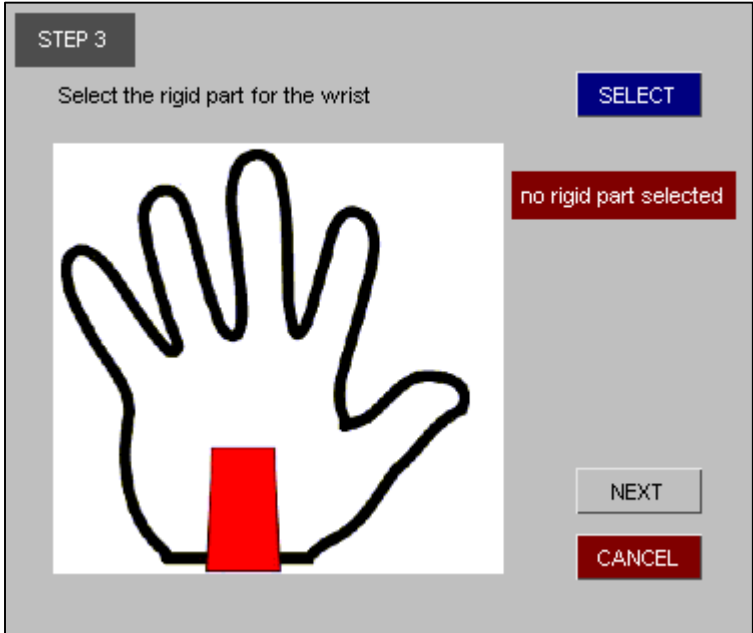
Step 4 – Selecting Thumb solids

Select the solids for the thumb part as shown below.
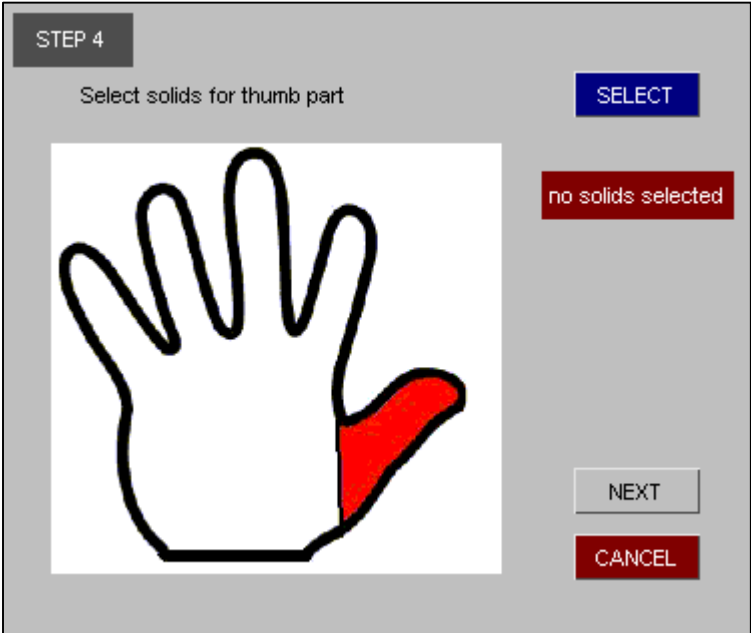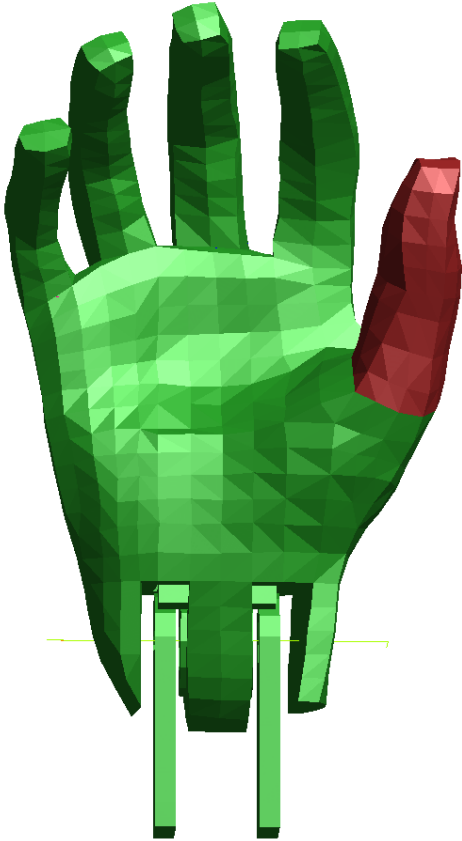
Step 5 – Finger 1 Solids

Select the solids for the finger 1 part as shown below.

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Select the solids for the finger 2 part as shown below.
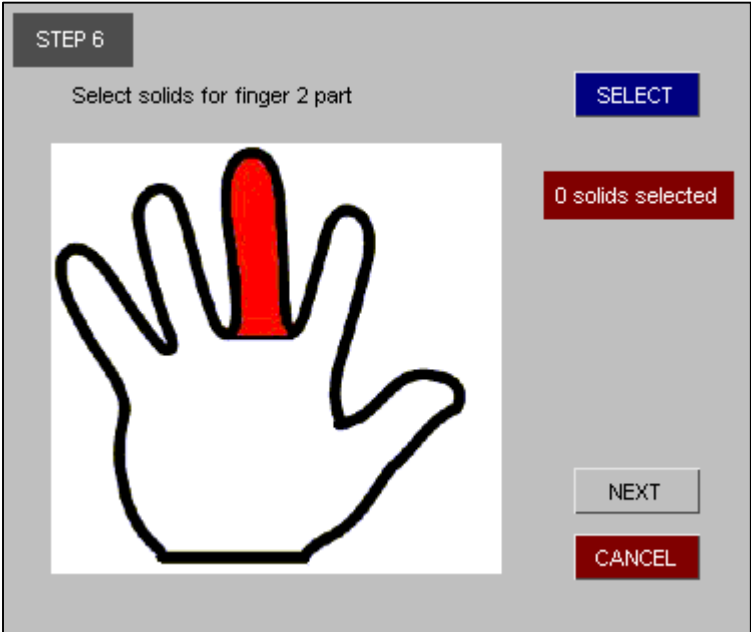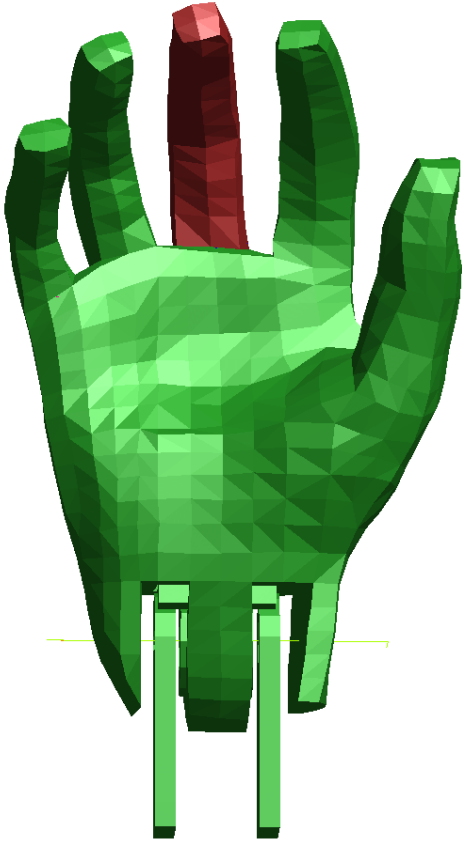
Select the solids for the finger 3 part as shown below.
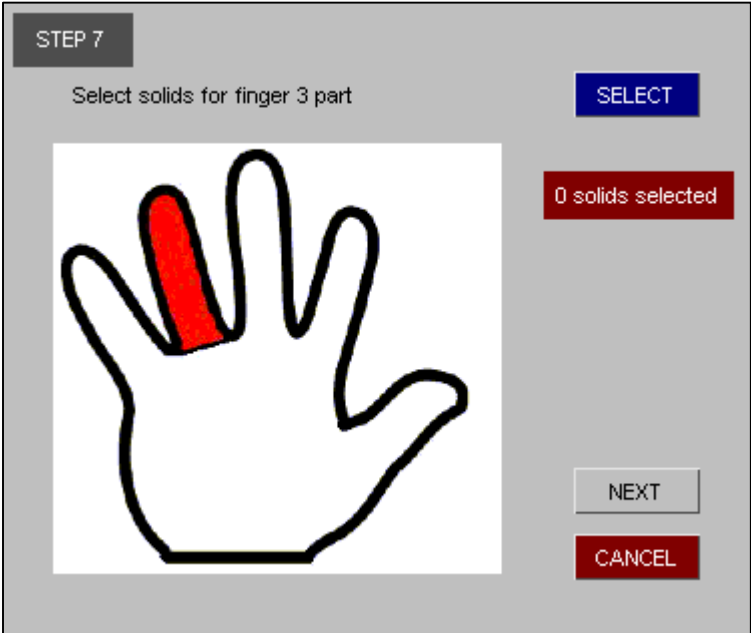
Select the solids for the finger 4 part as shown below.

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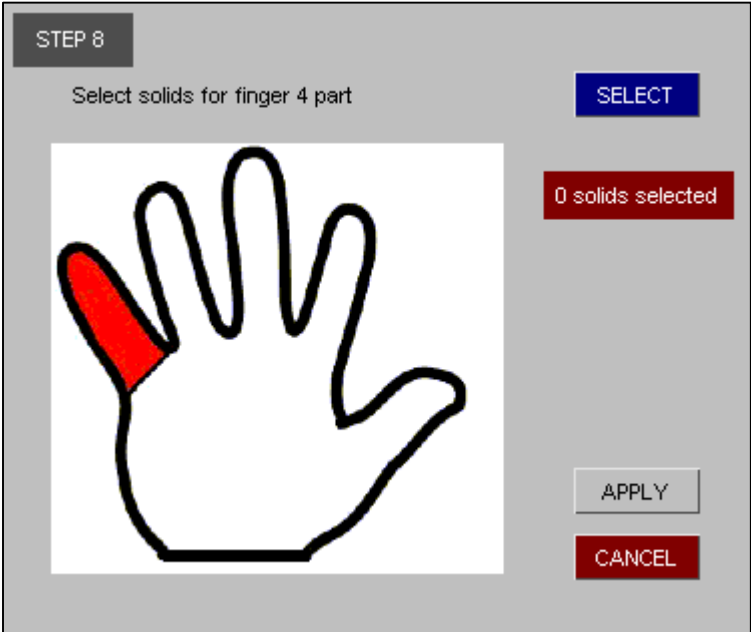
Dummy hand with fingers split

- Click on the apply button to create the finger parts for which the solids have been selected.
- Click on the cancel button to start over again.
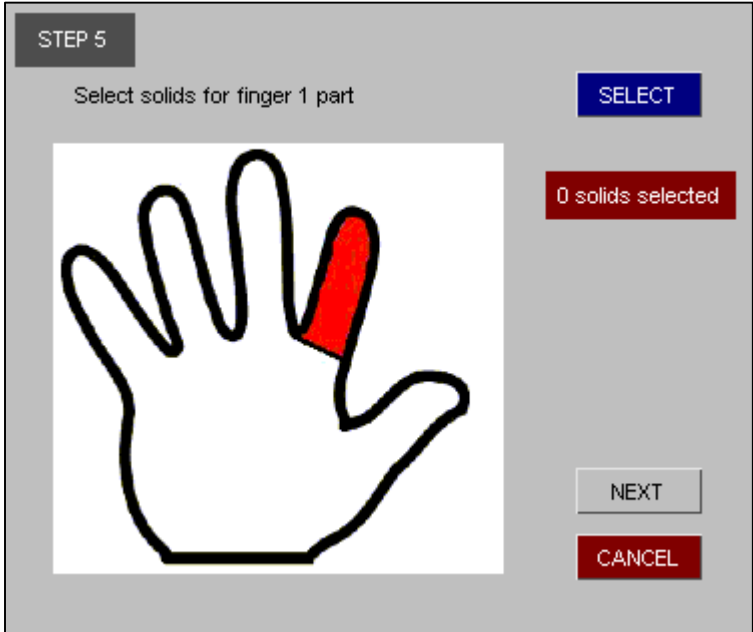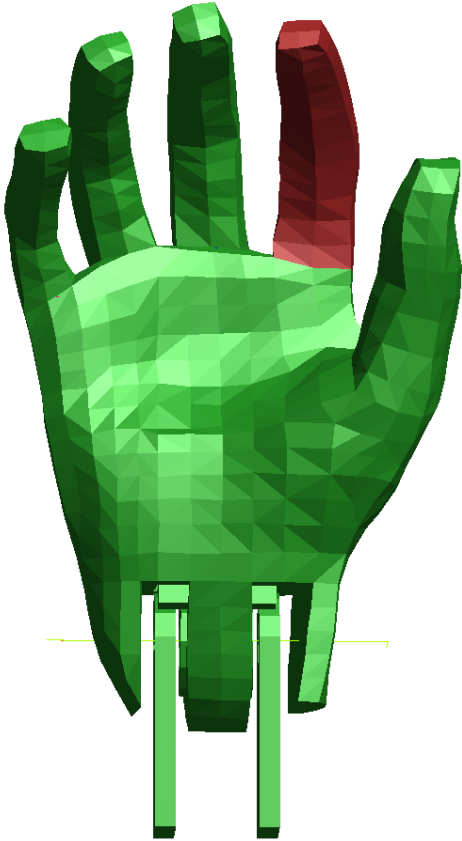- The message box shown below should appear if everything has been created correctly.

STEP 8

Select solids for finger 4 part

SELECT

64 solids selected

APPLY

CANCEL

Solids and Shells have moved into seperate finger parts.

Nodes, joints, joint stiffnesses, rigid bodies, extra nodes and assemblies have been created to allow the fingers to move.

OK

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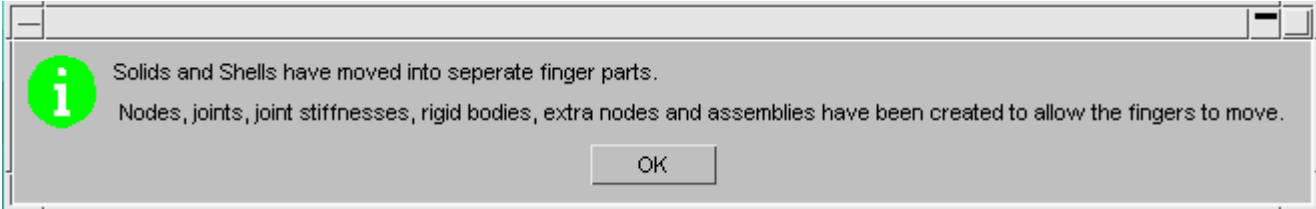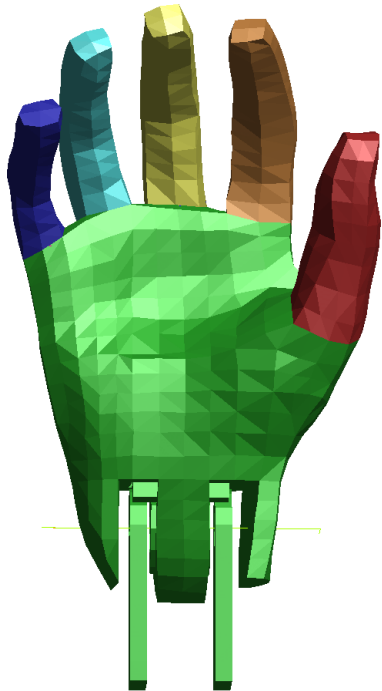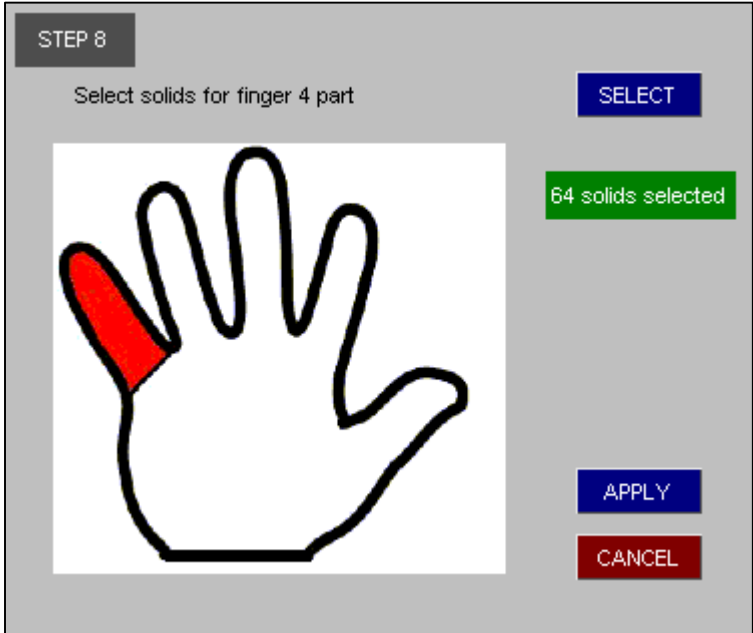
1. The 2 nodes selected at the thumb are used to create a vector which defines the y-direction of the joint beams.

2. The 2 nodes selected at the palm are used to create a vector to define the z-direction of the joint beams.

3. The cross product of these 2 vectors are used to find a vector which defines the x-direction of the joint beams.

4. To create the centre node at where these 3 joint beams meet, the average point is found between the surface of the thumb and the palm part.

5. The beams are used later on to create the co-ordinate system for the thumb.

6. A spherical joint is created for the thumb at the centre node.
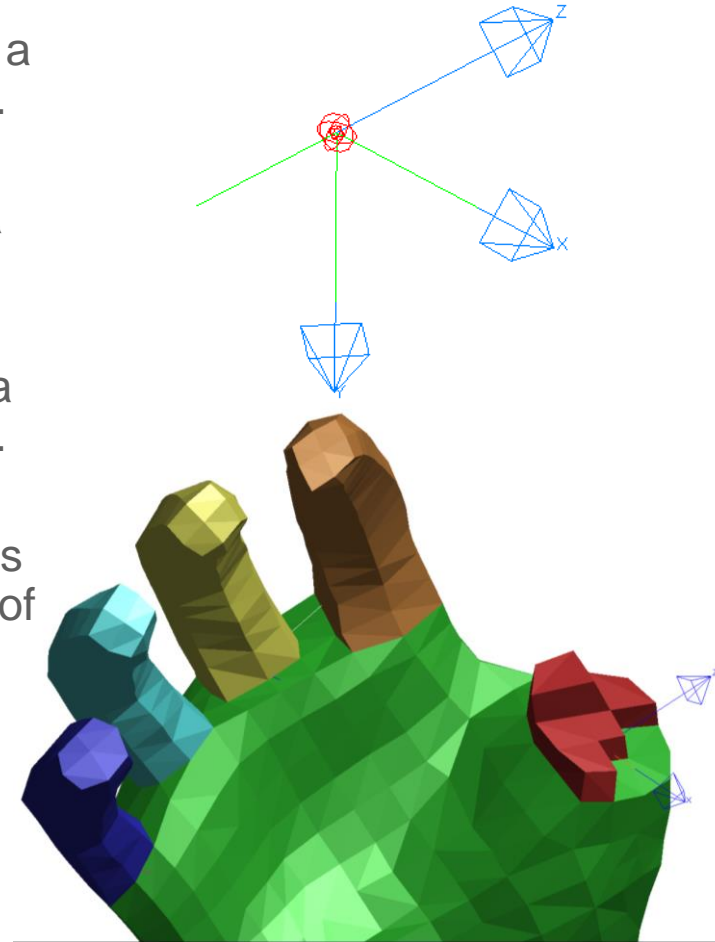
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1. The 2 nodes selected at the palm are used to create a vector which defines the x-direction of the joint beams.

2. The average point is found between the surface of the finger and palm parts.

3. Then, the node closest to this average point is used as the centre node.

4. The flagged solid in the centre node is found, and the face that is flagged within the solid with the finger and palm part is used to find the normal vector to this face.

5. The normal vector is calculated by finding the cross product of 2 vectors within this flagged face, and this is used to define the y-direction of the joint beams.

6. The cross product of the x and y-direction vectors are calculated to get a vector which defines the z-direction of the joint beams.

7. A revolute joint is created for each finger at the centre node.
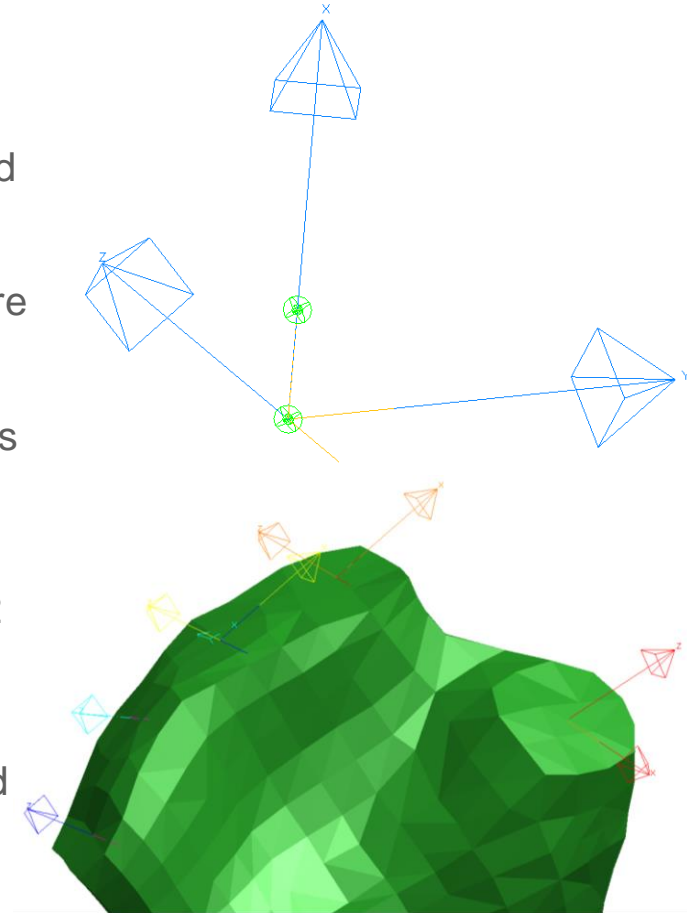
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