Creating Mid Surfaces

You can create a mid-surface from a pair of faces that are offset from each other. This functionality is useful for simulating medial surface representation of thin solids.

This task shows you how to:

- Create a Mid Surface
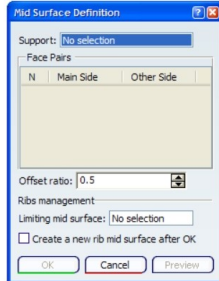- Manage Ribs

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Before you begin: Create a 3D shape in the form of a solid feature, volume feature or a solid body.

Create a Mid Surface

You can quickly create a mid-surface from a pair of faces.

1. Click Mid Surface ⊞ in the Surfaces toolbar (Offsets sub toolbar).

    The Mid Surface Definition dialog box appears.

2. In the Support box, select the solid feature, volume feature or body that contains a pair of faces.

3. In the Face Pairs area, select one or more pairs of faces from which the mid-surface will be extracted.

    Important: The Face Pairs area becomes available only after you select a feature in the Support box.
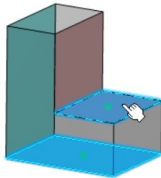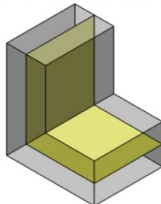

4. In the Offset ratio box, type the offset value or use the arrows to change the value.

    Important:
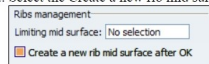   - Value of offset ratio should be between 0 and 1.

5. Click OK to generate the mid-surface.

Manage Ribs

You can manage the mid-surface creation of ribs using an existing connex mid-surface.
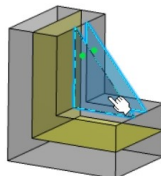
1. Perform above steps 1 to 4 to define the main shell mid-surface.

2. Select the Create a new rib mid surface after OK check box.

3. Click OK.

    The Mid Surface Definition dialog box appears again with Limiting mid surface box containing the main shell mid-surface.
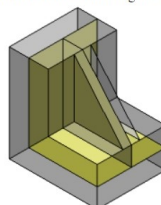
4. In the Face Pairs area, select a pair of faces from the rib.

    Important: During the mid-surface creation of ribs, offset ratio is set to 0.5 by default.

5. Click OK.

    The rib mid-surface is generated with the main shell mid-surface acting as a relimiter.

About Creating Mid Surfaces

The Mid Surface command is useful for extracting the medial surface from a pair of faces. Here is the basic information needed when selecting and editing the pair of faces.

- Face Pair Selection
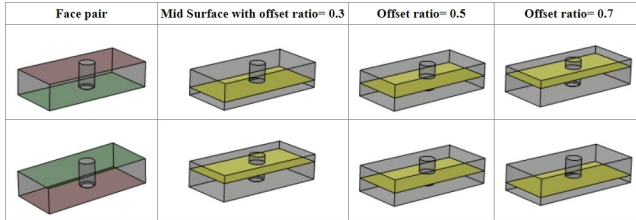- Multi-cell Management
- Contextual Edition

Face Pair Selection

You can select a pair of faces belonging to a solid feature, volume or body. Within a pair, faces are ordered as the 'main side' and the 'other side' and are always offset from each other (that is, they do not share an edge or vertex). After you select the main side, the Mid Surface command automatically selects the other side and generates a mid-surface according to the specified offset ratio. If you select a face whose other side cannot be located in the 3D geometry, a message appears informing about the selection.

Some considerations for selecting a pair of faces:

- Offset ratio is relative to the ordering of faces and the mid-surface is created at an offset from the other face side.

    Note: The main side is color coded as red and the other side as green.

| Face pair	Mid Surface with offset ratio= 0.3	Offset ratio= 0.5	Offset ratio= 0.7

- The shape of the mid-surface depends on the order of face selection.
    - For face pairs P1-Q and P2-Q, the mid-surface is continuous.
    - For face pairs P-Q1 and P-Q2, the mid-surface is non-continuous.

Face pairs	Mid Surface
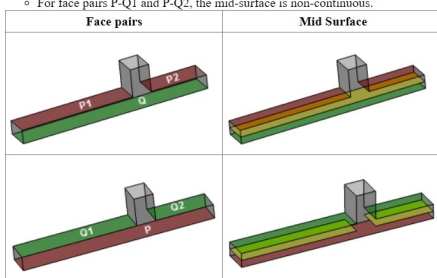
    Note: A face can belong to more than one pair.

Multi-cell Management

When a sub-element contains several topological faces to form a pair, the Mid Surface command performs automatic pairing of faces. A pair is accepted only if the number of paired faces is equal to the number of faces of the sub-element with the lowest number of faces.
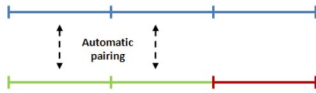
Above illustration shows a pair with two multi-cell surfaces. The first one has three faces (blue) and the second one has two faces (green). The Mid Surface command automatically computes the pairing and accepts two pairs of cells.

Contextual Edition

In the Face Pairs area, you can edit various parameters of the selected face pairs from the contextual menu.
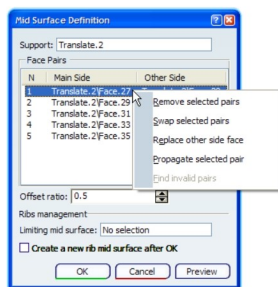
- Select Replace other side face to replace the second face of the pair with the first one.
- Select Propagate selected pair to automatically create a pair of adjacent faces by propagation.

    Notes:

    - The face pair is propagated radially according to the continuity criterion. A pair is kept if its offset value is within the specified threshold.
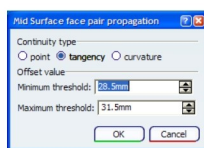
    - In some cases, propagation might be done on the other side of the selected volume, resulting in swapping of some face pairs. You will need to swap back these pairs manually.

- Select Find invalid pairs to find and select existing face pairs that are invalid for mid-surface creation, such as:
    - Pairs whose input topology is not part of the selected input support
    - Incomplete pairs
    - Pairs with input face in error (lost B-REP)
    - Duplicate pairs
    - Pairs whose input faces are not offset from each other.

    After finding the invalid pairs, you can remove them by selecting Remove selected pairs.

Important: The Find invalid pairs selection is available only when the feature is in error.

Note: All of the contextual selection and edition options are also available in the 3D area. You can right-click the face pair to select these options.