

Unigraphics Assemblies

Set Up

Create the components of the assembly first as part files and save.

Create and name a new file for the assembly.

Go to the Applications menu and select the option, Assemblies

As with a part file which has a base feature, that is, the feature (or features) to which subsequently created features are attached, an assembly model has a base component. The base component may be a solid model, or again paralleling model file construction, you may use a set of three datum planes for the base component. If you wish to use the datum planes as the base component, create them using the Insert > Datum Plane command before adding any other components to the assembly.

To Add Components to the Assembly

Assembly > Components > Add Existing

Choose Part File then select the first component from the data base window

If this is the base component of the assembly, select Positioning option Absolute in the Add Existing Part dialogue. This will orient the component by aligning its Component Coordinate System to the Absolute Coordinate System of the assembly file. You are prompted for a Base Point for locating the Component Coordinate System with respect to the assembly.

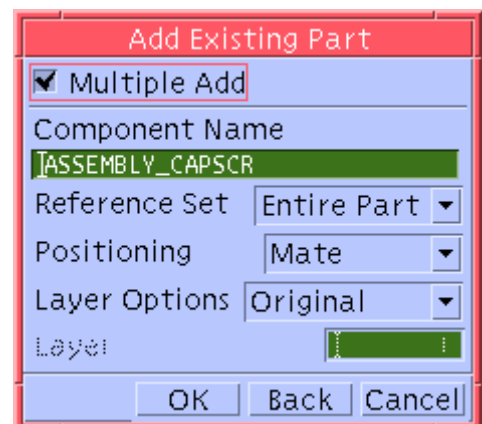
For components added to an existing solid, Select Positioning Option Mate and follow the instructions given below.

Set the Positioning Option to Mate. This means you will be using assembly constraints to position the new component. The new component will appear in a small window on the work window. If you pick the window and make it active, you can use the display command to Pan Zoom Spin the display of the new component.

Pick OK in the Add Existing Part dialogue.

If multiple instances of the same components are to be added (such as a pattern of fasteners), check the Multiple Add toggle.

The Assembly Mating Conditions dialogue will now open.



Using The Assembly Mating Conditions Dialogue

The top portion of the dialogue shows the Assembly Tree. This is a display of the components in the assembly and their assembly constraints. Use the “+” to expand the tree display. To “blank” a component, uncheck the box adjacent to the component name. To disable a constraint, uncheck the box adjacent to the constraint name. If you pick the constraint name (to highlight) and press the RMB, you will get a menu allowing you to:

Convert To (change the constraint type), Delete, or Rename the constraint. When a constraint is selected, the constraint references (faces, edges, etc.) are highlighted on the model.

The next section of the dialogue shows the available constraints (Mating Types) as icons. Explanations of the constraint types are given below.

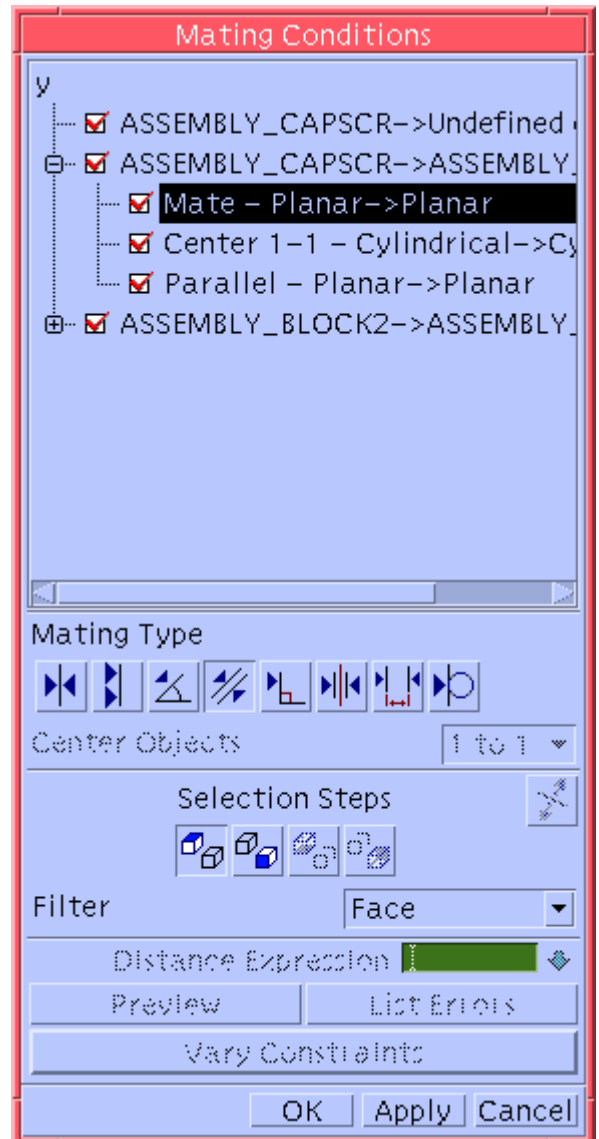
For each Mating Type you will choose entities (faces, edges, etc.) new component (the FROM component) and on the assembly (the TO component).

To apply the constraint, select Apply or OK

To preview the effect of the constraint, select Preview.

The prompt line at the bottom of the screen will notify you of over-constrained or conflicting constraint cases as well as when the component is fully constrained.

Arrows are displayed on screen to represent the 6 DOF (three translational and three rotational) of the added component. As constraints are applied, the arrows are removed.



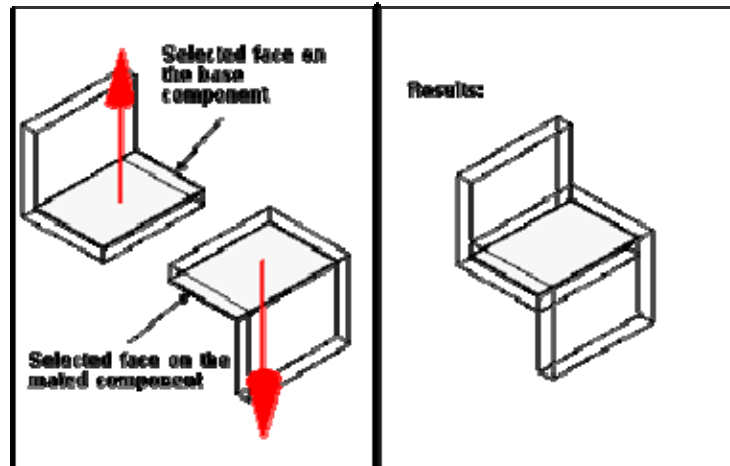
Explanation of Mating Types



Mate: The Mate constraint positions two objects of the same type so that they are coincident.

Mating Planar Faces

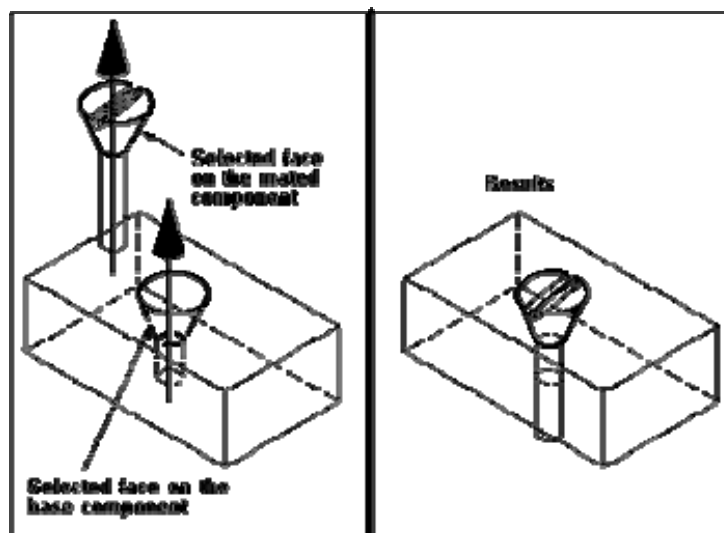
The system mates planar objects (planar faces and datum planes) by locating the faces so that they are coplanar and their normals point in opposite directions.



Mate Constraint Using Planar Faces

Mating Conical Faces

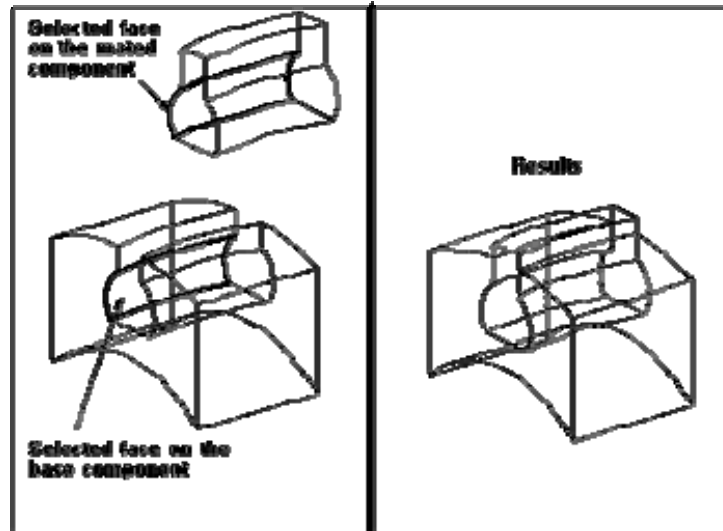
When mating conical faces, the system checks to see if the conical half angles of the two selected faces are equal. If they are the same, it aligns the axes of the faces and positions the faces so that they are coincident.



Mate Constraint Using Conical Faces

Mating Toroidal Faces

When mating toroidal faces, the system checks to see if the inner and outer diameters of the two toroidal faces are equal. If they are the same, it aligns the axes of the faces and positions the faces so that they are coincident.



Mate Constraint Using Toroidal Faces

Mating Other Objects

The system mates edges, lines, and cylindrical faces in a manner similar to the Align constraint.

Concerns

When mating cylindrical faces, the radii of the selected faces must be equal.

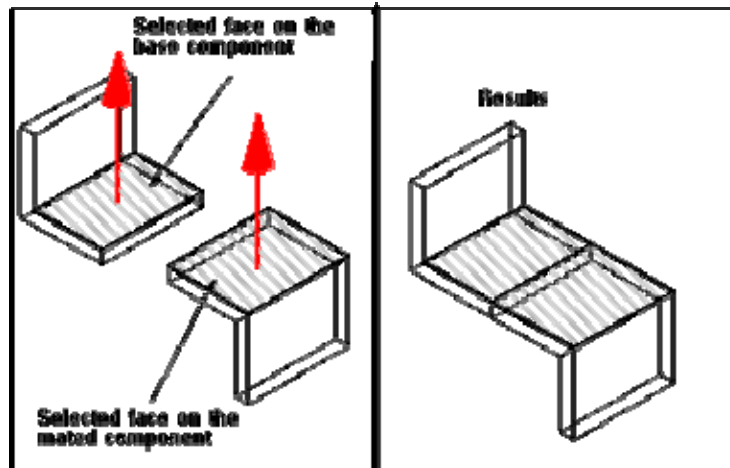
When you select a circular edge for use in a Mate or Align constraint, the system uses the axis of the circle. If this behavior is not what you want, you can select the face instead of the edge.



Align: For planar objects, Align positions two objects so that they are coplanar and adjacent. For axisymmetric objects, it aligns the axes.

Aligning Planar Faces

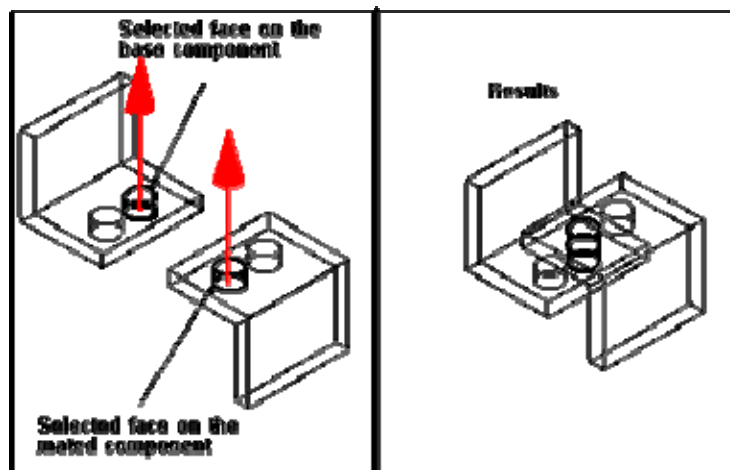
The system aligns planar objects (planar faces and datum planes) by locating the faces so they are coplanar, and their normals point in same direction.



Aligning Constraint Using Planar Faces

Aligning Cylindrical, Conical, and Toroidal Faces

The system aligns axisymmetric faces (cylindrical, conical, and toroidal faces) by positioning the axes of these objects to be coincident. The align constraint lets you mix and match different axisymmetric faces. The radii of the selected faces need not be equal.



Align Constraint Using Axisymmetric Faces

Aligning Edges and Lines

The system aligns edges and lines to be collinear.

When you select a circular edge for use in a Mate or Align constraint, the system uses the axis of the circle. If this behavior is not what you want, you can select the face instead of the edge.



Angle: Lets you position two objects by defining a rotational angle between them. The angle can be used to rotate a mated component into the correct position.

For example, if you had a round pin placed in a hole, the pin would be free to rotate about its axis. But if the pin and hole had a notch on them, it would be possible to define the angle between the notches on the hole and the pin so that the notches line up.

An angle constraint can be created between any pair of objects that have direction vectors. The angle is measured between the direction vectors. This constraint allows you to mix and match geometry types such as faces and edges. For example, it is possible to specify the angle between a face and an edge.



Parallel: Defines the direction vectors of two objects as parallel to each other. Lets you constrain objects from the From and To components by defining them or their direction vectors as parallel.



Perpendicular: Defines the direction vectors of two objects as perpendicular to each other. Lets you constrain objects from the From and To components by defining them or their direction vectors as perpendicular.



Center: Lets you center one object everywhere along the center of the other, or center one or two objects between a pair of objects.

Center Objects Option Menu

When you choose the Center mating type, the Center Objects option menu becomes active. Choose the option that describes how many objects you are mating.

- 1 to 1 When you are placing one object in the center of the other object. One of the objects must be a circle or an axisymmetric object, such as a cylinder.
- 1 to 2 When you are placing a single object between a pair of To objects. When you choose this option, the Second To selection step becomes active to let you select the second To object when it is time to do so.
- 2 to 1 When you are centering a pair of To objects on a single From object. When you choose this option, the Second From selection step becomes active to let you select the second mating object. (The Second To step is still grayed out.)
- 2 to 2 When you are centering a pair of From objects between a pair of To objects. When you choose this option, the Second From and Second To selection steps become active.



Distance: Lets you specify the minimum separation in 3D space between the selected objects. This option lets you offset the object being mated from the object that it is being mated to.

The offset distance can be either a positive or negative value, which allows you to control which side of the To object the mated object will appear.

Options on Mating Conditions Dialog

When you choose the Distance mating type and select two objects, these options become active on the Mating Conditions dialog:

Distance Expression: Shows the current name and value of the distance constraint expression. If an expression did not exist, a new one is created.

Units: Shows the units for the distance, such as "in" (for inches).

Option menu: Opens an option menu that gives you options for defining the expression, including Measure, Formula, Function, Select, or Make Constant. Most of these options open a dialog or GWIF toolbar that helps you define an expression of that type.



After you have defined the expression, the option menu may change to become a launch tool for the dialog that you used. This lets you edit the expression later.

Procedure

To define a distance constraint:

- Select an object on the From component.

- Select an object on the To component or base geometry.

- The Distance Expression field, units, and the expression option menu become active.

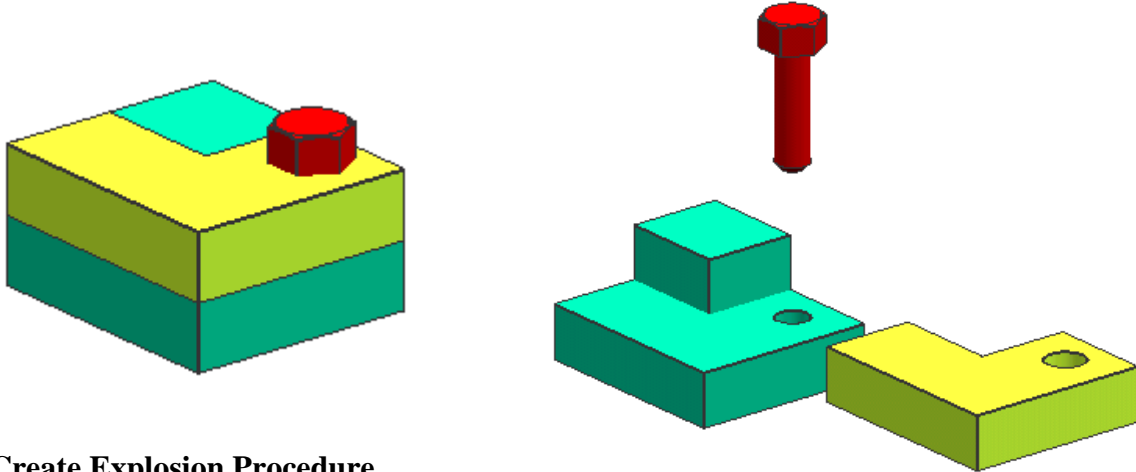
- You can enter a value directly in the Distance Expression field, or select a choice (including Measure, Formula, Function, Select, or Make Constant) to help you define the expression.



Tangent: Lets you define a physical contact between the selected objects on the From and To components. The contact can be at a point or along a line.

Note: Sometimes there may be multiple solutions for the objects you selected. For example, if you select a plane and a sphere, there are two possible points for the tangent point. When there are multiple solutions, the system chooses a solution based on where you selected the objects. You can see other solutions by choosing the Alternate Solution option on the Mating Conditions dialog.

Creating An Assembly Explosion



Create Explosion Procedure

To create a new explosion:

Assemblies > Exploded Views > Create Explosion

Enter a new explosion name or accept the default name. Duplicate names are not allowed.

Assemblies > Exploded Views > Edit Explosion This will open the Edit Explosion dialog.

Select the Selection button and select the component(s) that you want to move.

Note: If you selected components before opening the Edit Explosion dialog, it appears in the Move Objects mode.

Select the Move Objects button. The Translation and Rotation handles will be displayed. (head of vector or point on arc, see figure at right)

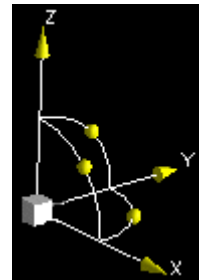
To move the drag handles into a different position before moving the components:

Choose the Snap Handles to WCS icon within the Edit Explosion dialogue, or

Select the Move Handles Only button and drag the handles into position.

Note: You can toggle between the Selection and Move Objects modes by pressing MB2.

You may drag the selected components by holding down MB1 while moving the cursor but this moves without restriction which may be undesirable for an exploded view.



To move with direction restriction (preferred), choose either a translation or a rotation handle. (head of vector or point on arc)

If you selected a translation handle:

You may define a Snap Increment if you want the component to move in set intervals as you drag the cursor. The Snap Increment must be an integer. Define the direction for the explosion by using the Vector Tool options. Hold down MB1 and drag the cursor. The Distance field keeps track of the distance that the selected components have been dragged as you move the cursor.

If you selected a rotation handle:

You may define a Snap Increment if you want the component to move in set numbers of degrees as you drag the cursor. The Snap Increment must be an integer. Hold down MB1 and drag the cursor. The Angle field keeps track of the number of degrees that the components have been rotated as you drag the cursor.
Note: You can select one or more exploded components and choose the Unexplode option to move them back to their unexploded positions.

When you have finished moving the selected components, you can press MB2 to switch back to the Selection mode. You can now add or remove (shift-pick to deselect) components from the group, and explode the new selection.