LESSON 1

Merging Databases

Objectives:

■ Construct two databases which have distinct similarities and differences.

■ See how PATRAN resolves model conflicts and differences when the two databases are imported into a combined third database.

Model Description:

An analysis model can often consist of multiple parts. There are many options in PATRAN for managing these multiple parts. The entire model can be built in the same database, containing a different group representing each part. An alternative is to create separate databases for each part. In order to simplify the part's creation and defining its properties, it is often necessary to have more than one person assigned to independently create the model. Merging databases can also be useful when replicating or instancing the parts.

Using separate databases to model the part is illustrated in this exercise. Two databases will be contructed, each containing part of the model. Each part will have it's own load and boundary conditions, as well as separate geometry. However, both will share a common load case, materials, and group names. The two parts will be united when the databases are merged into a third composite database. The purpose of this exercise is to become aware of how MSC/PATRAN resolves conflicts when merging two databases.

Exercise Procedure:

Part I - Building the First Database

1. Open a new database and call it **quarter_plate**.

Type **p3** in your xterm. The *Main Window* and *Command Window* will appear.

File/New ...

New Database Name: | **quarter_plate** |

| **OK** |

The viewport (PATRAN's graphics window) will appear along with a *New Model Preference* form. The *New Model Preference* sets all the code specific forms and options inside MSC/PATRAN.

Tolerance: ◆ **Based on Model**

Analysis Code: | **MSC/NASTRAN** |

Analysis Type: | **Structural** |

| **OK** |

2. Run a session file to construct the first database.

File/Session/Play ...

Session File List: **quarter_plate.ses**

Apply

3. Check certain aspects of the database (to know what is there before importing).

First, lets check the materials of the database.

◆ **Materials**

Look at all 3 names of materials. Closely examine the properties of the material **test**.

Action:	**Show**
Object:	**Isotropic**
Method:	**Tabular**
Existing Materials:	**test**

Show Properties ...

Notice that the Elastic Modulus is 15e6.

Cancel

Now, check the property sets of the model.

◆ **Properties**

There is only one, called **plate**. Now check the groups.

Group/Post ...

Notice all 3 groups. Then post the default group.

Select Groups to Post: **default_group**

Apply

Cancel

Now notice the MPC that is visible at the hole. Plot all loads and boundary conditions.

◆ **Loads/BCs**

Action:　　　　　　　　　　　| **Plot Markers** |

Assigned Load/BC Sets:　　　| **Displ_fix_edge** |

Select Groups:　　　　　　　| **default_group** |

| **Apply** |

Notice the **fix_edge** boundary condition, restraining the edges of the model from translation. Now, prepare to create the second database.

File/Close ...

Part II - Building the Second Database

4.　　Open another new database and call it **tower**.

File/New ...

New Database Name:　　　| **tower** |

| **OK** |

The viewport (PATRAN's graphics window) will appear along with a *New Model Preference* form. The *New Model Preference* sets all the code specific forms and options inside MSC/PATRAN.

Tolerance:　　　　　　　　◆ **Based on Model**

Analysis Code:　　　　　　| **MSC/NASTRAN** |

Analysis Type:　　　　　　| **Structural** |

| **OK** |

5.　　Run a session file to construct the second database.

File/Session/Play ...

Session File List:　　　　| **tower.ses** |

Apply

6.   Check certain aspects of the database (to compare after merging the two databases).

Notice the dimensions of the cross section tube that are displayed on the screen. Close the display.

Close

Next, check the materials of the database.

◆ **Materials**

Look at all 3 names of materials. They are the same 3 names as the first database. However, there is one difference. To see it, closely examine the properties of the material **test**.

Action:	**Show**
Object:	**Isotropic**
Method:	**Tabular**
Existing Materials:	**test**

Show Properties ...

Notice that the Elastic Modulus is 20e6. Remember that the first database had a modulus of 15e6. How will PATRAN deal with this difference? Wait and see.

Cancel

Now, check the property sets of the model.

◆ **Properties**

There are two, called **beam** and **solid**. Now check the groups.

Group/Post ...

Notice all 3 groups, having the same names as the first database. Then post the default group.

Select Groups to Post:	**default_group**

Apply
Cancel

Next, check the fields of the database.

◆ **Fields**

Existing Fields:

wind

Notice the function and coordinate system of the field. Now, check the load in which this field is used..

◆ **Loads/BCs**

Action:

Show Tabular

Object:

Pressure

Existing Sets:

wind_load

Apply

Notice that the load is applied to two solid surfaces using the field **wind**. Having just looked at the fields, loads, materials, properties, and groups of both databases, you are now ready to merge the two databases. Close the second database.

File/Close ...

Part III - Merging the Two Databases

7.   Open a final new database and call it **full_model**.

File/New ...

New Database Name:

full_model

OK

The viewport (PATRAN's graphics window) will appear along with a *New Model Preference* form. The *New Model Preference* sets all the code specific forms and options inside MSC/PATRAN.

Tolerance: ◆ **Based on Model**

Analysis Code: | **MSC/NASTRAN** |

Analysis Type: | **Structural** |

| **OK** |

8. Import the first database into the new one.

File/Import ...

Object: | **Model** |

Source | **MSC/PATRAN DB** |

PATRAN Databases: | **quarter_plate.db** |

| **Preview PATRAN Database...** |

What you now see is a summary of what entities the database contains. Write the contents to a report file and continue importing the database.

■ **Write to Report File**

| **OK** |
| **Equivalence Options ...** |

Notice that (as a default) duplicate nodes and geometry are equivalenced upon import, and that the tolerances of both the current and importing databases are shown.

| **OK** |
| **Apply** |

Look at the import summary. Then close the *Import Summary* form.

| **OK** |

9. Import the second database into the new one.

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Before importing the second database, change the view using the following toolbar icon:

Iso 3 View

File/Import ...

Object:	**Model**
Source	**MSC/PATRAN DB**
PATRAN Databases:	**tower.db**

Preview PATRAN Database...

What you now see is a summary of what entities the database contains. Write the contents to a report file and continue importing the database.

■ **Write to Report File**

OK

MSC/PATRAN DB Options ...

In order to differentiate the fem and geometry between the two databases, we will offset the ID numbers of the second database by a value of 1000. To do so, perform the following operations:

Under the ID Offset column, drag the mouse to select the cells corresponding to the entities **Point** through **User Data**. On the form that pops up, enter the following:

Offset Option:	◆ **Input**
Offset Value:	**1000**

Apply

Close

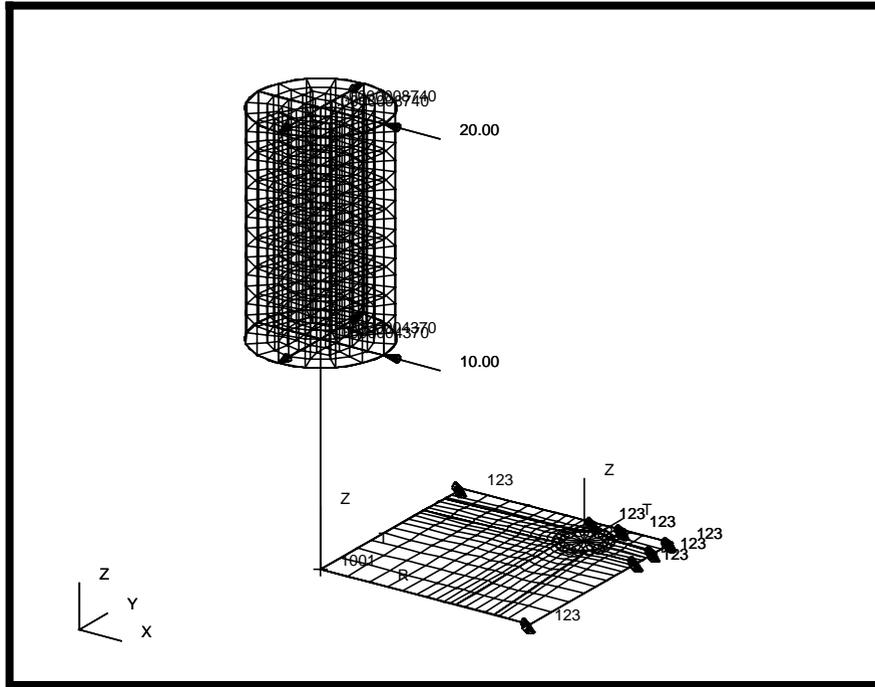Continue with the import.

OK

Apply

Clear the *Import Summary* form.

| OK |

The following should now be seen in your viewport:

10. Examine the contents of the merged database to see the effects of the merging.

Examine the display. Notice that the geometry and fem for both models appear, and are placed in the same location each occupied in reference to the global coordinate system in their respective original databases. Also notice that all load conditions have been imported. Even the alternate coordinate systems have been imported (although the ID on one of them is 1001 - from the offset).

Next, we will examine the effect of the import on the groups of the databases.

Group/Post ...

The **SM_...** groups correspond to all entities of each of the original two databases. The **default_group** is the result of merging the two default groups. Both the **fem** and **geom** groups contain the combined entities of both the first and second databases. Post each of the groups and examine its contents.

Select Groups to Post: | select each group |

> **Apply**

After viewing each group, post the **default_group** group and close the form.

Group/Post ...

Select Groups to Post: | **default_group** |

| **Apply** |
| **Cancel** |

Now, look at the materials of the database.

◆ **Materials**

Notice that there are now 4 materials instead of 3. Compare **test** and **SM_002_test**. Originally, they both had the same name, and differed only in elastic modulus. If PATRAN finds any discrepency between the attributes of materials with the same name (the same goes for properties as well), it creates another material preceded by the submodel prefix assigned in the database import options.

Next, check the **Properties**.

◆**Properties**

Three properties exist in this database: one from the first and two from the second.

Now, check the fields.

◆ **Fields**

Existing Fields: | **wind** |

Notice that the function is the same, but the coordinate system value is 1000 more than it originally was. This is due to the offset applied during the second database import. Notice that not only did the coordinate ID change, but all properties (in this case, fields) dependent on the coordinate changed to accommodate the new ID.

11. Move the tower to the center of the hole.

Group/Transform ...

Action: | **Transform** |

Method: | **Translate** |

| **Change Target Group ...** |

Existing Groups: | **SM_002** |

| **Cancel** |

■ **Delete Original Members**

■ **Use Original IDs**

Properties: | **Copy** |

In order to select the translation vector, click the cursor in the *Translation Vector* box and be sure to use the following entity select icon:

Tip point for vector with base at [0 0 0]

Translation Vector: | select center point of hole |

| **Apply** |

There will be a warning about applying old element properties to the transformed group members. Since there is no directionality problem (the beams keep the same directionality), override this warning.

| **Yes For All** |

When asked if you wish to delete the original group members, repsond with a **Yes**.

| **Yes** |

Hide the *Group* form.

| **Cancel** |

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NOTICE:
> There is no longer a load applied to the newly transformed tower. This is fine, because we need to delete it anyway in order to apply the field to a new coordinate system (at the hole center.)

◆ **Loads/BCs**

Action:	**Delete**
Object:	**Pressure**
Existing Sets:	**wind_load**

Apply

Now, modify the field to use the new coordinate system.

◆ **Fields**

Action:	**Modify**
Object:	**Spatial**
Method:	**PCL Function**
Select Field to Modify:	**wind**
Coordinate System:	select the coord at the base of the tower (Coord 2)

Apply

Now, re-create the wind load which uses the field **wind** applied to the tower.

◆ **Loads/BCs**

Action:	**Create**
Object:	**Pressure**
Type:	**Element Uniform**
New Set Name:	**wind_load**
Target Element Type:	**3D**

Input Data ...
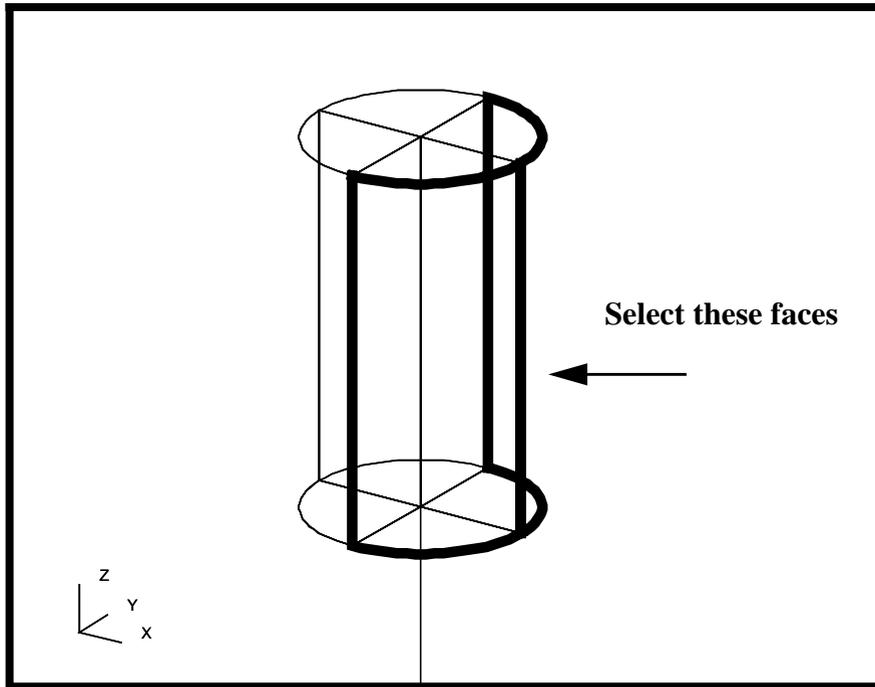
Pressure:	**f:wind**

OK

Select Application Region...

To select the application region, be sure to use the following entity select icon:

Free Face of Solid

Select these faces

z

Y

x

Select Solid Faces: | select 2 right outer faces of tower cylinder |

Add
OK
Apply

The two models have now been successfully compiled into one. However, what if this were only part of a symmetrical model, say 1/4? We use the Group/Transform option again to add the rest of the model.

12.   Mirror the model on the screen about the Y-axis.

First, create a new group to mirror.

Group/Create ...

New Group Name:	**all**
Group Contents:	**Add All Entities**

Apply

Action:	**Transform**
Method:	**Mirror**

Change Target Group...

Existing Groups:	**all**

Cancel

❒ **Delete Original Members**

When you define the mirror plane normal, be sure to use the following entity select icon:

Frame Direction 1

Define Mirror Plane Normal:	select dir. 1 of default coord system

Apply

When asked if you wish to apply the same element properties, respond:

Yes For All

You will get a warning message that there is a displacement set which has a different analysis coordinate system. This set is the mirror of **fix_edge**. Since there is no displacement for this BC, just clear the warning. Besides, this coordinate system is the same as the default system.

OK

Hide the *Group* form and fit the model view to fill the screen.

Fit View

Cancel

Now, transform the cylindrical coordinate system to the center of the new hole (to apply the field to)

◆ **Geometry**

Action:	**Transform**
Object:	**Coordinate**
Method:	**Translate**
Coord. ID List:	**3**

To select the translation vector, be sure to use the following entity select icons:

Tip & Base Points   **Point**

Translation Vector:	select first hole, then select second hole
Coordinate Frame List:	select coord frame at center of 1st hole

The function autoexecutes, and a new coordinate system can be seen at the center of the second hole.

You now need to create the field for the second wind load.

◆ **Fields**

Action:	**Create**
Object:	**Spatial**
Method:	**PCL Function**
Field Name:	**wind2**
Field Type:	◆ **Scalar**

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Coord System Type: ◆ **Real**

Coordinate System: select the system at center of 2'nd hole (Coord 3)

Scalar Function: **'Z*10*cosr('T)**

Apply

Finally, create the second wind load.

◆ **Loads/BCs**

Action: **Create**

Object: **Pressure**

Type: **Element Uniform**

New Set Name: **wind_load2**

Input Data ...

Pressure: **f:wind2**

OK

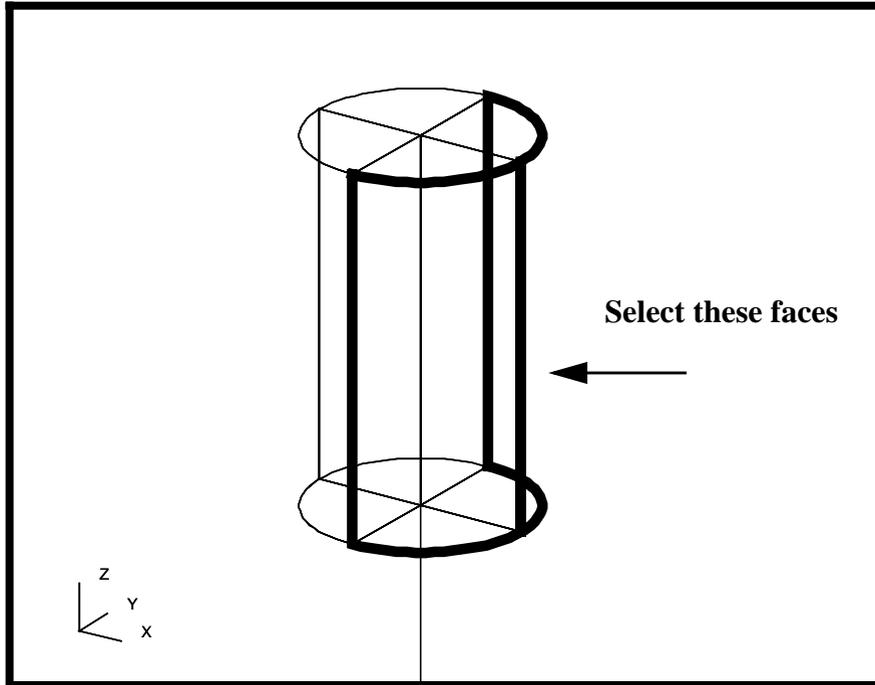**Select Application Region...**

To select the application region, be sure to use the following entity select icon:

Free Face of Solid

Select these faces ←

Select Solid Faces:

select 2 right outer faces of 2'nd cylinder

Add
OK
Apply

You have now successfully mirrored the model. If you wished to continue this replication further, you now see how to do it. For now, this is good enough.

File/Close ...

This ends the exercise.