CREATING GEOMETRY AND SURFACES IN PATRAN

The goal of this exercise is to create a 2D geometry, add surfaces, and apply a distributed load. These steps combined with the practice you completed with the 2D Link Bar will give you all the necessary tools to complete the project.

I. CREATING THE GEOMETRY

Options for creating straight lines

- Create points then create curves between points
  - Example: Create points (0,0,0) and (5,0,0) and create a line between the points
    - Geometry
    - Action: Create, Object: Point, Method: XYZ
    - Point Coordinates List: [0 0 0]
    - Apply (if auto-execute is checked, you do not need to click Apply)
    - Point Coordinates List: [5 0 0]
Apply (if auto-execute is checked, you do not need to click Apply)

Action: Create, Object: Curve, Method: Point
Starting Point List: Point # (use your mouse to select the point you just created at (0,0,0)
Ending Point List: Point # (use your mouse to select the point you just created at (5,0,0)
Apply

- Create lines without creating points first
  - Example: Create line between (5,0,0) and (5,2.5,0)
    - Action: Create, Object: Curve, Method: Point
    - Starting Point List: [5 0 0]
    - Ending Point List: [5 2.5 0]
    - Apply

Options for creating curved lines

- Create a circle and delete the unneeded portions
  - Example: Create the circle of radius 2.5 centered at (5,5,0) and delete extra
    - Geometry
    - Action: Create, Object: Curve, Method: 2D Circle
    - Input Radius: 2.5
    - Center Point List: [5 5 0]
    - Apply
    - Create points at (5,2.5,0) and (2.5,5,0)
    - Action: Edit, Object: Curve, Method: Break
    - Option: Point
    - Curve List: Curve # (use your mouse to select the circle)
    - Break Point: Point # (use your mouse to select point at (5,2.5,0))
    - Apply
    - Curve List: Curve # (use your mouse to select the circle)
    - Break Point: Point # (use your mouse to select point at (2.5,5,0))
    - Apply
    - Now the circle is broken up
    - Action: Delete, Object: Curve
    - Curve List: Select the portion of the curve you want to delete
    - Apply

- Create only a portion of a circle
  - Example: Create the portion of a circle with radius 2.5 between points (5,2.5,0) and (2.5,5,0)
Action: Create, Object: Curve, Method: 2D ArcAngles
- Radius: 2.5
- Start Angle: 180.0
- End Angle: 270.0
- Center Point List: [5 5 0]
- Apply

II. CREATING SURFACES

Once you have the geometry created you can create surfaces

- Create a surface from edges (Note: this method should be used when you have a surface with one or more curved edges)
  - Example: Create the following surface

Create line from (1.25, 5, 0) to (1.25, 3.75, 0)
Break top edge at intersection of new line
Create line from (1.25, 3.75, 0) to a point on the curved edge
Break curved edged at intersection of new line

Geometry
- Action: Create, Object: Surface, Method: Edge
- Option: 4 edge
- Surface Edge 1-4 List: Select 4 edges
- **Apply** (If you get a warning that the surface already exists, do not duplicate. This means that auto execute is enabled and you don’t need to click apply)

- **Create a surface from points**
  - Example: Create a surface with vertices (0, 3.75, 0), (1.25, 3.75, 0), (1.25, 5 0), (0, 5, 0)
  - ♦ **Geometry**
  - **Action:** Create, **Object:** Surface, **Method:** Vertex
  - **Surface Vertex 1 List:** [0 3.75 0]
  - **Surface Vertex 2 List:** [1.25 3.75 0]
  - **Surface Vertex 3 List:** [1.25 5 0]
  - **Surface Vertex 4 List:** [0 5 0]
  - Note: By changing the Picking Filters, you can also select points or points on a curve using your mouse

### III. Creating Distributed Force Boundary Conditions

To apply a distributed force along an edge you could first mesh the model, then apply equivalent nodal forces at each node. However, this would be tedious and time consuming, so instead you can apply a Pressure along an edge

- ♦ **Loads/BCs**
  - **Action:** Create, **Object:** Pressure, **Method:** Element Uniform
  - **Target Element Type:** 2D
  - **Input Data...**
    - **Top:** Leave blank
    - **Edge:** Enter amount
    - **Bottom:** Leave blank
    - **OK**
  - **Select Application Region...**
    - **Select Curves:** Select edge
    - **Add**
    - **OK**
  - **Apply**

Note: displacement boundary conditions can also be applied to an edge instead of individual nodes, see the Box-Beam problem.