

# ANSYS - Semi-monocoque shell - Step 1

## Problem Specification

1. **Start-up and preliminary set-up**
2. Specify element type and constants
3. Specify material properties
4. Specify geometry
5. Mesh geometry
6. Specify boundary conditions
7. Solve!
8. Postprocess the results
9. Validate the results

## Step 1: Start-up and preliminary set-up

### Create a folder

Create a folder called *shell* at a convenient location. We'll use this folder to store files created during the session.

### Start ANSYS

On Windows systems, select the appropriate menu path. On my system, the path is

**Start > Programs > ANSYS 10.0 > ANSYS Product Launcher**

Enter the location of the folder *shell* that you just created as your Working directory by browsing to it.

Enter shell as your *Initial jobname*. Click on *Run*.

Resize windows as shown in [this snapshot](#) so that you can read instructions in your browser window and implement them in ANSYS.

### Set Preferences

#### Main Menu > Preferences

In the *Preferences for GUI Filtering* dialog box, click on the box next to *Structural* so that a tick mark appears in the box. From now on, only the menu options valid for structural problems will be made available.

### Units

ANSYS leaves it to us to use a consistent set of units. For convenience, we'll use the following set of units: mm for geometric dimensions; N for forces; and N/mm<sup>2</sup> for Young's modulus and pressures. The resulting stresses will be in N/mm<sup>2</sup> or MPa. Convince yourself that this is a consistent unit system; don't take my word for it.

### Enter Parameters

We'll play smart and create scalar parameters corresponding to the plate and stiffener dimensions. This will later allow us to vary these parameters and perform optimization studies.

#### Utility Menu > Parameters > Scalar Parameters

Define a parameter for the plate length  $L_1$  in mm:

`L1=750`

Click *Accept*. Similarly, define other parameters corresponding to the dimensions and click *Accept* after each (parameter names are *not* case-sensitive). Before you specify a parameter, refer to the [geometry specification](#) to remind yourself what dimension that parameter represents.

`W1=250`

`W2=2`

`W3=2`

`H1=5`

`H2=15`

`H3=20`

`{{}}`

We'll play smarter and also specify the number of stiffeners in each direction as parameters so that these too can be varied easily in tradeoff studies. We'll employ the labels *NSX* and *NSY* for the number of stiffeners in the x and y directions, respectively.

`NSX=2`

`NSY=3`

We'll use the above parameters when creating the geometry in [Step 4](#). We'll also define some parameters which we'll use in [Step 5](#) to set the mesh size along edges.

```
NDIV_X=3  
NDIV_Y=6  
SIZE_Z=5
```

**Close** the *Scalar Parameters* window.

Go to [Step 2: Specify Element Types and Constants](#)

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