

# Modelling Using Axisymmetry

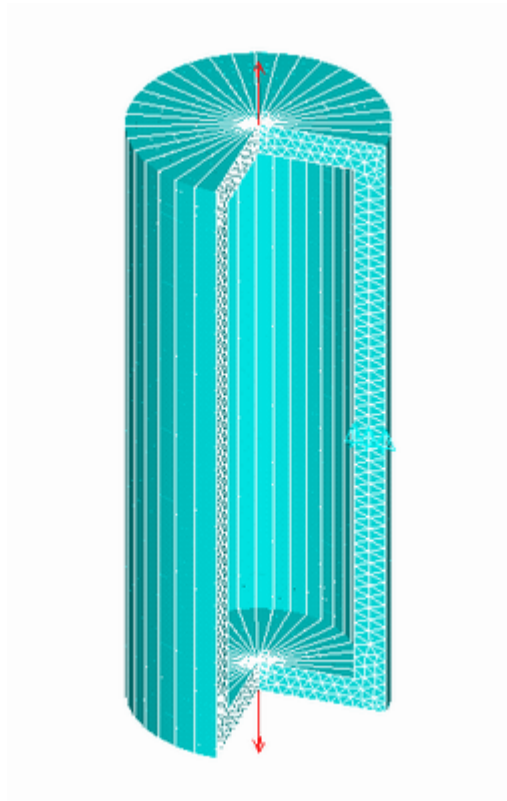
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## Introduction

This tutorial was completed using ANSYS 7.0 This tutorial is intended to outline the steps required to create an axisymmetric model.

The model will be that of a closed tube made from steel. Point loads will be applied at the center of the top and bottom plate to make an analytical verification simple to calculate. A 3/4 cross section view of the tube is shown below.

As a warning, point loads will create discontinuities in the your model near the point of application. If you chose to use these types of loads in your own modelling, be very careful and be sure to understand the theory of how the FEA package is applying the load and the assumption it is making. In this case, we will only be concerned about the stress distribution far from the point of application, so the discontinuities will have a negligible effect.



## ANSYS Command Listing

```
finish  
/clear  
  
/title, Axisymmetric Tube
```

```
/prep7
/triad,off           ! Turns off origin triad marker

rectng,0,20,0,5     ! Create 3 overlapping rectangles
rectng,15,20,0,100
rectng,0,20,95,100

aadd,all            ! Add the areas together

et,1,plane2        ! Define element type
keyopt,1,3,1       ! Turns on axisymmetry
mp,ex,1,200000     ! Young's Modulus
mp,prxy,1,0.3      ! Poisson's ratio

esize,2            ! Mesh size
amesh,all          ! Mesh the area

finish
/solu

antype,0           ! Static analysis

lselect,s,loc,x,0   ! Select the lines at x=0
dselect,all,,symm  ! Symmetry constraints
lselect,all        ! Re-select all lines

nselect,s,loc,y,50 ! Node select at y=50
dselect,all,uy,0   ! Constrain motion in y
nselect,all        ! Re-select all nodes

fk,1,fy,-100       ! Apply point loads in center
fk,12,fy,100

solve
finish

/post1
nselect,s,loc,y,45,55 ! Select nodes from y=45 to y=55
prnsol,s,comp        ! List stresses on those nodes
nselect,all          ! Re-select all nodes

/expand,27,axis,,,10 ! Expand the axisymmetric elements
/view,1,1,2,3       ! Change the viewing angle
/replot
```