# *www.FEA-Optimization.com*    ANSYS Note #1
# Apply Bending Moment or Torque on a Cross Section

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Sometimes it is required to apply a bending moment on a cross-section. Here we assume the bending moment we want to apply is a linear distribution of either pressure, nodal force, or displacement, etc. See Figure 1. This document tells you how to apply such bending moments. For torque that varies linearly along the radius from the axis, the procedure is similar.

First, you have to download the macro from *www.FEA-Optimization.com*
Go into **ANSYS Resources**, under **Macros**, download the macro **x_bcslpoe.mac**

Assume that we want to apply a bending moment of 400 around the X-axis, on the nodes of X-Y plan, as Figure 1. Following the step-by-step procedures below to implement the bending moment on the model

1.    Make sure your active coordinate (CSYS) in on the place you want. Like Figure 1.
2.    Pick all the nodes on the X-Y plan which you want to apply the bending moment.
3.    Figure out what is the maximum distance of the nodes from the x-axis. Say it is y=-100
4.    Apply the macro as

      **x_bcslope,2,'F','FZ',-100,100,-1.0,1.0**

      This means that : apply "**F,ALL,FZ**" on all nodes, which are inside the range of Y=-100 to Y=100 (the 1st argument of 2 indicates Y), and the value varies from -1.0 at Y=-100, to 1.0 at Y=100  (don't be nervous. This will be fixed later)

5.    After the macro is applied, check the parameter **X_BCSLOPE_FY** (this is the summation of Force*Y)

6.    Scale all the "FZ" you just applied by the factor of X_BCSLOPE_FY/400.0 Note that 400.0 is our target bending moment values

Similar tricks can be used for torque, etc. as long as you get the logic about the procedure here. Even if the distribution of the BC values is not linear, you can check into the macro carefully, and modify it for your own need.
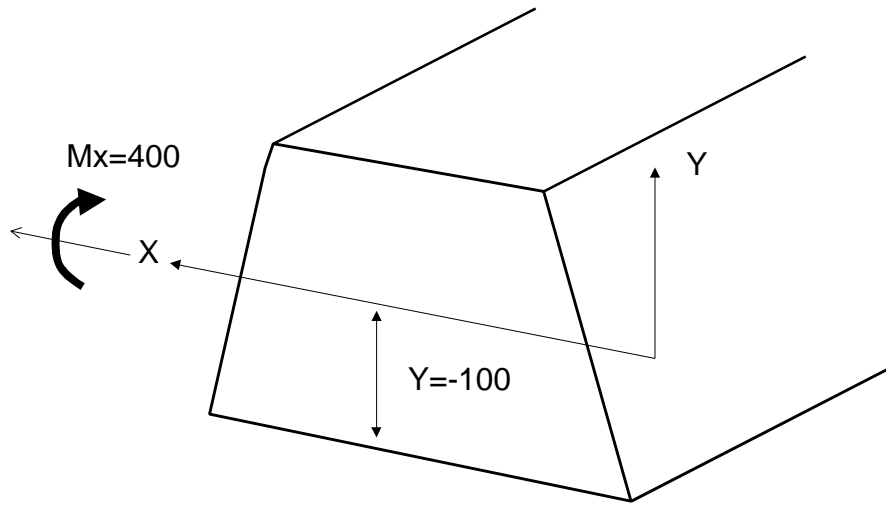
Mx=400

X

Y

Y=-100

Figure 1