Hand Out AEmar1103 Statics:

"Calculating Internal Loading using the Principle of Virtual Work"

The principle of Virtual Work can also be used to calculate the internal forces and moments. This hand out explains the approach you must take.

Bending Moment

At the location where the value of the bending moment is required introduce a hinge and a "reaction moment M" on either side of the hinge (see figure 1). Now proceed as you would with any other reaction moment to calculate the internal bending moment.



Figure 1

Shear Force

At the location where the value of the shear force is required introduce a "shear hinge" and a "reaction force V" on either side of the shear hinge (see figure 2). Now proceed as you would with any other reaction force to calculate the internal shear force.



Figure 2

Normal Forces

At the location where the value of the shear force is required introduce a "telescope hinge" and a "reaction force N" on either side of the telescope hinge (see figure 3). Now proceed as you would with any other reaction force to calculate the internal normal force.



Figure 3