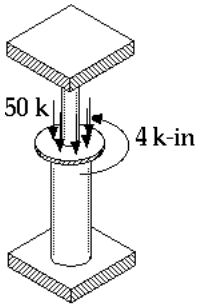
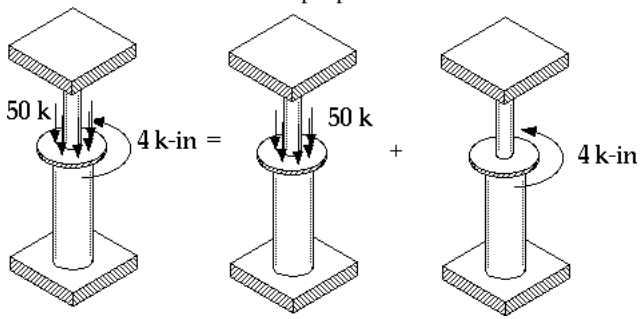


As an illustration of superposition in action consider the problem shown. We already know how to find the solution to each load separately. Superposition allows us to use these separate solutions to determine a combined solution.

Calculate the Stresses

1 Hide Text

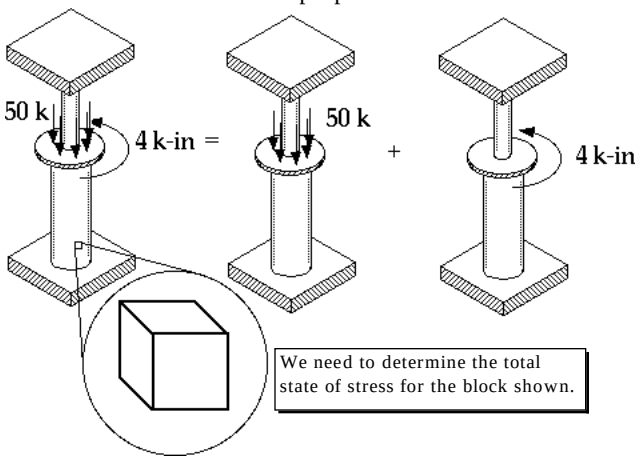
Superposition



Here is a symbolic statement of superposition.

2 Hide Text

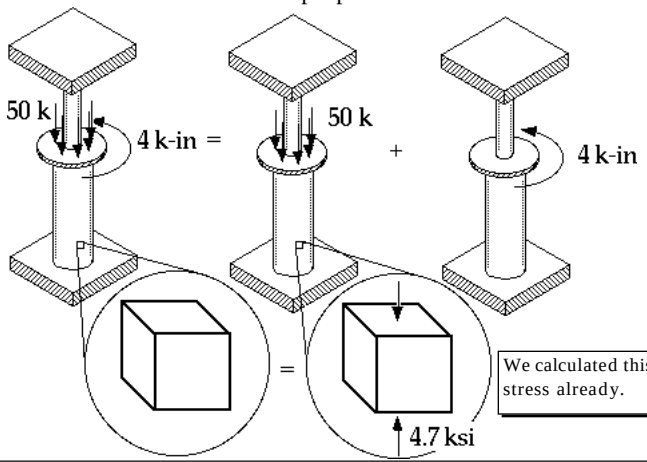
Superposition



We need to determine the total state of stress for the block shown.

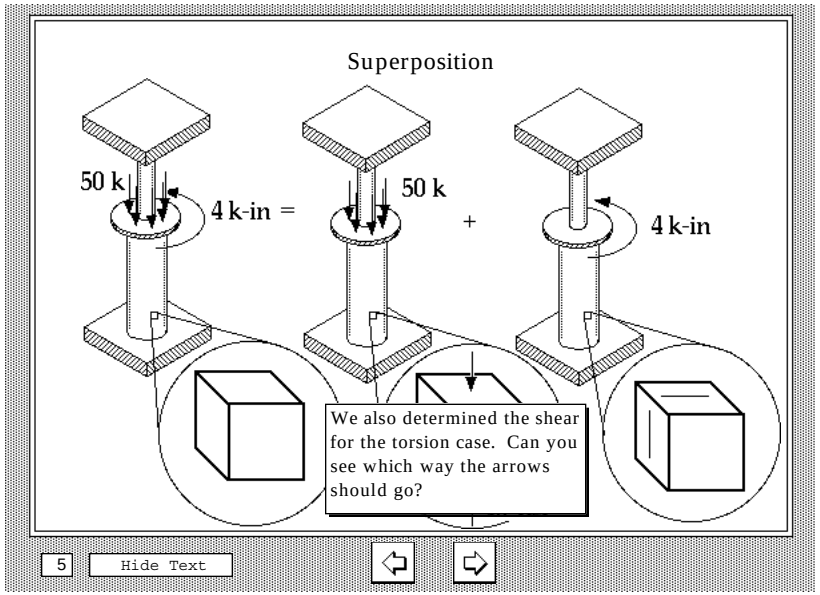
3 Hide Text

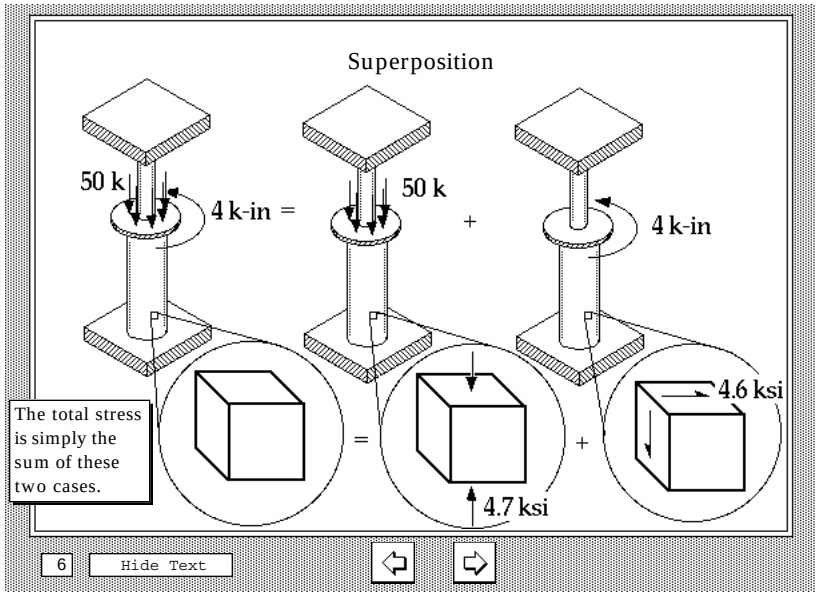
Superposition

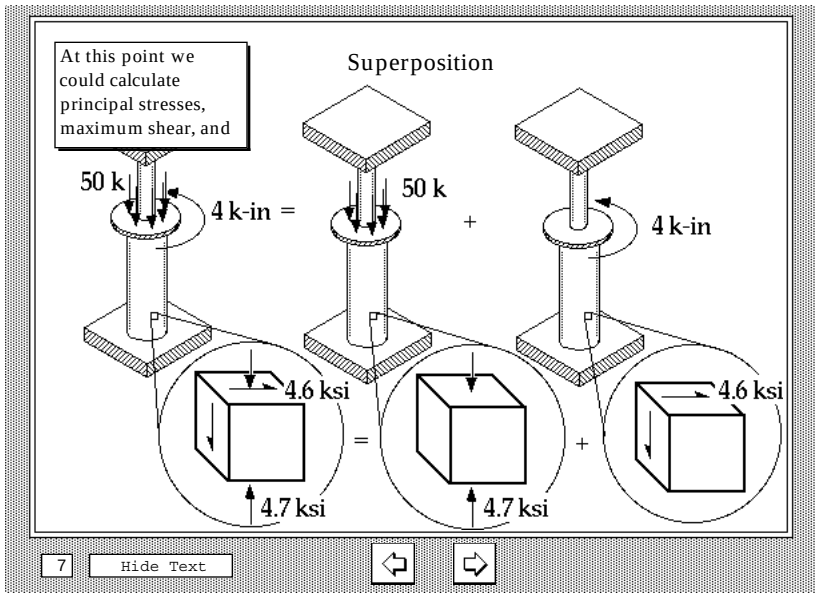


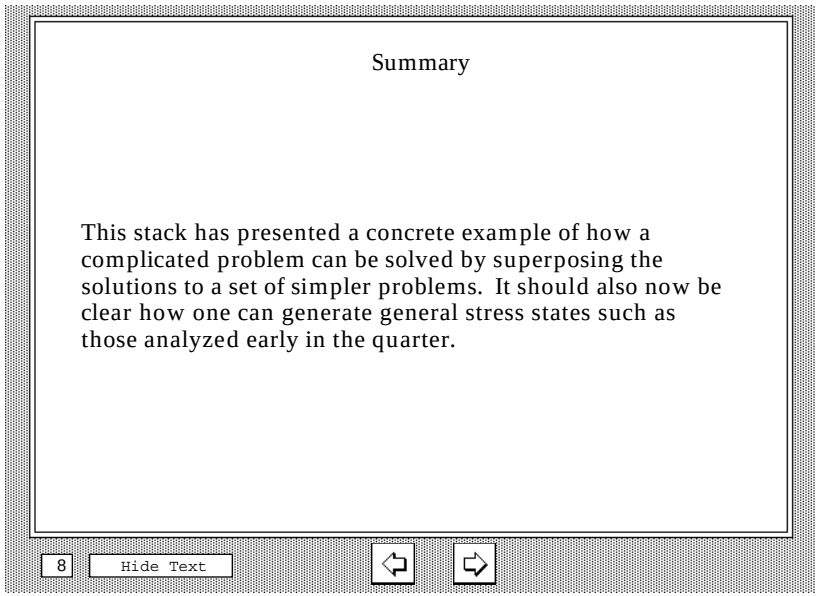
We calculated this stress already.

4 Hide Text


Superposition
50 k
4 k-in =
50 k
+
4 k-in
We also determined the shear for the torsion case. Can you see which way the arrows should go?
5
Hide Text


Superposition
50 k
4 k-in =
50 k
+
4 k-in
4.6 ksi
The total stress is simply the sum of these two cases.
=
+
4.7 ksi
6
Hide Text


At this point we could calculate principal stresses, maximum shear, and
Superposition
50 k
4 k-in =
50 k
+
4 k-in
4.6 ksi
4.6 ksi
=
+
4.7 ksi
4.7 ksi
7
Hide Text


Summary
This stack has presented a concrete example of how a complicated problem can be solved by superposing the solutions to a set of simpler problems. It should also now be clear how one can generate general stress states such as those analyzed early in the quarter.
8
Hide Text

Torsion/Axial SuperPosition3