

Liner Yielding

Liner support (beam) elements in *Phase2* model plastic behaviour using the layered approach described in Chapter 5 of the book by Owen and Hinton, the full reference of which is provided below. In this approach, the depth of a beam segment is divided into a number of layers (Figure 1).

In *Phase2*, beam elements are modeled using **100 layers**.

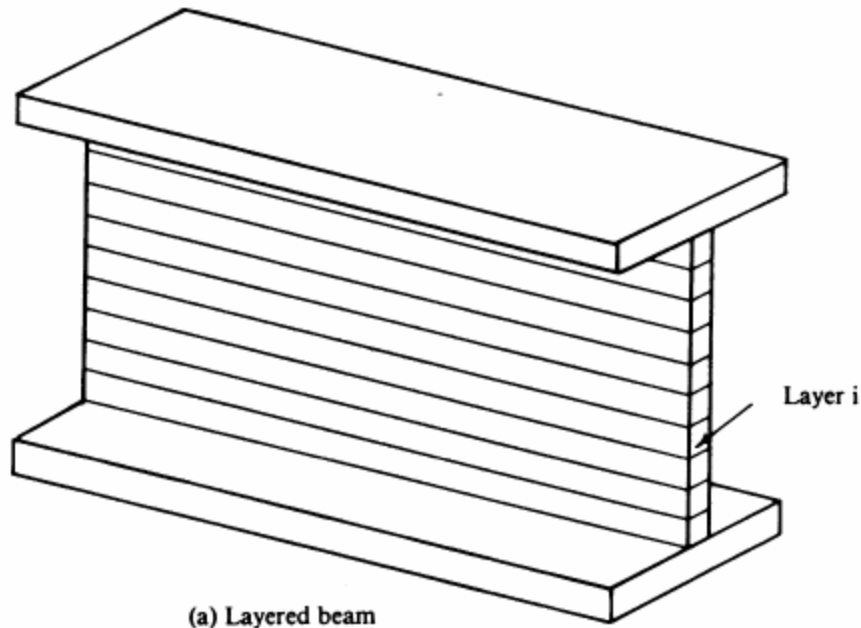


Figure 1: Layered sub-division of beam and plate.

For pure bending, the stresses acting on the cross section of the beam decrease from maximum values at the outer edges to zero at the neutral axis as shown in Figure 2.

If the combination of stresses from axial loading and bending in any layer exceed the material yield strength, *Phase2* flags the beam (liner) element as having failed. However, the behaviour of other layers may remain elastic.

If a material is assigned zero post-failure strength, the failed layer completely sheds its stresses; however the remaining layers retain their elastic loads. As a result, a liner element can have a yielded flag and still carry loads.

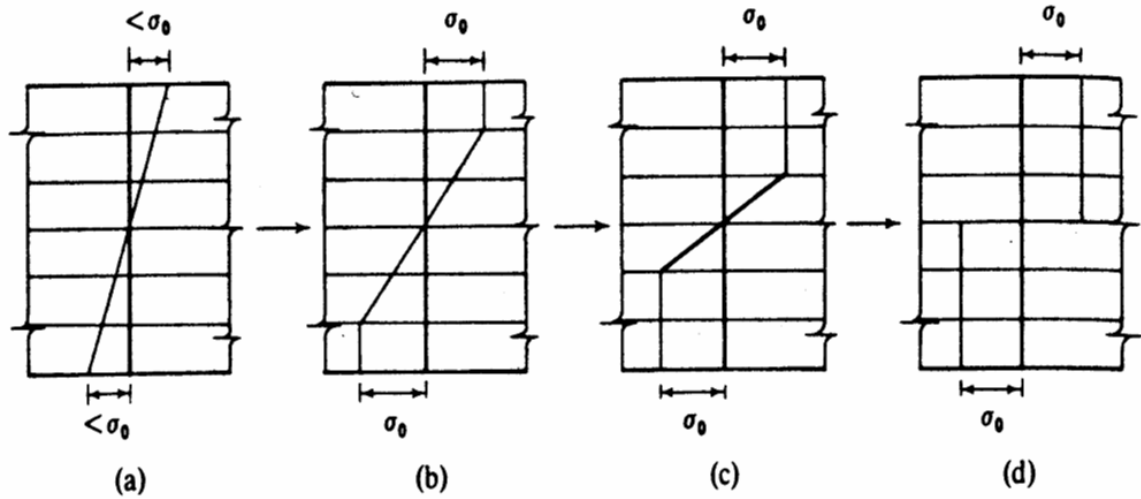


Figure 2: Yielding of layered beam.

Reference

Owen, D. R. J. and Hinton, E., *Finite Elements in Plasticity - Theory and Practice*, Pineridge Press, Swansea, 1986, 594 pp (Chapter 5.5).