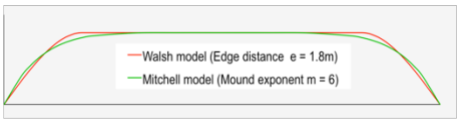
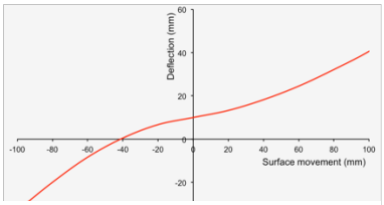
FLAWED AS 2870 MODEL



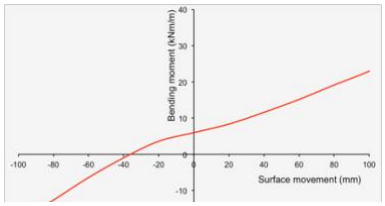
Mound profiles

The flawed AS 2870 model reduces to using a static analysis method to analyze the dynamic effect of foundation movement. Foundation movement is treated as a static load equal to soil stiffness times a function called the *'Mound profile'*. This static analysis corresponds to superimposing a pre-fabricated structure on a building platform that has been pre-distorted into the assumed mound profile, and then analyzing the combined static effects of dead load, live load, and assumed foundation movement load. Mathematically correct as these static solutions are, they are solutions of a hypothetical problem.

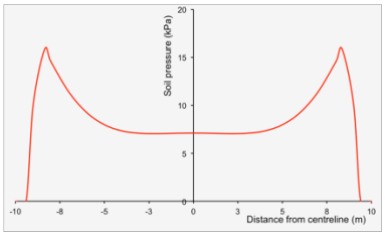


Deflection versus surface movement

The most significant evidence that the AS 2870 model is flawed is that it uses linear elastic theory, but graphs of performance parameters versus surface movement exhibit no linearity.

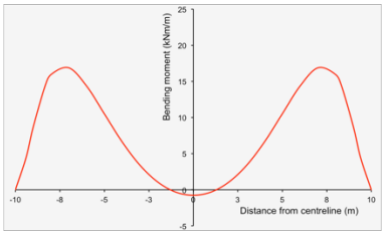


Bending moment versus surface movement

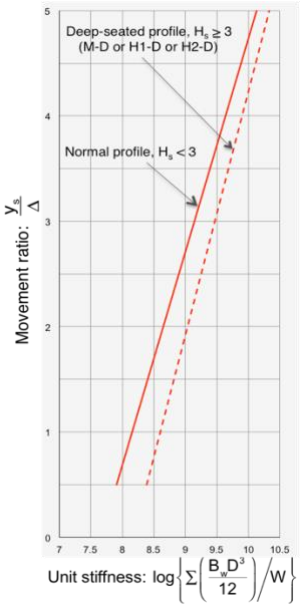


Soil pressure versus distance from centreline

The unusual shapes of the bending moment diagram and soil pressure diagram for the *'Centre heave'* condition, also demonstrate the flaws of the AS 2870 model. Intuitively, centre heave should produce peak bending moment and peak soil pressure at the centre of the beam, not near the edges. Worse still, the bending moment is negative over a short distance near the centre, which is physically impossible..



Bending moment versus distance from centreline



Movement ratio versus unit stiffness

Last but not least, the graph of movement ratio versus unit stiffness also suggests flaws in the AS 2870 model. Clause 4.5.1 of AS 2870-2011 suggests this graph covers a huge range of design parameters. Actually, it appears that the graph is an empirical fit to deemed to comply slab design solutions in Figures 3.1 and 3.4 of AS 2870-2011, taking the logarithm of unit stiffness on the horizontal axis of the graph to get a straight line. It does not take account of the dynamic nature of soil-structure interaction. Admittedly the term within the brackets of the logarithm is the sum of the second moments of area of the gross (that is, un-cracked) webs of the stiffening beam cross-sections divided by the overall width of the slab, but to call it *'Unit stiffness'* is misleading, and taking the logarithm of a number involving units of measurement breaches the fundamental principles of mathematics.