StressCheck v11 Training Outline

Advanced Training in Nonlinear Analysis

Objectives:

1) Nonlinear analysis types supported (material and general)
2) Material nonlinear theories supported (deformation and incremental)
3) Defining and assigning elastic-plastic materials
4) Nonlinear load step/limit load analyses
5) Simulation of cold-working and other nonlinear events
6) Geometric nonlinearities (large deformation/nonlinear strains)
7) Fastener elements and links for in-plane fastened connections

Session I Nonlinear Analysis Overview, 2D Material Nonlinear, Automation

- Lecture: "Nonlinear Analysis Overview" (a-Nonlinear Analysis Overview.pptx)
- Exercise: Import planar plate section with holes, apply mesh/materials/loads/constraints, perform material nonlinear analysis using deformation theory of plasticity (DTP), and assess extent of plasticity due to overload event.
    1. Reference: b-2D Material Nonlinear DTP Example.pptx
- Exercise: Open pre-built Handbook model, discuss nonlinear events/steps necessary to represent a cold working process, perform material nonlinear analysis using incremental theory of plasticity (ITP), and assess cold working analysis results.
    1. Reference: c-2D Material Nonlinear ITP Example.pptx
- Demo/Exercise: "Automation of Nonlinear Analyses via COM API" (Nonlinear.xlsm)

Session II 3D Material Nonlinear, General Nonlinear, Fastened Connections

- Exercise: Open pre-built Handbook model of a support bracket, update parameters, modify materials/loads/constraints, perform material nonlinear analysis using deformation theory of plasticity (DTP) with load stepping, and assess extent of plasticity as the load parameter is increased.
    1. Reference: d-3D Material Nonlinear Example.pptx
- Exercise: Open pre-built model of a bonded lap joint, complete geometric features, automesh, assign materials/loads/constraints, perform general nonlinear analysis with load stepping, and assess the difference between linear and general nonlinear results.
    1. Reference: e-General Nonlinear Example.pptx
- Exercise: Import pre-built geometry of a six-fastener splice joint, automesh, create fasteners/links, assign materials/loads/constraints, perform general nonlinear analysis to activate fasteners/links, and assess load transfer between fasteners and hole stresses.
    1. Reference: f-Fastened Connection Example.pptx