Introduction to StressCheck Workshop

Session I (4 hrs)   Introduction to StressCheck   DAY DATE (TIME)

- ❑ Welcome and introductions
- ❑ Presentation/Exercise: "Introduction to StressCheck"
    - StressCheck GUI snapshot & walkthrough
    - Exercise: Open a handbook model, solve, post-process, update parameters/re-solve
        - Files: Eyebolt.scw (Handbook/Parts folder)
    - The Key Quality Checks for FEA Solutions
- ❑ Presentation/Exercise: "Exploring StressCheck"
    - Exercise: end-to-end StressCheck application
        - File: Arm.x_t
    - Importing CAD geometry
    - Automeshing overview
        - Global mesh input parameters
    - Boundary conditions overview
        - Supported load types
        - Supported constraint types
    - Solving a linear analysis
        - What is discretization error?
        - Reducing discretization error via h, p and hp-FEM approaches
    - Post-processing and solution quality checks
        - Check global error, deformed shape, fringe continuity and convergence
- ❑ Presentation: "Why Use StressCheck?"
    - Vision for StressCheck & S.A.F.E.R. Simulation
    - Example engineering applications
    - Strengths & differentiators vs. typical FEA implementations

Session II (4 hrs)   Model Creation   DAY DATE (TIME)

- ❑ Presentation/Exercise: "Model Creation"
    - Discuss model creation techniques, best practices, associativity, & common errors.
    - Exercise: Build a 3D lug from scratch
    - Enhancing model flexibility with parameters
    - Exercise: Edit the lug model & mesh to be parametric
- ❑ Presentation: "Limiting Modeling Errors: Point Loads & Constraints"
    - Traditional vs. StressCheck implementations for interpreting pointwise input data
    - Best practices for point loads & point constraints in StressCheck
- ❑ Presentation: "Tips for Practical StressCheck Usage"
    - Commonly used features for StressCheck productivity
    - Dockable panes & GUI layout customizations

Session III (4 hrs)   Advanced Modeling   DAY DATE (TIME)

- ❏ Presentation: "What's New in StressCheck?"
    - The latest StressCheck features & enhancements
- ❏ Exercise: "Building 2D Geometry"
    - Building a parametric plate with four satellite holes around a central cutout.
    - Analyze for tension & compression load cases.
- ❏ Presentation/Exercise: "Mesh Refinement Features, Strategies & Best Practices"
    - When is mesh refinement necessary?
    - Discuss mesh refinement by the Any Boundary, Boundary Layer & Local Size methods
    - Exercise/Demo: Railroad Tie Mesh Refinement Workflow
        - File: RRTie.x_t
- ❏ Presentation/Demo: "FEA-Based Sim Apps via StressCheck's COM API"
    - How StressCheck may be automated via scripting (e.g. VBA/Python)
    - Demo: Analyzing the 2D satellite hole model via Excel VBA script
    - Files: SatelliteHoleDriver.xlsm, SatelliteHoles.scp
- ❏ Discussion: Debugging StressCheck errors & warnings (time permitting).
    - Associativity errors
    - Meshing errors
    - Solver errors

Session IV (4 hrs)   Complex Analyses   DAY DATE (TIME)

- ❏ Presentation/Exercise: "Multi-Body Contact"
    - StressCheck multi-body contact overview
        - How the algorithm works, solver/post-processing features
        - Model requirements & setup
        - FAQ's & best practices
        - Quality checks
        - Troubleshooting
    - Exercise: Connecting rod under tension loading
        - File: ConnectingRod.x_t
- ❏ Presentation: "Global-Local"
    - StressCheck global-local overview
        - Saint-Venant's Principle
        - Global-local methods
        - FAQ's & best practices
        - Example global-local workflow for DaDT analysis
    - Exercise: Bracket stress analysis with imported TLAPs
        - Files: bracket.x_t, fbd_sc.csv
- ❏ Presentation: "Wrap Up & Next Steps"
    - What we learned in this training course
    - Next steps & online e-Learning resources
    - Q&A