

7. ACHIEVING INTEGRATED FEA MODEL AND LOADS MANAGEMENT

Tom Walin

MSC

SUMMARY

Particular advancements in simulation data and process management have made the approach to internal loads development at leading aerospace companies more efficient and easy to understand. Smaller sized companies can also take advantage of these developments without the excessive monetary investments previously required. The loads development process is iterative. Due to the complexity of models, the number of variations of vehicle configuration, and the number of product teams and partners involved, only a limited number of 'loads releases' are currently possible during the design evolution. This presentation will show how to overcome this challenge using modern computing architecture techniques. The loads development process typically consists of building integrated structural and aerodynamic Finite Element Models (FEMs), distributing various mass configurations on the FEMs, and 'flying' a series of maneuvers. The external loads are represented as 1000's of static load cases on several internal loads FEMs in various configurations. The results of these 1000's of load cases are then screened for the critical few that will ultimately size the structure for any given component of the aircraft. Models containing the initial sizing are replaced by updated models which are then fed back into the external loads analysis step. It is vital to be able to maintain complete traceability of critical load cases to the internal and external loads cycle and development models. All of these simulation related activities can now be launched in the context of user defined simulation and model definitions. The entire simulation process including execution details is managed along with the component and assembly models, solver results, and specified key results which are used for load case screening and selection. The process presented will demonstrate how simulation data is captured and managed as part of the simulation execution. Systematic verification of model components to ensure model quality will also be discussed along with model solution validation techniques.