

**EXPERIENCES IN IMPLEMENTING SIMULATION PROCESS AND  
DATA MANAGEMENT PRACTICES FOR DEVELOPMENT OF  
AIRPLANE INTERNAL LOADS**

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**KEYWORDS**

Finite Element Analysis, Vehicle Level Internal Loads Simulation, Process and Data Management (SPDM), Data Standards, Metadata, Pedigree

**ABSTRACT**

Design, analysis and certification of a commercial airplane require a rigorous engineering process involving use of numerous tools including commercial analysis tools, in-house developed tools and scripts, and proprietary methods. The internal loads development process is a highly collaborative process between internal engineering organizations as well as partner companies and suppliers. It is important to ensure proper configuration control and management of the engineering processes and data during the design phase of an airplane program to support engineering and manufacturing decisions, and subsequent to delivery to aid in product support.

At Boeing Commercial Airplanes, finite element analysis is used in development of airplane internal loads. The process to develop the internal loads is iterative with numerous inputs necessary including airplane section geometry, materials information, analysis parameters, external loads and other types of data supplied by the various airplane commodity organizations. The amount and size of input and output data is complex enough to warrant simulation process and data management (SPDM) practices. In addition, the data produced is critical in that airplane internal loads are used broadly in downstream component level and detail level structural analysis to support airplane regulatory certification. For this purpose the ability to maintain configuration control and have traceability of the data, processes and methods used in development of the internal loads is highly desirable, if not required. This presentation

provides insights gained in implementing SPDM for Boeing Commercial Airplane's internal loads process.