

10.1 Design Loads Spectrum

The design load spectrum is used to determine the damage growth in each critical part during analysis and testing. It is based on the specified mission profile information and the required aircraft life. A description of the load sequence development is given in Section 5.3 of this handbook. A brief review is presented here. Giessler, et al. [1981] presents a detailed description of load sequence development methodology.

The load sequence is composed of the load cycles that can be expected to occur during the lifetime operation of the aircraft. They are the result of ground operations, such as towing, taxiing, turning, braking, take-off and landing, and of airborne operations of maneuvering, turbulence encounters, store ejection and refueling. The specification documents include the numbers of these loads to be anticipated at various levels during the aircraft life.

The design spectrum must be based on a reasonable estimate of the anticipated mission usage history. All load sources should be included and the anticipated severity should reflect on both previously observed data and on any performance advances being designed into the new aircraft. It has become somewhat of an axiom that the full maneuvering capability of the aircraft will be used during its operation. Thus, it is essential that the design load sequence be representative of the aircraft capability. [Figure 10.1.1](#) from Buntin [1979] illustrates a basic procedure for the development of a design loads spectrum. This is an interactive program involving several different data sources and other design activities.

The design loads spectra usually progresses from a preliminary effort based on the initial aerodynamics to a final form based on the final aerodynamics and aircraft configuration.

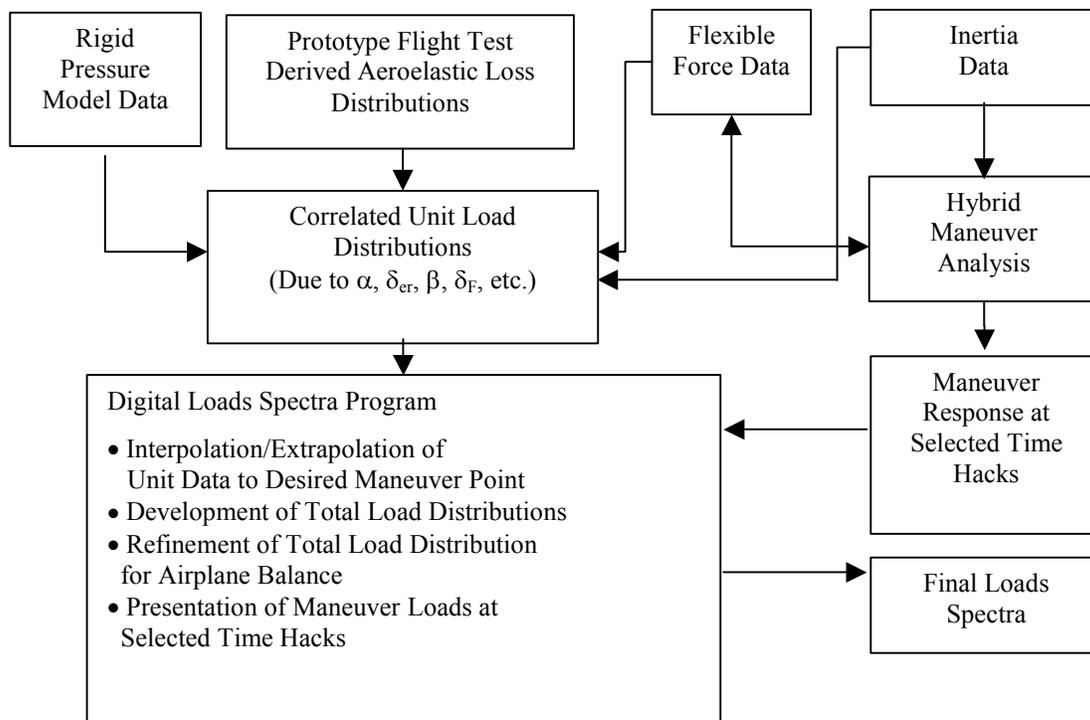


Figure 10.1.1. A Procedure for Development of Design Loads Spectra [Buntin, 1979]