Abstract	This paper introduces the concept of the ELWIS model generator for Finite Element models of aircraft wing structures. The physical modelling of the structure is extended beyond the wing primary structures, to increase the level of accuracy for aircraft which diverge from existing configurations. Also the impact of novel high lift technologies on structural masses can be captured already in the early stages of design by using the ELWIS models. The ELWIS model generator is able to create structural ANSYS Finite Element and Multi Body Simulation models of the following components: the wing box, the wing fixed trailing edge including flap tracks, the wing movable trailing edge (flaps and ailerons), the spoilers, the engine pylon and the main landing gear, if attached to the wing. In order to enable trade studies on configurational level, the high number of required design parameters for the 3D model is derived from a minimal set of input parameters by making use of knowledge patterns for the individual components and technologies. A robust, CAD-free method is employed leading to model generation times which are well suited for preliminary design. This paper focuses on the generation of the structural models as one component of a wide MDO approach for overall aircraft design.