



## **Aeronautical Engineering Services: Structural Design**

DARcorporation has been offering aeronautical engineering software and consulting services since 1991. We can design, analyze, build and test anything that moves through the air, ranging from airplanes, UAVs, flying cars to flying toys.

### **Structural Design & Analysis**

Finite Element Analysis (FEA), coupled with analytical methods when necessary, is usually used to carry out structural analysis on strength, stiffness, elastic stability, dynamic modes and responses, and flutter, etc. Femap/NEi Nastran is used to model and analyze the structure, which can be made out of steel, aluminum, glass fiber and/or carbon fiber or any combination thereof. Load cases are based on LSA, U.S. Experimental Category, U.S. FAR 23, FAR 25, U.S. MIL SPEC requirements for load factors. Aerodynamic loads in the form of pressure distribution from Computational Fluid Dynamics (CFD) or experimental data are mapped onto the finite element model. Other types of loads (thermal, inertial, etc) are also included to account for various extreme load cases. Stresses, deformations, buckling factors, natural frequencies, etc are inspected against possible structural failure modes. Fastened and bonded joints are also analyzed. Fatigue analysis is carried out too to ensure service life. As the output, the structural analysis yields material comparison/selection, material thickness, composite layup schedule. Detailed CAD for FEA is generated in Siemens NX and can be translated into other CAD formats. DARcorporation engineers can produce 3-D solid CAD drawings and illustrations for business plans, parts production, assembly, and quality control.



## **Structural Review**

Upon review of many existing airplane designs, DAR engineers have discovered serious problems with longitudinal and lateral stability of the airplane. Other airplanes had serious stall and spin recovery issues. All of these problems were due to insufficient analysis in the initial design stage. We have also observed structural design, analysis and manufacturing methods that did not meet the rigorous standards demanded by flight vehicles. The outcome was airplanes with serious weight and balance issues and structural defects. All of these problems could have been avoided if adequate engineering had been performed prior to fabrication and if the prototypes were built according to the appropriate flight vehicle standards.

## **The DARcorporation Advantage**

Experience in the design, detailed analysis and building of prototypes gives DARcorporation a unique advantage over other companies, since we can go from initial design all the way through full size manufacturing. The unique tools we developed for design and analysis make DARcorporation the best choice for any new or existing aeronautical project. DARcorporation engineers can advise on what the best materials are for your design and what the best configuration is. We will work with you to design and optimize your aircraft for performance, manufacturability and cost.