British Aerospace Powers New Products With I-DEAS™

SITUATION

British Aerospace Systems and Equipment (BASE), a subsidiary of British Aerospace plc, is a European leader in high technology aerospace and defense engineering. It has considerable experience in the development and manufacture of defense electronics and is an established supplier to the United Kingdom's Ministry of Defence (MoD). In a recent project, British Aerospace was asked by the lead company, U.S.-based Northrop Grumman, to design the power supply for a new system to protect aircraft from the latest generation of infrared missiles.

OBJECTIVES

✔ Produce a high output (8kw) power supply within a small, defined space.

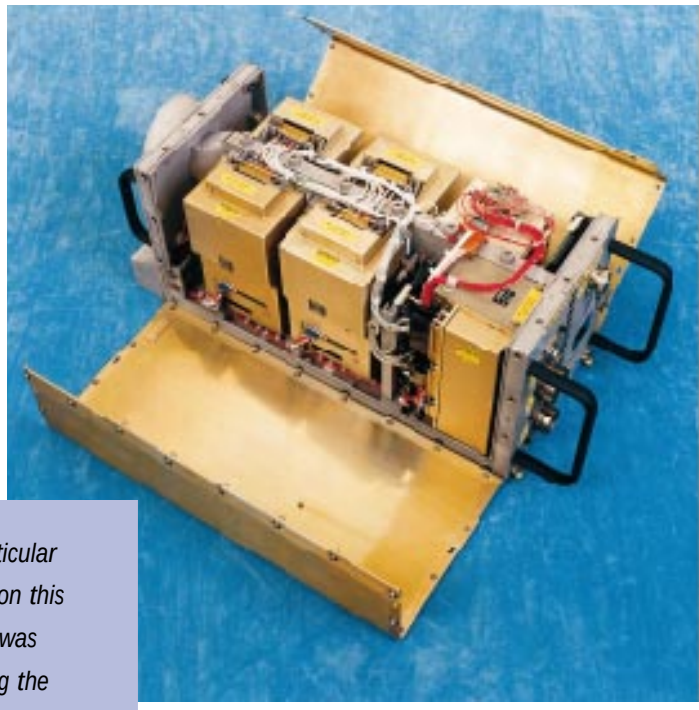
✔ Ensure that the heat generated by such a compact arrangement of components could be dissipated.

✔ Design the unit to withstand vibration, shock, and extremes of temperature and altitude.

PROCESS VISION

✔ Apply product development tools and processes that enable the team to analyze the design as it evolves to ensure all specifications are being met.

✔ Cut out iterative stages of physical prototyping and obtain a high-quality working model at first prototype.



ACTIONS

✔ The concept 3D design was created in I-DEAS Master Series™ software and approved at the first review meeting. Several designers, sharing data files, then created the detailed component designs, which were positioned in assembly models to ensure correct fit. The components used were checked into an I-DEAS™ software library to create a resource for future use.

✔ The finite element, static, dynamic and thermal analyses were conducted in I-DEAS as the design was being refined.

✔ Using the interfaces between I-DEAS and Zuken Visula, profiles of the circuit boards were imported as solid models and built into the master 3D model.

✔ Using the visualization capabilities of I-DEAS, the designers demonstrated the product to the manufacturing engineers and

"The particular challenge on this project was managing the thermal and stress aspects of an extremely dense electronic product weighing more than 50 lbs. I-DEAS software enabled us to meet the exacting specification and get to first prototype within a demanding deadline of nine months."

- Geoff Hardman
Engineering Team Leader
BASE

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the casting vendor. As a result, the casting vendor was able to ensure that its process restraints were incorporated into the 3D model.

✔ All 2D drawings were generated directly from the 3D master model.

✔ Information from the 3D model was used to produce exploded views and technical drawings needed for end-user manuals.

RESULTS

✔ From concept to working prototype took only nine months, a 50% savings in time. Using 2D, the project would have required two intermediate prototype stages and would have taken 18-20 months.

✔ I-DEAS' integrated thermal and dynamic analyses allowed BASE to begin analysis work prior to having a physical prototype. Bringing analysis up-front in the design process allowed the engineers to reposition components to ensure maximum effectiveness of the airflow cooling system; to understand the behavior of air flowing through the cooling tube so that the correct degree of turbulence could be specified; and to simulate and compensate for the effects of severe vibration.

✔ As a result, the first prototype met all the requirements of size, weight, functionality and durability. Meeting all these specifications at this stage in the development would have been impossible using 2D.

✔ Following the first prototype, the 3D model was used to ensure and enhance the manufacturability of the product by reducing the amount of labor required and facilitating mass production through a modular system of components.

✔ The new design was selected by both the MoD and the U.S. Special Operations Command for use on several types of front-line aircraft.

PLANS

✔ BASE will continue to expand on the library of standard fasteners and parts its engineers have built using I-DEAS.

✔ BASE plans to expand its application of I-DEAS Master Series to include I-DEAS Harness Design™ software to permit cable harness solid models to be designed in confined spaces. Similarly I-DEAS Sheet Metal Design™ will be used in the design of flexible circuit boards. By providing the ability to fold up a complex multilayer structure, it helps ensure that the 2D material is translated into an accurate 3D item.

✔ To speed manufacturing, BASE plans to implement I-DEAS Generative Machining™ software, which will enable direct communication with its machine shop by allowing it to create NC programs directly from solid models. Links to casting subcontractors will also be developed.

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