BOEING JET TAKES OFF ON TIME WITH SDRC AND HP

SITUATION

When McDonnell Douglas (now part of The Boeing Company) was building the expanded version of the F/A-18 fighter jet (F/A-18E/F) for the Navy, the company had to meet an aggressive test schedule to get the first aircraft (E1) into the air by a certain date. The aircraft's frame needed extensive ground vibration testing (GVT) before the first flight. Since the company's existing 16-channel data acquisition system threatened to be the bottleneck that would cause the company to miss the deadline, McDonnell Douglas engineers began looking for a new system that would allow the company to complete testing in 15 days and get E1 into the air on time.

OBJECTIVES

✔ Perform a larger and more demanding GVT program on the F/A-18E/F in the same amount of time that had been allotted for previous aircraft—15 days—by developing a new GVT system.

✔ Team with hardware and software vendors who could provide systems integration and technical support.

✔ Meet the company's first-flight deadline.

PROCESS VISION

Develop and implement a new GVT system that would improve accuracy and throughput for this and future programs.

ACTIONS

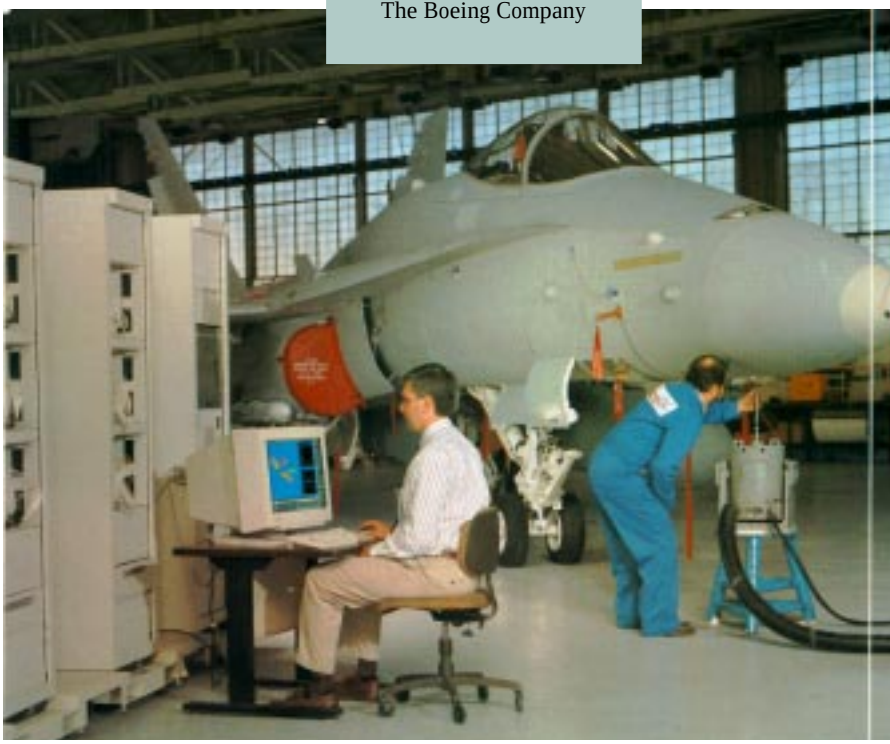
✔ McDonnell Douglas engineers developed detailed specifications and issued a request for proposals for a system with higher capacity than the existing 16-channel data acquisition system, or the then "state-of-the-art," 64-channel systems. The new system would include:

- Software that could: generate complete mode shapes for every measurement; perform swept sine, random, and dwell (normal) excitation; supply transducer-calibration data for use by the existing lab database; and support hardware for parallel signal processing.

- Hardware would be capable of providing 320 response channel measurements and 8 reference channel measurements. It would also have sufficient signal processing speed and memory for front-end signal processing of multiple inputs and outputs.

"SDRC and HP were the only vendors that met our specifications in every respect. The result is one of the most advanced GVT systems in use today."

-Mark Hopper,
Senior Project Engineer,
The Boeing Company



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✔ The company selected the system proposed by SDRC and Hewlett-Packard, which integrated I-DEAS™ test software and Hewlett-Packard's computers and data acquisition equipment.

✔ The system was delivered in two phases. The first consisted of a 64-channel subsystem that the team put to immediate use testing ailerons and other components of the aircraft control surfaces. The second phase included the balance of the channels and a considerable amount of new software such as algorithms for shaker control.

✔ SDRC supported McDonnell Douglas during much of the GVT with SDRC test engineers who provided on-site support and training after delivery of each phase of the system, and enabled McDonnell Douglas to run 24-hour-a day-operations.

✔ The McDonnell Douglas/GVT team worked around the clock to test three configurations of the aircraft, logging 215 test events.

RESULTS

✔ The team used an acceptance test plan to ensure the products performed as expected. However, even with such a large-scale system, only minor fixes were required prior to the first aircraft GVT.

✔ Test plans required more capable equipment than early budgetary time and manpower estimates assumed, but with the support of SDRC test engineers, the team still succeeded in performing full-scale ground vibration tests within the allotted 15 days.

✔ GVT testing was completed in one-third to one-half the time the previous data acquisition system would have required.

✔ Test data was more accurate with the new GVT system because less placement and replacement of sensors was required, which reduced opportunities for human error.

✔ Also, the new system measures all data points simultaneously. This not only improved accuracy but also reduced the requirements for post-processing.

✔ The new GVT system paid for itself on its first project by decreasing technician time and by allowing McDonnell Douglas to meet the flight test schedules.

PLANS

Boeing engineers are confident that their advanced GVT system will help them continue to secure future business. They also believe that the application of vibration analysis with high-channel capabilities is a sign of things to come in aerospace and other industries.

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