Conversation Pieces

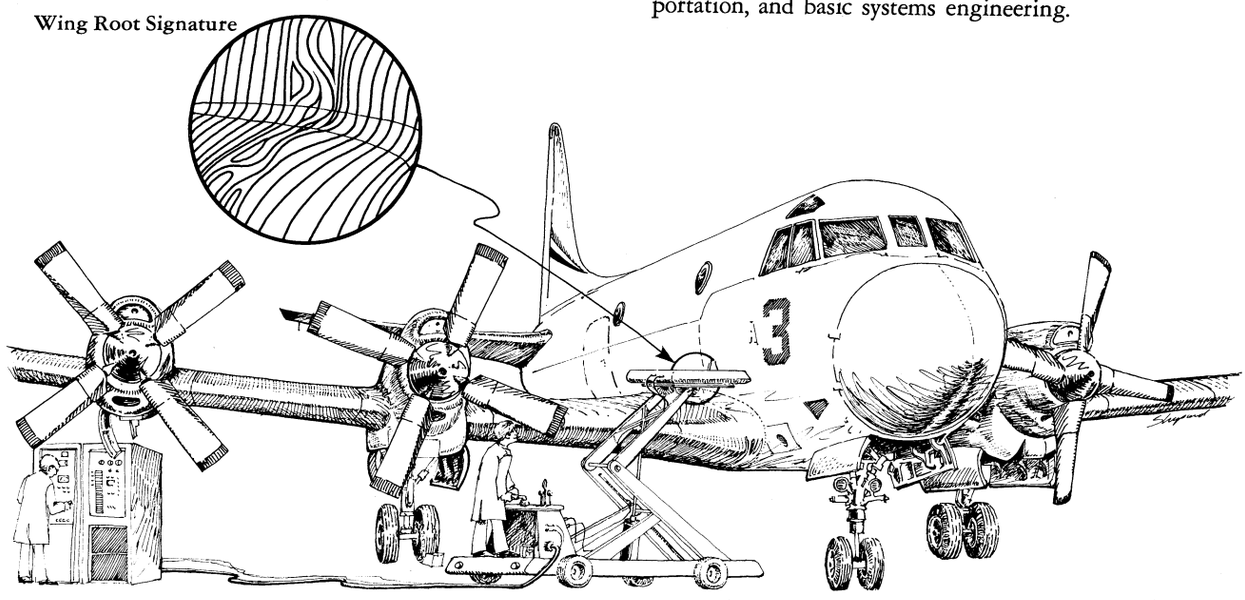
Fault-Finding Without Tears

With today's huge high-speed aircraft, meticulously careful maintenance is essential to safety as well as to efficient operation. A vital element in every maintenance program is the kind of probing inspection that detects even invisible signs of corrosion, fatigue, and other early symptoms of deterioration in highly stressed structures.

This need has given rise to a whole new breed of test engineers. They use magnetism, high-frequency sound, penetrating dyes, and now the coherent light of laser beams to find the subtlest internal flaws before they become dangerous.

Under the innovative leadership of Dr. Pravin Bhuta, a TRW team has developed a system that uses holographic interferometry to reveal potential weaknesses in landing gear, wing panels, turbine blades, and other critical parts of aircraft. With the sponsorship of the U.S. Navy's Analytical Rework Program Office, the system has been successfully used in an ordinary maintenance environment.

Wing Root Signature



The first tests were conducted in a TRW lab, however, where wing panels from a P-3 patrol pane were inspected. The prototype holographic systems not only found every flaw that had been previously located by conventional methods but also found several that had not been detected at all.

The next step was to do the same kind of job under workaday maintenance conditions *without* disassembling parts or removing paints or sealants. The completed system was taken to a Navy facility and the holographic equipment was mounted on a fork lift. It produced clear fringe patterns without external optics, whether it was pointed up, down, or sideways.

With this degree of mobility and flexibility, *in situ* inspection of critical parts becomes a practical reality not just for aircraft but for countless different kinds of structures. Compared with conventional methods, the saving in time alone is estimated to be as high as fifty percent.

When the technique has been fully developed, it will provide a cradle-to-grave record. Technicians will be able to compare the optical signature of the factory-new structure with later signatures, made during routine maintenance. Any significant differences will indicate the need for preventive repairs.

Dozens of promising ideas are under investigation at TRW, where we put the most advanced technology to work on the practical problems of defense, energy, transportation, and basic systems engineering.

For further information on the holographic interferometry system, write on your company letterhead to:

TRW®
SYSTEMS GROUP

Attention: Marketing Communications, E2/9043
One Space Park, Redondo Beach, California 90278

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