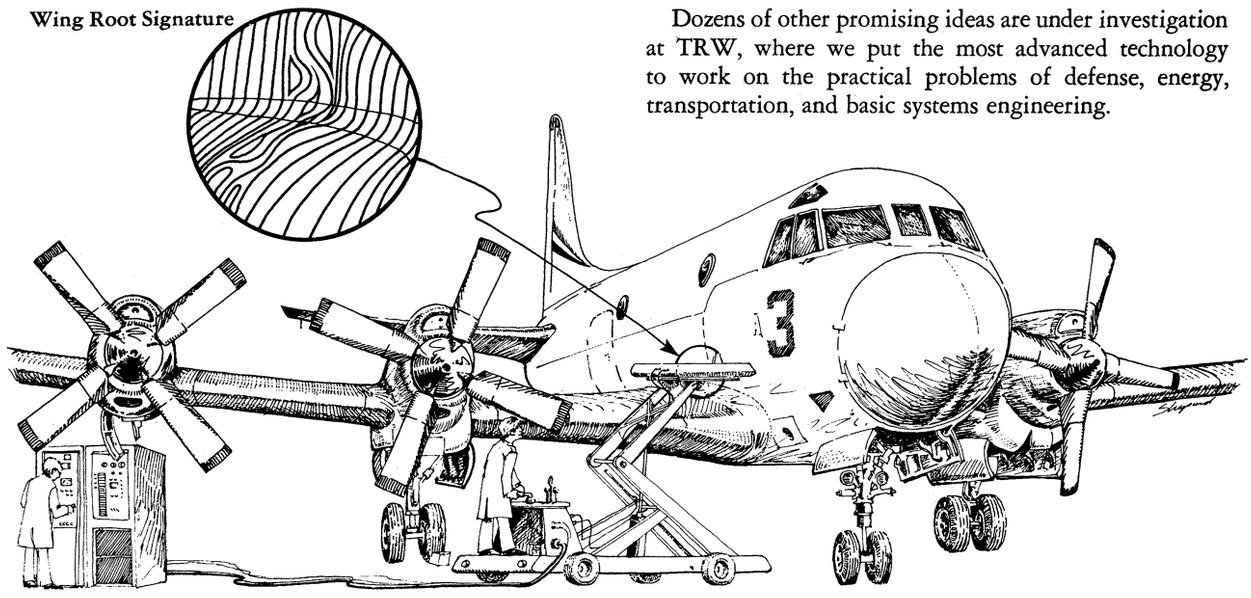
Conversation Pieces

Fault-Finding Without Tears

This is a good example of technology transfer, or putting advanced technology to work on every day problems. TRW started working some time ago on bread-and-butter ways to use holography in testing materials. When the people in charge of the U.S. Navy's Analytical Rework Program saw some of the results, they gave us a small contract to work specifically on the problem of locating invisible cracks in critical parts of airplane structures. What they wanted was to spot cracks that couldn't be found by conventional methods and speed up the whole inspection process. Or, as an economist might say, they wanted to reduce costs by increasing productivity.

Conventional fault-finding techniques make use of magnetism, high-frequency sound, and penetrating dyes to reveal cracks in landing-gear struts, wing girders and skin panels, and in turbine blades in jet and turboprop engines. But, with these methods of doing the job, critical parts usually have to be laboriously disassembled and taken to the inspection equipment. With TRW's holographic interferometry system, the equipment can be brought to the aircraft on a fork lift. Estimates show a time saving of as much as 50% with this kind of *in situ* inspection.



It all started with a team under the innovative leadership of TRW's Dr. Pravin Bhuta, a physicist with a number of patents to his credit. His team built the prototype camera and power supply and it was first tested in our labs on wing panels from a P-3 patrol plane. It not only found every corrosion crack 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 in the maintenance hangar, and do it without removing panels, sealants, or paints. Sure, enough, the system demonstrated its flexibility by producing clear holographic interferometric fringe patterns whether it was pointed up, down, or sideways. No external optics are needed. Pre-stressing the structure by means of jacks is expected to produce even better fringe patterns in future tests.

When this technique has been fully developed, it will be able to provide a cradle-to-grave record, not only for aircraft but for critical parts of all kinds of structures that deteriorate as a result of corrosion, vibration, flexing, and general aging. 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 maintenance.

Dozens of other 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, write on your company letterhead to:

TRW®
SYSTEMS GROUP

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