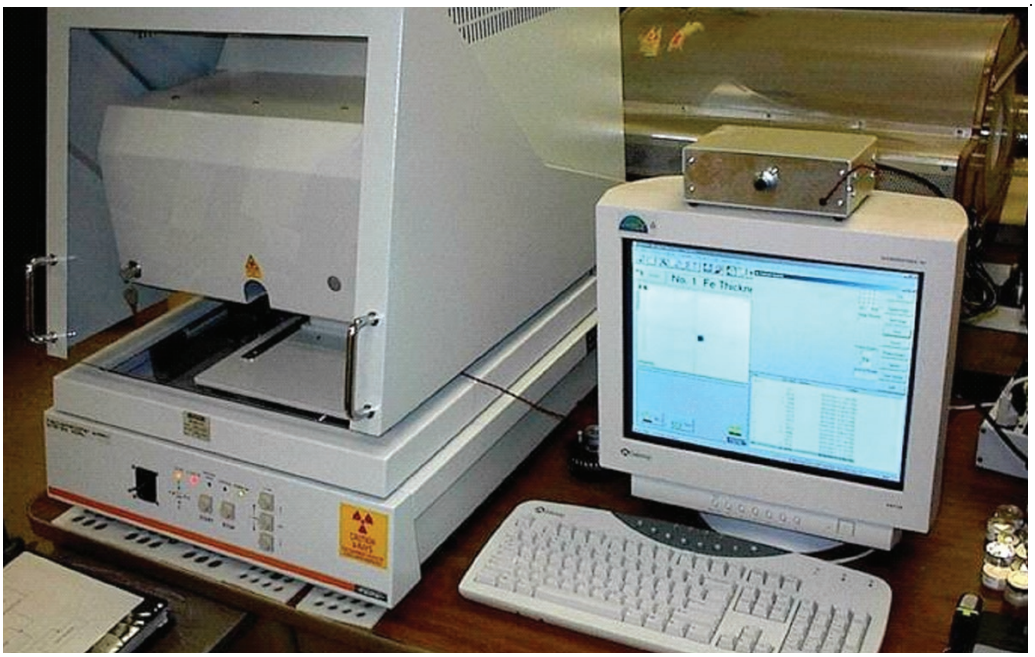
Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

LOW-COST PORTABLE WEAR DEBRIS MONITOR DEVELOPED FOR TURBINE ENGINES



The Propulsion Directorate and the University of Dayton Research Institute (UDRI) can now diagnose potential engine bearing failures more reliably and quickly with cheaper and less bulky commercial off-the-shelf monitoring equipment, thanks to recent experiments. Flight line use of unwieldy and costly scanning electron microscope (SEM) systems may be a thing of the past with UDRI's more cost-effective alternative.

Air Force Research Laboratory
Wright-Patterson AFB OH

Accomplishment

The directorate's Mechanical Systems Branch and UDRI developed a portable wear debris monitor that detects and identifies bearing wear debris in turbine engines. The device, based on X-ray fluorescence (XRF) technology, provides visual imaging, size measurement, and alloy composition determination. This detailed information allows flight-line personnel to track and identify wear debris taken from the engine's bearings and take appropriate maintenance actions to prevent lubrication system failures.

Background

The XRF instrument is bench-top size and could potentially replace SEM technology currently in use for bearing debris analysis by the Air Force. The XRF would cost approximately 80% less than SEM instruments and weigh 72% less, while providing essentially the same capability.

The new commercial off-the-shelf system is also less expensive to maintain. Annual maintenance costs are approximately 85% less than the bulky SEM system.

Technicians could use the XRF system for commercial engine debris analysis as well as other industrial failure critical applications where metallic wear debris is available for examination. The directorate recently demonstrated the XRF for the Propulsion Product Group at Oklahoma City Air Logistics Center. The Air Force is considering the device for field demonstration in the upcoming Patriot 2003 exercise.

Propulsion
Support to the Warfighter

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-PR-17)