

# Compact Performance Under Pressure!

## TECHNOLOGY FOR ENERGY CORPORATION'S

(TEC) Materials Testing Division proudly introduces MAX, a Miniature Advanced X-ray Diffraction System, which promises to have a profound effect on the stress and retained austenite measurement industry. TEC meets customer needs and offers unparalleled compatibility, convenience, and reduction in time and costs with this compact, portable device for measuring surface residual stresses in previously inaccessible locations. This innovative, powerful new product was developed under an Air Force SBIR program to measure residual stresses in hard-to-access locations on aircraft.

The miniaturized system measurement head fits within a space 8 inches in diameter and uses x-ray diffraction to measure stresses in common engineering materials. This third generation version of miniature diffractometers now uses the  $\sin^2 \Psi$  technique which improves the precision of the measurement. This system is unique in its ability to measure retained austenite in accordance with ASTM E975. MAX's versatility in other industrial and real world applications seems limitless. It is compact, effortless and accurate.

The MAX system consists of hardware and software packaged in two rugged traveling cases plus a laptop PC. The hardware contains a measurement head, safety system and electronics. The measurement head includes a low-powered x-ray tube with a 4-Watt high-voltage power supply and a miniature position-sensitive proportional counter (PSPC) detector. Data obtained by the detector are analyzed with re-designed electronics that incorporate the capabilities of a full-sized electronic module on two integrated circuit boards. The measurement head is small enough to fit inside an 8-inch opening. Accurate measurements can be made in as few as 2-3 minutes.

Designed for field use, MAX only requires 110V/15A service. The entire system is controlled by software from a laptop computer. Rigorous peak fitting routines provide excellent data analysis for this low-powered system. Users may choose from several commonly used routines to optimize analysis accuracy. Software guides the user through the entire measurement and analysis routines with simple, easy-to-use visual guides. An interlocked optical beam provides a barrier to protect personnel from the emitted x-rays during system operation.

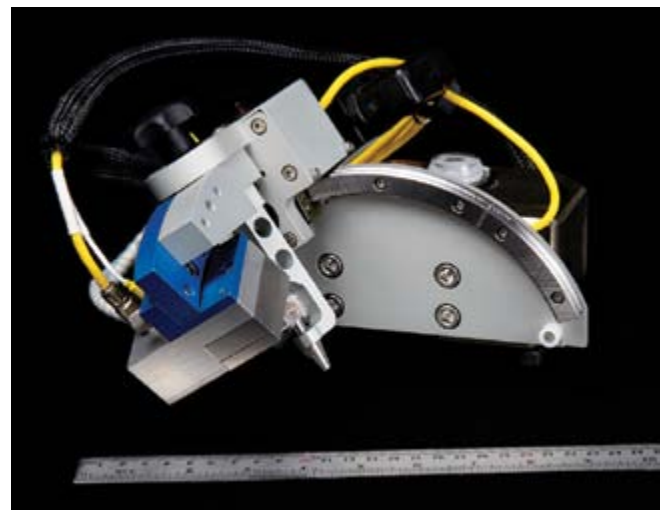
The addition of retained austenite measurement capability makes MAX a versatile tool for any industry using ferrous materials (steels and cast irons). MAX uses the "4-peak" method which measures two separate austenite and two separate martensite/ferite peaks. The measurement of at

least two different austenite peaks is required by ASTM E975. MAX can measure engineering metals and ceramics through the proper combination of x-ray tubes and detector positions. Currently, chromium and copper x-ray tubes are available. Additional tubes may be available in the future. MAX has the ability to measure diffraction peaks in the high back-reflection region of  $120^\circ$  to  $170^\circ$ .

This innovative new product will be available later this year. ●



*The MAX system is portable and compact for measuring previously inaccessible locations.*



*The Max measurement head fits easily within an 8-inch diameter space.*