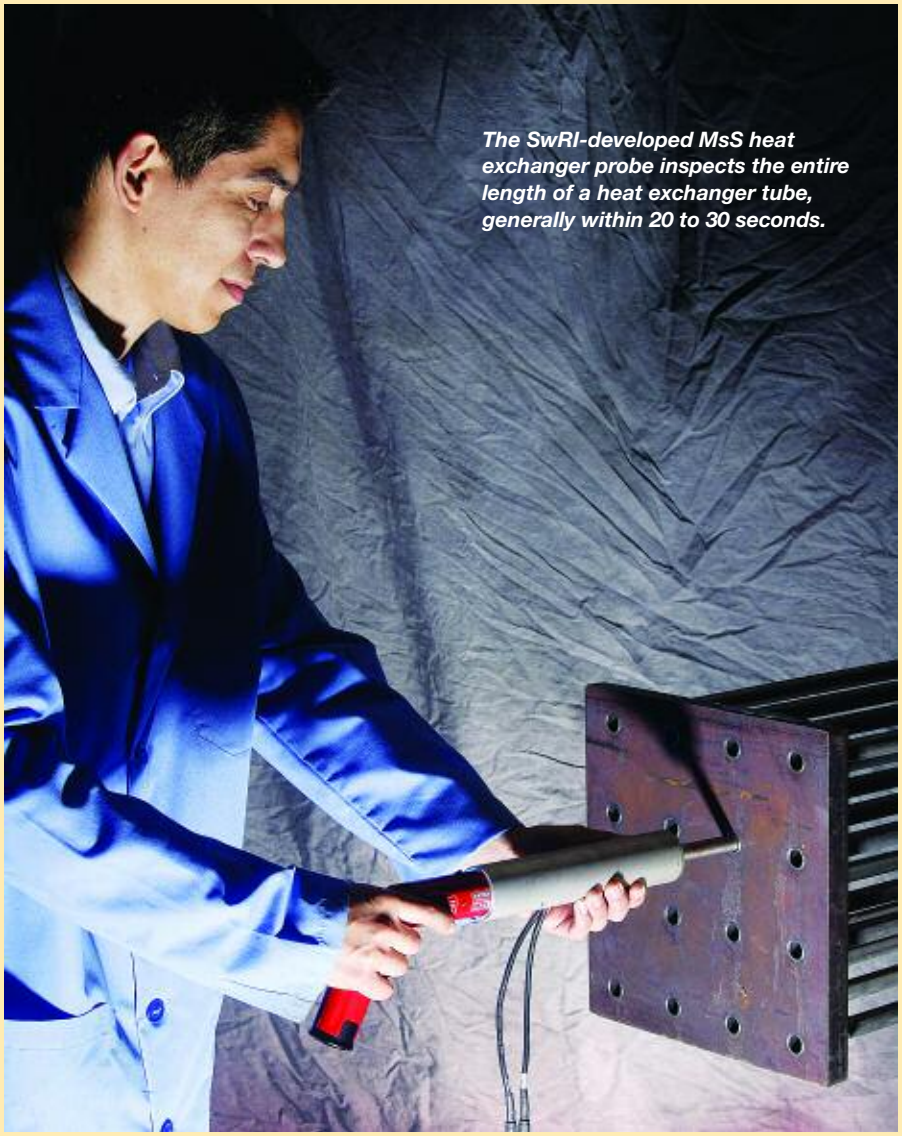
# MsS® Heat Exchanger Probe Wins R&D 100 Award

## *Inspection system surveys heat exchanger tubes faster than conventional methods.*

A device that uses guided wave technology to inspect heat exchanger tubes has received an R&D 100 Award. *R&D Magazine* selected the SwRI magnetostrictive sensor (MsS®) heat exchanger probe as one of the 100 most significant technological developments of the past year.

Heat exchangers are essential to the operation of many systems in industry, including processing and electric power generation plants. Because of their vital importance to plant operation, heat exchangers are inspected and maintained during regular service outages.



***The SwRI-developed MsS heat exchanger probe inspects the entire length of a heat exchanger tube, generally within 20 to 30 seconds.***

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Conventional inspection techniques of heat exchanger tubes, such as ultrasonic and eddy current, examine one local area at a time and therefore a scan of the entire tube is required. Because there are several hundred — in some cases, thousands — of tubes in a heat exchanger, and because conventional inspections are comparatively slow, this technique typically involves inspecting only a small fraction of the tubes.

"Our device represents a significant improvement over current inspection techniques," said Dr. Glenn Light, director of the Sensor Systems and NDE Technology Department in the Applied Physics Division. "The MsS heat exchanger probe allows fast inspection of the entire length of a tube, generally within 20 to 30 seconds."

The hand-held system generates and detects torsional guided waves that fill the entire tube wall. These waves also have the advantage that they don't couple into liquid on the tube wall like other waves. A short pulse of the waves generated by the probe is mechanically coupled to the tube under inspection and propagates along the length of the tube. When the transmitted wave encounters geometric anomalies such as corrosion or cracks in the tube wall, a part of the wave is reflected and travels back to the probe where the reflected signal is detected. At the same time, the transmitted pulse keeps propagating toward the far end of the tube, producing reflected signals whenever it encounters anomalies.

"Using our device, 100 percent of the tubes can be surveyed faster than conventional methods can sample a smaller number of tubes, thereby identifying any potential problems," Light said. "Our product streamlines inspection significantly and helps industry maintain heat exchanger reliability more cost effectively."

SwRI holds U.S. Patent No. 7,019,520, "Method and System for Torsional Wave Inspection of Heat Exchanger Tubes," for the MsS heat exchanger probe. Inventors are Staff Scientist Dr. Hegeon Kwun, Staff Engineer James F. Crane and Senior Research Engineer Dr. Sang Y. Kim, all of SwRI's Sensor Systems and NDE Technology Department.

SwRI developments have earned 30 R&D 100 Awards since 1971. ❖

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