Measure the Wall Thickness of Boiler Tubes with External Oxide using Electromagnetic Acoustic Transducers

Our electromagnetic acoustic transducer (EMAT) uses magnetostriction to generate ultrasonic shear waves in ferromagnetic materials, such as the high-temperature oxide scale (magnetite) typically found on boiler tubes. The EMAT offers a fast way to determine the approximate wall thickness (+/- 0.01 in. or 0.25 mm) of boiler tubes without removing the beneficial oxide scale.

EMATs do not require couplant, but if the scale is not fully bonded to the surface of the steel, the sound energy from the transducer will not transmit to the material. Our E110-SB EMAT can also be used on high-temperature surfaces, rough surfaces, and even at a small distance from the part.

The oxide scale found on boiler tubes only occurs at high temperatures where iron from the steel leaches to the surface where it combines with oxygen to form a magnetite (oxide) layer. Keep in mind that even though rust is referred to as an oxide, it is not bonded to the steel, and the E110-SB EMAT transducer cannot be used on metal with a coating of rust.

Advantages

- Measure to approximate wall thickness (+/- 0.01 in. (0.25 mm)) without removing the external oxide scale
- No couplant required
- Generates shear waves in the steel
- Works on rough surfaces, pitting, or pipe OD
- Can be used at elevated temperatures
- Minimum thickness is 0.08 in. (2 mm)

Note: the E110-SB EMAT cannot be used on steel that does not have an external coating of high-temperature oxide (magnetite). It will not work on metal that is covered in oxide rust.