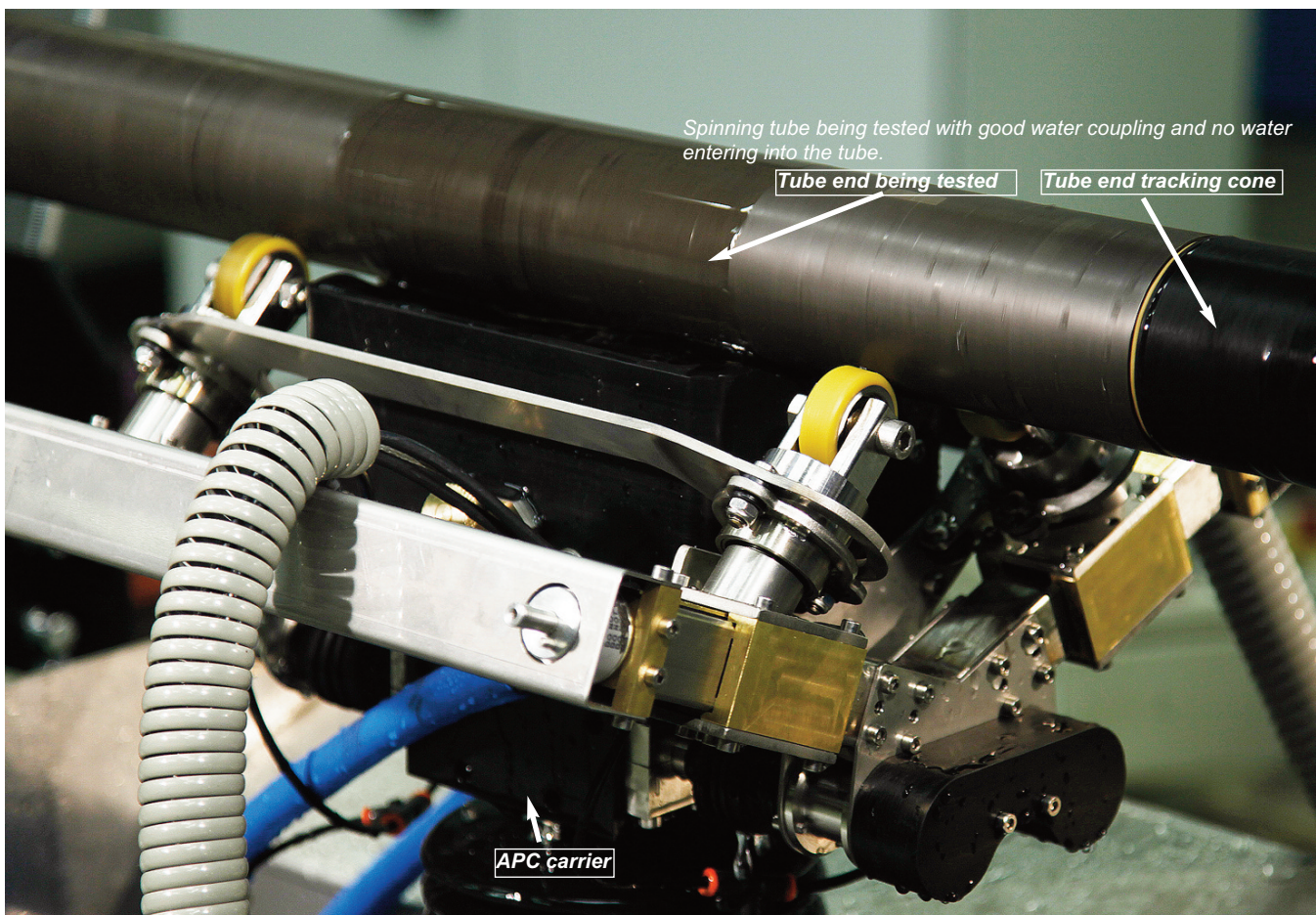




Echomac[®] UT End Tester

For Tube & Pipe



Innovative Design for Inspecting Tube Ends

The Echomac® UT End Tester consists of two independent, identical test stations designed to inspect the untested portion of a tube end. Generally this portion would range between 250 and 500mm from the tube end, depending on the application.

The tube is fed to one of these test stations where a tracking cone is inserted into the tube end, the tube is spun, and the end is inspected. The end plug cone tracks with the rotating tube and keeps the couplant out of the tube interior to prevent interference with the test signals.

The tube is then transferred to the second test station where the other end is scanned. The stations each include Echomac® ultrasonic instrumentation with transducer elements, housed in a transducer box which contains the water couplant and follows the tube surface, as it is being spun.

Multiple element arrays and/or discrete elements can be used, depending on the test specifications. A recent installation tests in 5 directions with 6 methods:

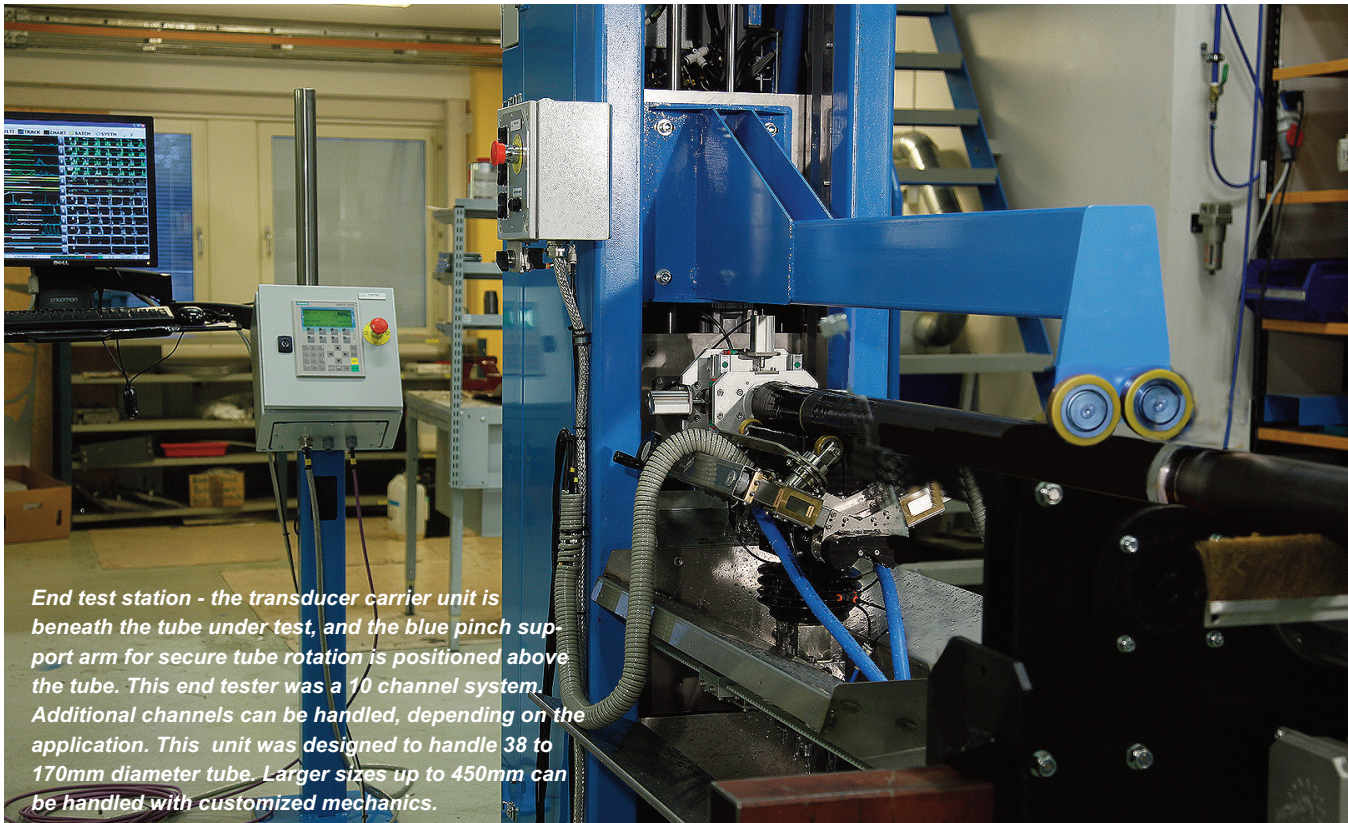
Circumferential Shear CW and CCW; Transverse FWD and REV; Wall and Lamination.

The target test cycle time for this installation is 12 seconds.

Cycle times vary depending on the number of channels, tube diameter, and mechanics.

The MAC Solution

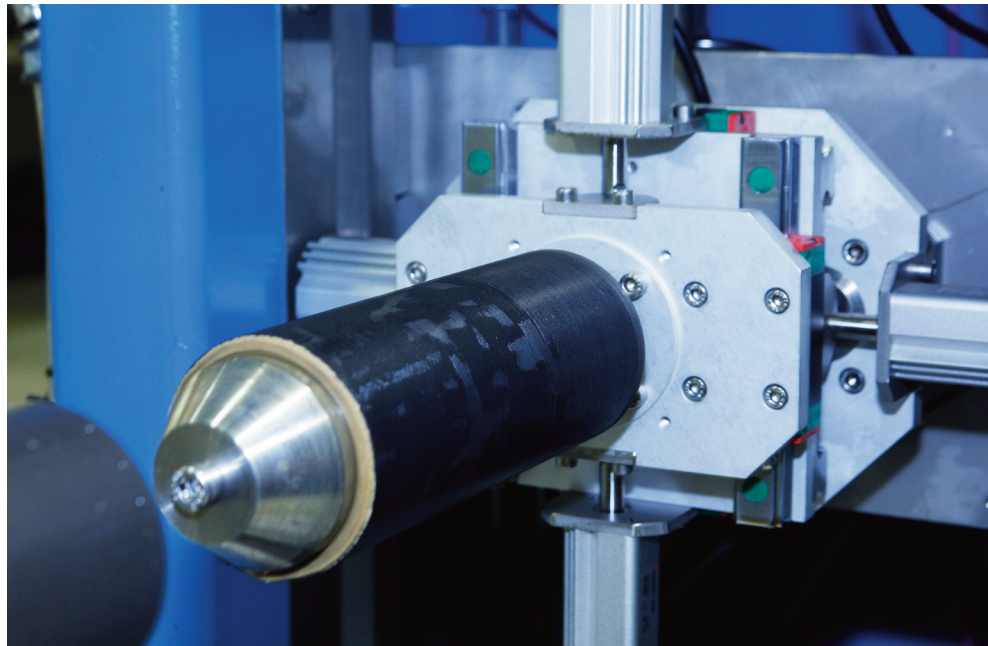
- ☑ Fulfills API 5CT & 5L Standards
- ☑ Detects ID & OD longitudinal and transverse notches down to 5% of the tube wall
- ☑ Detects lamination 6.2mm FBH
- ☑ Measures wall thickness
- ☑ Innovative Automated Pitch Control
- ☑ Unique end plug cone follows unstraight tube ends



End test station - the transducer carrier unit is beneath the tube under test, and the blue pinch support arm for secure tube rotation is positioned above the tube. This end tester was a 10 channel system. Additional channels can be handled, depending on the application. This unit was designed to handle 38 to 170mm diameter tube. Larger sizes up to 450mm can be handled with customized mechanics.

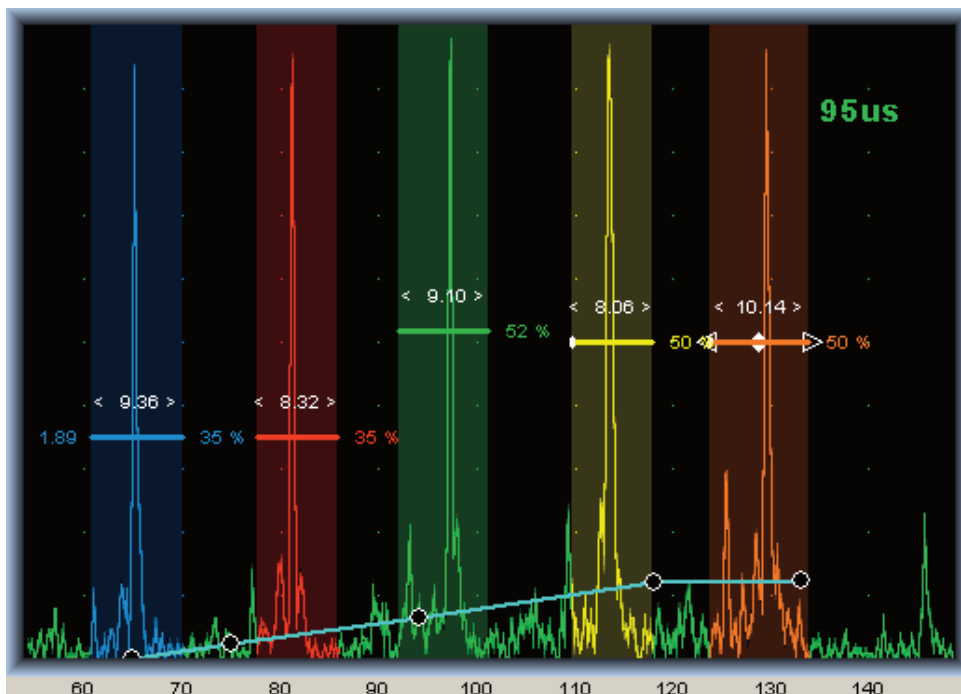
Tube End Tracking Device

The tube end tracking device consists of a cone which is inserted into the tube end. It adjusts to variations in the straightness of the rotating tube, and keeps the couplant out of the tube interior to prevent interference with the test signals.



Tube end tracking cone being inserted into the tube end.

All NDT test methods have some limitation in regard to testing to the very end of a tube. These “untested ends” must be cut off, resulting in a substantial loss of product and revenue, or the manufacturer needs to develop a method to test these ends to meet the tube integrity requirement. Some industries require that the end be tested to a higher level of integrity because it is being expanded, threaded, or welded in the field, and end integrity is critical to the tube performance. MAC’s new UT End Tester provides a solution to this problem.



Echomac[®] FD Series Electronics

MAC’s Echomac FD electronics provide the critical software for controlling the transducers and receiving, adjusting, analyzing, and reporting the test results.

Standardized Pulse Repetition Rate

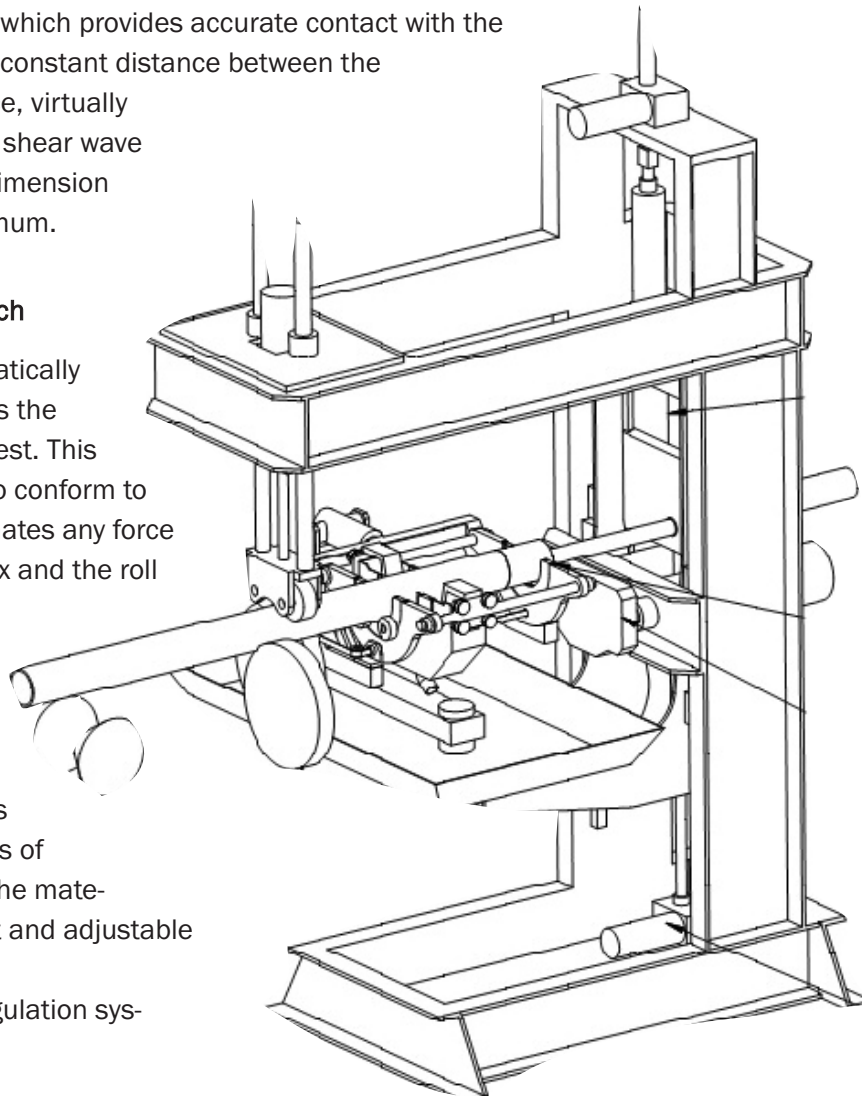
The tube rotation rate is limited to approximately 3 to 5 revolutions per second, allowing the pulse repetition rate to be standardized. Transducer to transducer interference is eliminated by the standard delay function built into the pulser/receiver.

Unique Transducer Box With Automated Pitch Control (Apc)

Four wheels mounted on the transducer box have an innovative Automatic Pitch Control (APC) feature which provides accurate contact with the tube surface to maintain a constant distance between the transducers and the surface, virtually eliminating adjustments of shear wave transducers and keeping dimension changeover time to a minimum.

Wheels Adjust to Actual Pitch

The follower wheels automatically adjust to the actual pitch as the tube is rotated during the test. This ensures the proper angle to conform to any helical pitch and eliminates any force between the transducer box and the roll assembly, resulting in minimal wear. The APC carrier is mounted in a flexible holding structure that also allows it to follow a material that is not straight without any loss of coupling. It is also held to the material surface with a constant and adjustable pressure created by a pneumatic regulation system.



Easy Adjustment for Dimension Changes

Changes in tube diameter can be handled by simply adjusting the roll separation using the diameter scale. This valuable feature is especially helpful because incident angles are maintained for the entire diameter range and no adjustment of transducers is necessary.

The APC carrier can operate from underneath or above the tube being tested, and can be used to carry eddy current and flux leakage probes as well as ultrasonic transducers.