Allan Edwards, Inc.

Ultrasonic Testing (UT)

Don’t Do Repairs Without It

Although uncommon, flaws can occur during the manufacturing of steel. Ultrasonic Testing (UT) is a nondestructive test that is performed on base steel material to detect potential flaws and laminations. This inspection is important because it detects small defects in steel that may not be visible to the naked eye. Though invisible, these flaws can cause issues down the line once a repair sleeve is installed. UT uses high-frequency soundwaves to scan the steel, detecting both internal and external flaws with unparalleled accuracy. Upon inspection, any steel that does not exceed rigorous ASTM standards is rejected.

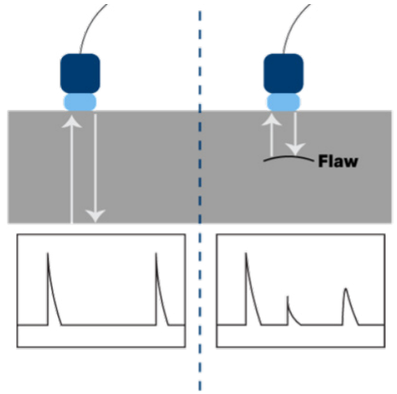
How Does It Work?

Allan Edwards, Inc. utilizes Phased Array Ultrasonic Testing (PAUT) technology. This method of inspection is even more accurate at finding flaws in manufactured materials than conventional UT. The ultrasonic beam assembly in a phased array probe uses 64 individual beams, rather than a single beam like conventional UT. These beams can be focused and swept electronically without moving the probe. As a result, this form of flaw detection is ten times more accurate than conventional UT. This means we can detect more flaws, smaller flaws, and inspire confidence that the steel used to manufacture our sleeves is of the highest possible quality.

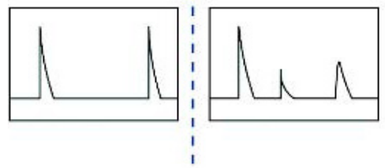
How Does It Work?

Resolution comparison of a Conventional UT probe vs. Allan Edwards, Inc. Phased Array UT Probe

In addition to PAUT providing more data than a single beam, PAUT allows for the collection of encoded data. This provides a traceable report documenting the quality of the mother plate. In an age where the industry requires a traceable, verifiable, complete (TVC) record, supplementing traditional mechanical testing data with inspection data increases the standard of care when it comes to steel sleeves.



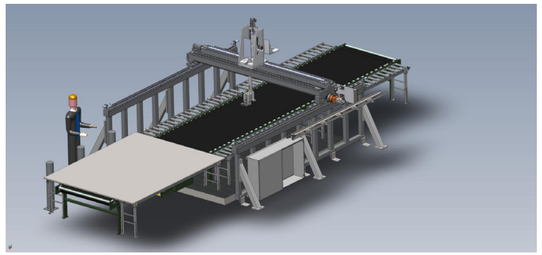
Left: UT signal detects no flaws
Right: UT signal detects flaw within steel



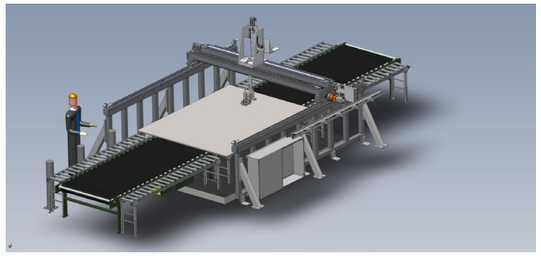
Left: Amplitude diagram showing no flaw detection
Right: Amplitude diagram. Shorter amplitudes indicate a subsurface flaw has been detected

Our 7 Step UT Process

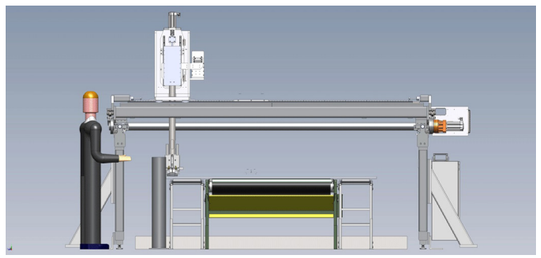
Step 1: Steel plate is loaded onto the incoming plate roller.



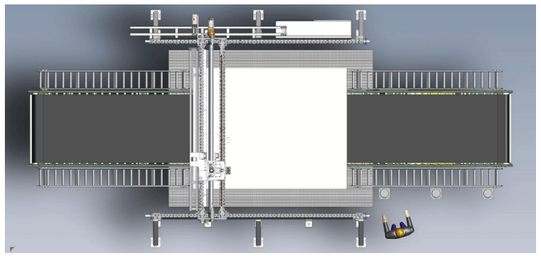
Step 2: UT machine automatically feeds the plate into the scanning area.



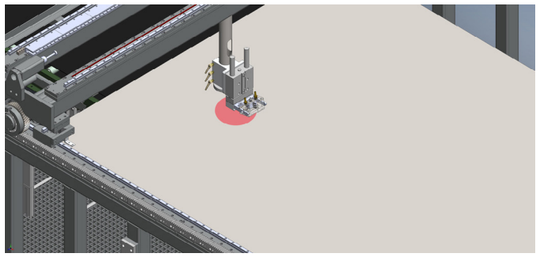
Step 3: UT machine detects all edges and aligns the scanning profile so that the plate is perfectly square on the table.



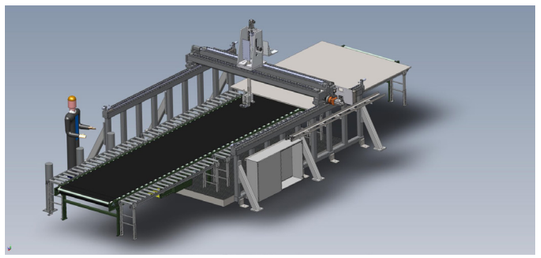
Step 4: UT machine scans 100% of the plate surface.



Step 5: If an anomaly is detected, UT machine locates it, dries the spot, then marks it.



Step 6: After scanning, the machine automatically moves the plate from the scanning area to the offloading area.



Step 7: The machine will repeat the previous steps for the next plate.

Key Benefits of Allan Edwards, Inc. UT

- **Detects Flaws Invisible to the Naked Eye**

  The primary reason UT is used is to catch laminations that are not visible during a cursory visual inspection. Our UT machine catches flaws both on the surface of steel and internally with unparalleled accuracy.

- **10x the Accuracy**

  Our assembly contains 64 individual beams that can be swept through a range of refracted angles. These angles can also be programmed to an interference pattern of time delays to focus the sound wave at a specific depth inside the element. In short, this greatly increases the probability of flaw detection.

- **Provides Peace of Mind & Full Transparency**

  Our UT process provides you with even greater assurance that the repair sleeves you use are manufactured from the highest-quality steel product.

- **A Custom Report Prepared for You**

  All data we gather is 100% available to you. A full UT report is automatically provided with every sleeve order placed.

Why Should It Matter to You?

To answer that question, you must consider this one: How much is quality worth to you?

Regulatory challenges are becoming stricter than ever as public perceptions of the oil and gas industry become increasingly critical. As the stakes continue to rise, so must our own standards. Consider PHMSA's Mega Rule, which has imposed new and significant regulations on over 400,000 miles of gas gathering lines. These previously unregulated lines now need highly reliable repair solutions. Because of this, we recognize the importance of diving deeper to safeguard our customers' future repairs. UT inspection is not a requirement for steel sleeve manufacturing, and most pipeline operators do not require it.

However, its numerous benefits make it a worthwhile investment. We know the stakes are high in this life-sustaining industry. That's why 100% of Allan Edwards, Inc. steel undergoes 100% UT inspection. Not because we had to – because we wanted to.

The Case for 100% Ultrasonic Testing of Steel Sleeves

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You get what you inspect, not what you expect. It's a simple adage, but it nicely summarizes the value of advanced material inspection, especially in the oil and gas industry. Inspection is a broad category; however, it generally describes a process to examine a given component or widget. In the oil and gas industry, this can include visual inspection, dye penetrant, magnetic particle, or ultrasonic testing, to name a few. Each testing method comes with its own set of positives and negatives, but when used properly, it allows for the identification of features not easily identified through visual examination alone.

The Advantage of Ultrasonic Testing

Often, pipeline operators rely on the use of steel sleeves to repair a defect found on a pipeline. These steel sleeves are typically manufactured from formed plate material. Manufactured plate undergoes a largely modern and routine manufacturing process; however, these processes are not immune to mid-wall or slightly subsurface features forming in the plate, which will eventually become the sleeve. While many surface features can be identified visually, subsurface features require some sort of through-thickness nondestructive examination (NDE) process. Limited NDE is performed while manufacturing the coil or plate, so anything later fabricated from this material relies solely on the manufacturing process, i.e., exception, rather than inspection.

Allan Edwards, Inc. has identified the lack of a uniform inspection requirement as an industry gap and has addressed this gap through the introduction of fully automated Ultrasonic Testing (UT) capabilities to its manufacturing process. UT is a nondestructive method of inspection where a form of ultrasonic (above human hearing) frequency (ultrasound) propagation in dense materials is measured for time and calculated based on the velocity of materials. The return amount of kinetic mechanical energy is also measured for strength (amplitude), and the reflection mechanics of the signals are interpreted to characterize features. The results of the inspection are collected in a report and analyzed to identify potential laminations. Any steel containing features that do not meet or exceed ASTM standards is rejected.

Implications for the Pipeline Industry

When a sleeve is installed on a pipe to provide additional reinforcement or to repair a damaged section of pipe, the underlying carrier pipe has, in most cases, undergone the most stringent inspection required by industry specifications – often including NDE. If we as an industry have become accustomed to the carrier pipe being inspected at the time of manufacturing, why are we as an industry not subjecting the repair material to the same level of care? Allan Edwards, Inc. PAUT ensures that the quality of the repair product matches the inspection standard of the carrier pipe that it is reinforcing.

Regulatory challenges are becoming more stringent than ever as public perceptions of the oil and gas industry become increasingly critical. As the stakes continue to rise, so must our own standards. Consider PHMSA's Mega Rule, which has imposed new and significant regulations on an estimated 400,000+ miles of gas gathering lines. These previously unregulated lines now need highly reliable repair solutions. The addition of a fully automated PAUT system results in a repeatable, reliable, and traceable record of the steel plate quality. Though UT inspection is not a requirement for steel sleeve manufacturing, and most pipeline operators do not require it, its numerous benefits make it a worthwhile investment. This addition is truly state-of-the-art in such a high-stakes industry. Allan Edwards, Inc. has elevated the repair space to a level that increases confidence in steel sleeve repairs when it matters most – so that we as an industry now get what we inspect, rather than just what we expect.

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