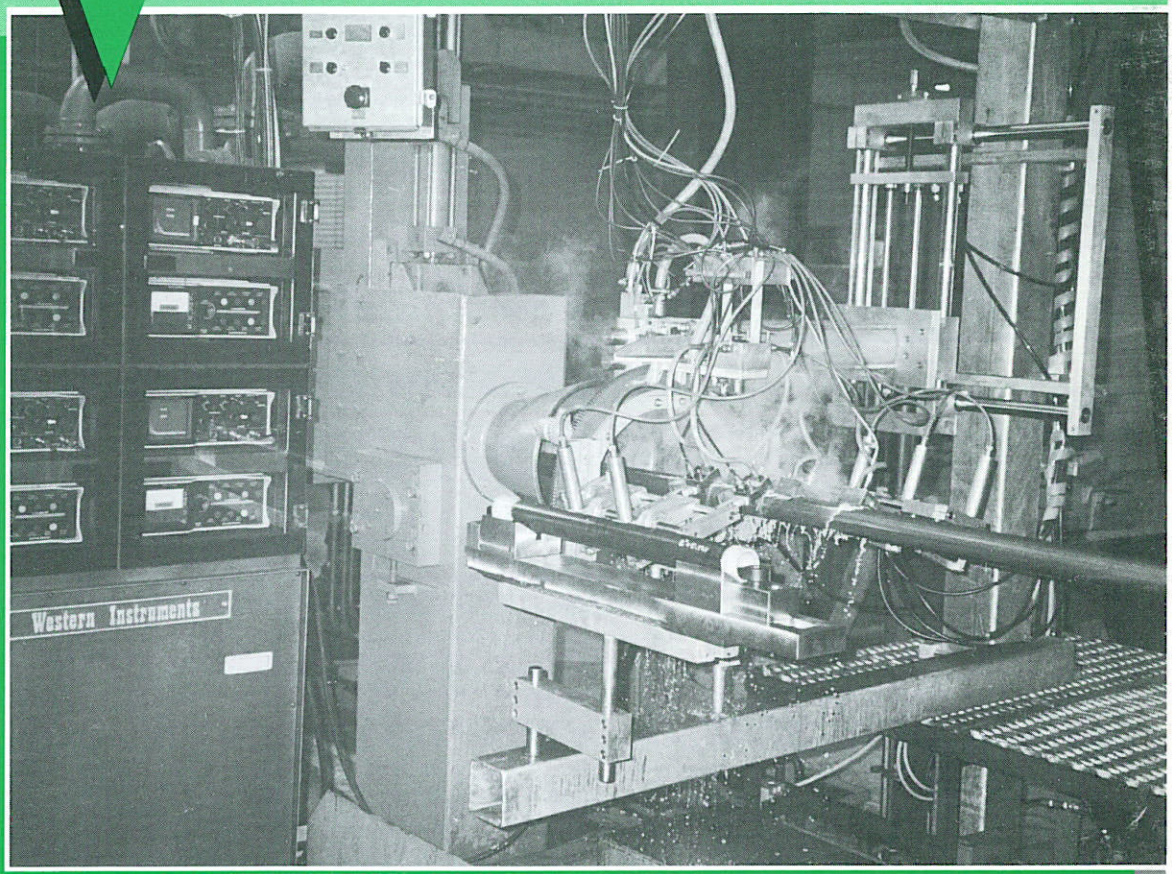
Western Instruments Inc.

Ultrasonic Testing Systems for Tubular Products



Hot, high-speed testing

Reasons why you should be using Ultrasonic Tubular Weld Test Equipment from Western Instruments

EXPERIENCE

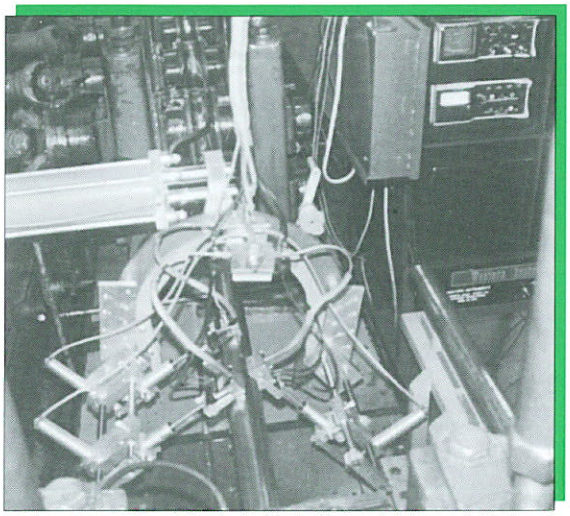
Western Instruments has been manufacturing Testing Systems for ERW and SAW tubes for over 30 years, with the vast majority still in operation. Our experience in the development of sophisticated electronic and ultrasonic test equipment dates back to 1957, and embraces not only testing methods, but also includes a solid background in pipe mill operation, engineering, and management practices. This helps to explain why Western Instruments' proven Ultrasonic Pipe Testing Systems are quickly becoming the industry standard.

FLEXIBILITY

Western's ultrasonic testing systems can be used on or off line and can be readily moved, without alteration, in a short period of time. The key to this flexibility is our superior mechanical design and the use of modules for each probe channel.

Mill Line Testing

When installed on the mill line, Western's testing systems can result in substantial savings for the mill operator. They not only provide an instant feedback to mill line operators by monitoring weld conditions, but also provide valuable information concerning mill setup. This can include the inside trim profile, with the exclusive Western Flash Gauge option, and certain mechanical conditions related to bearings and other mechanical items. Utilized as a mill operator's tool, the systems provide important data in time to prevent costly product downgrading.



Two channel system – sizing section

Operational Features

Western has pioneered many features that result in more consistent and reliable testing and can eliminate costly retesting. Our Coupling Monitors monitor coupling quality with an additional transducer working in conjunction with the primary transducer, giving the operator an indication of coupling quality. With the installation of Automatic Gain Control, controlled by the Coupling Monitor, the system automatically compensates for variations in coupling quality, thus providing more reliable and accurate testing.

Probe Temperature Protection helps in the elimination of probe failure due to excessively high temperatures in the crystal. Interfaced with Automatic Probe Lift-Off, the system automatically retracts the probes before irreparable damage occurs.

These operating features result in unparalleled flexibility to meet any specific pipe manufacturer's testing requirements.

Western supplies all the necessary technical documentation for local service and all components are double sourced to ensure an adequate supply of parts during repair.

Off Line Inspection

Where market conditions are such that prime product yield is of paramount importance, off line inspection can be used most effectively to determine acceptable rework, such as lead and trail point cut-off and minimizing scrap.

Specification Testing

This usually calls for a comprehensive system that can be reproducibly calibrated to meet tight testing specifications. It is generally located after final visual and dimensional checks and typically will require a four-channel function with visual display that can be monitored by the customer's inspectors.

Lamination Detection

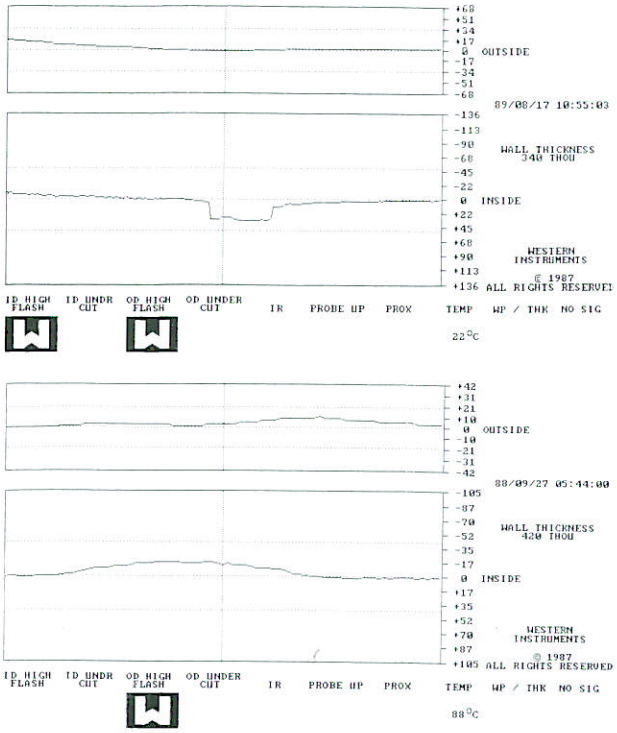
Western has installed a number of lamination detection systems at various locations along the mill. These were designed through consultation with the customer to meet individual requirements on each mill.

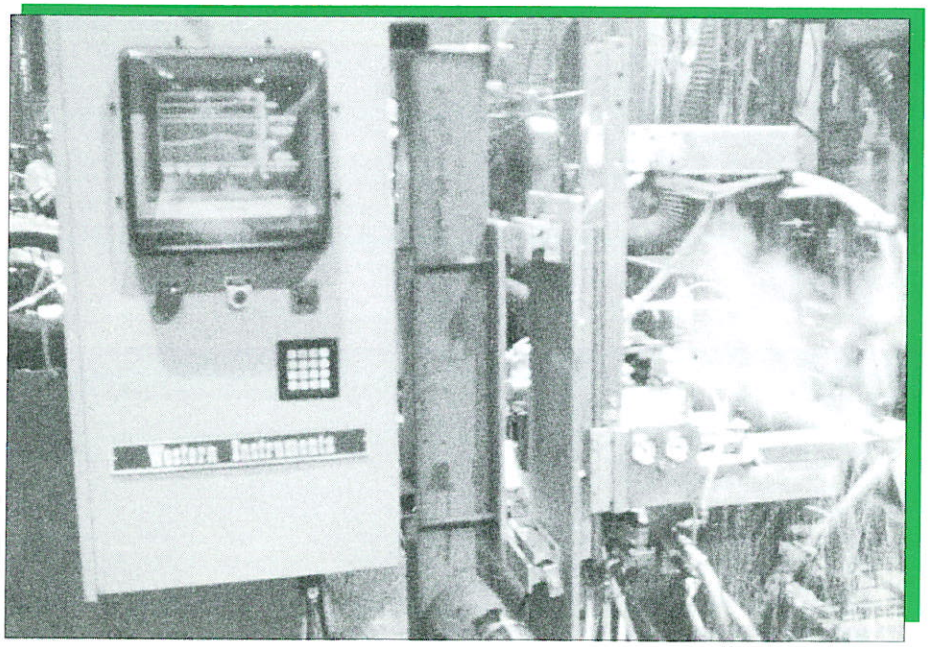
Calibration

Many system features were designed to ensure fast and accurate calibration during size change-overs. Periodic calibration checks are made by moving the test head off line to be checked against a calibration standard. Generally, mill operators can be trained to calibrate and monitor the equipment during installation.

Responding to the welded tube industry's greatest technological need ... The Flash Gauge

Western Instruments Flash Gauge provides a profile of the Weld Area on Welded Tube and Pipe. The Ultrasonic Probe oscillates across the weld area, continuously taking thickness measurements. The computer compiles these thicknesses and displays them in a graphical representation of the weld cross section, 120 times per minute.





The Flash Gauge

LOCATION

The flash gauge sends ultrasonic waves through the couplant (water or mill solubles) and into the Weld Area which is often in excess of 750 degrees F. Due to its ability to test at elevated temperatures, the Flash Gauge is installed as close as possible to the Weld Pressure Rolls, typically after the first, pull-out stand. This location permits the early detection of broken I.D. tools, mandrel misalignment, inadequate or excessive flash removal by the welder operator.

EASE OF USE

The Flash Gauge profile is quickly understood by mill personnel. Trim conditions are immediately displayed on the unit monitor so there is no delay in determining the outside or inside trim condition. Generally, welder operators watch the flash gauge monitor regularly but there are a total of eight alarm parameters which automatically alert the operator.

CALIBRATION

The Flash Gauge is self-calibrating. The operator starts the procedure, and after the unit has measured the returning ultrasonic signals from the O.D. and I.D. surfaces, the operator enters the nominal wall thickness of the mill product.

Probes

This is THE pipe mill probe specifically developed for welded tube and pipe. Western Instruments' probes, with necessary transducers incorporated, were specifically developed to eliminate unnecessary down time. The probes overcome unreliable performance characteristics of individual transducers which have traditionally been adapted to pipe testing. Western Instrument probes are now a well-proven success and have become the mill probe to count on.

Features include:

- Rugged and long-lasting
- Precise angle — no adjustments necessary
- Built-in irrigation for reliable, noise-free coupling
- Use of standard potable water or mill coolant
- Built-in EMI shielding
- Vibration free
- Integral coupling monitor probe
- Ease of mounting eliminates costly change-over down time

The Mill Probe

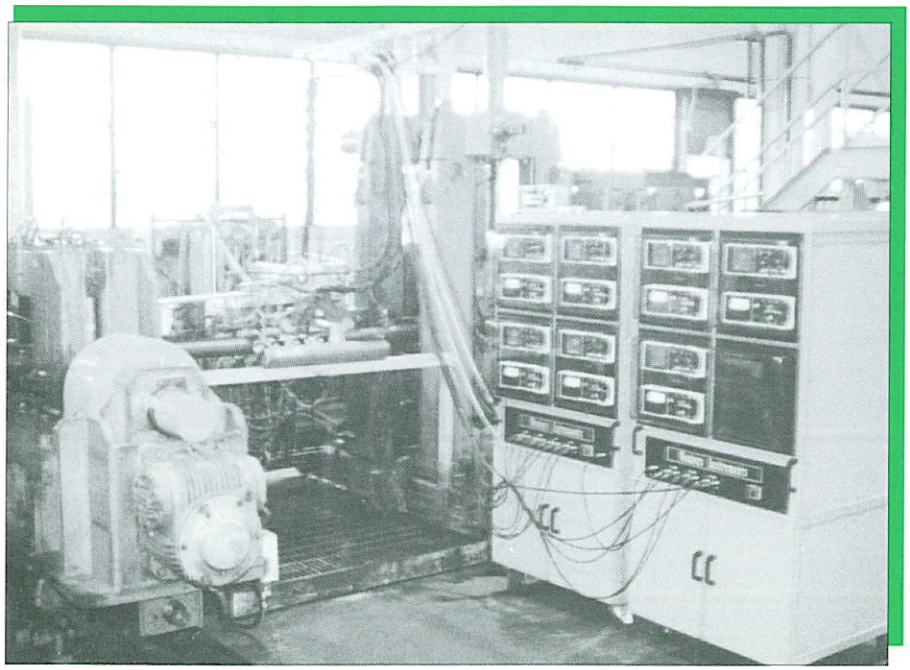
SIMPLE TO OPERATE

Amongst the most sophisticated systems in the world, Western has been able to simplify them so that the welder operator can interpret and calibrate the unit.

Instrumentation

While Western Instruments' Modular Systems are sophisticated from the electronics engineering standpoint, they are simple to set up, operate and maintain. The overall system is designed so that any malfunction is readily detectable and no individual failure will result in the shut down of the entire system.

Western Instruments has ongoing research and development working towards an on-line Defect Analyzer to give the operator the location and the type minimizing the amount of interpretation needed by the operator.



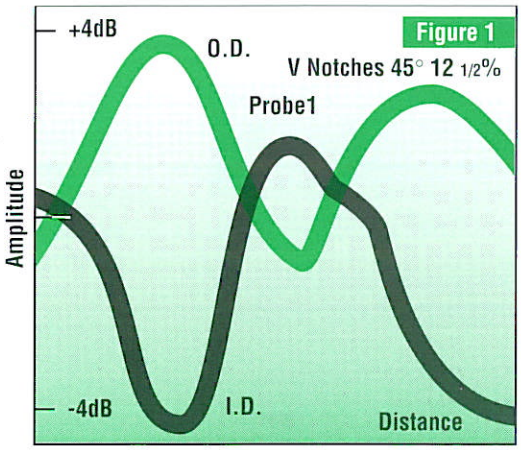
Seven channel system – sizing section

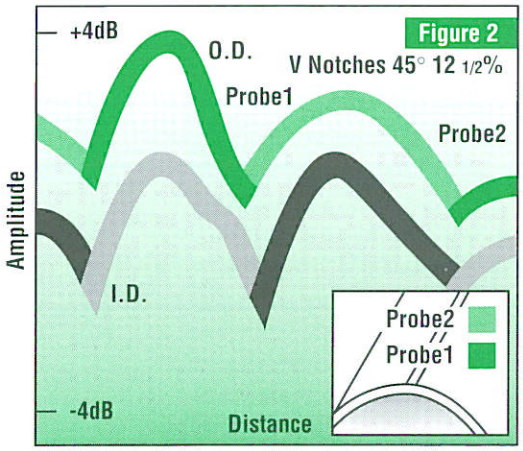
LESS MAINTENANCE/ DOWNTIME

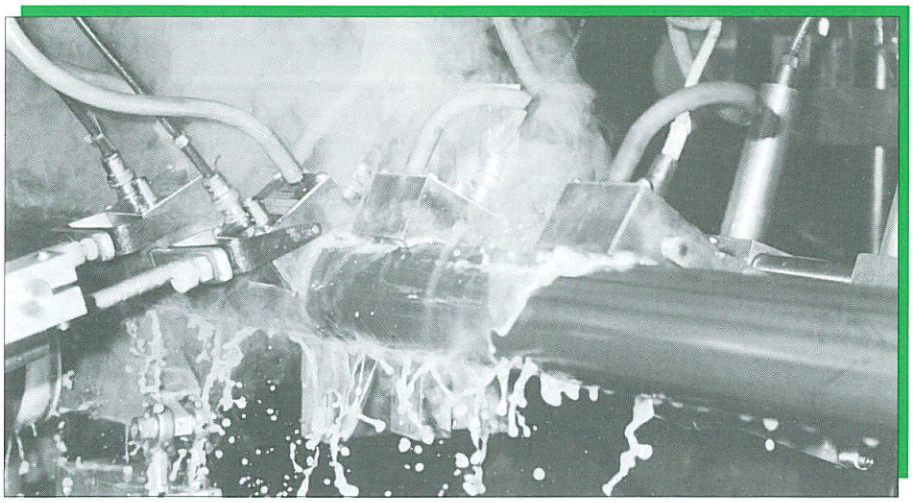
Over the past 30 years, developments in mechanical design, operational techniques and service in the mill environment has resulted in reliable and rugged equipment. The smooth movement of mechanical manipulators is of paramount importance in design and thus all moving parts use roller, ball, or plain bearings for long-lasting, trouble-free operation.

Why Western Instruments Multiple Probe System works best

Western Instruments personnel started working on ultrasonic testing of welded pipe as far back as 1957. Two problems due to geometry effects were encountered initially: probe-to-weld distance and defect nature. Both situations resulted in wide variations in sensitivity response from a given defect, as illustrated in *Figure One*. Western's personnel solved these problems by using multiple probes, displaced to give the effect shown in *Figure Two*. This lead to the first known 4-probe system for ERW pipe testing. The result is a testing system that is effective for detecting injurious defects. Western Systems test effectively without the necessity of using excessive sensitivity that would result in unwarranted rejects.







Four channel system – immediately after welding

PRODUCT LIST

Tube and pipe

- ✔ Ultrasonic Testing Systems for welded tube and pipe:
  - Single channel "Pin Hole Detector"
  - Two channel for wall thicknesses below 0.300"
  - Four channel for wall thicknesses below 0.700"
  - Localized Lamination Testing (eg. 180° from weld – 6 o'clock position)
- ✔ "The Flash Gauge" for resistance weld profile
- ✔ End Lamination and/or Lamination Detection Systems
- ✔ Full Body Ultrasonic Flaw and/or Lamination Detection Systems
  - On-line
  - Off-line
  - Post-straightening
- ✔ Field Ultrasonic Testing Systems

Strip and Coil

- ✔ Ultrasonic Butt Weld Testing System
- ✔ Strip Lamination Detection Systems
- ✔ Strip Thickness Profilers

Bar

- ✔ Ultrasonic Testing Systems for body and end welds

Railroad

- ✔ Rail Field Testing Equipment

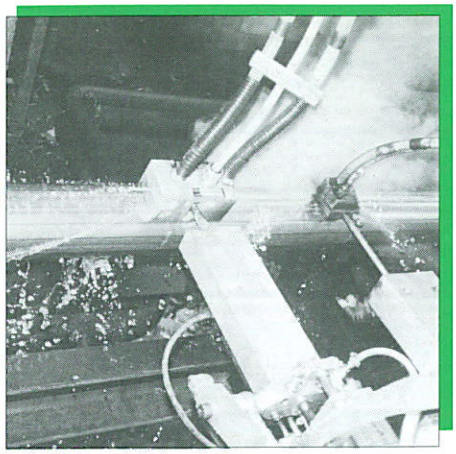
DURABILITY

The Flash Gauge has been in use for eight years, with the original unit still in operation. The unit has Western Instruments' 30 years of Tube Mill experience designed into it. Equipped with many different safety features and electrical/mechanical interlocks, we expect many more years of reliable service.

For mechanical protection, a proximity safety probe is mounted upstream of the oscillating probe to sense injurious mechanical conditions, such as windows or untrimmed O.D. flash. When potentially damaging conditions are sensed, the entire unit is automatically retracted. Press the start button and the unit is testing again.

The Ultrasonic Probe is equipped with a temperature sensor to protect the ultrasonic Transducer from overheating due to inadequate cooling. Coolant and Couplant are fed through a pressure switch which automatically retracts the unit to avoid overheating and excessive wear.

The O.D. size of product is compensated for by a Probe Shoe. The Shoe is attached to the Ultrasonic Probe, creating the probe shoe assembly. This assembly in turn is actuated with the oscillator. The Shoe has an integral coupling and cooling manifold for directing flow. The Shoe is also fitted with ceramic wear pads to extend the component's life.



Flash Gauge test head

BENEFITS

The most obvious benefit of the Flash Gauge is in increased yields due to the early detection of broken I.D. tools. The operator can also observe tool condition deteriorating and take corrective action when it is necessary or convenient. The outside trim condition display gives the operator much better information about the O.D. than looking or feeling.

Strip mismatch also referred to as offset or high-low appears prominently on the Flash Gauge monitor, thus the operator can make adjustments and have immediate feedback. Adjustable and releasable I.D. mandrels are now often used in tube mills. The Flash Gauge closes the feedback loop, by allowing the operator to see the results of his adjustments.

THE FLASH GAUGE GUARANTEE

Western Instruments guarantees that after the installation of our Flash Gauge customer's mill yields and weld quality will improve.

Call us today!

The design and building of Non-Destructive Testing Systems for electric weld pipe mills is Western Instruments' specialty. Our length of experience, breadth of knowledge and service record in this field are assets which we would be pleased to place at your disposal. If your company is considering modernizing, adding to or changing your present testing system, contact us for more information.

Increase your yields and weld quality with the Flash Gauge. We would be pleased to place our experience at your disposal.

Villenueve Works and Head Office

Edmonton, Alberta Canada

Mailing address:
Box 72, Site 2, RR1
St. Albert, Alberta
T8N 1M8

Phone: (780) 459-6720
Fax: (780) 459-7837

Western Instruments Inc.

Established in 1965