Automated Ultrasonic Testing (AUT)

Is a non-destructive testing method utilizing the advantages of conventional ultrasonic techniques in an automated process with computerized data acquisition and data storage. A distinct advantage of AUT is the creation of baseline inspections with a database and hard copy scan images for reporting and customer review for each scan image. Data collection is accomplished in the A-Scan, B-Scan, B-Prime (D-Scan) and C-Scan formats with an overlay capability of the data.

The advantages of the AUT process also include the versatility, speed and coverage attainable on the test specimens. Large areas of materials are scanned quickly and accurately. Multiple scanner configurations and transducer applications including; angle beam, straight beam, TOFD and other specialty transducers including Phased Array may be utilized. Sophisticated data analysis software is implemented for the resolution, interpretation and sizing of AUT indications. Other customer advantages include in-service examinations, thus eliminating downtime costs by bringing the equipment out of service and equipment cleaning costs for internal inspections and fitness-for-service evaluations. AUT is a non-hazardous procedure which may be performed in conjunction with other activities. Access to only one side of test material is required for the inspection.

The AUT reporting we have created is the most comprehensive in the industry. Scan image enhanced reports allows customers and their engineering departments to visually reference indications located in scan areas. CAD drawings of equipment and scan areas allow for easy reference and repeatability of future inspections. The database or scan file created is accessible at any time for additional analysis or reference. The analysis program is an essential tool for indication sizing and determining propagation of indications.

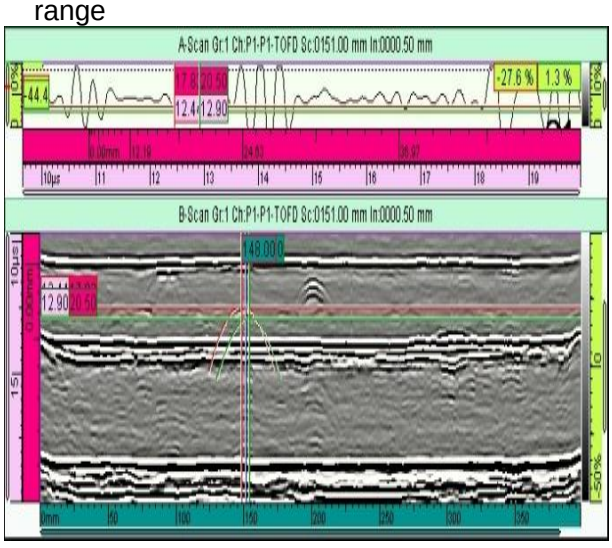
Automated Ultrasonic testing has gained acceptance while proving in various industries to be an acceptable and preferred inspection technique saving customers time and costs while increasing inspection coverage and inspection integrity. The object of these nondestructive testing methods is to utilize all the advantages of Ultrasonic techniques in an automated process with data acquisition and storage.

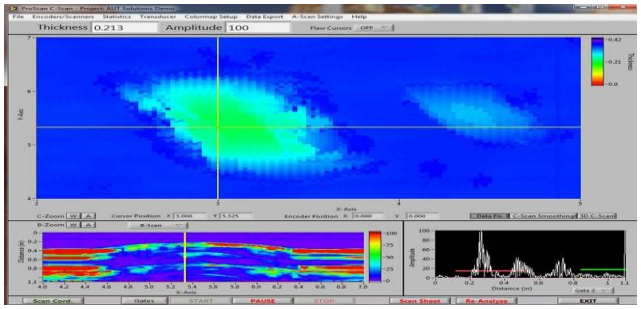
APPLICABLE SUBJECT MATERIALS

- All ferrous metals and all grades of carbon steel.
- Non-ferrous materials capable of supporting ultrasound.
- HDPE (high density polyethylene) and other plastic materials capable of supporting ultrasound.
- Certain layered materials, plastics and ceramics.

APPLICATIONS

- Corrosion Mapping
  - Inspect large areas with mechanized scanners
  - Accurate information on amount and location of corrosion
  - Capable of detecting large and small diameter pitting, corrosion, erosion in piping, pressure vessels, tanks and flange raised faces.
- Weld Inspection(In-service and New pressure Vessels)
  - Perform restoring shear wave weld inspection
  - TOFD weld inspection
  - Phased Array weld inspection
  - Able to inspect long weld seams with multiple files
  - Short range inspection on Butt-Welded Annular plates
- HIC and SOHIC Inspection
  - Detection and sizing of hydrogen damage
  - Accurately map out laminar cracking over large areas
  - Detection of step wise cracking
  - Detection and sizing of SOHIC cracking in the HAZ
- Cladding Inspection
  - Perform inspection from the OD surface
  - Detect cladding disbondments
  - Inspection for cladding failures and associated base metal degradation
- High Temperature Inspection
  - Able to perform techniques at higher temperatures
  - Mount scanners on specialized tracks
  - Possible to inspect materials in the 300 °C range





ADVANTAGES

- Highly reproducible technique
  - Computer controlled data acquisition
  - Data is stored for future comparison or audit
  - Data is gathered with weld positional information
  - 3D image presentation of all defects
- Rapid large area inspection using automated scanners
- Better ability than manual ultrasonic testing to distinguish flaw signals from geometric signals
- Good ability to trend flaws for growth by comparing to previous inspection results

LIMITATIONS

- Scan areas on test material must be accessible to scanner(s) with no immediate obstructions to scan areas.
- The scan surface must be in a clean condition; thin wall paints and other coatings are acceptable if no disbonding, flaking or other anomalies are present.
- Coarse grained materials can present problems for ultrasonic techniques.
- Non-ferrous materials need to have alternative methods of securing the scanner to the material surface

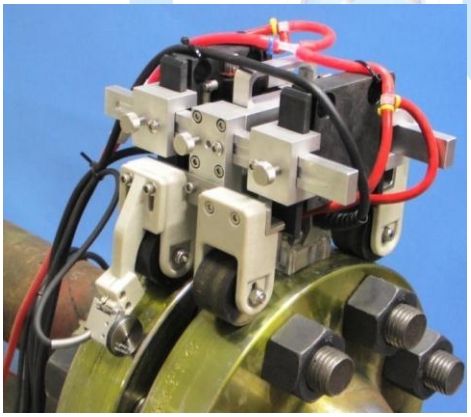
RAISED FACE (RF) FLANGE

- RF flange seal with a flat gasket, formerly made of asbestos but now made of more environmentally friendly material, designed for installation between the raised faces of two mating flanges (both flanges will have raised faces). The raised faces have a prescribed texture to increase their gripping and retaining force on the flat gasket. Some users of raised face flanges specify the use of spiral wound gaskets.

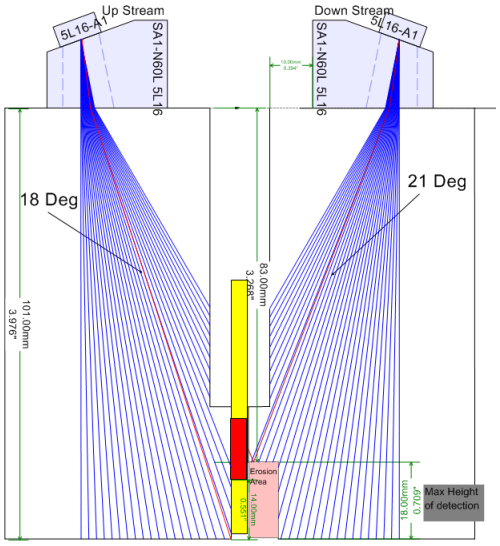
The incursion of corrosion / erosion can have a wide range of attack, from bore activity to migration under the seal

Calibration / Demonstration Block

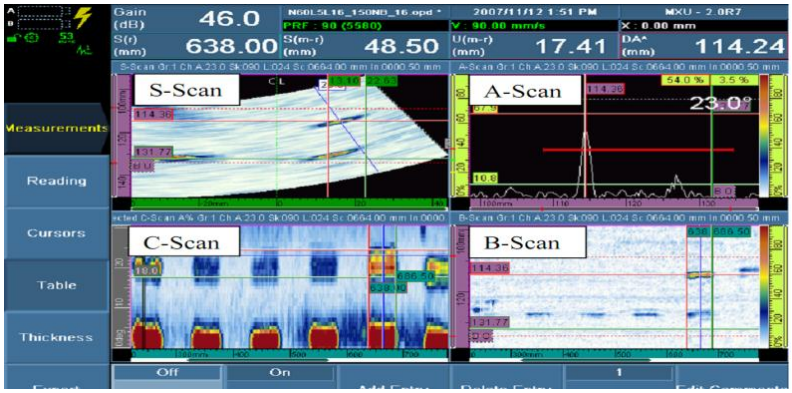
This corrosion pattern is typical and varies in some cases with clock position, general or uniform corrosion patterns or in some cases the pattern can be seen more predominant at the 6 o'clock position.



Flange Scanner

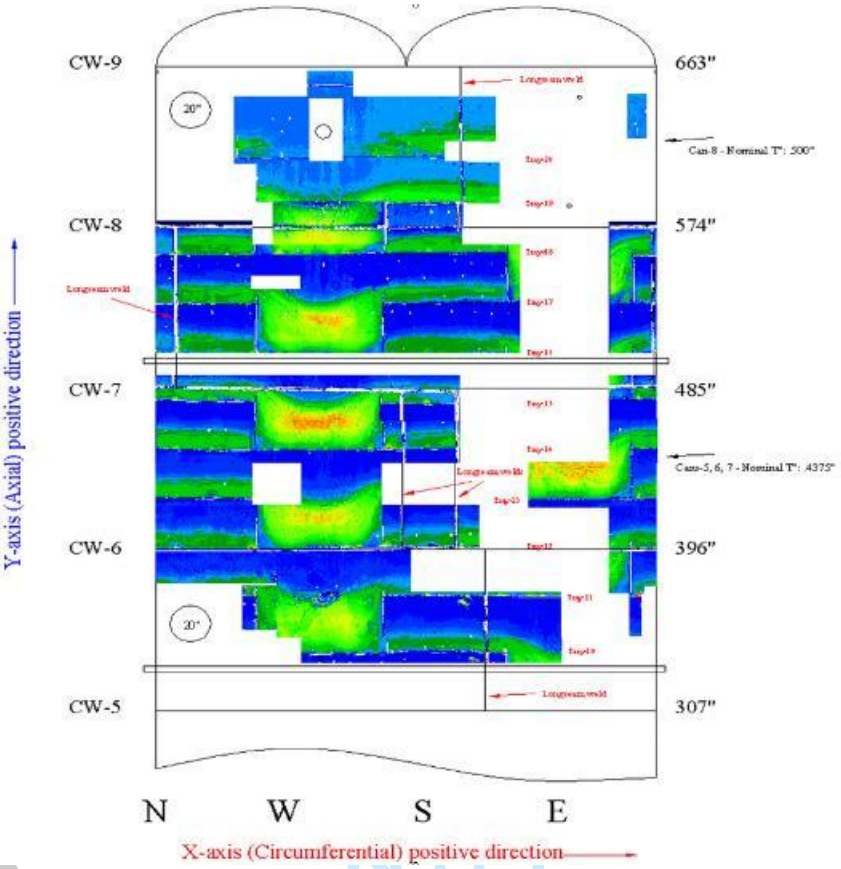


Scan Plan



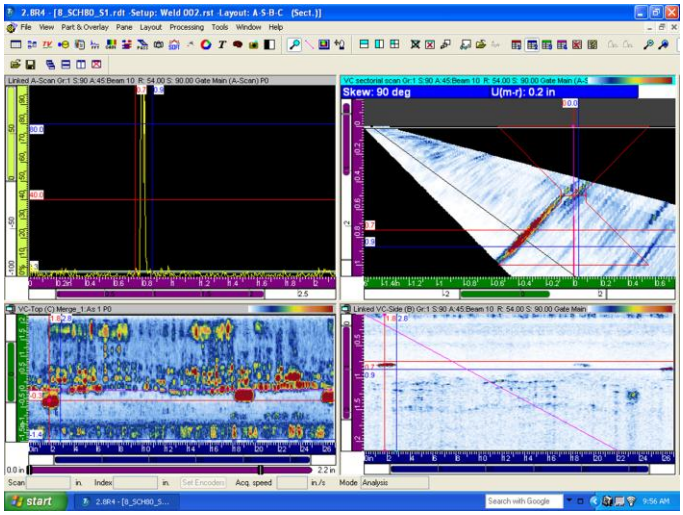
Scan Image of an eroded flange raised face

CORROSION MAPPING / MONITORING



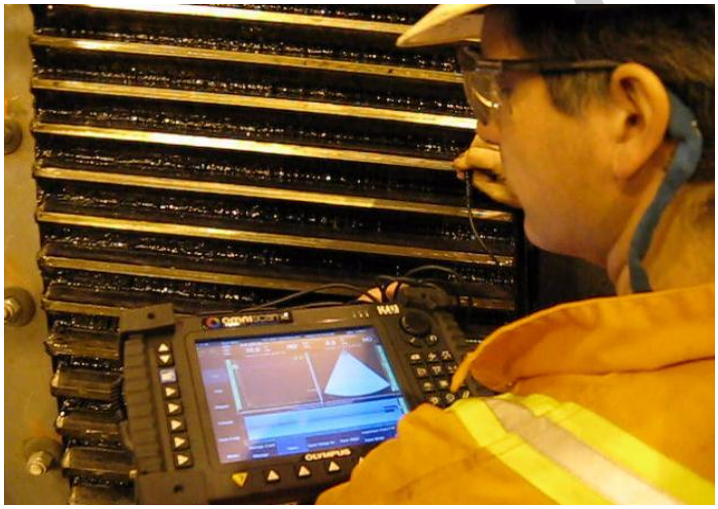
ACCUSCAN-2009/2010 can reach scan speeds up to 40”/sec and can scan on diameters as small as 3”pipe and 24” long in length. The scanner comes with a very strong motor controller housing and both motor housing are sealed to prevent against moisture damage. This scanning system is a slave system, meaning we can easily take the encoder feedback from the scanner and direct it into any UT system with encoder inputs with a single encoder whip which comes with the scanner.

Corrosion / Thickness Survey with Automated Magnetic Crawler



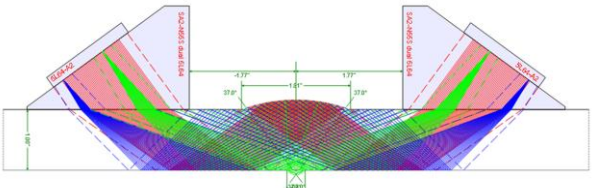
PHASED ARRAY BULL GEAR INSPECTION

- Mining industry Rod and Ball Mills
- Pulp and Paper industry Kiln Gears



PHASED ARRAY WELD INSPECTION

- Oil and Gas Plant Pressure Vessel as per ASME Section 8 Div. 1 & 2 Code Case 2235
- Fabrication Shop Piping Examination as per B31.3 Code Case 181, B31.1 Code Case 179



BEAM PROFILE OF PHASED ARRAY WELD INSPECTION

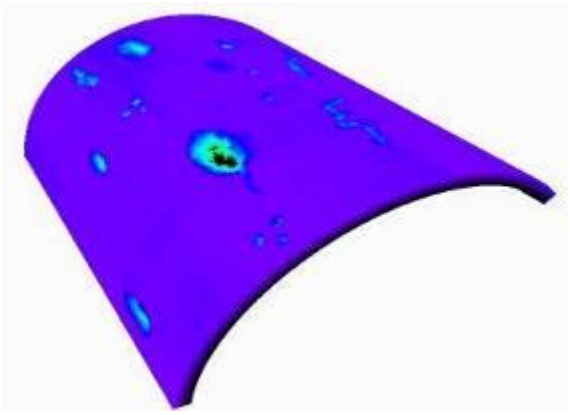
- Scan plan are developed and approved by Level III prior to examination for permanent documentation and repeatable examination

Laser Mapper

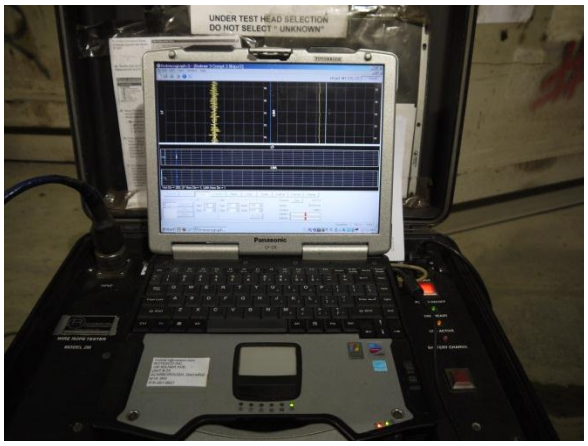
The Laser Mapper makes laser corrosion mapping practical. It works on smooth, shiny and dull or rough surfaces without any special surface preparation. The Laser Mapper is capable of scanning at high resolutions at up to 30 inches per second.

Features:

- Fast-Scan up to 30 inches per second
- Accuracy - Depth measurements accurate to within +/- 0.002”(0.051mm), the Laser Mapper also eliminates problems inherent in UT corrosion mapping such as water loss
- Portable - laser senor and controller weigh less than 2lbs.



EM TESTING (ELECTRO - MAGNETIC) WIRE ROPE TESTING



EM Instrument can provide accurate, objective and quantifiable data on the deterioration, both internal and external, of a steel wire rope. EM Instruments non-destructively test ferromagnetic steel wire ropes for deterioration caused by corrosion, wear, broken wires, etc. These instruments can test for deterioration that is located both on the outside layer of a rope and on the inside layers of a rope. They can also test for this deterioration in all types of steel wire ropes, including locked coil ropes and plastic coated ropes. However, they can only test ropes that are ferromagnetic EM Instruments simultaneously indicate Local Faults (localized deterioration) in the form of broken wires, lay distortion, inter-strand nicking, external wear, or corrosion pitting and measure Loss of Metallic cross-sectional Area caused by corrosion, broken wires, external wear, and inter-strand nicking. The measured Loss of Metallic cross-sectional Area (LMA), combined with the extent and nature of the pattern of the Local Fault (LF) Channel trace, can be used to assist with the determination of when a steel wire rope has reached the end of its safe working life and should be removed. The measured LMA, combined with the extent and nature of the pattern of the LF Channel trace, can also be used to estimate the Loss of Breaking Strength (LBS) of a steel wire rope. EM Instruments are portable instruments so that steel wire ropes are tested in situ. EM Instruments consist of 2 components: a Console, which provides a means to display the test results, and a Test Head, through which the rope travels. (The Console and the Test Head are connected by an Inter-connecting Cable.) The Test Head is similar to an elongated donut ring that opens. This allows the Test Head to be placed around the rope that is to be tested. In order to test the rope, either the rope must be pulled through the Test Head or the Test Head must be pulled along the rope. In many jurisdictions, government regulations require that steel wire ropes that are utilized in underground mining operations be regularly non-destructively tested using an EM Instrument

It is important that a steel wire rope be regularly non-destructively tested using an EM Instrument and that the information obtained be augmented by a visual inspection of those sections of the steel wire rope where the EM Instrument indicates there is deterioration that is significant. The information that is then obtained, from both of these inspections, can be used to accurately determine the complete condition of the steel wire rope and thus track its rate of deterioration so that a valid assessment of the steel wire rope can be made regarding any preventative measures that should be taken to slow down the rate of deterioration or whether it should be replaced because it has reached the end of its safe working life.

REPORTING

The reports are prepared from standard laptops after the data has been transferred from the field unit. The data and reports are then CD archived for future reference or inspection comparison. The reports are presented to the customer at the end of the shift before the crew has left site; the formal report is issued later after peer review. Reporting formats vary by customer request.

FOCUS NDT ADVANTAGE

Services are provided 24 hours per day every day of the year, on-site, in the field, and at either FOCUS NDT facilities.

- Our personnel are certified and experienced to perform our services, and are dedicated to providing quality service.
- We are committed to the objective of helping our clients to be as efficient and profitable as possible.
- FOCUS NDT is 100% owned by its management team.