NATIONAL NDT SERVICES (PTY) LTD

SPECIALISTS IN NON-DESTRUCTIVE TESTING

WWW.NATIONALNDT.CO.ZA

It's not faith
in technology
It's faith in
People.

Contents

NATIONAL NDT SERVICES (PTY) LTD.

National NDT Services (Pty) Ltd maintains as its priority, growth in its business sector through the maintenance of high quality standards and customer services. Thus the company confirms its commitment to being an integral part of the growth in the petrochemical and engineering industry throughout Southern Africa.

Origins

Based in Durban, the company was established in 1969 as a result of a demand predominantly in the petrochemical & engineering industries for non-destructive testing services. The late Mr. Lloyd Pillay gained the earliest and most influential experience from National Non Destructive Testing Services (Pty) Ltd. He subsequently purchased the company in 1990 and continued to uphold the high standards and quality workmanship while consolidating and expanding on the company's client base in Southern Africa and abroad. The company continues under the directorship of Mrs. Sharin Pillay and Mr. Ricardo Pillay. Mr. Ricardo Pillay has been trained and mentored by his father and continues with the same standard, quality of service and staff compliment while exploring innovative techniques of delivering excellence.

OUR MISSION

We maintain, as our priority, high quality standards and exceptional customer service. Our company confirms its commitment to being an integral part of the growth in the Petrochemical & Engineering Industry throughout Southern Africa.

OUR VISION

We maintain, as our priority, high quality standards and exceptional customer service. Our company confirms its commitment to being an integral part of the growth in the Petrochemical & Engineering Industry throughout Southern Africa.

OUR VALUES

- Integrity
- Continuous improvement
- Trust
- Quality
- Safety first

About Us

OUR PHILOSOPHY

National NDT Services prides itself on its commitment to continuously update, incorporate and utilize modern technology and methods both with respect to staff and equipment in order to remain competitive and effective in the market.

The company has thus grown to become one of the local leading companies in the Supply of non-destructive testing services

EXECUTIVE SUMMARY

NNDT is driven by its determination to be the leading culturally diverse company in the Non Destructive Testing Industry. This determination is fed by the provision of cost effective and efficient services.

KEY ATTRIBUTES OF THE COMPANY INCLUDE

- A proven track record spanning over 30 years
- International and national operational capabilities

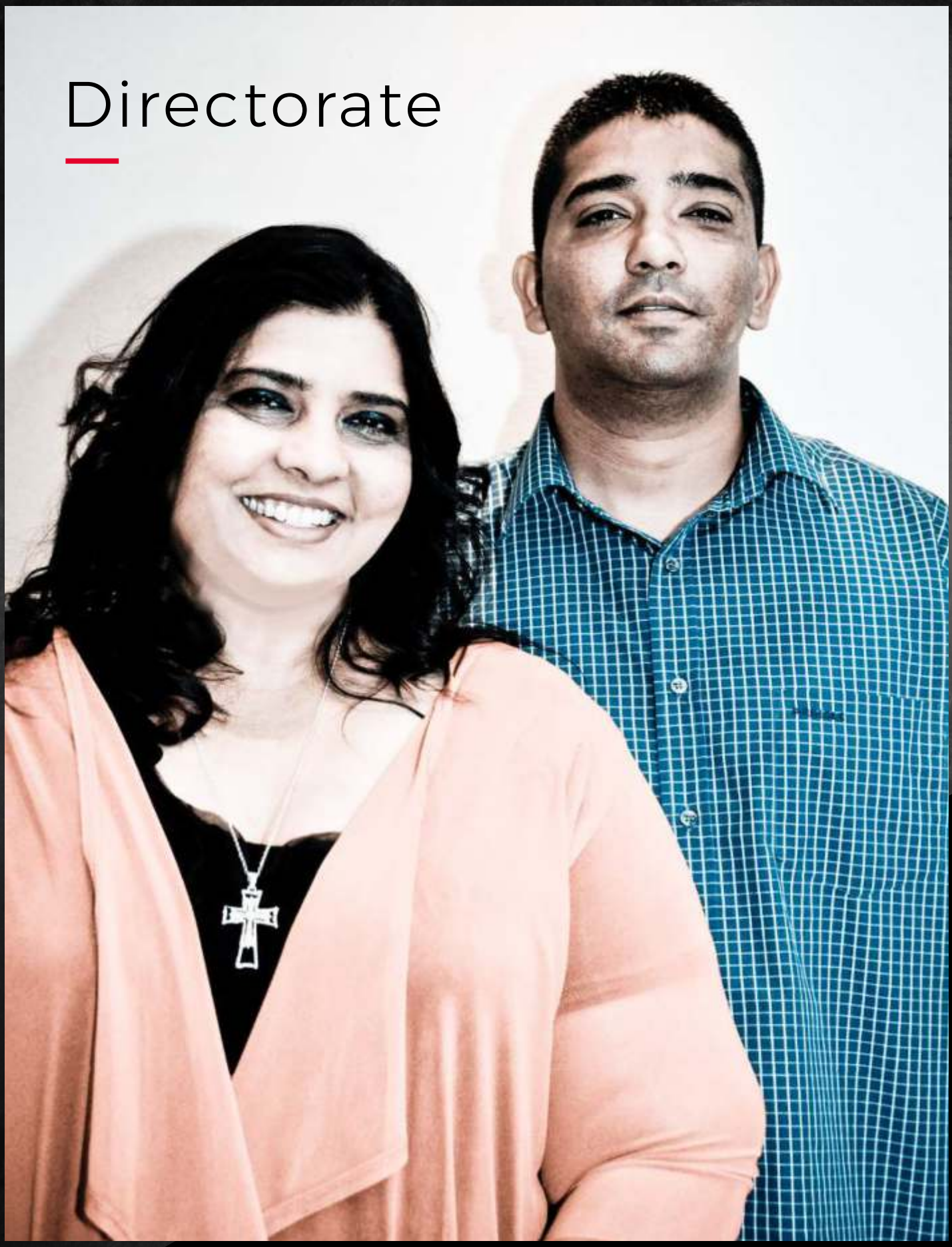
Profiler

NATIONAL NDT SERVICES

We always endevour to give more value & innovation to our clients needs with creative & efficient solutions.

Full Name Of Company	National NDT Services PTY (Ltd)
Type Of Enterprise	Private Company
Contact Details Of Lead Members	Ricardo Pillay +27(0)83 611 6075 ricardo@nationalndt.co.za Sharin Pillay +27(0)82 440 4303 sharinpillay@nationalndt.co.za
Nature Of Business	Non Destructive Testing Services
Certifications	**South African Institute of Welding** - Member **Atomic Energy Corporation** - Approved for the handling of isotopes **South African Bureau of Standards** -All radiation workers are registered and monitored for radiation absorbed doses and calibration of radiation equipment **Department of Health** -Licenced and subject to their controls and regulation **The American Society for Non-Destructive Testing** -Member

Directorate



SHARIN PILLAY
CEO

RICARDO PILLAY
Technical Director

Services

The primary role of the company is the provision of non-destructive testing of materials to ensure safety and quality. The following services are offered:

Conventional NDT

ULTRASONIC TESTING

Ultrasonic methods of NDT use beams of mechanical waves (vibrations) of short wavelength and high frequency, transmitted from a small probe in contact with the specimen surface and detected by the same or other probes. Such mechanical vibrations have different forms depending on the direction of particle movement in the wave motion, so there are several forms of ultrasonic waves. The most common and widely used in NDT are compressional and transverse (shear) waves. They can travel large distances in fine-grain metal and an oscilloscope display (A-scan) shows the time that it takes for an ultrasonic pulse to travel to a reflector (flaw or back-surface). Applications include location of manufacturing defects in welds and castings through to Corrosion / Erosion monitoring and large scale corrosion mapping.

PAINT THICKNESS TESTING

Coating thickness gauges (also referred to as a paint meter) are used to measure dry film thickness. Dry film thickness is probably the most critical measurement in the coatings industry. A coating thickness gauge provides vital information as to the expected life of the substrate, the product's fitness for purpose, its appearance and ensures compliance with a host of International Standards. Dry Film Thickness can be measured on either magnetic steel surfaces or non-magnetic metal surfaces such as stainless steel or aluminium using a digital coating thickness gauge. The principle of electromagnetic induction is used for non-magnetic coatings on magnetic substrates such as steel. The eddy current principle is used for non-conductive coatings on non-ferrous metals substrates

POSITIVE MATERIAL IDENTIFICATION (PMI)

Positive Material Identification (PMI) is the identification and chemical analysis of various metal alloys through nondestructive methods. PMI can be conducted on-site or in the laboratory.PMI helps our customers choose the right materials for their application from this vast market. In production, PMI confirms through certification that the materials our customers have received are, in fact, the materials they've purchased. At all stages, PMI services allow clients to build successful business plans for their products and processes.

MAGNETIC PARTICLE TESTING

An extremely cost effective method for the detection of surface and near surface flaws in ferromagnetic materials is primarily used for crack detection. Following magnetisation the specimen is covered with very fine iron particles either dry or suspended in a liquid. Surface breaking flaws distort the magnetic field causing local magnetic flux leakage that attract the iron particles producing a build-up that can be seen visually.

HARDNESS TESTING

Hardness is a measure of how resistant solid matter is to various kinds of permanent shape change when a compressive force is applied. Some materials, such as metal, are harder than others. Macroscopic hardness is generally characterized by strongintermolecular bonds, but the behavior of solid materials under force is complex; therefore, there are different measurements of hardness: scratch hardness, indentation hardness, and rebound hardness.

Hardness is dependent on ductility, elastic stiffness, plasticity, strain, strength, toughness, viscoelasticity, and viscosity.

DYE PENETRANT TESTING

A low cost method of detecting surface breaking flaws, such as cracks, cold laps, porosity etc. the dye penetrant is drawn into the surface breaking flaw by capillary action and excess surface penetrant is then removed; a developer is then applied to the surface, to draw out the penetrant in the crack and produce a surface indication. the technique can be applied to any non-porous clean material, metallic or non-metallic.

SPARK / HOLIDAY DETECTION

Flaws such as pinholes, air bubbles, inclusions, cracks, void and thin spots can occur in a wide range of coating material used in industry. A pinhole although small can cause extreme damage by permitting corrosive materials to reach the base material. Lack of continuity of coating causes premature failure, which can be very expensive to repair and lead to possible stoppages in production. In certain circumstances, an air pocket can represent a substantial portion of the total thickness, and thus cause a weak point, even though the coating is continuous.

High voltage Holiday Detectors are, in principle, insulation testers used to indicate a fault in the non-conductive coating under test be generating a spark which triggers audible and visual alarm.

INDUSTRIAL GAMMA AND XRAY RADIOGRAPHY

Industrial Radiography or Radiographic Testing (RT) uses ionizing electromagnetic radiation to view objects in a way that can't be seen otherwise. It is not to be confused with the use of ionizing radiation to change or modify objects; radiography's purpose is strictly for viewing. It is a method of inspecting materials for hidden flaws by using the capability of short wavelength electromagnetic radiation, x-rays and gamma radiation, to penetrate various materials.

Gamma radiation sources, most commonly Iridium-192 and Cobalt-60, are used to inspect a variety of materials. The vast majority of radiography concerns the testing and grading of welds on pressurized piping, pressure vessels, high-capacity storage containers, pipelines, and some structural welds. Other tested materials include concrete (locating rebar or conduit), welder's test coupons, machined parts, plate metal, or pipewall (locating anomalies due to corrosion or mechanical damage). Theoretically, industrial radiographers could radiograph any solid, flat material (walls, ceilings, floors, square or rectangular containers) or any hollow cylindrical or spherical object.

Specialised Services

CLOSE PROXIMITY RADIOGHRAPY

Close Proximity Radiography is similar to Gamma radiography with the exception that the demarcated exclusion areas are considerably less. With the use of a special source container and additional shielding, the safe barrier distance can be reduced to as much as no more than 2.5 metres from the point of the exposed source during operations. This can be very beneficial when having to perform radiography on sites that have equipment that are sensitive to the presence of outside sources of ionising radiation, such as level switches. It grants planners greater freedom with other activities that would normally be affected by this method of inspection due to the substantially smaller demarcated areas required. This is especially effective during Turnarounds and Shutdowns whereby radiography can be carried out 24 hours of the day without interfering or stopping of any other surrounding work.

C SCAN PIPING AND VESSEL CRAWLER INSPECTION

The RMS2 is a high speed, high accuracy remote access ultrasonic corrosion mapping system designed to evaluate the condition of ferrous structures such as storage tanks, pipelines, pressure vessels and other critical equipment, supporting effective and safe operation. The RMS2 can give 100% coverage in a band up to 1000 mm wide, significantly increasing Probability of Detection (POD) ofcorrosion, enabling engineers to determine the optimum repair strategy and improve risk life assessment (RLA) & risk based inspection (RBI) maintenance programs. The RMS2-450 scanning head is designed for operating circumferentially on curved surfaces such as pipelines or pressure vessels from 152 mm (6 inches) up to flat plate.

TANK FLOOR SCANNING

The Floormap VS2 uses the magnetic flux leakage technique to detect surface and bottom side corrosion on above ground storage tank floors to provide a reliable indication of the floor condition within an economical time frame. The test can be carried out through surface coatings like paint or epoxy etc. The VS2i contains significant improvements in terms of defect positioning, electronic data processing and software manipulation. Additional data from visual, ultrasonic, vacuum box and magnetic particle inspection can be added to the report generating a full fingerprint of the tank

DIGITAL RADIOGRAPHY

Front end technology and equipment is the same as used for conventional radiography, the difference is in recording the image and the use of phosphor screens. When exposed to X or gamma ray electrons phosphor crystals are excited and trapped in a semi-stable higher energy state. The radiation exposed flexible phosphor plate is then processed through a laser scanner, delivering the image onto a high resolution monitor. This digital image can be enhanced and analyzed whilst the phosphor screen is automatically erased for immediate reuse. The image can then be interpreted, reported and digitally stored for future retrieval or analysis.

CORROSION UNDER PIPE SUPPORT

This common form of outside corrosion occurs, when pipelines are lying on steal or concrete, or are hanging in clamps. Because of temperature changes, the pipeline is moving over the support, which can cause damaging of the coating of the pipeline. With the combination of water, corrosion occurs.
The method of lifting and inspection during process is not acceptable because of the high risks which are involved. National NDT is utilizing the Ultrasonic technique which is called through transmission or pitch and catch whereby two angle probes are used, one transmits the sound and the other receives. Corrosion depths under or around the supports are measured by the amplitude of the signal received from the transmitting probe. Inspection can be carried out on +-20 - 25 supports per 9 hour shift depending on pipe sizes. This technique has been proven to be cost effective & reliable and approved by Shell & BP Refinery South Africa.

HEAT TREATMENT

Heat Treatment of steel and other suitable metals involves the heating of the items to specific temperatures where desired metallurgical changes to the microstructure takes place. These temperatures can range from as low as 250˚C to temper hardened steel to as high as 1150˚C on certain Tool Steels. The main purpose of Heat Treatment is to obtain the desired Hardness, Tensile Strength, Ductility, Internal Stress Levels and Microstructure in the steel.

INTERNAL X-RAY PIPELINE CRAWLER

X-Ray Crawler is similar to conventional radiography however an x-ray source tube on a crawler device is run inside the pipe to each weld. Film is wrapped around the welds and the source tube is excited. The technique is quick and can inspect on average 100 welds per day. The advantages of X-ray crawlers are their speed and the short exposure time. The film is also crisper and much less grainy when compared to conventional radiography using Iridium type sources.

TANK CRAWLER INSPECTION

The system utilises the proven reliability of the Scorpion wall crawler with an added transverse scanner fitted to the front end. The scanner covers a 130 mm wide strip at a speed of 600 mm per second. The adjustable scanning head allows inspection of small vessels and pipes with a minimum diameter of 1m. This technique meets or even exceeds requirements of the relevant inspection standards without the need for costly rope access or scaffolding. Stored data can be viewed as either A, B or C scan.

BOROSCOPE INSPECTION (Internal inspection with camera)

Boroscopes are used for visual inspection work where the area to be inspected is inaccessible by other means. Similar devices for use inside the human body are referred to as endoscopes. Boroscopes are mostly used in non destructive testing techniques for recognizing defects or imperfections.

Boroscopes are commonly used in the visual inspection of boilers, aircraft engines, aero derivative industrial gas turbines, steam turbines, diesel engines, exchanger tubes and automotive and truck engines. Gas and steam turbines require particular attention because of safety and maintenance requirements. Boroscope inspection of engines can be used to prevent unnecessary maintenance, which can become extremely costly for large turbines. They are also used in manufacturing of machined or cast parts to inspect critical interior surfaces for burrs, surface finish or complete through-holes.

VACUUM BOX TESTING

Vacuum box testing is a non-destructive examination used when trying to locate weld seam leaks. A vacuum box and a compressor create a high or low pressure vacuum while a detergent solution is applied to the test area. The detergent bubbles, making leaks visible within the created pressure envelope.

UNDERGROUND PIPE/CABLE LOCATOR

Buried utilities represent a major challenge to electricians who need to trace and trouble shoot such systems. They also represent a hazard to excavation crews. Improperly performed digging can cause cable or pipe damage resulting in personal injury, costly repairs and penalties. Using superior design and powerful software, NNDT offers several new performance features, establishing them as the new standard for locating and pinpointing faults in the underground systems. Distance sensitive Left/Right indication guides the user to the exact location of the buried utilities which saves time and effort not available on standard locators. The Signal Select and Distortion Alert provide superior accuracy by visually indicating a clean signal of the traced line. versus "ghost and 'return' path of false signals coming from the neighboring lines, and keeping the user on the target line.

ULTRASONIC PHASED ARRAY

Phased Array Ultrasonic Testing (PAUT) is an advanced non-destructive examination technique that utilizes a set of ultrasonic testing (UT) probes made up of numerous small elements, each of which is pulsed/phased individually with computer-calculated timing. This technique can be used to inspect more complex geometries that are difficult and much slower to inspect with single probes. PAUT can be used to inspect almost any material where traditional UT methods have been utilized, and is often used for weld inspections and crack detection.

Tube Inspection Techniques

EDDY CURRENT

Conventional eddy current testing is applied when testing non-ferromagnetic heat exchanger tubes. The test is performed with a bobbin coil that produces an electromagnetic field in the tube. This allows the inspection to have greater sensitivity on the inside diameter of the tube where defects are most likely to occur and with the use of multiple frequencies we are able to penetrate 100% of tube wall thickness in order to detect flaws at variable depths. When the probe is pulled across a discontinuity, the electromagnetic field is distorted in per portion to the discontinuity size and relationship to the field. This distortion in magnetic field changes the coil impedance that is related to the discontinuity. Because of this coupling effect of the eddy current probe to the material it is crucial to have a properly cleaned tube and to know tube dimension prior to commencing the inspection. The eddy current testing method detects pits, wall loss and cracks

Eddy Current inspection is a very fast technique with data acquisition rates of up to 2m/sec being feasible, making it an ideal technique for the inspection of equipment with large numbers of tubes. Between 600 -1000 can be inspected during a shift depending on the tube lengths.

REMOTE FIELD TUBE INSPECTION

Remote field testing (RFT) is applied in the testing of ferromagnetic heat exchanger tubes such as those made of carbon steel. The test is performed with a bobbin coil that transmits an electromagnetic field in the tube. These coils look similar to those for saturation only the housing is longer and there are two connections to the testing unit as opposed to one. . RFT is a relativity fast technique. For example, it is possible to test from 400-420 5-6 meter heat exchanger tubes in a 12-hour shift. This depends both on how clean the tubes are and to some extent the number of defects or indications needing evaluation. Remote field testing is limited to detection of large discontinuities and severe wall loss.

MAGNETIC FLUX LEAKAGE

MFL is capable of detecting the presence and location of significant longitudinally or transversely orientated defects such as pits, scabs, slivers, gouges, roll-ins, laps, seams, cracks, holes and improper welds in ferromagnetic tubes under inspection. In addition, the severity of electromagnetic indication produced by the discontinuity may be estimated and a rejection level set with respect to the magnitude of the electromagnetic indication produced by the discontinuity. Thickness measurement of piping and storage tank pressure vessels.

INTERNAL ROTARY INSPECTION SYSTEM (I.R.I.S)

Unlike all the tube inspection techniques which operate on magnetic or electromagnetic principles the IRIS, technique is based on ultrasonics. As shown in the attached illustration a beam from an ultrasonic transducer is reflected from a mirror set at 45 degrees so that the reflected ultrasonic beam impinges on the tube I.D. at right angles. Part of this beam is then reflected from the tube I.D., while the remainder is transmitted through the wall thickness and is reflected from the tube O.D. This technique can detect defects with a diameter down to 1.5 to 2.0mm and defect depth can be measured to an accuracy of less than 0.1mm. The time difference between the two reflected signals is then used to measure the tube wall thickness. The inspection of the tube can be viewed in B, C and D-scan.

Forerunners

Certifications

We are proud to say that we are compliant with Industry standards : 9001 , 14001 , 45001 and have been certified by SHEQ National CERT (Pty) Ltd

ISO 9001

ISO 9001 is the international standard that specifies requirements for a quality management system (QMS). Organizations use the standard to demonstrate the ability to consistently provide products and services that meet customer and regulatory requirements. It is the most popular standard in the ISO 9000 series and the only standard in the series to which organizations can certify.

ISO 14001

ISO 14001 is the international standard that specifies requirements for an effective environmental management system (EMS). It provides a framework that an organization can follow, rather than establishing environmental performance requirements.

ISO 45001

ISO 45001:2018 has been designed to act as a single standard to promote better occupational health and safety (OH&S) management around the world. It incorporates new concepts on OH&S management, helping to strengthen both leadership, management of risk and worker involvement. Implementation of this new standard aims to reduce potential risks to both employees and employers, by reducing the cost of lost work days and regulatory action that can result from poor OH&S management.

Clients

WE AREA AN APPROVED SUPPLIER TO

Sapref Shell BP & Petroleum refiners
Shell Chemicals (Pty)Ltd
Engen Refiners
Chevron Refinery (Cape Town)
Transnet
Illovo Sugar
Bevline Mechanical Projects
Frontier Pipelines
M & B Engineering
Pipeline Erectors
Fast Move electrical
RPM Pipelines
Innovative Industries
Rex Engineering
FNC Lavalin
PDPS
Mondi paper Merebank
LHL Egineering
Duy's Engineering
Murray & Roberts
Sasol
Fluor Global Systems
FFS Refiners
Independant Minds
Trotech engineering
Kinsey Alloy
Ethekwini Water Services
WK Construction
SHM Engineering cc
Vodacom
Group Five Oil And Gas

OUR INTERNATIONAL CLIENTS

Stork RBG – Middle East
Cooper Heat – Middle East
Sony Sugar – Kenya
ALS Globas NDT – Australia
NDTS Inspection Services – Kazakhstan
Sonamatic – New Zealand
John Thompson Actom – Malawi
Illovo Sugar – Tanzania
Illovo Sugar – Zimbabwe
Illovo Sugar – Malawi
M.W.I.S Mozambique
SNC Lavalin – Madagascar
PGBI – Mozambique
WK Group- JV – Mozambique


THAMI
SHWABEDE

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