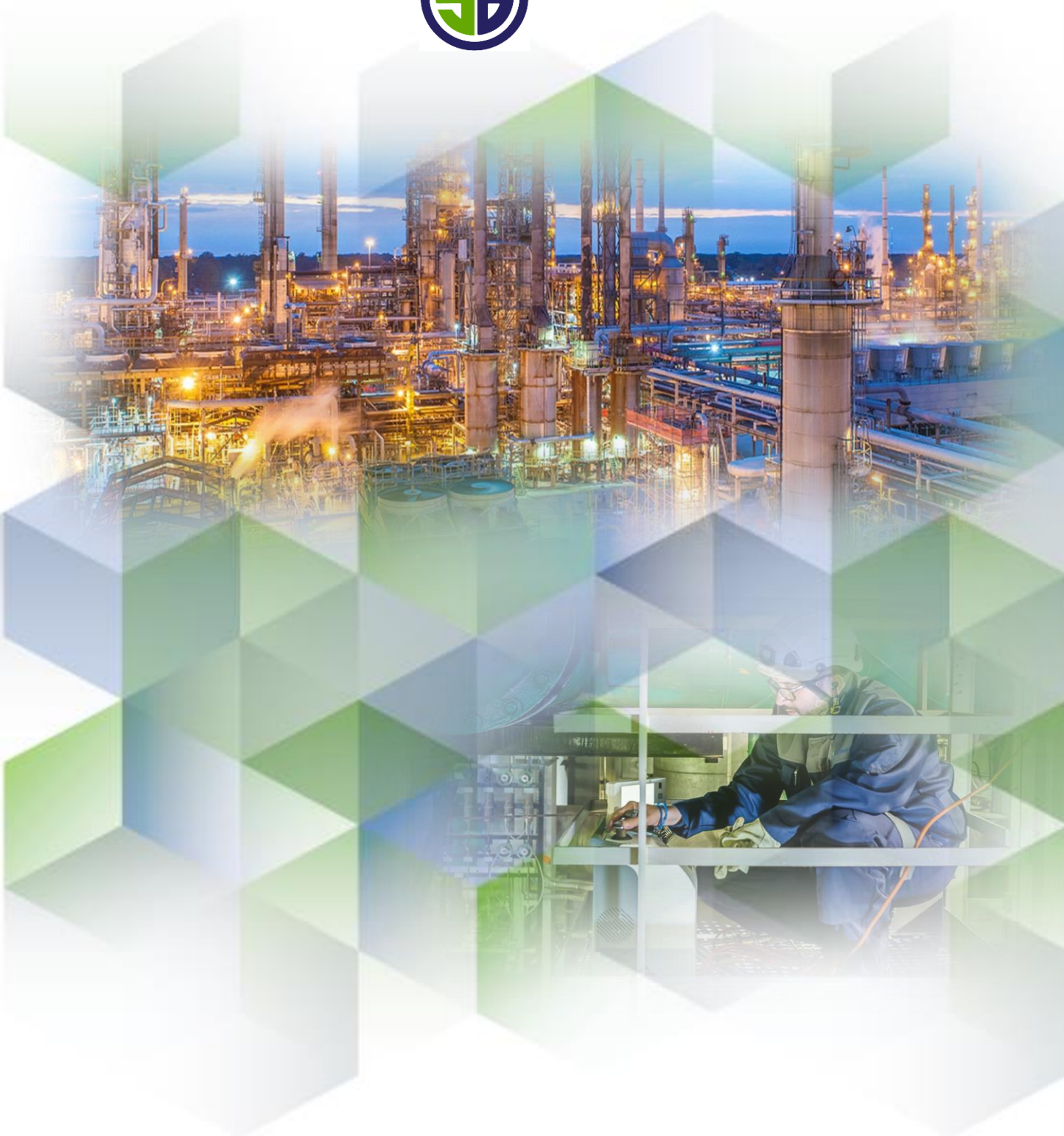
SG ENGINEERING & INSPECTION PTE LTD

Safety is our Priority & Quality is our Standard



Inspection and Engineering Services

www.sgeipl.com | enquiry@sgeipl.com | +65-69785854

About **SGEIPL**

SG Engineering and Inspection is specialized in “Non-Destructive Testing” caters to all types of industries in Singapore such as Construction, Oil & Gas, Petrochemical, Manufacturing and Shipyards.

As SG Engineering and Inspection is approved by “Singapore Accreditation Council“ (SAC Singlas body), we can provide a full inspection service as per regulatory, deploy with local and international standards.

Our inspection laboratory is equipped with a continuous Technological Innovation system. Along with, the proficiency test and reliability are helping us to build a constant reputation with the client. It has driven us to provide the best in services to the client.

We are Certified

BCA

ACCREDITED CERTIFICATION BODY
SAC
Cert No.: LA-2021-0793-D

bizSAFE 3

Why Choose **SGEIPL?**

ONE STOP SOLUTIONS

INDUSTRY EXPERTS

COMPANY WIDE COMMITMENT TO SAFETY

WORLD CLASS QUALITY PROCESSES AND SYSTEMS

DIGITIZED INSPECTION PROCESS THROUGH ERP SYSTEM WITH FAST AND ACCURATE

WELL TRAINED AND CERTIFIED TECHNICIANS

+ Validates the integrity of your materials, processes and components utilizing advanced testing methods and techniques

+ Detects deficiencies prior to failure

+ Ensures quality, safety and productivity in your critical components, equipment, and structures.

+ Minimizes both scheduled and unscheduled downtime.

+ Detects and characterizes damage mechanisms utilizing specialized techniques.

Our Experts Knowing What You Need

Our Conventional NDT Testing:

- Radiography Testing
- Ultrasonic Testing
- Ultrasonic Thickness Measurement Survey
- Magnetic Particle Testing
- Penetrant Testing
- Eddy current Testing
- Visual Testing
- Hardness Testing
- Positive Material Identification (PMI)
- Heat Treatment Services
- Ferrite Testing
- Holiday Testing
- Remote Visual Inspection (Borescope, PTZ, Drone, Ground Based RVI – Push Camera, Robotic Crawler)
- Vacuum Box Testing
- Infrared Thermography
- Painting / Coating Thickness Measurement

Our Advanced NDT Testing:

- Phased Array Ultrasonic Testing (PAUT)
- Time of Flight Diffraction (TOFD)
- Tube Inspection
- Magnetic Flux Leakage (MFL Tank Inspection)
- Drone Inspection
- Concrete NDT Testing
- Computed / Digital Radiography Testing
- Long Range Ultrasonic Testing (LRUT)
- Alternating Current Field Measurement (ACFM)

Our Specialized Services:

- NDT Level III Consultancy Services
- Training and Certifications
- Technical Manpower Supply
- Rope Access Services
- API Services
- Audit Consultancy Services
- Third Party Inspection Services
- QA/QC Services

Our Services for Industries

- ∞ Oil and Gas
- ∞ Chemical and Petrochemical
- ∞ Power Generation
- ∞ Construction
- ∞ Manufacturing
- ∞ Transportation
- ∞ Pharmaceutical
- ∞ Food
- ∞ Defence
- ∞ Processing
- ∞ Aerospace

CONVENTIONAL NDT SERVICES

Our In-service Inspection Department NDT level-III, and API Inspectors have been pioneer for this industry, more than 20 years experienced, well versed technical knowledge, an excellent reputation for solving complex tasks.

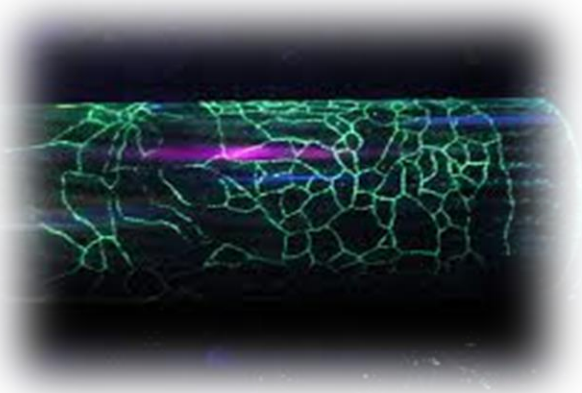
SG understands the customer needs as per codes and standards without delaying schedules, delivering a high-quality service, reliability, flexibility, and speed of response are key driving factors for our NDT Services.

PENETRANT TESTING

Liquid Penetrant Testing (PT) reveals surface flaws by the "bleed-out" of a penetrating medium against a contrasting background. This is done by applying penetrant to the pre-cleaned surface and flaw of the item being inspected. The penetrant liquid will be drawn into any surface opening by capillary action. Following removal of excess penetrant an application of a developer reverses the capillary action and draws penetrant from the flaw. The resultant indications reveal the presence of the flaw so that it can be visually inspected and evaluated.

We provide the following services with this method:

- Visible Penetrant
- Fluorescent Penetrant
- High Temperature Penetrant



MAGNETIC PARTICLE TESTING

Magnetic Particle Testing (MPT) is used to locate surface and slight subsurface discontinuities in ferromagnetic materials. Such flaws present in a magnetized part will cause a magnetic field to leave the part. If magnetic particles are applied to this surface, they will be held in place by the flux leakage to give a visual indication.

We provide the following services with this method:

- Yoke Methods (AC, DC and Permanent)
- Cable Wrap Method

Magnetic Particles

- Dry Powder
- Wet Particles (Fluorescent, Color Contrast)

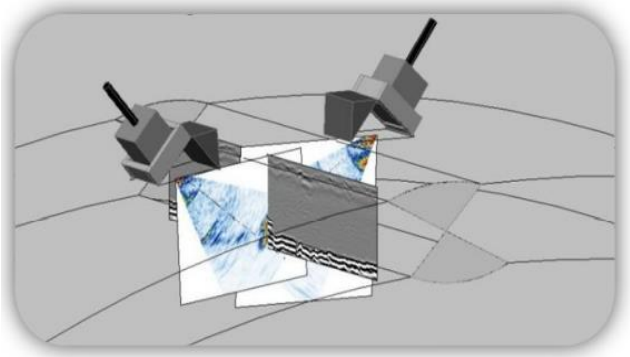
EDDYCURRENT TESTING

In Eddy Current Testing (ET), a coil carrying an AC current is placed close to the specimen surface, or around the specimen. Flaws and material variations in the specimen affect the strength of the eddy currents. The presence of flaws, etc. is therefore measured by electrical changes in the exciting coil.

ULTRASONIC TESTING
PULSE-ECHO Method

Ultrasonic Testing (UT) is a non-destructive inspection method that uses high frequency sound waves (ultrasound) that are above the range of human hearing, to measure geometric and physical properties in materials. One of the primary benefits of UT is that it is a truly volumetric test. UT can determine not only the length and location of a flaw, but it will also provide information as to the type of flaw found.

We provide the following services with this method:



ADVANCED UT

- Corrosion Mapping (AUT C-Scan)
- AUT HIC/SOHIC C-Scan and Welds
- Advanced UT Techniques
  - High Temperature AUT
  - Creeping Wave
  - Stainless Steel and Austenitic Welds
  - Dissimilar Metal Weld (DMW)
  - High Temperature TOFD

APPLICATIONS

- Pipeline Girth Welds
- AUT in lieu-of Internal Inspections
- Sizing of Stress-Corrosion Cracking
- Thin-walled Austenitic Welds
- Dissimilar Metal Welds
- UT In-Lieu of RT
- Heavy Wall and Complex Geometries
- Customized Applications

CONVENTIONAL UT

- Crack Sizing
- Immersion Testing
- Shear Wave Weld Inspection
- RAW Material and Manufactured Products
- High Temperature UT
- Thickness Measurement

Leak Testing

Hydrostatic test is a method by which pressure vessels, piping systems, boilers and tanks can be tested for strength and leaks. Sun Marine Engineering provides this hydrostatic testing service with all necessary equipment and qualified personnel. This service provided with all necessary test reports and documentation. It can be customized to suit client requirements from a small equipment/piping testing to a complete plant.

The pressure test can be performed as two methods.

- Hydrostatic
- Pneumatic.

A Hydrostatic test is performed by using water as the test medium, whereas a Pneumatic test uses air, nitrogen, or any non-flammable and non-toxic gas. Pressure tests must always be performed under controlled conditions, following an approved test plan, and documented in a test record. A single approved test plan may be used for several similar tests, but a separate test record is required for each.

HOLIDAY TESTING

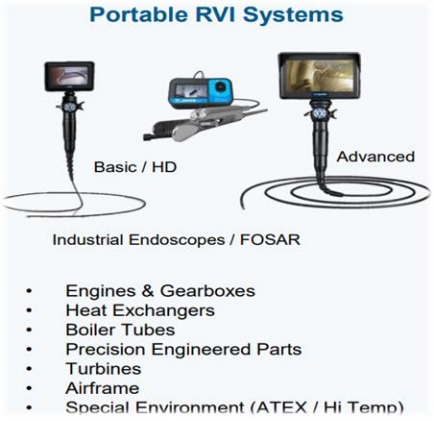
Holiday testing is a non-destructive test method applied on protective coatings to detect unacceptable discontinuities such as pinholes and voids. The test involves checking an electric circuit to see if current flows to complete the circuit.

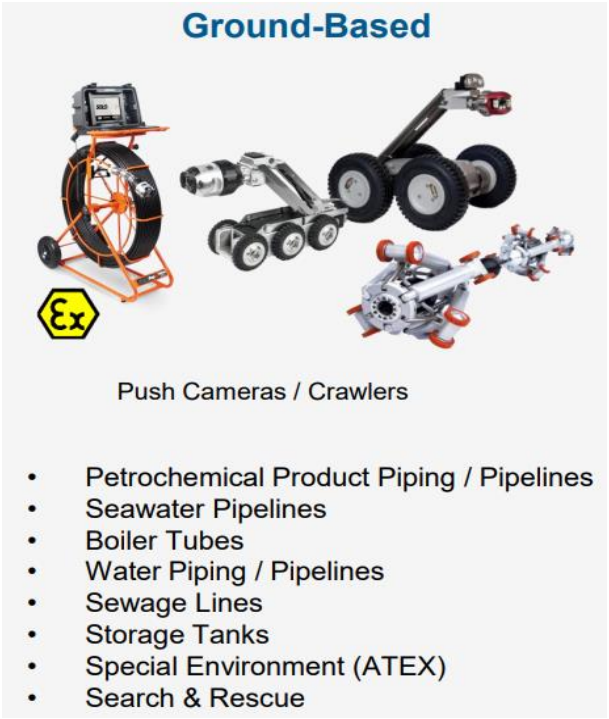
Welding and Visual Inspection

Visual Inspection (VT) relies upon the detection of surface imperfections using the eye or remotely using borescopes or videoscopes. Normally applied without the use of any additional equipment, VT can be improved by using aids such as a magnifying glass and white light to improve its effectiveness and scope.

We provide the following services with this method:

- **Structural Steel Inspection**
- **Welding Inspection**
- **In-Service Inspection**
- **Confined Space (Vessel, Tank, Pipelines, Ducts, Etc)**





RADIOGRAPHY

We also have advanced radiography capabilities in our in-house labs to inspect newly-manufactured components for the aerospace, automotive, and other manufacturing industries. SGEIPL's conducts RT inspection services in the field for refineries, pipelines, nuclear and fossil plants, and many other industrial clients.

RT inspections are sensitive to corrosion, changes in thickness, voids, cracks, and material density changes. SGEIPL's inspects for these damages for a wide range of large and small assets, including **Piping, Pipelines, Castings, Forgings, Welds, Pressure Vessels, Valves etc.**

Gamma Radiography

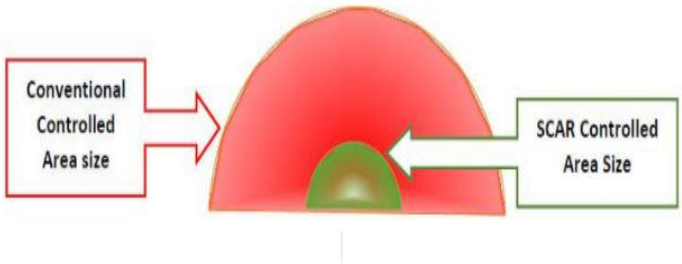
Gamma radiography is carried out using radioactive isotope sources (e.g. Selenium-75, Iridium-192) although its sensitivity is generally less than that achievable by X-ray radiography. It is widely used for fieldwork because of its greater portability.

X-RAY Radiography

X-ray equipment is usually described by the electrical voltage across the X-ray tube: thus, 300 kV X-rays. The higher the voltage, the greater the penetrating power of the radiation; industrial X-ray equipment ranges from about 20 kV to 20 MV and the most powerful equipment's can be used to radiograph up to 500 mm (20") steel.

SCAR Radiography

SCAR or Small Controlled Area Radiography is the concept of controlling the radiation utilized for RT allowing. for radiographic inspection without restrictive shooting windows (24/7 radiography concept), in close proximity. to other trades, and without impacting critical sensor systems.



Computed Radiography (CR)

Computed radiography (CR) is based on the persistent marking of a radio luminescent screen using X-rays or Gamma rays. CR technology is portable and can be used in almost any environment.

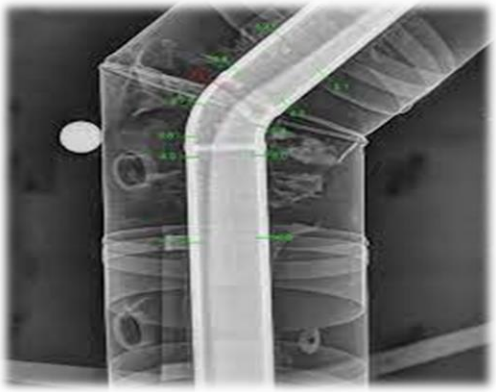
The CR method is mainly used to inspect forged parts, castings, and welds. This method also validates the integrity of piping for corrosion and erosion.

- Portable.
- Can be used where portable dark rooms cannot be installed.
- Precise sizing, improved imaging, and faster analysis with the help of software tools.
- Faster and more cost-efficient than conventional radiography.
- No chemicals required.
- Electronic data storage.
- All information can be acquired from a single position, even with complex geometries.
- Weaker X-rays or Gamma rays for a smaller safety perimeter.

Digital Radiography (DRT)

Direct Radiography (DR) is a type of imaging using X-rays or Gamma rays. This method uses numeric radiation sensors instead of traditional photo film. The DR technology is completely portable and can be used in almost any environment.

DR is mainly used for qualitative inspection of forged parts, castings, welds and also to validate the integrity of piping (corrosion and erosion).



- High quality numeric image in a few seconds for on-the-spot analysis.
- Precise dimensioning, better image quality, more efficient analysis thanks to software tools.
- No chemicals required.
- Electronic data storage.
- The customer does not need specialized equipment or software to visualize data.
- All information can be acquired from a single position, even with complex geometries.
- Weaker X-rays or Gamma rays for a smaller safety perimeter.

COATING THICKNESS

Dry Film Thickness is measured for cured coatings (after the coating dries as per manufacturer) spot coating verification made the accuracy of the layer thickness and uniformness.

POSITIVE MATRIAL IDENTIFICATION

PMI can determine the alloy composition of materials and is a well-established technique that can either be performed in the field using handheld devices or in a laboratory.

Two methods are X-Ray Fluorescence (XRF) and Optical Emission Spectroscopy (OES).

X-Ray Fluorescence (XRF)

XRF works by exposing the material to be tested to an X-ray, causing the material to emit its own secondary X-rays in response. The levels of X-rays emitted by any material are always consistent based on the composition of that material. Thus, by analysing the secondary X-rays it is possible to determine the chemical composition of any unknown material. However, it should be noted that XRF cannot distinguish between material grades in certain elements such as carbon and silicon, among others.

Optical Emission Spectroscopy

OES works by exposing the material to an electrical spark and an electrode, often in an atmosphere of Argon. This spark works in a similar way to the X-rays in that it forces the material to emit light, which will differ in colour and intensity based on the material that it is emitted from. It tends to offer a more complete view than XRF and is the only method that can distinguish between levels of carbon in a material.

FERRITE TESTING

Measuring Ferrite content in Austenitic and Duplex stainless steel.

Ferrite test is accurate way to measure delta ferrite content in austenitic stainless steel, without destroying the method as NDT technique.

VACCUM BOX TESTING

Vacuum box testing is used for locating welding leaks in storage tanks. A vacuum box and a compressor create a high or low-pressure vacuum and a detergent solution is applied to the test area. The detergent bubbles help to identify the leaks within the created pressure envelope.

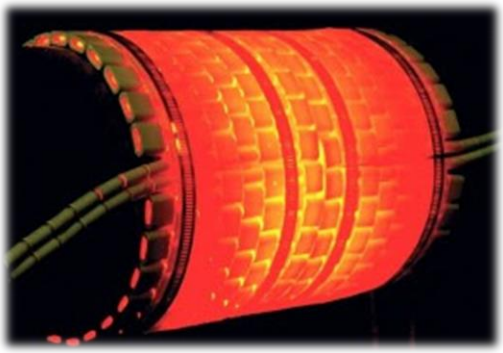
HARDNESS TESTING

Hardness is a characteristic of a solid material expressing its resistance to permanent deformation, penetration, bending, cutting, scratching or other physical force. Hardness testing enables to evaluate a material's properties, such as strength, ductility and wear resistance and helps to determine whether a material is suitable for the purpose required.

HEAT TREATMENT SERVICES

Post-weld heat treatment is a process that involves elevating the temperature of a material following a welding process. The post-weld heat treatment is performed to alleviate residual stresses, increase the strength, increase, or decrease the hardness, and reduce the risk of cracking.

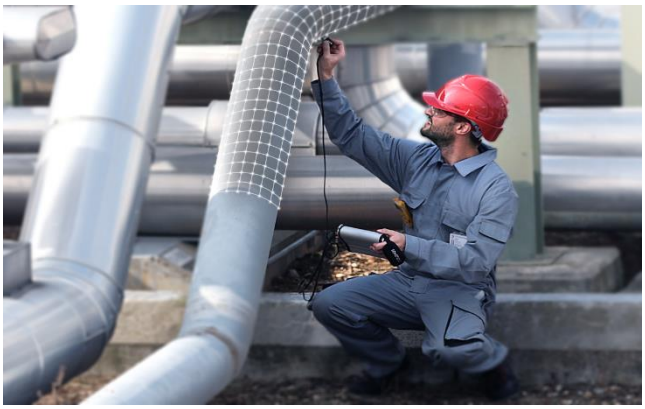
Preheating in welding is used to help ensure weld quality and reduce the occurrence of cracking and other problems that can result in costly rework. Welding preheat is commonly used before welding steel or steel alloy pipes or plates. It reduces the cooling rate of the weld and drives out moisture, which in turn helps prevent hydrogen build-up and the potential for cracking.



UTG THICKNESS MEASUREMENT

Ultrasonic Testing Gauge (UTG) used to inspect the thickness of a coating and uncoated material. An ultrasonic thickness gauge works by measuring how long it takes for a sound pulse to travel through a material and reflect from in internal surface, this is then displayed on a digital screen.

This commonly used method can be applied to a wide range of structures and components such as ship hulls, piping and pressure vessels and structural steel.

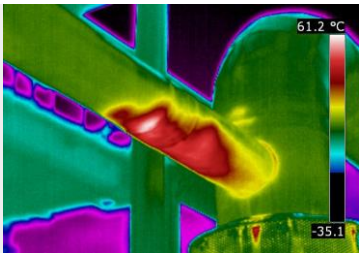


INFRARED THERMOGRAPHY (IR)

Infrared thermographic surveys help to detect areas of abnormal temperature, diagnose problem areas, and determine their severity in electrical systems and mechanical equipment. SGEIPL offers comprehensive services to meet your IR thermography needs.

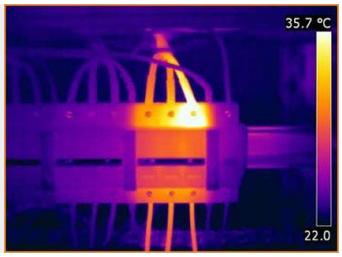
OIL AND GAS

- Flare Inspection
- HSSE Surveillance
- Pipeline Leakages
- Heat Insulation



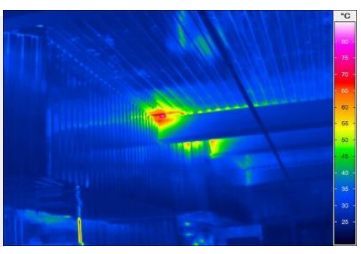
ENERGY

- Hotspot Detection
- Predictive Maintenance
- Asset Handover Verification
- Efficiency Metrics



INFRASTRUCTURE

- Roof Inspection
- Facade Inspection
- Heat Insulation
- Water Pooling



PUBLIC SAFETY

- Search & Rescue
- Fire Fighting
- Disaster Damage Assessmen
- Security Surveillance

ADVANCED NDT SERVICES

SGEIPL'S Advanced Non-Destructive testing (ANDT) inspection services are performed by trained experts who are well-versed in their correct application and operation. Using ANDT, there's a high probability of flaw detection than with traditional NDT methods.

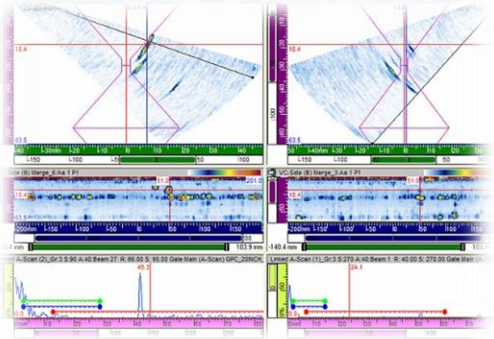
SGEIPL's advanced NDT services use the latest inspection technologies to identify anomalies, analyse their characteristics and aid plant personnel in making run-repair-replace decisions on potentially-damaged assets.

PHASED ARRAY ULTRASONIC TESTING (PAUT)

Phased Array Ultrasonic Testing (PAUT) is a focused inspection technique designed to incorporate beam technology to detect complex geometries & sizing defects.

SGEIPL's Phased Array (PA) inspection services are an accurate, efficient, and reliable volumetric examination technique offering real-time imaging to reliably detect and measure corrosion, cracking, flaws, and other defects across a wide variety of materials, components, and industries.

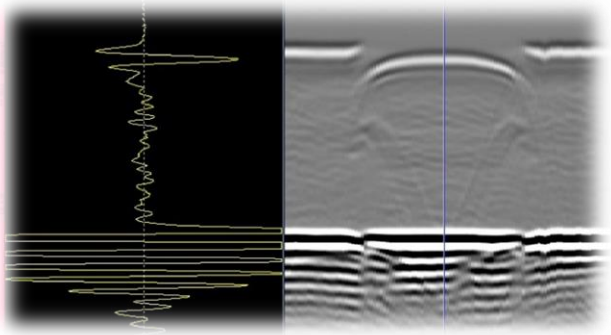
- Excellent repeatability
- Increased inspection speed
- Accurate results
- Ability to inspect complex geometries
- Ability to inspect large areas
- Permanent auditable results
- No safety hazards



TIME OF FLIGHT DIFFRACTION (TOFD)

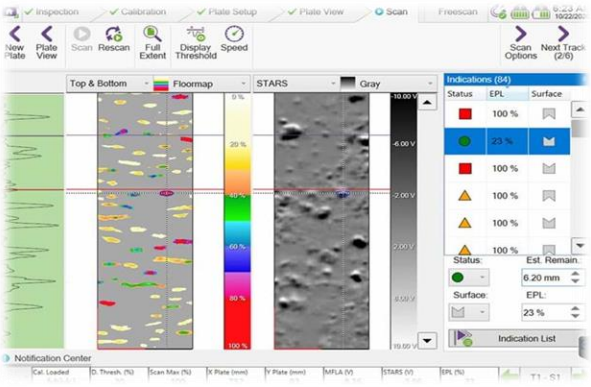
Time-of-Flight Diffraction (TOFD) is an advanced NDT inspection method which is widely used for weld testing. It is very effective in detecting defects such as cracks, lack of fusion and slag inclusion.

TOFD is an innovation of ultrasonic testing which uses two probes. One probe sends the ultrasound and the other one is used as a receiver. Instead of recording the ultrasound that is reflected by defects, it detects diffraction of sound waves that emanate from the tips of a defect. TOFD inspection provides accurate information about the length and height of defects. Unlike other testing methods, TOFD can detect flaws regardless of their orientation.



MAGNETIC FLUX LEAKAGE(MFL)

Magnetic Flux Leakage (MFL) is a non-destructive technique that uses electromagnetism to inspect for flaws or material degradation in steel structures. In the oil and gas industry, it is often used to search for flaws in piping and pipelines, as well as aboveground storage tank floors. MFL uses magnets to temporarily magnetize the structure. If there are flaws present, the magnetic field created will show distortions, signalling the presence of things like corrosion, pitting, and wall loss.



CONCRETE NDT TESTING

We are specialized in the advanced inspection and non-destructive evaluation of concrete structures. We offer a wide range of customized engineering solutions for cost-effective, timely, and reliable inspection, condition assessment, and maintenance of civil infrastructure.

SGEIPL is providing services for

- Structural Condition Assessment
- Bridge Inspections
- Concrete Scanning and Imaging
- Corrosion Inspection
- Non-destructive Evaluation for Concrete Structures, Tanks,
- Inspection of Parking Garages

SGEIPL providing techniques

- Schmidt Hammer (Rebound Hammer)
- Microwave Scanner (Electromagnetism)
- GPR (Ground Penetrating Radar)
- Pull-off Test
- Ultrasonic Pulse Echo (UPE)
- Ultrasonic Pulse Velocity (UPV)
- Eddy Current
- Infrared Thermography
- Profoscope(+)
- Profometer
- Impact Echo

DRONE INSPECTION

PROJECT PROGRESS MONITORING

CONFINED SPACE AND TUNNEL INSPECTION

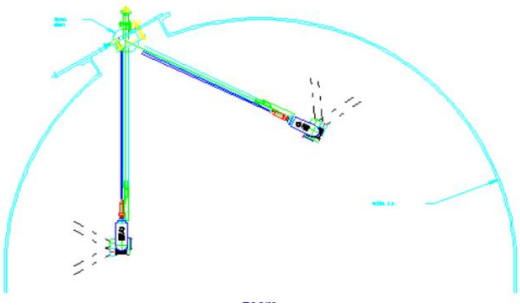
PLANT INSPECTION

SHIP SURVEY

DRONE THERMOGRAPHY (IR)

PTZ CAMERA SYSTEM

A unitized pan, tilt, light, colour, zoom video inspection system was developed for use in confined-space, and hazardous-area locations associated with these components. These inspection systems shall be utilized to check the visual condition of inspection item or vessel.



GROUND-BASED RVI SYSTEMS

Push Cameras / Crawlers

- Petrochemical Product Piping / Pipelines
- Seawater Pipelines
- Boiler Tubes
- Water Piping / Pipelines
- Sewage Lines
- Storage Tanks
- Special Environment (ATEX)
- Search & Rescue

Push Camera Systems

Ryonic Crawler System

Robotic Crawler Systems

TUBE INSPECTION

Tubes can be inspected periodically to detect and size discontinuities e.g., pits, erosion, cuts, grooves, and wear. Correct technique selection is critical and depends on the tube material (ferromagnetic or non-ferromagnetic) and the type of discontinuities expected.

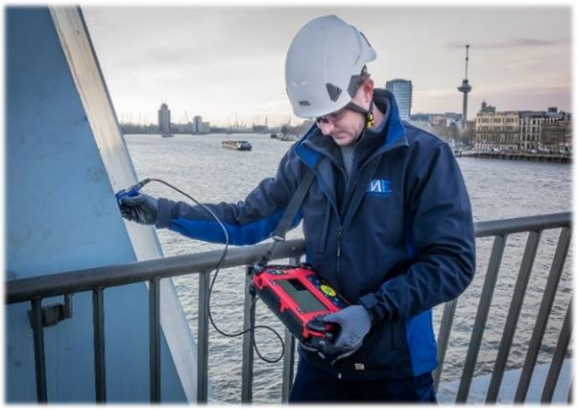
Widely applied techniques are:

- Eddy Current Testing (ECT)
- Remote Field Technique (RFT)
- Magnetic Flux Leakage (MFL)
- Internal Rotary Inspection System (IRIS)
- Remote Visual Inspection (Borescope)
- Near Field Testing (NFT)

Material/Tech		ECT	ECA	IRIS	RFT	NFT	NFA	MFL	PSEC
Non-ferromagnetic	Tube	●	●	●	●	●	●	●	●
	Finned tube	●	●	●	●	●	●	●	●
Low ferromagnetic	Tube	●	●	●	●	●	●	●	●
	Finned tube	●	●	●	●	●	●	●	●
Ferromagnetic	Tube	●	●	●	●	●	●	●	●
	Integral finned tube	●	●	●	●	●	●	●	●
	Aluminum finned tube	●	●	●	●	●	●	●	●

Defect/Tech	ECT	ECA	IRIS	RFT	NFT	NFA	MFL
ID pitting	●	●	●	●	●	●	●
OD pitting	●	●	●	●	●	●	●
Axial cracking	●	●	●	●	●	●	●
Circumferential cracking	●	●	●	●	●	●	●
ID corrosion	●	●	●	●	●	●	●
OD corrosion	●	●	●	●	●	●	●
At tubesheet	●	●	●	●	●	●	●

● Excellent ● Acceptable, but limited ● Not suitable



LONG RANGE ULTRASONIC TESTING (LRUT)

Long Range Ultrasonic Testing (LRUT) is an advanced non-destructive examination technique that was developed for testing large volumes of material from a single test point.

It's the uniform spacing of the ultrasonic transducers around the circumference of the pipe allows for the guided waves to propagate symmetrically along the pipe axis, providing complete, 100% coverage of the pipe wall, including areas such as at clamps and sleeved or buried pipes.

ALTERNATING CURRENT FIELD MEASUREMENT (ACFM)

Alternating current field measurement (ACFM) is an electromagnetic inspection technique that introduces an alternating current into the surface of a component to detect surface-breaking cracks. Immediate defect sizing and recording is a major benefit compared to other NDT methods.

With ACFM's lower cleaning requirements and fewer false calls, inspections are significantly

The American Society for Nondestructive Testing

ASNT & PCN NDT LEVEL III CONSULTANCY SERVICES

Selection and implementation of right non-destructive testing methods and techniques for the application.

Preparation of Advanced and Conventional NDT procedures.

Preparation of written practices as per ASNT recommended practice SNT-TC-1A and ISO 9712.

Review of procedures based on International, National, or in-house Standards & Specifications.

Attend Client audits, process verification checks, and technical discussions with clients, sub-contractor, and auditors.

ASNT NDT LEVEL II TRAINING

The SGEIPL offers best quality training for NDT Level I and Level II certifications as per ASNT SNT-TC-1A from the NDT Experts.

Each training module contains ample practical NDT testing exposure. A combination of classroom and hands on practical sessions quickly improve the NDT skills of trainees.

OFFERING COURSES: Ultrasonic Testing, Eddy Current testing, Radiography Testing, Magnetic particle testing, Liquid Penetrant testing, Radiography Film Interpretation course, Visual Inspection Training Course, Ultrasonic thickness Gauging.

ROPE ACCESS SERVICES

Rope access makes difficult-to-reach locations accessible in a safe and efficient manner. It refers to a set of techniques whereby ropes, and specialised hardware are used for working at heights. SGEIPL has a team of well trained and highly experienced rope-access technicians who assist in a variety of situations such as specialised rigging and lifting projects, and maintenance and repair activities.

SGEIPL Providing Rope Access Services to

- Bridges
- Commercial Buildings
- Storage Tanks
- Refinery and Petrochemical industries
- Towers
- Anchorage Ship Inspection

API & QA/QC SERVICES

SGEIPL Provides Experienced AWS/CSWIP 3.1 & 3.2 /API 570 / 510 / 653 / NACE 1, 2, 3 Coating , WQT Preparation and ASNT / PCN Level 2 & 3 for your inspections.

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