Non Destructive Testing (NDT)

TCR Engineering Services

A Material Testing Laboratory in India

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Non Destructive Testing (NDT) Services

At TCR Engineering Services, a team comprising of expert metallographers and metallurgists perform Radiography Testing (Gamma/X-Ray), Ultrasonic Flaw detection, Magnetic Particle and Liquid Dye Penetrant testing, Ultrasonic Thickness Gauging survey, Storage/Sphere Tank Inspection.

We provide on-site In-situ Metallography and Positive Material Identification (PMI) using portable alloy analyzers and portable hardness testing equipment. We can determine thickness of metal through coatings without removing them. We also offer tests on Pre and post Heat treatment, Residual Life Assessment (RLA) of Boilers and pressure vessels. At times, we can also provide Training and Certification of NDT technicians as per ASNT level I and II.

Field service metallography and structural inspection are also offered. Our experienced personnel are respected for their integrity and recognized by all the relevant inspection authorities.

Wide Range of Customers

Our NDT services are routinely performed in the following market sectors: nuclear / energy, space and aerospace, petrochemical, automotive, construction, transport, defense and general engineering.

TCR Engineering's NDT facilities include:

- Kraut Krammer USK 7 Ultrasonic Flaw Detector
- Dye Penetrant Test
- Portable Alloy Analyzers
- Remote operated Radiography Camera including Lead shielded and Depleted Uranium Shielded
- Remote control units for camera
- Radiation Surveymeters and Radiation Dosimeters
- Collimators
- X Ray Machine Andrex 250KV
- Ultrasonic Flaw Detector and an Ultrasonic Flaw Detector with printer facility
- Ultrasonic thickness gauges
- Magnetic Yoke with AC/DC and Permanent
- Ultraviolet light for MPI
- Post Weld Heat Treatment Equipment with Control Panel and Recorder

NDT Capabilities include:

- In-Situ Metallography
- Ultrasonic Inspection
- Dye Penetrant
- Magnetic Particle Testing
- Radiography
- Weldability Study
- Visual Inspection and Field Services
- Portable Hardness
- Non-Destructive Testing; ASNT Level III and Level II
- Structural Steel Inspection
- Residual Life Assessment (RLA) of Boilers and pressure vessels
- Training and Certification as per ASNT Level I and II

In-Situ Metallography

In-situ metallography is performed as NDT on actual site with a team comprising of expert metallographers and metallurgists. It is used to find out in-service degradation of critical components of process plants operating under high temperature/ high pressure/ corrosive atmosphere. It provides damage assessments of fire affected equipment of plants. Microstructure survey for critical components viz., Boilers, Pipelines, Reactors and Vessels for condition monitoring and health assessments. TCR can also develop a data bank of critical components of equipment of process plant by periodical monitoring for preventive maintenance and planning for inventory control. TCR can provide suggestions on repair welding of used components of process plants. In-situ metallography checks the microstructure of component for intended service prior to being put in use. In-situ metallography is used for remaining life assessment studies.

Ultrasonic Inspection

Ultrasonic methods of NDT use beams of sound waves (vibrations) of short wavelength and high frequency, transmitted from a probe and detected by the same or other probes. Usually, pulsed beams of ultrasound are used and in the simplest instruments a single probe, hand held, is placed on the specimen surface. An oscilloscope display with a time base shows the time it takes for an ultrasonic pulse to travel to a reflector (a flaw, the back surface or other free surface) in terms of distance traveled across the oscilloscope screen. The height of the reflected pulse is related to the flaw size as seen from the transmitter probe. The relationship of flaw size, distance and reflectivity are complex, and a considerable skill is required to interpret the display. Complex mutiprobe systems are also used with mechanical probe movement and digitization of signals, followed by computer interpretation are developing rapidly.

Dye Penetrant

This method employs a penetrating liquid, which is applied over the surface of the component and enters the discontinuity or crack. Subsequently, after the excess penetrant has been cleared from the surface, the penetrant exudes or is drawn back out of the crack is observed. Liquid penetrant testing can be applied to any non-porous clean material, metallic or non-metallic, but is unsuitable for dirty or very rough surfaces. Penetrants can contain a dye to make the indication visible under white light, or a fluorescent material that fluoresces under suitable ultra-violet light. Fluorescent penetrants are usually used when the maximum flaw sensitivity is required. Cracks as narrow as 150 nanometers can be detected.

Magnetic Particle Testing

The Magnetic Particle Inspection method of Non-Destructive testing is a method for locating surface and sub-surface discontinuities in ferromagnetic material. It depends for its operation on the face that when the material or part under test is magnetized, discontinuities that lie in a direction generally transverse to the direction of the magnetic field, will cause a leakage field, and therefore, the presence of the discontinuity, is detected by use of finely divided ferromagnetic particles applied over the surface, some of these particles being gathered and held by the leakage field, this magnetically held collection of particles forms an outline of the discontinuity and indicates its location, size, shape and extent.

Visual Inspection Services

Non-Destructive visual inspections can be preformed on-site or at the laboratory facility, and are based upon the requirements of the client or specification. Industries utilizing this service include Fabrication, Construction, Automotive, Power Generation and Transportation. Inspections can be performed at the laboratory facility or onsite. These inspections are performed to IS, BS, ASTM, AWS, ASME (American Society for Mechanical Engineers) and many others.

Radiography

With TCR's state-of-the-art equipment such as laser alignment devices, microprocessor controlled x-ray machines and automatic film processors, we are able to increase the speed, quality and efficiency of our radiographic services.

Portable Hardness

Per ASTM E110, this testing is normally used for on-site applications or on very large samples. The TCR portable hardness unit performs the hardness testing by applying a 5 kg. Vickers load indenter and electronically converts the values in the preferred scale.

Positive Material Identification (PMI) Service

TCR Engineering's Positive Material Identification service is fast becoming an integral part of process safety management in the petroleum refining, petrochemical and electric power generation industries in India, Middle-East and Asia-Pacific.

TCR Engineering's PMI equipment includes:

- Portable X-Ray Florescence (XRF) Based Instruments:
- Metal Master 2000 (2 Nos.) from Metorex, Finland
- Metallurgist Pro 9288 from Thermo MeasureTech, USA
- XMet 3000T from Metorex, Finland
- Alloy Pro 9266 from T N Technology, USA
- Niton Model XLt from Niton Corporation, Finland

Onsite Positive Material Identification (PMI) Services

The TCR Engineering Services PMI division has expert engineering and inspection personnel to undertake incoming material inspection and provide on-site alloy verification for Quality control and Stock control purposes. TCR can analyze Melt and Weld and provide a comprehensive Maintenance assessment. Our expert engineers can provide guidance to clients in selection of test equipment and forming test standards.

Our engineers can travel across India, Middle-East, Hong Kong, China, Singapore, Malaysia, Russia, Dubai and even to places in USA, UK and the rest of Europe. PMI Service engineers travel from our offices in Mumbai, India.

Cost of PMI Services

The PMI services team at TCR undertakes assignments on a Time and Material or fixed-cost basis based upon the customer or project requirement.

About TCR Engineering Services

Founded in 1973, TCR Engineering Services (TCR) is India's most reputed and established, NABL and ISO 17025 accredited independent material testing laboratory. The core services TCR provides include Mechanical Testing, Chemical Analysis, Positive Material identification (PMI), Non Destructive Testing, Metallography, Corrosion Testing, Failure Analysis, Raw Material Inspection, Metallurgical Product evaluation, Engineering Research and Consultancy.

TCR has pioneered in introducing latest analytical facilities and has upgraded the same every decade. TCR has state-of-the art testing facilities for testing of Engineering Goods, Ferrous and Non-Ferrous Metals, Non-Metallic Materials such as Polymers, Ceramics, Glass, etc.

More than 1000 Quality driven clients (in India and a select few globally) in Aerospace, Automotive, Oil Refineries, Petrochemical plants, Chemical Processing, Defense, Nuclear Power and Capital Goods manufacturing trust TCR to handle their Material Testing and Research & Development requirements.

Engineers, Chemists, Metallurgists & Technicians, at TCR, have the qualifications, the education and the experience to meet rigorous standards in the testing field, whether serving the Private and Public Sector, Government or the Military.

Customer Service Representatives, at TCR, provide clients with up-to-the-minute information on the status of your sample through our in-house laboratory automation software. The need for responsiveness is something understood by everyone in the company. We have improved turnaround time without sacrificing quality by operating 12 hours a day in the lab, 16 hours a day in the machine shop.

TCR laboratories are located in Lower Parel, Mumbai and Electronic Zone, Navi Mumbai with a sample collection office in the Mumbai Metal market. TCR Advanced Services, a TCR Engineering affiliate company, has its laboratory in Baroda. Engineering professionals travel across India to conduct on-site material testing. International clients are served by a sales office in Washington DC, USA.

ISO 17025 Accredited Laboratory in India

TCR Engineering Services is a Bureau of Indian Standards and NABL accredited laboratory. NABL approval is from Department of Science and Technology, Government of India. NABL provides laboratory accreditation services to laboratories that are performing tests / calibrations in accordance with ISO 17025.

TCR is one of the select few test houses, in India, to be on the approved list of such organization as Bharat Heavy Electrical Ltd., Nuclear Power Corporation of India Ltd. (NPCIL), Larsen & Toubro Ltd. (L&T), Engineers India Ltd. (EIL), Toyo Engineering India Ltd., Oil & Natural Gas Commission (ONGC), Bhabha Atomic Research Centre (BARC), Vikram Sarabhai Space Centre (VSSC), Dept. of Defense, DGS&D, Indian Railways, Mumbai Municipal Corporation, Dept. of Telecommunications, Electronic Corporation of India Ltd and others.

TCR is also approved by international recognition bodies such as American Bureau of Shipping (USA), Bureau Veritas (France), Lloyds Register of Shipping (UK), Det-Norske Veritas (Norway), SGS (India) Ltd. and others.

Material Testing Laboratory Services

TCR Engineering Services' ability to provide value to our metal testing customers is based on organizing our talents into a focused set of technological capabilities. This gives us the unique ability to apply appropriate combinations of capabilities and expertise to provide multi-disciplinary solutions for our clients.

We have several testing services, but, no matter which discipline we use, one thing is certain. When you send a sample to TCR, you can have confidence in the results, because you are working with a company that has a reputation for being meticulous.

The list of services offered by TCR includes:

Mechanical and Physical Testing

Comprehensive range of Mechanical Testing with a dedicated machine shop to assist in sample preparation. Capabilities include: Tensile, Impact, Weldability, Bend, Compression, Flaring/Flattening, Hardness, Dynamic Loading, Drop Weight, Proof Load, Fasteners, Hydraulic/Pneumatic, Component Testing, and more.

Chemical Analysis

State of the art Chemical Analysis laboratory allows our expert chemists to analyze ferrous and non-ferrous metals, ceramics, glass, refractories, mineral and ferro alloys in PPB or PPM level or in percentage. Our capabilities include: Wet Chemistry, Optical Emission Spectroscopy (OES), Inductively Coupled Plasma (ICP) Spectrometer, Automatic Combustion based Carbon and Sulfur determination, Glow Discharge spectrometer for (GDS) chemical depth profiling, and more.

Positive Material Identification (PMI)

TCR Engineering's Positive Material Identification service is fast becoming an integral part of process safety management in the petroleum refining, petrochemical and electric power generation industries in India, Middle-East and Asia-Pacific. Our capabilities include: Portable Optical Emission Spectrometer and a number of Portable X-Ray Florescence (XRF) Spectrometers.

Failure Analysis and Metallography Testing

Our facilities include Optical Microscope with Image Analysis system, Micro Hardness Tester, In-situ Metallography Kits, Stress Analyzer, Dilatometer, and Electronic Polishing and Etching system. TCR can procure on-hire basis, a scanning electron microscope and an elemental analysis by EDAX.

Corrosion Testing

TCR performs a wide range of Corrosion and Stress Corrosion Tests as part of the AST, NACE or client supplied specifications. Senior staff members are available to help and advise on corrosion problems or materials selection in laboratory or on-site inspection. Routine tests undertaken to evaluate the corrosion resistance of materials to environmental corrosion, pitting corrosion, resistance of materials to stress corrosion and inter-granular attack, including HIC, and SSCC tests.

Specialized Non Destructive Testing (NDT) Services

Radiography Testing, Ultrasonic Flaw detection, Magnetic Particle and Liquid Dye Penetrant Testing, Portable Hardness detection, Ultrasonic Thickness Gauging survey and Raw Material Inspection. Residual Life Assessment (RLA) of Boilers and pressure vessels.

Locations

We welcome service and technical inquiry, from simple questions to more involved interpretations of codes and specifications. We are located at:

TCR Engineering Services Pvt. Ltd.
35 Pragati Industrial Estate,
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