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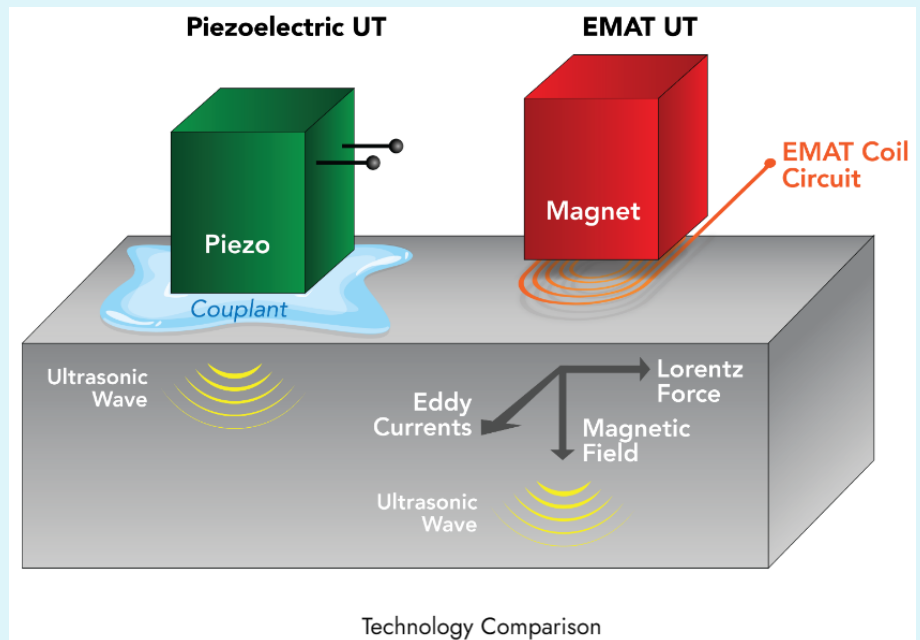
## Electro Magnetic Acoustic Transducer (EMAT)

EMAT is an Ultrasonic Testing technique that generates the sound in the part inspected instead of the transducer.

An EMAT induces ultrasonic waves into a test object with two interacting magnetic fields. A relatively high frequency (RF) field generated by electrical coils interacts with a low frequency or static field generated by magnets to generate a Lorentz force in a manner similar to an electric motor.

This disturbance is transferred to the lattice of the material, producing an elastic wave. In a reciprocal process, the interaction of elastic waves in the presence of a magnetic field induces currents in the receiving EMAT coil circuit.

For ferromagnetic conductors, magnetostriction produces additional stresses that enhance the signals to much higher levels than could be obtained by the Lorentz force alone. Various types of waves can be generated using different combinations of RF coils and magnets.



### Electro Magnetic Acoustic Transducer (EMAT)

Because the sound is generated in the part inspected instead of the transducer, **EMATs have the following advantages over more conventional piezoelectric transducers:**

- Dry inspection. EMAT does not require couplant for transmitting sound, which makes it very well suited for inspection of very hot and very cold parts, and integration in automated environments.
- Impervious to surface conditions. EMAT can inspect through coatings and are not affected by pollutants, oxidation, or roughness.
- Easier sensor deployment. Not having wedges or couplant, Snell's law of refraction does not apply, and the angle of the sensor does not affect the direction of propagation. This makes EMAT transducers easier to control and deploy.
- Ability to generate SH modes. EMAT is the only practical means for generating shear waves with horizontal polarization (SH waves) without high mechanical pressure or low-density couplants that impede scanning of the part.
- Mode selectivity. The antenna-type construction of the EMAT coil combined with a multi-cycle excitation provides great specificity in the frequency domain, thus the ability to precisely select the wave mode of interest, which is of great importance for guided wave generation and interpretation.

### Industry Standards and Quality Codes

As an ultrasonic technique EMAT can be used to meet ISO, AWS, API, MIL-STD and other international ultrasonic test standards.

- API 5CT (ISO 11960) and API 5L8 for tube and casing (OCTG).
- EN 10160 for plate.
- MIL-STD 2154 for ultrasonic inspection of wrought metals.
- CGA C-20 for high-pressure cylinder.

EMAT is also specifically referenced in several EMAT ultrasonic standards and codes including the following ASTM guides:

- ASTM E1774-96 Standard Guide for Electromagnetic Acoustic Transducers (EMATs).
- ASTM E1816-96 Standard Practice for Ultrasonic Examinations Using Electromagnetic Acoustic Transducer (EMAT) Technology.
- ASTM E1962-98 Standard Test Methods for Ultrasonic Surface Examinations Using Electromagnetic Acoustic Transducer (EMAT) Technology.

### Electro Magnetic Acoustic Transducer (EMAT)

#### Wave Modes

Bulk/ Guided	Beam Orientation	Wave Mode	Technique	Main Applications
Bulk	Normal	Longitudinal	Piezo EMAT	- Thickness and Velocity Measurements - Flaw Detection - Properties Measurement
		Shear Horizontal	EMAT 1	
	Angled	Shear Vertical	Piezo EMAT	- Flaw Detection
		Shear Horizontal		- Flaw Detection, including austenitic materials
Guided	Surface	Rayleigh	Piezo EMAT 2	- Flaw Detection (surface)
	Volumetric	Lamb	Piezo EMAT 2	- Flaw (including Corrosion) Detection - Velocity and Properties Measurements
		Shear Horizontal	EMAT 1	- Flaw (including Corrosion) Detection - Velocity and Properties Measurements

1 Generation restricted to EMAT for practical purposes

2 Especially well-suited for generation with EMAT

\*\*\*\*\* EOR \*\*\*\*\*

**Certifications:**

ISO 9001-2015 Certificate



# CERTIFICATE OF REGISTRATION

This is to certify that the management system of:

## TCR Arabia Company Ltd.

Main Site: King Abdul Aziz Seaport Facility, P.O. Box 8143, Dammam  
32211, Kingdom of Saudi Arabia

has been registered by Intertek as conforming to the requirements of:

## ISO 9001:2015

The management system is applicable to:

Conventional Non-Destructive Testing Services (NDT), Advanced Non-Destructive Testing Services (ANDT), Metallurgical Services, Mechanical Laboratory Testing Services, Welding Inspection Service, Post Weld Heat Treatment (PWHT).

**Certificate Number:**

21111010003

**Initial Certification Date:**

25 March 2014

**Date of Certification Decision:**

02 March 2023

**Issuing Date:**

02 March 2023

**Valid Until:**

24 March 2026



intertek



Calin Moldovean

President, Business Assurance

Intertek Certification Limited, 10A Victory Park,  
Victory Road, Derby DE24 8ZF, United Kingdom

Intertek Certification Limited is a UKAS  
accredited body under schedule of  
accreditation no. 014.



### Certifications:

## Mechanical Testing Lab of TCR Arabia is now ISO-17025 Accredited



### Approvals:

TCR Arabia is now an approved contractor in SABIC for providing high-end inspection services like HTHA/FFS, Metallurgy Solutions and Root Cause Analysis.

Classification: Internal Use



Tuesday, August 20, 2019

Subject: APPROVED CONTRACTOR CONFIRMATION

Dear Mr. Darwin,

This is to confirm that "TCR Arabia Ltd. KSA" is an approved third party and part of "Approved Contractor List" (ACL) of SAUDI BASIC INDUSTRIES CORPORATION (SABIC) to conduct business as a third party inspection & testing contractor for onshore/ offshore services for SABIC site & Mega projects. The onshore/offshore services are:

- Conventional NDT techniques (RT,UT, PT, MPT, VT & PMI)
- Advanced NDT techniques (ToFD, PAUT, MFL & tube inspection).
- Material testing (destructive)
- Welder qualification
- HTHA/FFS services
- Metallurgy solutions
- Root Cause Analysis

However, this certificate has been issued upon the request of above named contractor for whatever purpose it may serve him without any liability on the part of SABIC.

Best Regards,



Gehad Al-Otaibi  
Senior Manager  
Global Suppliers relationship Management



SABIC  
Shared Services  
Global Procurement Services  
P.O. Box 11115  
Jubail Freezone - Al City 31961  
Kingdom of Saudi Arabia  
T: 966 13 350 6600  
F: +966 13 350 6333  
[www.sabic.com](http://www.sabic.com)

Saudi Basic Industries Corporation  
Saudi Joint Stock Corporation  
Authorized capital: SAR 30 billion  
CR: 1010010813

الشركة السعودية للصناعات الأساسية  
شركة مساهمة سعودية  
رأس المال المصرح به 30 بليون ريال  
رقم التسجيل 1010010813

سابق  
الخدمات المشتركة  
خدمات المشتريات العالمية  
مستوى جيب 11115  
ص. ب. 11115 المنطقة الحرة  
الجبيل - المملكة العربية السعودية  
هاتف: +966 13 350 6600  
فاكس: +966 13 350 6333  
[www.sabic.com](http://www.sabic.com)



ASNT Partner



ISO 9001-2015 Certified



ISO 17025 Accredited



# TCR Arabia Company Limited

## Inspection, Testing & Advisory

Redefining Reliability

### ARAMCO & SABIC Appreciation Letters:



### Services Portfolio



#### TESTING

##### Material Testing

###### Mechanical

Tensile, Impact, Hardness, Bend, Elongation, Yield

###### Corrosion

ASTM A923, A262, G28, G48

##### Welder Qualification

WPS, PQR, WQT, Welder Certification

##### Civil Laboratory

Construction Material Testing, Concrete, Soil, Aggregates & Field Tests

##### Metallurgy Testing

In-situ Metallography,

Failure Investigation

Remaining Life Assessment

Fitness for Service



#### INSPECTION

##### Non-Destructive Testing (NDT)

###### Conventional NDT

RT, MT, PT, UT, UTT, FM, PMI, HT

###### Advanced NDT

ToFD, PAUT, Corrosion Mapping  
Helium Leak, Thermography, MFL  
ECT, RFT, IRIS, HTHA, High Temp UT

##### Robotic Inspection Services

Submersible Inspections

Inspection of buried & above ground assets

##### Non-Metallic Testing Lab.

FRP/GRP/Composite Lab Testing



#### CONSULTING

##### Inspection Manpower

NDT Technicians, Plant Inspectors, Inspection Engineers, Corrosion Engineers

- Stress Analysis
- Risk Based Inspections (RBI)
- Damage Mechanism Study
- Third Party Inspection
- Coker Drum Inspection
- Trainings (NDT, Metallurgy, Welding)
- Plant Asset Integrity Management
- Corrosion Study





# TCR Arabia Company Limited

## Inspection, Testing & Advisory

Redefining Reliability

### Location

TCR Arabia Head Office & Labs are located in Dammam  
Branch Offices in Jubail & Yanbu



GPS Location: 26.450525, 50.193787



ASNT Partner



ISO 9001-2015 Certified



ISO 17025 Accredited

### Events

TCR Arabia is featured on The Gulf Time newspaper page 8 under Energy dated 14 June 2023

# TCR Arabia, an Indian JV company, completes 15 successful years in Kingdom of Saudi Arabia

One of the key reasons for TCR Arabia's success is the expertise of its founding companies

SAUDI ARABIA / GULF TIME

**T**CR Arabia is a company that specializes in engineering services specifically in the field of Material Testing, Advanced Non-Destructive Testing and Metallurgical investigation. Founded in 2007 as a joint venture between TCR Engineering Services (India) and GAS Arabian Service (Saudi Arabia). The company is based in Saudi Arabia and has rapidly established a reputation for reliability and quality in all sectors it services namely oil & gas, petrochemical, mining, desalination, power, fertilizer and other such process and manufacturing industries.

One of the key reasons for TCR Arabia's success is the expertise of its founding companies. TCR Engineering Services (India) has over 50 years of experience in providing engineering solutions for a wide range of industries, including oil and gas, power, and infrastructure. On the other hand, GAS Arabian Service is a leading provider of engineering services in the Middle East, with a strong reputation for delivering high-quality projects on time and within budget.

Together, TCR Arabia combines the best of both worlds: The experience and knowledge of TCR Engineering Services (India) with the local expertise and understanding of GAS Arabian Services. This unique combination of expertise enables TCR Arabia to provide a comprehensive range of engineering services to its clients in the region.

TCR Arabia offers a wide range of services, including Advanced Non-Destructive Testing Services, Material Testing Services (Mechanical, Metallurgical and Non-Metallic Products), Engineering & Consulting on all process related assets, Welding Inspections, Welder Qualifications, Heat Treatment etc. TCR Arabia has partnered with global specialized companies in providing solutions to clients on Robotic Inspections, Coke Drum Inspections, Boiler Inspection & Life Assessment etc.

As an ISO-9001-2015 Certified and ISO-17025 Accredited Organization, TCR Arabia ensures all its services are delivered to its clients as per global standards and prescribed procedures. Trained and qualified staff ensure that quality is not compromised at any level of testing and inspection works.

As an employee oriented organization, we value the contributions of every single employee in the growth of our organization. Our employees play a key role in planned expansion, strategic



development and technical expertise which results in winning the trust of our valued clients and to serve them to higher standards everytime. Today we are a strong team of qualified API Engineers, NDT Engineers, Corrosion Engineers, Metallurgists, Skilled Technicians.

One of the key factors that sets TCR Arabia apart from its competitors is its commitment to safety. The company places a strong emphasis on safety in all of its projects, and it has implemented strict safety procedures to ensure the safety of its employees, as well as its clients. TCR Arabia also carries out regular safety audits to ensure that all of its projects are being carried out in compliance with the highest safety standards.

TCR Arabia is committed to develop the local manpower (Saudi Nationals) by providing 'on the job' trainings, class-room trainings in the field of NDT & Material Testing. Consistent growth in the percentage of IKTV (In-Kingdom Total Value Addition) has yielded positive results in the success of TCR Arabia.

In conclusion, TCR Arabia is a leading engineering services company in Saudi Arabia and the Middle East. Backed by the trust of its valued clients and the ability of its staff to deliver quality services, the organization is motivated to serve and deliver best results year after year.



### Syed Ameen Hassan, Country Manager, TCR Arabia, Saudi Arabia

**S**yed Ameen heads the TCR Arabia operations in Saudi Arabia. MBA in Marketing and Finance, from Chifley University, Australia, Syed Ameen has been instrumental in developing the business of TCR Arabia from its inception stage. Experience of over 25 years in the Saudi Arabian and Middle East market, specifically in the down-stream industry business, helps Syed Ameen to reach out to the decision makers and also run the operations in a professional manner. Business plans, budgeting, decisions on CAPEX / OPEX and Resources Management are his key roles and reports to the EXCOM & Board Members on the performance of the Organization.

Under the leadership of Syed Ameen, the organization has grown from its incubation stage to one of the top Inspection & Testing Companies in Saudi Arabia. Ensuring routine business with all major clients is the key to sustenance of the Organization and Syed Ameen has been instrumental in gaining long term contracts with major clients like Saudi Aramco, SABIC, TASNEE, MAADEN, SWCC etc.

Expansion of the organization by setting up new service areas like Robotic Inspection Services, Welder Qualification Department, Mechanical Testing Lab, Metallurgical Testing Lab, Corrosion Testing Lab are some of key achievements.

Operational alliance with major international service providers like CANAP Engineering of India for Stress Analysis Studies, CIA of Canada for Coker Drum Inspections, Planys of India for Submersible Robotic Inspection and so on were formed under the leadership of Syed Ameen to provide advance inspection and technical support to all of TCR's valued clients in KSA. Adapting to the fast evolving Inspection Field with new and advanced techniques to help the client save loss of production time and improve profitability, TCR team is consistently working in offering safer, faster and reliable inspection and testing techniques to clients under the leadership of Syed Ameen.

An Active team player and a firm believer in Team Work, Syed Ameen has been able to develop a team of professional engineers, technicians, admin staff, and support staff to work towards a common goal of developing the organization.

TCR Arabia serves majority of its clients in the 'downstream industry' which includes Saudi Aramco, SABIC, TASNEE, CHEVRON, ADVANCED, SWCC, Saudi Electricity Company, Petrorabigh, SADARA, SATORF, MAADEN and so on. It also serves all major contracting companies in infrastructure development and maintenance projects

### Events

### Celebrating 50 years of TCR




**REDEFINING ON-TIME QUALITY**  
Material Testing | NDT | Consulting & Inspection

*Winner of "Best Laboratory" Award by NACE  
NABL, ISO 17025, ISO 17020, ISO 46001, IIR, BIS Accredited*

#### Materials Testing Solutions and Inspection Asset Integrity & Plant Reliability Consultants

Since 1973, TCR Engineering Services is well known for its work ethics, precision, transparency, & reliability and has been trusted by over 3500 customers across India. TCR's expertise guarantees superior quality, safety, and reliability, empowering business to reach new heights while fueling the national economy through enhanced product performance, reduced downtime, and accelerated innovation. Together, we are the key drivers of the "Make in India" movement to build a vibrant and prosperous economy.

TCR has completed NDT works on over 3000 kms. of Cross-Country Pipeline for EPC companies on IOCL and GAIL sites. TCR offers specialized fatigue testing for Reinforcement Couplers and Grouter for Mechanical Splices of Bars in Concrete used in Infrastructure and Road construction projects. Defence industry vertical is served by undertaking Fracture Toughness and Fatigue Crack Growth Rate analysis. TCR has worked on over 5000 failure investigation cases, over 75 Fitness For Service assignments and over 300 boiler RLA projects.

TCR is approved by IOCL, GAIL, RIL, L&T, JSW, HAL, NMRL, DMRL, PDIL, DRDO, COAE, RITES, BMC, Mecon, EIL, BSE, NSE, Mazagon Dock, NPCIL, Customs Authority India and Saudi Aramco, SABIC, PDO, QCHEM, QAFCO, KOC, KNPC, Iraq Ministry of Oil, SHELL, National Oilwell Varco, Sakhalin Energy and many others internationally. TCR is the preferred laboratory for members of the Bombay Metal Exchange and the Mumbai Steel Traders Association.

TCR prides itself in being a Pan-India based material testing and inspection services company with global operations in Saudi Arabia, Qatar, Kuwait, Malaysia and Nigeria.

#### MATERIAL TESTING LAB

- Mechanical Testing
- Chemical Analysis Spectro
- NACE Sour Gas Corrosion
- CTOD & Fracture Toughness
- Coupler & Rebar Fatigue Test
- Railtrack butt joint Fatigue
- Microstructure Studies
- SEM & EDAX Analysis
- Welder Qualification
- Hot Tensile
- RoHS Compliance
- Construction/Civil Lab
- Composite Testing
- Wet Chemical

#### NDT & INSPECTION

- Cross Country Pipeline RT
- ToFD and PaUT
- Robotic Reformer Tube Inspect
- Robotic Tank Inspection
- Eddy Current Test for Tubes
- IRIS, RFET and MFL
- Metallographic Replica
- Helium Leak Detection
- PMI-Positive Material Id
- Gamma Radiography
- PWHT and Heat Treatment
- Civil NDT for Concrete
- Inspection of Bridges
- Third Party Inspection

#### ENGINEERING CONSULTING

- Asset Integrity Management
- Pipeline Integrity
- Fitness for Service
- Remaining Life Assessment
- Boiler Audit
- Failure Analysis Investigation
- Insurance & Litigation Referee
- Digitalization of RT Films
- Plant Relocation Advisory
- Manpower Supply for Turn Around
- CAD/CAM and Piping Stress Analysis
- Custom Research
- Welding Consulting
- Plant Reliability Training



# TCR Arabia Company Limited

## Inspection, Testing & Advisory

Redefining Reliability

### Events

### Celebrating 50 years of TCR



**Mumbai Corporate Office**  
35, Pragati Industrial Estate,  
N. M. Joshi Marg, Lower Parel,  
Mumbai, Maharashtra - 400 011  
Tel: +91-22-23097921, 67492324

**Laboratory and Research Center**  
VKB House, EL-182 MIDC-TTC,  
Mahape, Navi Mumbai,  
Maharashtra - 400 710  
Tel: +91-22-67380900

**TCR Advanced Engineering**  
250-252/9, GIDC Estate,  
Makarpara, Vadodara,  
Gujarat - 390010  
Tel: +91-7574805594 - 96

**TCR-BME Metal Market**  
BME House, 88/90 Kika Street,  
2nd Floor, Room #18,  
Gulawadi, Mumbai - 400 004  
Tel: +91-9699210864 / 9920011298  
+91-9820008656 / 8779216510

**TCR Engineering (Eastern)**  
Plot No.114/1955, Vishnu Vihar,  
Jayapur Pahala, Bhubaneswar,  
Odisha - 752101  
Tel: +91 - 9776704680

**TCR Nashik**  
Shubham Park, Building No. 7 # 30,  
'C' Wing, Near Bhole Mangal Karyalay,  
Cidco, New Nashik - 422010  
Tel.: +91 - 8421922315

**TCR Assam**  
H. No. 28, Saiz Lane,  
Bethal Path, Bagharbori,  
Guwahati, Assam - 781037  
Tel.: +91 - 9932034791

**TCR Southern**  
# 52, A4, 3rd Main Rd,  
Mogappair West, Chennai,  
Tamil Nadu - 600037  
Tel: +91 - 9566615842

**TCR Advanced (Bharuch Division)**  
711, 7X-The Business Hub,  
Opp. K. J. Polytechnic College,  
Above Sales India Showroom,  
Bholav, Bharuch - 392001, Gujarat  
Tel: +91- 9898084235

**Pune – Sample Collection Center**  
Shop No A53, Plot No T 204,  
Next to D Y Patil Hospital ,  
Pavana Complex , Bhosari,  
Pune, Maharashtra, India  
Tel: +91 - 9762801034

**Evolve by TCR**  
215, Pancham Icon, Vasna Road,  
near D-Mart, Vadodara,  
Gujarat - 390007  
Tel: +91 - 7574801050



[www.tcreng.com](http://www.tcreng.com) | [sales@tcreng.com](mailto:sales@tcreng.com)



ISO/IEC 17025 : 2017  
Accredited Testing Laboratory by

**NABL**

Vide Certificate No. TC - 6905

### Events

TCR Arabia will be participating in the following exhibitions:



**2nd EDITION**  
**ASSET INTEGRITY AND PROCESS SAFETY**  
CONFERENCE & EXHIBITION 2024

Brought to you by 

Hosted by  
الهيئة العامة للغذاء والدواء  
Saudi Commission for Food & Drug Control

**Strategic Partner**

**OBTAINING EXCELLENCE BY ALIGNING ASSET INTEGRITY AND PROCESS SAFETY STRATEGIES WITH BUSINESS OBJECTIVES**

CONFERENCE DATES:  
24 – 25 April 2024  
TECHNICAL WORKSHOPS  
23 April 2024

[www.assetintegrityksa.com](http://www.assetintegrityksa.com)

Jubail, Kingdom of Saudi Arabia

Asset Integrity & Process Safety Conference & Exhibition  
April 23-25, 2024



VISIT US AT  
D-08

INTERNATIONAL  
Storage Tank &  
Terminal Technology  
CONFERENCE & EXHIBITION

MAY 13-15 2024 DAHRAN EXPO KSA

We are proud to be an  
Exhibitor of  
TANKCONEX

**Strategic Partner**

Tankconex 2024  
May 13-15, 2024



**JUBCOR** **2024**  
CONFERENCE & EXHIBITION

Jubail Corrosion Conference & Exhibition  
September 1-3, 2024

### Events

#### Saudi ARAMCO assessment for WQT & Laboratory



#### RC Corridor Pre-Qualification Audit



### Events

#### Client Visit: Baghlaf Steel Saudi



#### ISO 9001:2015 Surveillance Audit



### Events

#### Audit By Entrion (NOV)



#### Weatherford Audit





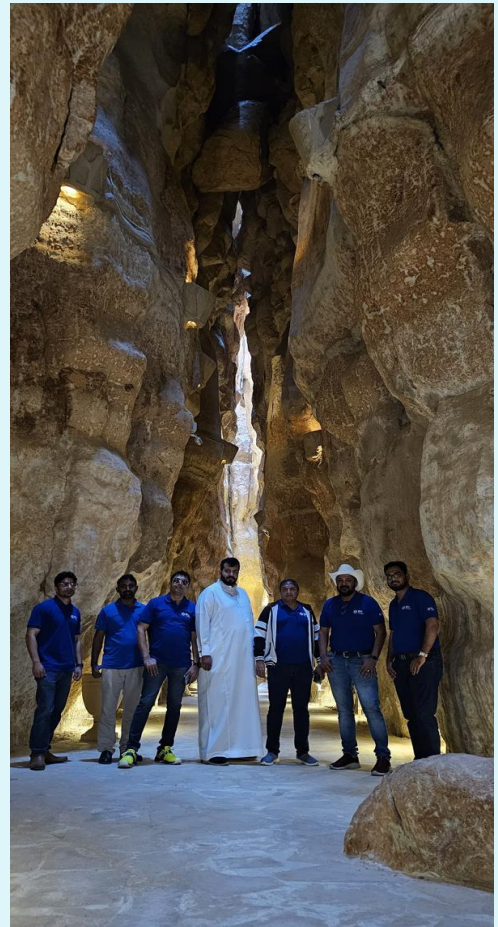
## Events

### Operations Management Team Excursion at Al-Ahsa



### Events

#### Operations Management Team Excursion at Al-Ahsa



### Events

#### TCR Arabia Iftar Party 2024



### Events

#### TCR Arabia Iftar Party 2024



### Events

#### Best Employee 1<sup>st</sup> Quarter 2024 Award held during Iftar



#### Best Employee 1<sup>st</sup> Quarter 2024 Gold, Silver, Bronze Awardees



**Gold - Veeramani**



**Silver – Nilesh Pevekar**



**Bronze – Darwin Dorado**



# TCR Arabia Company Limited

## Inspection, Testing & Advisory

Redefining Reliability

### Events

#### TCR Team Photos

