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Topic of the Quarter – HTHA

High temperature hydrogen attack (HTHA) is a phenomenon of metal degradation that is well known in the petrochemical and refinery industry. HTHA occurs in carbon and low alloy steels exposed to high partial pressure of hydrogen at elevated temperatures. Such damage has occurred over time on the long-term exposure of steels in hydrogen service. Equipment designed to be safe as per engineering codes has experienced such damages as well.

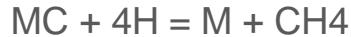
Detection of hydrogen attack is important to assure safe operation of pressure vessels and piping susceptible to such damage. HTHA can lead to a catastrophic failure, which is a sudden and total failure from which recovery is impossible (See Fig 1 & 2).



HIGH TEMPERATURE HYDROGEN ATTACK

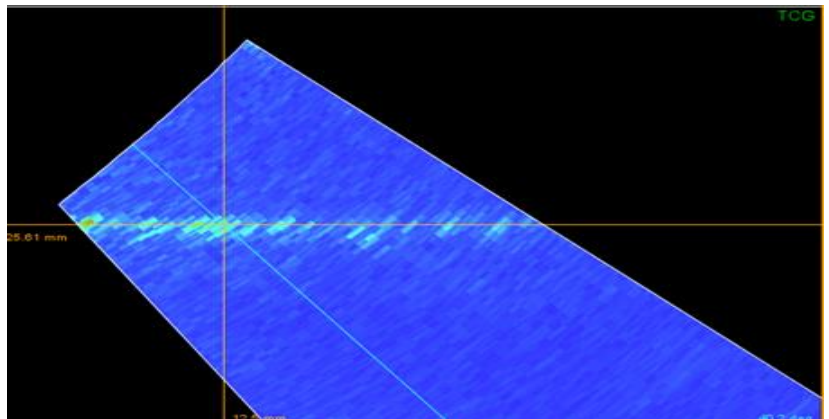
Core Capabilities:

- High temperature hydrogen attack (HTHA) is observed in steel exposed to high temperature above 200 degrees. At high temperature atomic hydrogen diffuses in steel. This hydrogen reacts with the carbon of steel and forms CH₄. This bubbles at grain boundary and forms voids



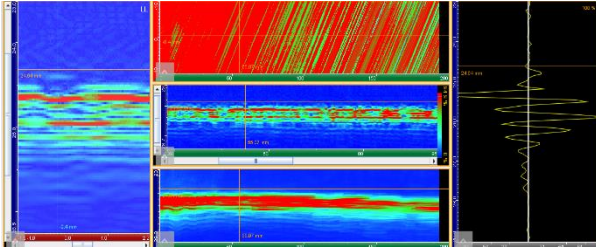
- These bubbles exert pressure and also coalesce resulting in fissures. The growth of voids and fissures weakens the metal and hence the fissures develop a major crack
- As per the guidelines of API941 and available latest Advance NDT technique, TCR Arabia has trained and experienced team for HTHA inspection.
- Below mention ANDT inspection technique are used by TCR Arabia for detection, sizing and characterizing HTHA damage.

- phase array ultrasonic testing (PAUT) and Velocity Measurement

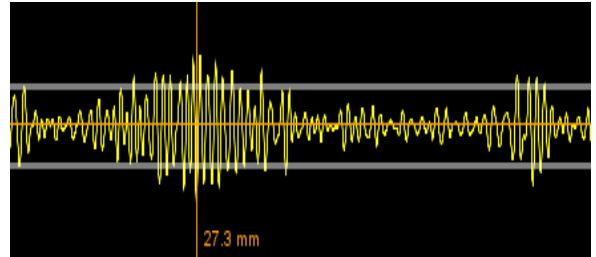


Topic of the Quarter – HIGH TEMPERATURE HYDROGEN ATTACK

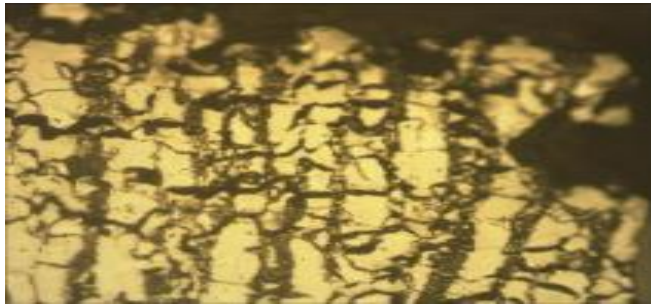
Core Capabilities:



- Total focusing method phase array ultrasonic testing TFM-PAUT



- Time of flight diffraction Ultrasonic testing and AUBT



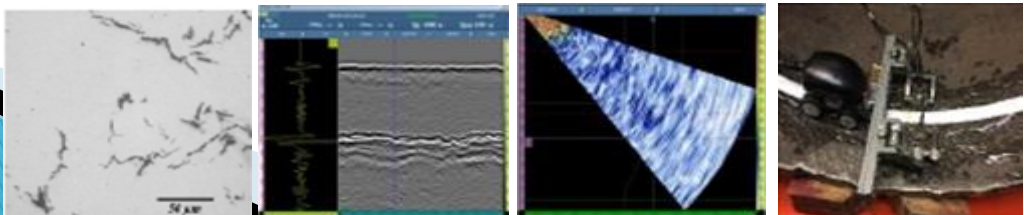
- In-Situ Metallography

HTHA training of TCR Employees in U.S.A

TCR Arabia recently completed training of its chosen staff on HTHA Detection and Sizing (HTHA-40). The training was concluded at Houston, Texas, U.S.A. by Lavender International last May 1-5, 2017.



HTHA course is designed to educate advance UT inspectors on methodologies and techniques to more reliably detect HTHA. The course is founded on extensive work and experience gained during industrial trials as part of the E2G HTHA JIP. Lavender are custodians of the extensive E2G sample inventory and this will be used for HTHA training and certification purposes.



Certifications:

Microbiology Lab of TCR Arabia is now ISO-17025 / SAC Accredited

شهادة اعتماد Accreditation Certificate



تشهد اللجنة السعودية للاعتماد (ساك) بأن
Saudi Accreditation Committee (SAC) Declare that

TCR Arabia Co. Ltd. Lab .

Address: Dammam

Scope : Food and agricultural

مختبر شركة تي سي آر العربية المحدودة

العنوان: الدمام

المجال : الغذائية والزراعية

قد حقق متطلبات اللجنة السعودية للاعتماد (ساك) وتم اعتماده وفقاً لمتطلبات المواصفة القياسية السعودية ساسو / آيزو / آي إي سي 17025 وذلك في المجال الملحق بهذه الشهادة

Has met the Requirements of Saudi Accreditation Committee (SAC) and has been accredited in compliance with SASO/ISO/IEC 17025 for the scope attached with this Certificate

رئيس اللجنة
SAC Chairman



سعد بن عثمان الفصبي
Saad O. Alkasabi



18/05/1442 : تاريخ الانتهاء / Expire Date

19/05/1439: تاريخ الاصدار / Issue Date

N-T-00053



TCR Arabia Company Limited

Inspection, Testing & Advisory

Redefining Reliability

Certifications:

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



ISO 9001-2015 Certified

اللجنة السعودية للاعتماد
 Saudi Accreditation Committee

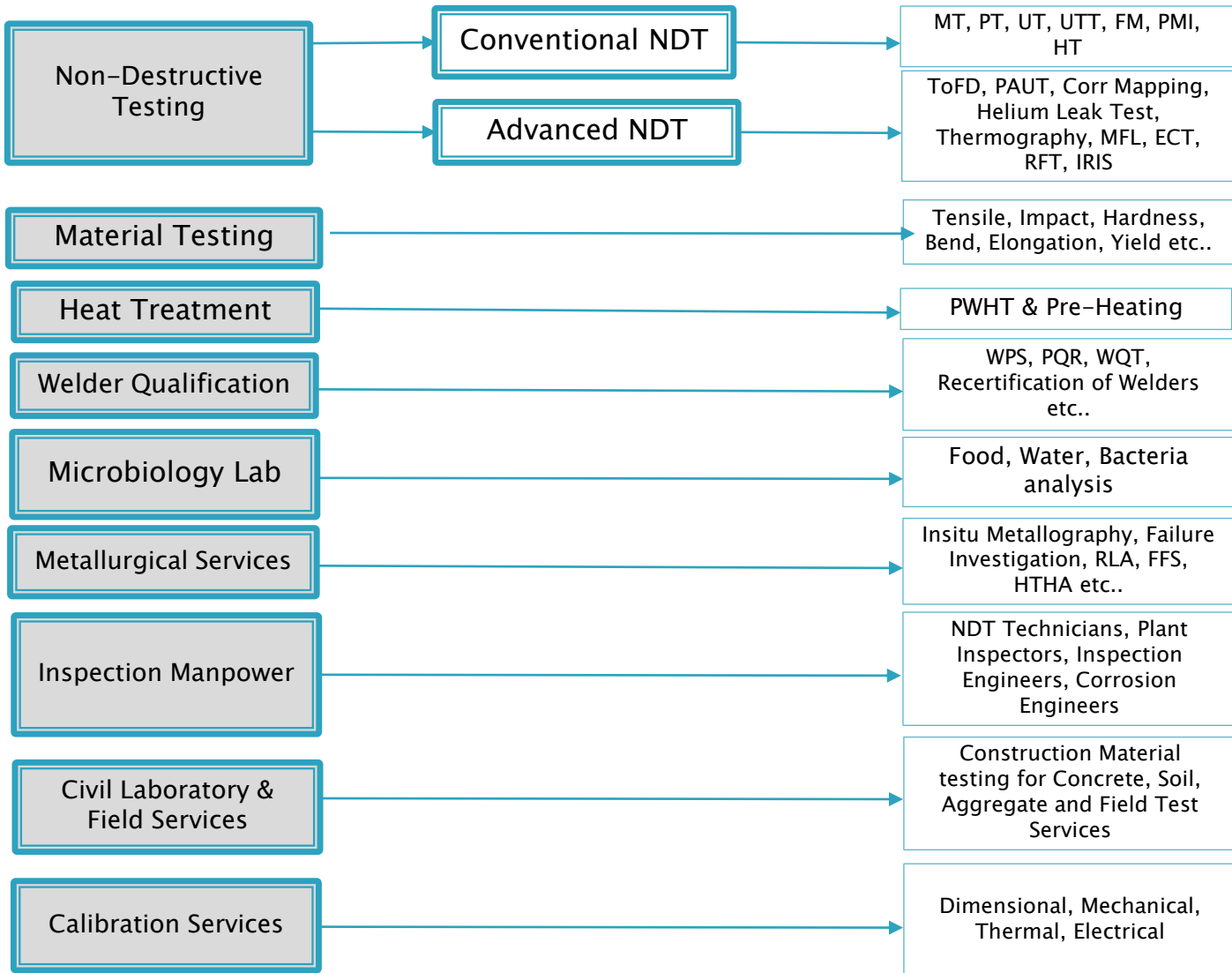


ISO 17025 Accredited



SFDA Approved

Services Portfolio



Advance / High Temperature Inspection Techniques

Sl.	Service Description
01	Automated High Temperature Corrosion Mapping
02	Automated High Temperature Time of Flight Diffraction UT (ToFD)
03	Automated High Temperature Phase Array Ultrasonic Testing (PAUT)
04	Hydrogen induced Crack Examination (HIC)
05	Stepwise Crack Examination (SWC)

Advanced Metallurgical Services

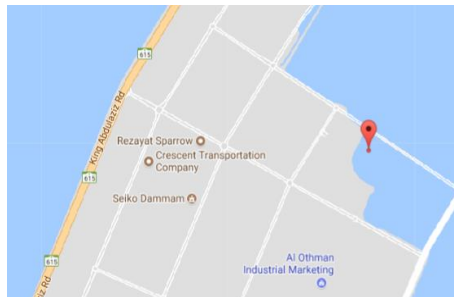
Sl.	Service Description
01	Root Cause / Failure Analysis
02	Remaining Life Assessment
03	Fitness for Service
04	Condition Assessment
05	Metallographic Replication / Insitu Replica

Events

TCR Arabia Head Office & Labs are now shifted to new location in Dammam



GPS Location: 26.450525, 50.193787



Events

Saudi Food and Drug Authority Accreditation



Trainings – Metallurgy



Events

Trainings – Welding Technology and Qualifications



Events

Trainings for New Spectrometer Unit



Trainings – Infrared and Thermal Imaging Level 1



Events

17th Middle East Corrosion Conference and Exhibit 2018, Manama Bahrain



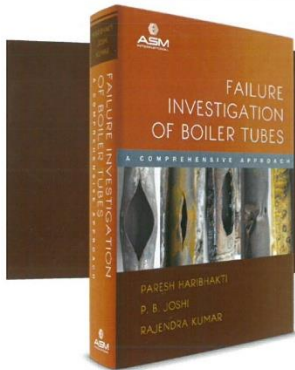
International Accreditation Service, Awarding of Plaque of Recognition



Events

Book Launch

TCR Arabia is pleased to announce that ASM International is publishing a book authored by our Director Mr. Paresh Haribhakti on "Failure Investigation of Boiler Tubes". Book your copy today at www.asminternational.org/05243G or call 800.336.5152



FAILURE INVESTIGATION OF BOILER TUBES: A COMPREHENSIVE APPROACH

BY PARESH HARIBHAKTI, P.B. JOSHI,
AND RAJENDRA KUMAR

Scheduled Release: August 31, 2018

Product Code: 05243G | ISBN: 978-1-62708-156-6
Hardcover | Estimated Pages: 500

Failures or forced shutdowns in power plants are often due to boilers, and particularly failure of boiler tubes. This comprehensive resource deals with the subject of failure investigation of boiler tubes from basic fundamentals to practical applications.

Coverage includes properties and selection of materials for boiler tubes, damage mechanisms responsible for failure of boiler tubes, and characterization techniques employed for investigating failures of boiler tubes in thermal power plants and utility boilers of industrial/commercial/institutional (ICI) boilers. A large number of case studies based on the actual failures from the field are described, along with photographs and microstructures to allow for easy comprehension of the theory behind the failures.

This book is geared to practicing engineers and for studies in the major area of power plant engineering. For non-metallurgists, a chapter has been devoted to the basics of material science, metallurgy of steels, heat treatment, and structure-property correlation. A chapter on materials for boiler tubes covers composition and application of different grades of steels and high temperature alloys currently in use and future materials to be used in supercritical, ultra-supercritical, and advanced ultra-supercritical thermal power plants. A comprehensive discussion on different mechanisms of boiler tube failure is the heart of the book. Additional chapters detailing the role of advanced material characterization techniques in failure investigation and the role of water chemistry in tube failures are key contributions to the book.

The authors have long-standing experience in the field of metallurgy and materials technology, failure investigation, remaining life assessment (RLA), and fitness for service (FFS) for industrial plants and equipment. They have conducted a large number of failure investigations of boiler tubes and have recommended effective remedial measures in problem solving for power and utility boilers.

Non-Member: ~~\$220~~ **\$199**

ASM Member: ~~\$165~~ **\$149**

Prepublication prices good through August 31, 2018

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ORDER YOUR COPY TODAY AT
www.asminternational.org/05243G
or call the ASM International Service Center at 800.336.5152.

Staff Skills Enhancement

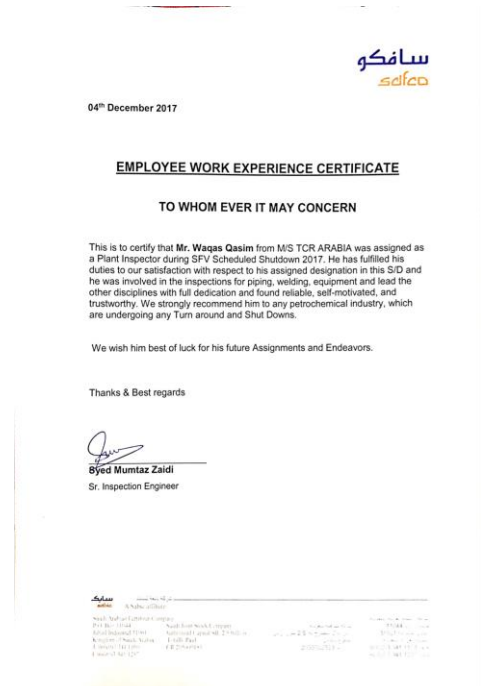
Certifications achieved by TCR Arabia employees in the 3rd Qtr. 2018.

Name	Certification
Laxmikant Kushwaha	SABIC PAUT Certification

Client Appreciation Letters



Client Appreciation Letters



New Staff

TCR welcomes its new team members and wishes them great success ahead



Mr. Hussam Alamri – Welding Inspector Trainee – WQT Department

Mr. Hussam has a bachelors degree in mechanical engineering, He also have a membership in Saudi Council of Engineers, He got many courses such as PMP, NLP, Autocad, MAT Lab, solid work and ANSYS Mechanical. He worked as volunteer in STEM event (2017) and Gawth team for searh and rescue.



Mr. Bareer Al-Ghumgham – NDT Technician – NDT Department

Completed High school and acquired English certificate, trained in the higher institute for engineering and petroleum for 2 and half years, Has knowledge on NDT, PT, MT has completed OSHA with certificate and mechanical inspections.



Mr. Jassim Ibrahim – NDT Technician – NDT Department

An experience NDT technician worked in NDTCCS for 2 months and in Songshang & Abdullah Al Sheikh Co. as welding technician from 2013-2017, his qualification includes acquiring diploma in Mechanical inspection and NDT technology from technical higher institute for engineering and petroleum.



Mr. Abdullah Mohammed Al-Hasson – Sales Coordinator – Sales Department

Mr. Ahmed has vast knowledge when in terms in NDT, he graduated with Mechanical Inspection and NDT Technology. His skills list in Radiographic Testing, Ultrasonic Testing, Penetrant Testing, Material Testing and Post Weld Heat Treatment is only few listed in his resume. He believed that joining TCR makes his skills improve and he is confident that growth with TCR makes him dwell in the field of the career he chooses.