

POST-EVENT REPORT

CORCON

Mumbai, India.

23rd - 26th September

2019



**UNITING THE WORLD
IN MITIGATING &
COMBATING CORROSION**

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Ministry of Chemicals and Fertilizers
Government Of India



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Ministry of Steel
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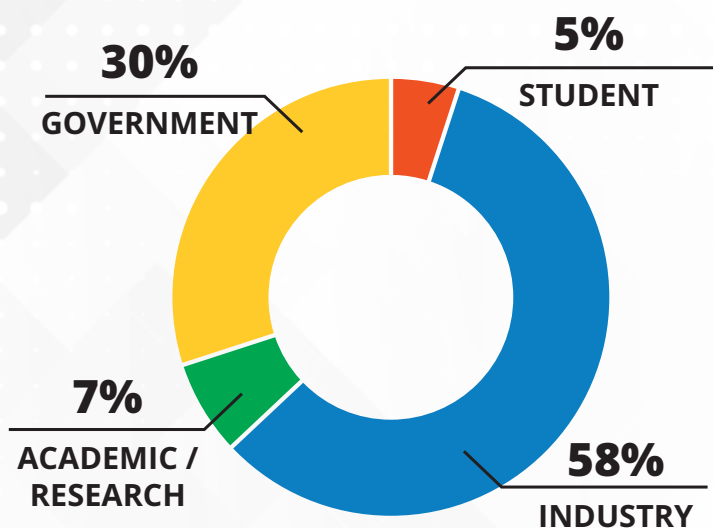
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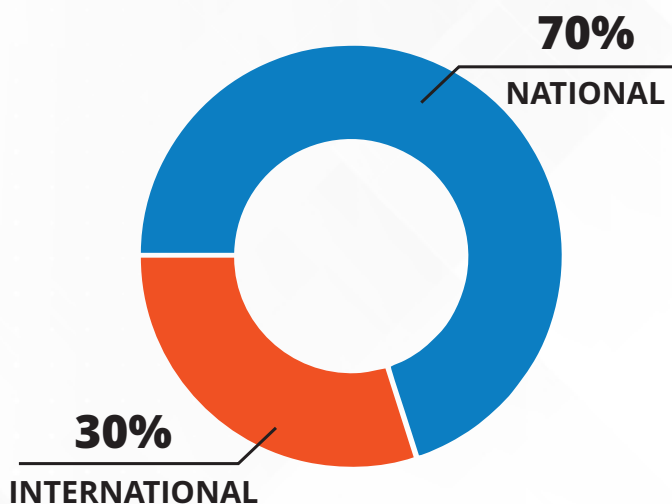
CORCON 2019, the largest event related to corrosion mitigation in Asia, was a grand success with active participation from academic and research institutions, public and private sector organizations including defense establishments and professionals. It was held at the sprawling CIDCO Convention Centre, Navi Mumbai, September 23 – 26, 2019, the 26th Annual Corrosion Conference and Expo (CORCON 2019) was organized by NACE International Gateway India Section (NIGIS), one of the largest and most active sections of NACE International.



PROFILE OF DELEGATES



PROFILE OF EXHIBITOR





Dr. U. Kamachi Mudali, Chairman, CORCON 2019 said “CORCON 2019 is a technical feast for the delegates numbering over 900 industry leaders from all across the globe, with four plenary talks, 24 keynote lectures, 175+ technical talks distributed across 36 sessions and over 25 technical poster presentations; this, besides the seven technical interactive forums along with a round table conference on the 'Protective Coating Industry’. “Corrosion is not new to all of us; we live with corrosion,” said Dr Mudali, who is also the Chairman and Chief Executive, Heavy Water Board, Department of Atomic Energy, Government of India. “If you look at the geographical location, out of 257 countries India stands 17th in the world for its length of over 7,500km of coastline. Corrosion is a menace in such a coastal and marine environment.”

“In the pipeline sector, we have roughly 18,000km of natural gas pipelines across the country. The Government of India will be investing an additional Rs 70,000cr to augment this sector. The Indian Oil Corporation Ltd, has 14,000km of pipelines for crude oil distribution and they have plans to increase this to 20,000km soon. All of us know that pipelines are prone to corrosion depending on various factors involved.” Dr Mudali also noted that the paints and coatings sector worldwide with a market of US\$160bn would grow to US\$208 by 2022, which is around a growth rate of 5.4 percent yearly, which is a good figure. Besides, there are a lot of innovations like self-healing coatings, self-regenerating coatings, intelligent coatings, and all these are coming in a big way and CORCON would be a place to learn about these.

The inaugural function on September 23, 2019 had **Dr. V. P. Joy**, IAS, Director General, Directorate General of Hydrocarbons, Government of India as Chief Guest.. He spoke about how our country will become the key driver of global energy demand in the next twenty-five years. “Our energy consumption of more than 1.2 billion population will grow by 4.2 percent a year for the next twenty-five years, which is fastest among major world economies,” he said, emphasizing on the importance of corrosion prevention and mitigation in the hydrocarbon sector.

He said, he was happy to see lots of fruitful papers and ideas being presented during the conference which would definitely help in improving activity in one's domain of work. “Corrosion is multi-disciplinary and is a critical aspect in any economy. In the area in which I am concerned, like the energy sector, corrosion is a very big priority. In the energy production, transmission, utilization there are large structures involved. Then, we have large lengths of pipelines running across the country and all these are subject to environmental influence and affected by corrosion. So, in short, when we are discussing about corrosion, we are discussing about a very important aspect of the economy.

Mr B. Narayan, Group President, Reliance Industries Ltd., Guest of Honor at CORCON 2019 said: “The CORCON series of conferences and exhibitions have played an important platform for the industry, research organizations and academics to exchange information on the new experiences in the field of corrosion, ongoing development work in protection or mitigation of corrosion and new techniques being successfully employed in measurement, control and automation in the corrosion field.”

Other dignitaries who spoke included **Mr Jeff Didas**, NACE Immediate Past President; **Mr Robert H. Chalker**, Chief Executive Officer, NACE International; **Mr Toyoji Takeuchi**, East Asia and Pacific Area Director, NACE International; **Mr Tushar Jhaveri**, Past President, NACE International, and **Mr N Manohar Rao**, Trustee, CORCON 2019.



Interesting 'Technical Interactive Forums (TIF)' like the one on 'Delivering Performance Through Optimum Coating Specifications' explored the scope of coatings specifications and how it plays a very critical role in the design life of an asset. The one on 'Regulations and Standards in Corrosion' discussed the need for standards in the field of corrosion and its control in industry and to what extent the need is being met by organizations formulating standards including NACE International and the Bureau of Indian Standards. The TIF on 'Corrosion in Concrete' discussed the challenges associated with poor quality construction materials / methods, poor workmanship, lack of awareness of latest technology, lack of corrosion management policies and mindset etc. The topics of the other TIFs included 'Water Treatment,' 'Corrosion Monitoring and Testing,' and 'Corrosion Control in City Gas Distribution.'



'Jung se Jung,' – Battle against Corrosion – another popular program at CORCON is intended to integrate the theoretical findings with the actual experience of the eminent people in the subject field. The topics discussed included internal corrosion, the MIC phenomenon, AC interference corrosion, inspection of non-piggable pipelines and corrosion mitigation.

The Round Table Conference on Protective Coating Industry convened by Mr S. Ravichandran, Berger Paints India Ltd., discussed topics like Training and Industry Connect Programs; Painter Qualification and Coating Contractor Certification; the NACE Impact Study; the Coating Inspectors Training Program of NACE; and NIGIS' Corrosion Consultancy Programs.

Technical papers distributed across 35 sessions were presented under various subjects such as Cathodic and Anodic Protection; Coatings, Linings and Thermal Insulation; Materials and Composites; Biomaterials Corrosion; Corrosion Monitoring and Testing; Corrosion Control in Water Treatment Utilities; Corrosion in Automobiles and transportation industry, Corrosion in Oil and Gas Industries; Corrosion in Petrochemical and Refinery Industries; Internal Corrosion in Pipelines; Corrosion in Power Plants and Utilities; Corrosion in Chemical and Fertilizer Industries; Corrosion in RCC Structures; Microbial Corrosion and Inhibitors; Marine Corrosion; Corrosion in Defense Equipment and Facilities; and Direct Methodology Applications. To encourage students there was a Young Student Scientists Forum with over 25 interesting and educative poster presentations.



The conference is also used as a platform to honor and respect individuals and institutions for their contribution to corrosion awareness and developments in the field of corrosion science and technology in India. The awards were presented during a function on the second day of the event.



This year, the Excellence in Corrosion Science and Technology in Research and Education was awarded to Dr Radhakrishna G. Pillai, IIT Madras, Chennai; the Excellence in Corrosion Science and Technology in Oil and Gas was given to Mr Basanta Kumar Lenka, Technimont Pvt Ltd., Mumbai; Excellence in Corrosion Science and Technology in Quality Management and Control, Dr Anil Krishna Kar; Distinction in Corrosion Science and Technology in Research and Education, Dr S. C. Vanitha kumari, Indira Gandhi Centre for Atomic Research, Kalpakkam, Distinction in Corrosion Science and Technology and Industry, Mr Viswanathan Venkateswaran, Petronas Chemicals Methanol SDN, Malaysia; Student Award for PhD Degree, Dr M. Ajay Krishnan, IIT Bombay, Mumbai; and Dr Poulami Chakraborty, Homi Bhabha Research Institute, Mumbai; Student Award for M. Tech, Mr Madhura B., Indira Gandhi Centre for Atomic Research, Kalpakkam; Award for Excellent Laboratory, Corrosion Laboratories at IIT Madras, Chennai; Meritorious Contribution in Research and Education, Mr T. Subba Rao, Bhabha Atomic Research Centre, Kalpakkam; Meritorious Contribution in Industry, Mr Sandeep Harshadray Vyas, Reliance Industries Ltd, Navi Mumbai; and the Lifetime Achievement Award, Prof Gurmeet Singh, Pondicherry University, Pondicherry.

CORCON 2019 also boasted of a large exhibition area where 81 stalls from not only India but across the globe used the opportunity to introduce their products, technology, and services to the industry.

This year, CORCON 2019 was also supported by the Ministry of Steel, Government of India; Ministry of Chemicals and Fertilizers, Government of India; Federation of Indian Chambers of Commerce and Industry (FICCI); Federation of Indian Petroleum Industry (FIPI); and the City and Industrial Development Corporation (CIDCO), Government of Maharashtra.



PLENARY TALKS



Dr. R. K. Malhotra

Director General, Federation of Indian Petroleum Industry

“Corrosion in Petroleum Industries”

Abdullah Moghram Al-Ghamdi

Principle Professional
Consulting Services Department
Saudi Aramco

“The Growth of Nonmetallic Materials Applications”



Prof. Cyrus M. Dordi

Consultant, Mumbai

“Strategies to prevent corrosion in concrete structures in the coastal environments”

Dr. Homero Castaneda

Associate Professor, Materials Science and Engineering Director of the National Corrosion and Materials Reliability Laboratory Texas A&M University

“Developments of Deterministic-probabilistic modelling for coating/metallic substrate performance in corrosive/harsh environments”



KEYNOTE TALKS



Jeffrey L. Didas

Senior Technical Specialist & Corrosion SME, Matcor, Inc., Chalfont, PA USA

Cathodic Protection of Well Casings - Design Issues, Lessons Learned and a Case History

Brenda J. Little

BJ Little Corrosion Consulting, Diamondhead, MS, USA

Mechanisms for Microbially Influenced Corrosion (MIC): Details are Important



**Hasan Sabri**

TPL Senior Specialist (Inspection & Corrosion)
Kuwait Oil Company Inspection & Corrosion Team

Indirect Inspection Tools Indications V/s Direct Examination Findings within External Corrosion Direct Assessment Process

Peter J. Engelbert

CIH, CSP, Grad IOSH, CHST, CET

BIRNCS Senior Nuclear Coatings Specialist, NACE & SSPC Protective Coating Specialist

SSPC Master Coating Inspector, NACE Certified Coatings Inspector – Level 3

SSPC Protective Coatings Inspector – Level 3, Level 3 Coating Inspection, LLC, USA

Failure Analysis of Coatings

**Dr. John Philip**

Head, Corrosion Science & Technology Division & Professor,
Indira Gandhi Centre for Atomic Research, Kalpakkam

Nanotechnology assisted corrosion mitigation strategies

R Suresh

Chief of Operation, Pipeline Infrastructure Limited

Corrosion and other integrity issues of buried pipelines

**Anand Kumar Tewari**

Executive Director, Pipelines Division, Indian Oil Corporation Limited

Corrosion in Oil and Gas

Patrick J. Teevens

President, Broadsword Corrosion Engineering Ltd.

Calgary, Alberta, CANADA

Corrosion Monitoring and Testing: Advances to 2019

**Jyotsna Dutta**

Department of Metallurgical and Materials Engineering,
Indian Institute of Technology Kharagpur

Compositionally Graded Yttria Stabilized Zirconia Based Thermal Barrier Coating for Improved High Temperature Oxidation Performance

Vinay Gupta

Director & CEO, M/S Tandon Consultants Pvt Ltd, New Delhi

Corrosion prevention of concrete bridges: state of the art provisions of morth specifications and some recent experiences

**Dr. Laxmidhar Besra**

Chief Scientist & Head, Materials Chemistry Department, &
Professor- Academy of Scientific & Innovative Research (AcSIR),
CSIR-Institute of Minerals & Materials Technology (IMMT),
Bhubaneswar

Electrophoretic deposition as a versatile coating technology for corrosion prevention:
 The case of TiO₂-siloxane and graphene coating



Dr. Sanjeev S. Katti

Director General , ONGC Energy Centre , Delhi

Material Challenges in Energy & Chemical Industries

Yousef Khuraibut

Senior Engineer Corrosion,
Kuwait Oil Company (KOC), Kuwait

Elemental Sulfur Corrosion in Tank Vapor Outlet



T Sundararajan

Head R&D, Wheels India Ltd, Chennai

Corrosion Challenges in New Generation Automotives and their manufacturing

Christopher Do

President & CEO – IEV Holdings Limited

The use of hanging anodes for life extension of platform cathodic protection



Soumakiyan Kichenamourthy

Passive Fire Protection Specialist, South Asia

Durability testing of Intumescent Coatings used for fire protection of structural steel

H K Varma

Bioceramic laboratory, Biomedical Technology Wing, Sree Chitra Tirunal Institute for Medical Sciences and Technology

Bioactive and Bioresorbable materials for Bone Tissue Regeneration



G. L. Rajani

Consultant (Technical Consultancy Services) Engineering & Corrosion Services, New Delhi
(Ex. Engineers India Ltd. (EIL)) and Ex. IOCL

Advanced Cooling Water Treatments (CWT) Program to Control Corrosion, Scaling, Fouling and increasing Life of Coolers/ Condensers for CT-CWS with Case Studies

Pinaki Deshmukh

Chief General Manager (Engineering Services & Inspection), IOCL

Corrosion Challenges in Petroleum Refineries & Effective Corrosion Monitoring System



Dr. S. RANGARAJAN

Head, Water & Steam Chemistry Division, BARCF, Kalpakkam &
Professor, Homi Bhabha National Institute, BARC, Mumbai

Durability testing of Intumescent Coatings used for fire protection of structural steel

N.S.S. Rajan

President and CEO of AKHANDS Enterprises, Chennai

Factors On Tank Lining For Corrosion Prevention In Chemical And Fertilizer Industries



NACE International Gateway India Section (NIGIS) Corrosion Awareness Awards are presented to honour and respect individuals / institutions for their contribution to corrosion awareness and developments in the field of corrosion science and technology in India. The awards are presented during the NIGIS Annual Corrosion Conference since 1995. NIGIS has so far honoured 127 scientists / teachers / engineers / professionals 46 students and 26 public / private sector laboratories. Detail information about awards is given at www.naceindia.org.

NIGIS CORROSION AWARENESS AWARD COMMITTEE 2019



Dr. Radhakrishna G. Pillai
IITM, Chennai

Excellence in Corrosion Science & Technology
in Research & Education



Dr. S C Vanithakumari
IGCAR, Kalpakkam

Distinction in Corrosion Science & Technology
in Research & Education



Basanta Kumar Lenka
Technimont Pvt. Ltd., Mumbai

Excellence in Corrosion Science & Technology
in Oil & Gas



Dr. Anil Krishna Kar

Excellence in Corrosion Science & Technology
in Quality Management & Control



Viswanathan Venkateswaran
Petronas Chemicals Methanol Sdn, Malaysia

Distinction in Corrosion Science & Technology
in Industry



Madhura B
IGCAR, Kalpakkam

Student Award for M Tech



Dr. Poulami Chakraborty
Homi Bhabha Research Institute, Mumbai

Student Award for PhD Degree



Dr. M. Ajay Krishnan
IIT Bombay, Mumbai

Student Award for PhD Degree



Corrosion Laboratories at IIT Madras
Chennai

Award for Excellent Laboratory



T Subba Rao
Bhabha Atomic Research Centre, Kalpakkam

Meritorious Contribution in Research & Education



Sandeep Harshadray Vyas
Reliance Industrial Limited, Navi Mumbai

Meritorious Contribution in Industry



Prof. Gurmeet Singh
Pondicherry University, Puducherry

Lifetime Achievement Award



19 best symposia awards and 5 best poster papers, as chosen by eminent experts, were presented during the valedictory session. Awards for two best exhibition stalls and two runner-up exhibition stalls were chosen among the 81 exhibition stalls, were also presented.

CORCON 2019: BEST PAPER AWARDS

1	Biomaterials Corrosion	Fluoride conversion coating: A solution for effective control of corrosion rate and enhanced bio-adaptability for orthopaedics K. Saranya and N. Rajendran , Anna University, Chennai
2	Cathodic and Anodic Protection	HVDC Interference on MGL Steel Pipeline Network Shraddha Garate, Mahanagar Gas Limited, Mumbai
3	Coatings, Linings and Thermal Insulation	Thermal Spraying of Polymers on Metals: A New Development Satish Tailor, Ankur Modi, S. C. Modi, Metallizing Equipment Company Private Limited, Jodhpur
4	Corrosion Control in Water Treatment Utilities	Case Study on Addressing Corrosion issues in Raw Water Treatment due to usage of Ferric Chloride as coagulant Venkata Sai Rambabu, Shivakumar, ONGC Mangalore Petrochemicals Limited, Mangalore
5	Corrosion in Automobiles and transportation industry	Prediction of Cumulative Galvanic Corrosion Damage under Service Life Environmental Conditions Robert Adey, Andres Peratta, John Baynham, Tim Froome, CM BEASY Ltd, UK and Thomas Curtin Computational Mechanics International Inc., Billerica, MA
6	Corrosion in Chemical and Fertilizer Industries	Experience Sharing On Corrosion & Its Mitigation In H ₂ S Based Heavy Water Plants Roma Goel, S.R. Gaidhani, K. V. Tale, M. Yaseen, R.K. Gupta, Heavy Water Plant, Kota
7	Corrosion in Defence Equipment & Facilities	Nano titania based hydrophilic self-cleaning high solid coating for ship's superstructure R. Baloji Naik, R S Naik, N G Malvankar, Sushil S. Pawar, T. K. Mahato, NMRL, Ambernath
8	Corrosion in Oil and Gas	Advanced Water Wetting Model for Pipelines T. Bos, Shell Technology Centre Bangalore, Y. Zheng, Shell Technology Centre Houston and J. Sonke, Shell Technology Centre Amsterdam
9	Corrosion in RCC Structures	Effect of ultraviolet exposure on corrosion performance of Fusion Bonded Epoxy (FBE) Coated steel rebars Deepak Kumar Kamde and Radhakrishna G. Pillai Indian Institute of Technology Madras, Chennai, Tamilnadu
10	Corrosion in Refineries & Petrochemical Industries	Failure Analysis Of A Cross Country Hydrocarbon Product Pipeline – A Case Study D. Sankara Rao, S P Singh, Madan Gopal, Sova Bhattacharya and M Sau , IOCL, Faridabad
		Importance of Materials Selection, Quality Requirement and Anticipated Repair for Equipment in Petrochemical Industry Parag P Karyakarte, Dr.Barun Chakrabarti, M. Suresh, L&T Hydrocarbon Engineering, Mumbai
11	Corrosion Monitoring and Testing	A Case Study on 'AC Interference in Pipelines by Single Core HV Cables Navneet Saxena Pipeline Infrastructure Limited, and Kamlesh Bera, Reliance Gas Pipelines Limited, Navi Mumbai
12	Direct Assessment Methodology Application	Integrated Survey for cathodic protection & coating during ECDA of 4" Condensate Pipeline – A case study Sahab Singh Gurjar, Cairn Oil & Gas and Bidyut B. Baniah and Praveer Narayan Singh, Allied Engineers
13	Internal Corrosion in Pipelines	ILI Verification for subsea pipelines Mark Stone, Patricia Conder and Zach McCann, Sonomatic Ltd, Warrington, UK
14	Marine Corrosion	Breakthrough in Pulsed Eddy Current Detection and Sizing Charles Tremblay ¹ , Marco Michele Sisto ¹ , Andréanne Potvin, 1Eddyfi Technologies, Québec, Canada
15	Materials and Composites	Microbial Induced Corrosion Behavior of multilayer Nanocomposite Coatings for the marine applications Preethia, Shashi Bhushan Aryaa*, Vidya Shettyb, National Institute of Technology Karnataka, Surathkal, Mangaluru

16	Microbial Corrosion and Inhibitors	Cross-linked glucose derivative as a green corrosion inhibitor for mild steel in HCl solution JiyaulHaque, Vandana Srivastava, Banaras Hindu University, Varanasi and M. A. Quraishi, King Fahd University of Petroleum and Minerals, Dhahran
17	Power Plants and Utilities	Localized oxidation of Zr-2.5Nb alloy in a gaseous environment containing hydrochloric acid Sai Karthik Nouduru ^{1,2} , M Kiran Kumar ¹ and Vivekanand Kain ¹ , 1Bhabha Atomic Research Centre, Mumbai and 2Homi Bhabha National Institute, Mumbai
18	Young Student Scientist Forum	Corrosion Monitoring By ER & LPR Probes for Oil Refinery Application Akshay Sonwane, Dr. Sunil Kahar, The M. S. University of Baroda and Arindam Gupta, Advance Tech Control Pvt. Ltd., Vadodara
19	Best Poster Award	Performance characteristics of nanophase modified fly ash concrete for marine applications Sudha Uthaman ¹ , Vinita Vishwakarma ¹ , D. Ramachandran ¹ , B. Anandkumar ² , Rani P. George ² and U. Kamachi Mudali ³ 1Sathyabama Institute of Science and Technology, Chennai, 2Indira Gandhi Centre for Atomic Research, Kalpakkam, 3Heavy Water Board, Mumbai
		Understanding the Throwing Power of Galvanic Anodes in Reinforced Concrete Structures Using Numerical Simulations Naveen Krishnan and Radhakrishna G. Pillai, Indian Institute of Technology Madras, Chennai
20	Best Poster Runner-up Award	Risk Assessment of Heat Exchangers Operating with High Chlorides in Cooling Water – A case Study Vineet Sharma and Umakanthan Anand, Reliance Industries Limited, Mumbai
		Smart Release Bionanocomposite Coatings for Corrosion Protection of Aluminium Alloys Sarah B. Ulaeto ^{1,2} , Anju V. Nair ¹ , Jerin K. Pancreacious ^{1,2} , T.P.D. Rajan ^{1,2*} , B. C. Pai 1 CSIR-NIIST, Trivandrum, Kerala 2 Academy of Scientific and Innovative Research (AcSIR), New Delhi
21	Best Poster Second Runner-up Award	Porous Microcapsule Based Superhydrophobic Coating on 304L SS and its Corrosion Properties in Chloride Medium Rasitha T.P. ¹ , S.C. Vanithakumari ¹ , R.P. George ¹ and John Philip ^{1, 2} 1 Indira Gandhi Center for Atomic Research, Kalpakkam and 2Homi Bhabha National Institute, Mumbai, India.

CORCON 2019: BEST STALLS

1	12 Sqm – Winner	BSS Tech CP (I) Pvt Ltd
2	12 Sqm – Runner-up	Sandvik International
3	9 Sqm – Winner	NDT Technologies (P) Ltd
4	9 Sqm – Runner-up	NDT Global LLC





CORCON 2019 was not only about heavy corrosion mitigation stuff, but also had its share of fun and mirth. The Cultural Program, organized on the evening of the third day of the event had MsKetaki Samarth and her troupe enthraling the audience with their rendering of Kathak dances. The program began with a Ganesh Vandana and followed by a few pure dance pieces like the 'todas' and 'tukdas,' followed by the depiction of different aspects of Lord Ganesha using fusion music and western beats.



This was followed by a unique interactive drumming experience by Drum Café, wherein the entire audience was given a drum each and led by Dr Vinod Hasal, through motions of communal drumming which lightened up the environment, broke down barriers, inspired people and took the entire audience across different rhythmic motions. Drum Café was actually started as a Café where drumming was used in a relaxed environment to break down barriers, inspire and bring people together.



"PROTECTIVE COATINGS INDUSTRY"

CONVENOR

S. Ravichandran, Sr. Manager, Berger Paints India Limited- Kolkata

PARTICIPANTS TO ROUND TABLE CONFERENCE

Company	Represented By	Designation
Berger Paints	Sanjay Chowdhury	Business Head- Protecton
Asian Paints	Mr. Nitin Bhagavat	Senior Manager Business Development & Product
Akzo Nobel	Mr. Dharendra Singh	Management Marketing Manager- Oil & Gas Lining
Shalimar Paints	Mr Suresh Nair	Vice President- Industrial Business
Tata Pigments	Mr. Khalid	Deputy Chief -Industrial and Decorative Coatings
Lalita Infraprojects	Dr. Buddhadeb Duari	Corrosion Consultant
Henkel Adhesives & Technologies	Dr. Prasad Khandagale	Product Development Manager (India-Middle East- Africa)
3M	Dr. Mukesh Kumar Madhup	Manager Technical
Kansai Nerolac	Mr. Xavier Pereira	Chief Manager Technical product Developemnt
Grauer & Weil I Ltd	Mr. Mahesh Aradhye	Associate Vice President R&D
Kirloskar Corrocoat	Mr. Ravindranath Mantri	Chief Executive

DISCUSSION POINTS

1. Mr. Sanjay Chowdhury

- Inadequate awareness as a primary cause of poor quality implementation and premature failures as seen in industries across all segments.
- Corrosion Audits and Risk Analysis is not implemented by industries as a result performance assessment of coating systems are never understood.
- Painting Process is less understood and mostly ignored by the facility owners when it comes to implementation.
- Sharing of corrosion failures is a must to ensure good coating systems emerge.

2. Mr. Khalid

- The budget for painting should be adequate enough to ensure complete protection of infrastructure and match the painting maintenance cycle.
- The industry should also be motivated to have Corrosion Management Policy.
- Education plays a key role and industries should be motivated to run corrosion awareness programs.

3. Mr. Rajes Bardia

- Corrosion and Management is not a new issue and we are to look for Global inputs and supports for addressing the queries of industries.
- Corporates and Industries should be approached to implement practices only by insisting them to adopt corrosion mitigation practices and Government should enforce it strictly to ensure implementation to protect infrastructure.

4. Mr. Dharendra Singh

- NACE should play a crucial role to bridge the gap between the industry and the Government.
- BIS should be well represented on a concentrated approach to create more standards to cater to the growing demands of protective coatings and in an effort to standardise the formulations for use by industries.

5. Dr. Buddhadeb Duari

- There are eight new standards that has been recently launched by the BIS and most of them are in pipeline coatings.
- BIS is open to work and membership is already open for all paint companies, but most of the work done currently is under other segments. It is for the paint companies and industry to call for standards in protective coating segment.

6. Dr. Prasad Khandagale

- Potable water Pipelines in India are still adopting cement coatings for internal linings. NACE should give a white paper to promote use of latest technology that is being adopted in developed countries to using polymer linings that are FDA approved and upgrade the coating system in this segment. This is important as it is not possible for paint companies to promote to Government Body in changing the specification unless there is clarity offered by a detailed technical study and performance track report which can be sourced by NACE from technical papers.

7. Dr. Mukesh Kumar Madhup

- Regulations like reduction of VOC is not practiced in India though there are lots of environment initiatives taken by the Government. Representations to be made to Government to implement water based products instead of solvent based that have high VOC emissions.
- Warranty has to be addressed by better coating specifications and there should be uniform guideline for evaluation of coatings under warranty claims. Drafting a copy by the committee will be useful for the industry.

8. Mr. O P Gupta

- Standard guidelines of coating specifications for various industries has to be drafted by the committee. This comes to light for none of the industries value the project coating specifications and when it comes to maintenance there is no track of the files and invariably work on coating specifications drafted by the contractors or local vendors.
- Similar to practices followed by National Paint Association USA, we in India have to formulate by forming a protective manufacturers committee.

9. Mr. Xavier Pereira

- Coating recommendation is a major concern and less work is done to create unanimity of manufacturers. Every manufacturer has something new to offer and the industry gets confused and ends up calling for defined performance on time lines and matches the rates offered by various companies. This is a clear cut cause for lack of improvement as expected in corrosion mitigation practices.

10. Mr. Mahesh Aradhya

- Lowest bidder concept prevailing in the industry for award of contracts has defeated the purpose of implementation of the best of specifications. The primary reason attributed is the non-justification to L1 pricing with the required quality.



SUMMARY

Points agreed by all the participating members representing the paint manufacturers.

1. Paint manufacturers are interested to contribute more proactively to represent NIGIS.
2. Paint manufacturers are keen to introduce more coating standards relevant to meet the formulations covering the protective coating requirements.
3. Paint manufacturers shall focus on one industry every four months and focus on creating an awareness program through NIGIS.
 - a. The group shall prepare case studies on coating failures specific to the industry and discuss the best practices adopted
 - b. The coating systems for each of the units shall also be framed by this team and unanimously be represented as a white paper under the banner of NIGIS
 - c. Coating contract governing challenges shall be discussed and pathways to ensure proper implementation will be discussed in these meetings with the industries.
4. Training programs for painters and qualification/ certification shall be promoted to ensure implementation of good painting practices.
5. NIGIS to coordinate with all paint manufacturers and offer a platform to promote coating industry contribution in CORCON and to the industries covering all segments over a period of time.

REPORT ON TECHNICAL INTERACTIVE FORUM

“CORROSION MONITORING AND TESTING”

PANEL MEMBERS

The panel comprised of industry expert, user, manufacturer and contractor so as to address various aspects of Corrosion Monitoring and Testing. The panel members were:

Patrick Teevens, Broadsword Corrosion Engineering Ltd.
Amish Gandhi, Metal Samples
V P Sastry, Ex. RIL
Vijay Aggarwal, Pyramid Technical Services Pvt. Ltd

PANEL CONVENER

Dr. Anil Bhardwaj, Ex. Ongc

VIEWS OF PANEL MEMBERS

At the outset of the interactive forum, the panel members expressed their views, which are summarized below:

1. The most common corrosion monitoring methods used by the industry are:
 - a. ER, LPR, Weight loss coupons
 - b. Process parameters
 - c. Fluid characteristics
2. Other advanced corrosion monitoring techniques that can help further analysis of corrosion mechanisms active in the process system.
3. Real time monitoring data interface provides additional advantage in dynamic systems.
4. Corrosion data collection, management and interpretation are important part of corrosion monitoring programme.
5. Corrosion inhibitor programme must be accompanied with suitable corrosion monitoring tools.
6. 99.9% availability of corrosion inhibitor dosing and monitoring devices should be planned right from the design stage.



DISCUSSIONS DURING THE TIF

The following questions from the participants were discussed at length:

1. Can weight loss coupons be re-used?
2. In water injection lines, in oilfields, which carry produced water, some of the coupons are covered with oil and thus the results are not representative. Such coupons face localized and under deposit corrosion. How to handle this scenario?
3. How subsea pipelines can be monitored more efficiently?
4. Fouling of LPR probes in oily effluent lines.

On the re-use of weight loss coupons, the following views were expressed:

- Ideally, fresh coupons should be used every time. Re-use of coupons requires to bring them back to the original surface condition.
- Coupons may undergo metallurgical changes or dimensional changes or pitting, cracking in general, in specific service. So, if coupons are free from metallurgical changes, pitting and cracking, the samples can be re-used, even if dimensional changes are measurably uniform, after re-measuring the area of the coupons and making corrections for the change of area.
- In the case of oilfield fluids the conditions are not such that they bring metallurgical changes. Hence, the coupons can be re-used after grinding, polishing, making surface pit free, measuring dimensions, taking fresh weight and marking. Cracks and pits are not permitted while re-using the coupons.

Issue related to weight loss coupons in water injection lines carrying produced water: The same delegates had expressed the same problem in their oilfields in Kuwait about 3 – 4 years ago as well. It reflected that the issue still existed. The following views were expressed on this issue:

- Expose additional coupon at the center of the pipewhere the fluid velocity will be maximum. The chances of oil droplets remaining in dispersed conditions will be high and the probability of oil coating will be minimized.
- The true corrosivity of water can also be assessed by using a by-pass stream with oil filtration facility and then exposing the coupons to oil free water.

How subsea pipelines can be monitored more efficiently?

The possibility of installing Fixed UT system with IP68 rating can be considered that can transmit data in real time to a shore based location. Other possibility is Integrity assessment through other means such as ILI or MTM. These are the techniques that can be used in addition to the common techniques used on the platform.

Fouling of LPR probes in oily effluent lines

By putting velocity shields on the electrodes or protecting the base of electrodes by installing Viton O rings, so as to isolate the electrodes to prevent them from for shorting, there is possibility of resolving the issue of fouling of LPR probes.



"INTEGRITY MANAGEMENT FOR COATING AND CP SYSTEM, INTERFERENCE AND MITIGATION"

PANEL MEMBERS

Mr. Hasan Sabri – KOC,
Mr. Sai Mudiam – Metal Samples,
Mr. Alok Gurtu – Reliance,
Mr. B. G. Prashanth- Jef Techno Solutions,
Mr. Ashish Khera – Allied Engineers.

PANEL CONVENER

Sandeep Vyas, Reliance Industries Limited.

Approximately 100+ (room was full throughout TIF) attendees were present for this Technical Interactive Forum that lasted for One and half Hours from 04:30 – to 6:00 in Conference Hall –C on 1st October 2018.

OBJECTIVE

To discuss the industry concerns regarding Pipeline integrity management, coating, CP, Internal Corrosion, and interference detection and mitigation; with aim to discuss amongst experts and providing best way forward.

DISCUSSIONS

The summary is as under :

- a. Opening of forum by Convener with brief presentation on objective and scope of TIF followed by introduction of all panel members with their experience and specific field experience.
- b. Each panel members were asked to highlight their area of expertise and thus share couple of latest experience related to pipeline integrity management.
 - Alok Gurtu outlined latest development and their uses in field of integrity, ILI, CP etc. and emphasized for use on online portal for integrity management (FMS / PIMS), Public Awareness Portal (PAP), Rou management due to population density increase surrounding pipeline areas etc. he also highlighted requirement of long term data records and their importance for study and action to reduce third party incidences.
 - Ashish Khera spoken on development and changes in standards and regulations in field of integrity monitoring requirements for non piggable pipelines, awareness and training needs and importance of data integrity and thus emphasized on data capturing and maintaining with minimum human intervention and with max. accuracy. He further shared that CP & CIP courses awareness and participation initiatives from organization like Gail is very good and so for other organizations too taking initiatives for codes and stds., regulations and training needs.



The latest developments in field of Integrity management, highlighting the need for enhancing requirements of Integrity management tools considering increasing of infrastructures as well aging of many pipelines systems across world needing special tools for ensuring integrity; considering many of pipelines are non piggable and needing different approach for monitoring and ensuring such structures integrity; highlighting several techniques as ECDA, ICDA, MTM, ILI and options to ILI for non piggable pipelines.

- Hasan Sabri give high incite for requirement of overall consideration of integrity aspects holistically including Coating, Cathodic Protection, ECDA/ICDA, pigging requirements, skill and competency development for involved manpower including contractors (Contractor development and assessment program). Sh. Sabri emphasized on requirement of developing and ensuring all integrity aspects as KPI matrix covering all highlighted aspects.
- Sai Mudiam highlighted importance of proper placement and analysis of Corrosion Probes and Coupons, selection of these monitoring tools, deciding on frequency of monitoring etc. he shared that there are mix of people approaching for technical inputs and system considering increase of awareness in industry. Sh. Sai further highlighted that there is not much of changes in technology of tools but the electronics are rapidly changing for data management, records etc. to moving from stationary data to wireless systems.
- B.G. Prashanth has give incite of his latest experience and increased awareness amongst industry for AC/DC interference situations, monitoring techniques, interference modeling requirements. Sh. Prashanth has emphasized on requirement of contractor as well inspection persons training and competency development requirements.

Current challenges faced in field of Coating, Cathodic Protection (CP) and mainly on interference detection and mitigation, experience with common ROU pipeline interference and consideration with their different coating systems were discusses.

CONVENER HAS SUMMARIZED ABOVE POINTS AND HIGHLIGHTED FOLLOWING POINTS.

- Awareness of overall Integrity management requirement and techniques need of standardization to extent as well making it specific to country / region considering local factors (eg. Urbanization in country like India) and thus making it modular accordingly.
- Need for Integrity management programs, training and awareness get stronger with increase of infrastructures as well aging of earlier installed systems including older coating system, sharing ROU, non piggable pipelines Vs piggable pipelines, integrity as well safety concerns due to interference situations.

Following detailed discussion and view sharing by panelists the forum was opened for Q&A by attendees thus queries raised by Attendees were discussed /responded by panelists and experts among audience as well :

A few of queries discussed during the interactive forum are listed below :

1. Is the systems development and implemented are monitored by system effectiveness in field, is Risk Based Inspection (RBI) been ensured by operating companies for making systems more effective.

Ans. : Alok Gurtu has confirmed that Risk based Inspections are surely been practiced for plants, however; for pipelines same is yes and no to extent considering changing Rou conditions on fast pace and thus continual developments and monitoring are practiced. Sh. Hasan has shared his experience of having 36 KPI model implemented including pigging, CP, Cleaning, repair, Coating and re-habitation, valve testing etc, to highlight few to cover RBI all aspects and is been successfully practiced.

2. CPL and DCVG interruption frequencies are different for TR interruption as per earlier and analogue tools than how come XLI functionality be compared considering single run.

Ans. : Ashish Khara has shared several of survey conducted and their feedback highlights, he also highlighted that considering accuracy of measurement and including several techniques combination in XLI, the data can definitely compared for interoperation and field actions and avoid multiple field visits, human intervention on data, accuracy of location etc. Sh. Hasan has confirmed that their company has got XLI done on their system and has found results to be accurate and verified in field too.

3. Specific CP Standard for plant piping and complex systems are not available covering all aspects, is there any development on same?

Ans. : CP design and implementation criteria remains same for both cross country and plant piping as well there are several international standards cover requirements of piping, tanks, bullet, internal CP etc. almost all aspects of CP. Complexity of plants and implementation strategies are different for projects pertaining to plants and thus no single standard can cover all aspects of CP for plants and thus multiple std. need to be referred on case to case basis.

4. Why we cannot enforce for HT lines to be away from pipelines, is there is any standard which specifies minimum distance maintaining requirement for same.

Ans. : PMP act as well word wide practices are considered based on experience, availability of land (ROU), practical possibility with increasing infracture and increasing population density nearly makes it difficult to maintain distances or separate corridor for utilities. However; need to implement monitoring and mitigation based on actual case to case. AC interference, modeling consideration including criticality of resistivity, coating stress voltage, selection of mitigation techniques, alignment of pipeline vs. interfering installation of HT, Sub-station, Earthing systems etc. What all need to be considered for the requirement of AC mitigation. PNGRB, OISD, IS etc. standards defines minimum distance from tower footing / earthing to pipelines.

5. Effect of less than 33 kV HT line crossing need to be considered as well any effect of underground cable crossing to pipelines.

Ans. : Both HT as well LT lines can interfere for pipeline CP as well safety aspects and AC corrosion; based on type of power line, loading, fault, earthing, resistivity etc. multiple factors and thus need to considered appropriately for mitigation, modeling etc.

To second question of underground cables, since cables are insulated as well are generally of multi core as well considering cancelling effects, the effect on pipeline may not be significant in normal circumstances.

6. Data availability and sharing by HT utilities are limited, thus what paramaters to be considered for modelling.

Ans. : Design data are standard /similar protection requirements and thus been available with authorities, however; the actual operating data may not be available / shared. The worst case scenario consideration of long parallel, deviating route away from pipe, design load etc. need to considered for modeling and mitigation implementation.

7. Operating several tanks for over 25 years and no corrosion /leak recorded till date, is CP required to implement now?

Ans. : Corrosion and CP requirements depends on multiple factors as back fill, resistivity, environment, coating, monitoring practices etc. having said that, CP is support system and always recommended to enhance integrity of underground structure. If no corrosion happen till now is good, however, with installation CP and continuing monitoring and inspection integrity of tanks can be ensured for longer period of time.

8. If bonding between multiple pipelines running parallel / same ROU are required?

Ans. : From Corrosion and CP prospective, maintaining same potentials for all underground intended structures are advisable to avoid mutual interference. Due to lack of awareness, negligence of CP/coating of some or other pipeline operator and considering system of self and maintenance as superior; generally pipeline companies do not agree on bonding. Bonding need to be decided with suitable balance resistance and detailed survey, same need to be monitored and maintained for maintaining potential balance and long term integrity of pipelines. .

9. There are difference size of coupons been used by different pipeline companies, what should be ideal size ? if magnetic switch is recommended to be used ?

Ans. : Coupons to be design and selected based on specific coating holiday expected over pipeline, a standard design guidelines is available as NACE standard for coupons. Material of coupon may not be critical to same pipe piece but preferred to have same grade, generally 1 sq. cm coupon is good for 3LPE coated pipe polarization check.

Magnetic switch is good tool for ON:OFF monitoring, provided it is well maintained, as discontinuity of coupon form pipe from longer may result in corrosion and thus do not indicate proper results.

SUMMARY OF DISCUSSIONS AND CLOSURE REMARKS

The expert panelist has responded queries from the attendees with reference to their experience in similar subject and vast knowledge base and suggestions were welcomed by attendees. The points were responded with case study and history as well referred to particular paper in this conference and / or to standards relevant to the issue. Also several of subject mater experts sitting in audience were also encouraged and have responded particular query related to their area of experience.

The question / query flow was continuing, however, considering the time limitations attendees were requested to raise their specific queries to NACE India mail Id and confirmed to be reverted with technical inputs.

Panelists were happy to share their experience and respond to queries by industry users, also attendees were happy to have their most of queries responded with experienced panelists and felt surely useful information sharing gathering.

With that, the Technical Interactive Forum on “Integrity Management, Coating and CP system, Interference and Mitigation” Came to an end with vote of thanks given by the convener to the panelists and all the participants.

WATER TREATMENT

PANEL

K.V. Suryam – CoE & Head (Water & Utilities), Centre of Excellence, Reliance Industries (I) Ltd,
Jeff Kramer – BWA Chemicals, USA, S M Mahadik – President (Vasu Chemicals LLP),
Nitin Umbralkar – ION Exchange (I) Ltd., Satish Kulkarni – WEX technologies.

OBJECTIVE

Fruitful Interactions on maximizing water recycling with constant reduction in discharges to meet the challenges of existing & forthcoming new environmental regulations.

DISCUSSION

New & forthcoming regulatory threats of reducing the treated water discharge are giving scope for finding opportunities in maximizing the recycling and reducing the water intake with adoption of existing proven & newer technologies in a cost-effective manner.

Presentation was given by Mr. Mahadik, on advanced cooling water treatment methods for operating cooling towers at higher COC's & good engineering operation practices with increasing use of recycled water.

Presentation was given by Mr. Jeffrey Kramer on simplifying cooling water formulations for cost reduction & improved performance, where lots of options for cost reduction strategies were discussed.

After the presentations, Question & Answer section was followed along with the above panel, in which each panel member shared their experiences on using recycled water like treated effluents, sewage recycling etc. Also TIF discussed the challenges & suggested implementable & feasible solutions that can be adopted by end users in exploring reuse & recycle of wastewater.

RECOMMENDATIONS

It was felt that such interactive forums give & excellent insight on the challenges & the mitigation measures which are highly useful for the participants. A half/full day session on water covering invited presentations & case studies followed by an interactive technical discussion covering all areas of water will be highly effective & useful for all the industries and institutions dealing & using water.





DELIVERING PERFORMANCE THROUGH OPTIMUM COATING SPECIFICATIONS

PANEL MEMBERS

Sanjay Chowdhury, Berger Paints
Satayapal Nair, Denso
K N K Vasan, Jal Engineers
Rajes Bardia, Asian PPG Paints
Umesh Urvala, Larsen & Toubro

PANEL CONVENERS

S. Ravichandran, Berger Paints India Limited
Denzil Dcosta, Graco India Pvt Ltd



SUMMARY

The coatings specification plays a very critical role in the design life of an asset. The panel members presented to a gathering of 100+ industrial professionals during CORCON 2018,

Mr. Satayapal Nair expressed the importance of Coating Specifications and the need for consultants to have qualified protective coating specialist in their teams to ensure tailor made specifications depending on the project and the environment.

Mr. Sanjay Choudhury stated that all the stake holders are working in silos and requested NACE to create awareness to ensure bringing synergy.

Mr. Vasan also reiterated the point of consultants not imparting sufficient priority on the task of writing the coating specifications and stated that without assessing the project site for its challenges in implementing the coating specifications, it is incomplete and deviations are observed due to this.

Mr. Rajesh Bardia has expressed that the lowest bidder concept prevailing in the industry for award of contracts has defeated the purpose of implementation of the best of specifications. The primary reason attributed is the non-justification to lowest bidder pricing with the required quality.

Mr. Urvesh insisted on painting operator qualifications and the lack of implementation of the 3rd party inspection from the client's side. The Facility owners are not keeping track of coating systems in project stage and hence during maintenance / shutdowns the coating systems are compromised.

TIF concluded based on the deliberations within the panel and discussions of the attending professionals the following points are brought forward to the NACE Governing Board to drawdown actionable way forward.

1. NIGIS shall have to create awareness among Coating Consultants to induct in their roles qualified PROTECTIVE COATING SPECIALIST personnel.
2. The industry is calling frequently and enquiring on the list of qualified inspectors who are available for extending coating inspection expertise as there is no such available source of information on the availability of expertise. If the local chapter can take the lead and provide for use by Indian Industries then it will be more beneficial for implementation of good painting practices.
3. Facility owners call for a standard operating practice (SOP) as a white paper to be published for understanding the method of estimation of costs and as how to compare the technical points of the specification parameters among various paint manufacturers products. They need a guideline on the variables and what precautions to take while deriving the cost estimates of maintaining the plant painting.
4. Painting specifications are not understood for implementation of fundamental check points like measurement of humidity and dew point in any industry. Secondly, DFT checks are also not being done with reference to notable international standard. All these continue to hamper the ultimate performance of the given coating systems.
5. Fabricators also do not have any liability on the coating performance though they are implementing the application at project stage. Hence, training and guidelines for effective implementation and governance of coating contract is becoming most important in today's context for delivering optimum performance of specified coating systems.

REGULATIONS AND STANDARDS IN CORROSION

PANEL

Dr. D. Parvatalu, Convener ONGC Energy Centre
Mr. S. Ravichandran, NACE President -East Zone, Berger Paints India Ltd
Mr. S. K. Mazumdar, Pipe line Group, ONGC, Mumbai
Dr. Homero Castaneda, NCMRL, Texas A&M University
Dr. Brenda J. Little, Corrosion Consulting, LLC, USA
Mr. V. P. Sastry, Ex-Reliance Industries, India
Mr. Sanjiv Maini, BIS, Delhi

OBJECTIVE

To discuss various national and international standards available including those of NACE standards in corrosion for meeting specific end user needs and further improvement taking into country specific regulations into consideration

ATTENDANCE

Wide spectrum of Delegates/ invited speakers / EXPO exhibitors etc., of Conference from various Govt /PSU and Pvt Industries, academia, industrial research institutions



DISCUSSION

- The convener circulated 10 questions to the Panellists well before the TIF to come prepared for discussion with each one's views on seeking needs, issues and opportunities for regulations and standards in respective areas of specialization and in what way NACE intervention can be helpful. Among others the response by Mr. Ravichandran, Mr. S. K. Majumdar, Mr. Saniv Milani and Dr. Brenda J. Little are of value addition.
- A brief presentation was made highlighting need for development of standards, NACE standards and efforts for greater international cooperation for meeting variety of country specific end user needs and suggestions for improvement in existing standards or need for new standards, adaptation of various national / international standards in a given regulatory framework with a request for feedback from Panel / audience.
- Each panellist briefly shared his/her views on availability of various international and national standards in corrosion in relevant fields of their expertise and opined the need for development of more NACE standards to meet country specific needs by following safe practices. Some of them include need for standards in High Performance Protective Coatings, addition of listed products to BIS, Oil field upstream operations in subsea applications / downstream operations with emphasis on safety for asset integrity, microbial influenced corrosion and limitation of existing test methods, need for proactive user interaction and feedback for continual improvement of standards, NACE Interaction with BIS to adopt some standards, need for periodic review of standards, withdrawal of outdated standards etc.
- The Convener initiated discussion by asking the need for critical standards that need improvement immediately and the response was on MIC in water, High performance Protective coatings, NACE standards IN DOWN STREAM should be applicable in Indian climate conditions, suggestion for changes in MR 215 and API 941, up gradation considering country specific climate change

RECOMMENDATION

- Periodic review / withdrawal / improvement of standards is required considering market availability, better quality to meet growing industrial needs
- Coordination with NACE and vice-versa with other committees especially, the country specific local bodies is needed to adopt / work on new standards.
- High Performance Protective coatings are needed to be covered in Indian standards. Protective coatings w.r.t. internal pipeline coating is the needs immediate attention.
- NACE standards for MIC test for drinking water distribution systems to be made
- Standards and practices are needed for submarine pipelines as none of the available standards solves the problem at present.
- While making standards, consider criteria for product selection.
- Standards should not only define product, methodology but performance has to be rated.
- NACE standards should be applicable in Indian climate conditions; Suggested changes required in MR 215 and API 941
- Guidelines for how to use design codes, standards need to be in place

CORROSION IN CONCRETE

PANEL

Dr. Radhakrishna G. Pillai, IIT Madras (Convener)
Dr. Harshavardhan Subbarao, Vice President, IABMS
Dr. Vijay Kulkarni, RMCMA Mumbai
Er. Chetan Raikar, Structwell Consultants, Mumbai and
Dr. Muhammad Salman, IIT Bombay.

POINTS EMERGING OUT OF FLOOR DISCUSSION

Healthy and intense debates emanating from the deliberations of the presentations by authors. The time allotted for presentation is adequate.

TIF provided thought provoking deliberations on the existing scenario in the construction industry towards corrosion protection / durability enhancement of RCC structures; need for bringing a unique performance based code emphasizing on durability of concrete, corrosion protection of steel rebar, optimized test methods to ensure durability of concrete, guidelines for repair and rehabilitation of RCC structures, workmanship rules etc and creating awareness among asset owners, statutory heads, law makers about importance of durable RCC structures and the challenges to the society and country in the near future because of negligence in these aspects.

CONCLUSION / RECOMMENDATION

- There is a need to optimize the test methods to evaluate the performance of corrosion control methods used in RCC structures.
- Develop performance and durability based codal provisions for RCC
- Understand the synergistic effects of carbon dioxide (carbonation) and chloride attack on service life of concrete structures.



EMERGING ISSUES / TECHNOLOGY

- Developing effective and feasible non-destructive testing methods for condition monitoring of corroded RCC elements.
- How to enhance the quality of coated rebars, considering the Indian site practices.
- Assessment of cathodic protection systems in concrete structures

CORROSION CONTROL IN CITY GAS DISTRIBUTION

PANEL MEMBERS

N Bose Babu, Gujarat State Petronet Ltd
Narendra Kumar, Torrent Gas
S. Murali, Mahanagar Gas Limited
T L Sharnagat, Mahanagar Gas Limited
Harish Tallam, Gujarat Gas Ltd.
S R Mondal, GAIL (India) Ltd.
Anand Nadkarni, Consultant

PANEL CONVENER

Sumeet Kataria, International Certifications Services

The session started with sumeet introducing all the eminent panellists.

All the panellists then started with their views on the CGD and the key issues faced and the way forward.

The key discussions that took place were started by

Mr. N Bose Babu who mentioned that An Integrated approach needs to be adapted when looking at CGD's, Internal Corrosion is a big issue and how to manage it can get very challenging at times, also in addition Hydro Test and pigging on a line must be done and the key should be to get off the entire residual water post hydro test which can be done by drying using PIGS that are even available for low radius pipes of 1.5D.

Mr. Narendra Kumar added that today Regulators are getting strong and with additional norms the compliance requirements are getting stringent, A lot of new companies in the field of CGD again pose a lot of challenges, Quality of gas will govern the internal corrosion and process upsets shall post a considerable threat and the external factors shall govern the external corrosion, Damage on external coating and repair shall be tricky due to the city and access issues, The current requirement is high which shall always post a challenge, Damage due to external factors and agencies is very common and always poses a threat to integrity of the pipe line, Inline inspection is challenging due to smaller radiuses, Tomography is gaining acclaim due to its benefits in the Corrosion monitoring and the length it covers, Monitoring the pipeline health must be done frequently to maintain integrity of the line.

Mr. S. Murali added that the Steel line network for them is close to 400 kms, Stray Dogs /Rodents/ Bandicoot / Pigeons pose a constant threat to the asset Integrity, Stray current DC traction was prevalent and was a challenge, which is now converted to AC so now AC traction poses a new set of challenges, 3 LPE coating needs to be constant monitored for its health, Encroachment is a constant issue in the CGD, Third party excavations pose a constant threat to the Integrity of the Lines, Surveys are a challenge in the CGD environment especially in certain parts especially with the widening and concretisation of roads posing a challenge as well as a greater threat, Internal corrosion monitoring is challenging due to non pigable lines, Moisture in the gas poses a great threat to the internal corrosion, 50 ppm H₂S again is challenging to deal, Supply unpredictability again poses its own complications and threat, Honey moon period and issues later is an inherent feature of the CGD where initial years are ok but later all points and issues crop up from all sides and fronts which pose a threat to asset integrity, Difficult to put piggable lines in the CGD network due to lack of ROW.

Mr. T. L. Sharnagat added to this that Cost is an issue in the CGD and contractor's availability is always low and poses an issue, No industry support on a common platform and only now the regulator has been making available a platform, Institutes are not there who govern the neither competence nor skill development, Design stage and procurement is challenging due to a lot of constraints, Capex increment limits thickness of the pipeline, Set up a state of art laboratory is the need of the day, Industry in CP to be educated and common forums like NACE should come up with such programs, 25 yrs. of age of the asset coming close and will have its own issues, Carbon footprint and highway pipeline traffic reduction is the biggest seen advantage, Contractor and AMC Organisation's need to be developed, Pipe Mfg. should generate a fund that can go into RnD, Modern technologies need to be adapted to keep pace with latest trends and technologies.



Mr. S. R. Mondal mentioned that the Wet gas and dry gas pose an inherent threat, Surveys is an issue as in CGD the asset gets constraint ROW from laying to monitoring and also many times gets encroached, or covered under the concrete road in road expansion, Data is not available for sharing between CGD, Designing the line is problem as no data available, Interference check not seen in preliminary survey, TCP and ICCP is time taking, Land getting issue, Collaboration to have bonding requirement to take care of interference issues, but that again is an issue as different assets have different technologies and also current demand and also age of asset poses a threat.

Mr. Harish Tallam mentioned that the Road infra expanding, External damage not known until ILI is done which too is rare / not possible in CGD, Third party damage always poses a threat, HDD is being looked to integrity however again have issues in coating integrity, and is emerging as a solution.

Mr. Anand Nadkarni added that the Data given is not matching the same as system cannot be correlated, Survey Data is different at different time zones and correlation is difficult as many dynamics in the CGD, Change in contractors constantly again poses a threat in the level of competence, skill being deployed.





CORCON
Chennai, India
11th - 13th September **2020**
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THANK YOU



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