Sunday 3/6/2022 1pm - 5pm	NDT Inspection for Corrosion Detection and Evaluation	Presented by Jorge Reyna, JRSA Inspections Using nondestructive testing (NDT) devices such as an ultrasonic thickness device, ultrasonic flaw detector, electromagnetic testing, and advanced equipment like phased array or radiographic testing makes it possible to inspect components and determine an internal corrosion grade. In this workshop we will demonstrate how this equipment works, how to interpret results, and how to use this kind of equipment in field inspections.	Henry B. Gonzalez Convention Center	Room 208	Forum
Sunday 3/6/2022 1pm - 5pm	- State-of-the-Art for Corrosion Inhibitors - Information Exchange		Henry B. Gonzalez Convention Center	Room 302 A	Technical
Sunday 3/6/2022 1pm - 5pm	SC 05 - Surface Preparation		Henry B. Gonzalez Convention Center	Room 212	Standards
Sunday 3/6/2022 2pm - 5pm	Guest Reception	The Guest Reception is for individuals that purchase the Guest Program Registration only and are not for attendees to the conference.	Grand Hyatt San Antonio	Presidio B	Networking
Sunday 3/6/2022 4:30pm - 5pm	Annual Member Meeting		Henry B. Gonzalez Convention Center	Room 224	Administrative
Sunday 3/6/2022 4:30pm - 5:30pm	MR0175/ISO 15156 Maintenance Agency		Henry B. Gonzalez Convention Center	Room 216	ISO
Sunday 3/6/2022 5:30pm - 7pm	Opening Reception		Henry B. Gonzalez Convention Center	HemisFair C1	Networking

Monday - 3/7/2022

Date & Time*	Name	Description	Location	Location Detail	Committee(s)	Type
Monday 3/7/2022 7am - 8:30am	Speakers' Breakfast		Henry B. Gonzalez Convention Center	HemisFair C3		Other

Monday 3/7/2022 7:30am - 9:30am	Guest Breakfast	Guest Breakfast is for individuals that purchase the Guest Program Registration only and are not for attendees to the conference.	Grand Hyatt San Antonio	Bowie AB	Other
Monday 3/7/2022 8am - 10am	Pipeline Crossings: Steel-Cased, Thrust-Bored, and HDD	Chair: Michael Snow Vice Chair: Cay Strother This symposium features technical papers on road, railroad, river, wetland, etc., crossings by directional drilling, thrust boring, casing, and HDD-type pipeline crossings, etc. Techniques, cathodic protection, coatings, best practice, construction challenges, etc., are included.	Henry B. Gonzalez Convention Center	Room 302 A	Symposia
Monday 3/7/2022 8am - 11:30am	Marine Coatings and Corrosion	Chair: Abdulhameed Al-Hashem Vice Chair: Moavin Islam This symposium features technical papers on marine coatings along with other protective measures for marine structures such as sea ports, off shore oil rigs, wind mills, commercial ships and oil tankers.	Henry B. Gonzalez Convention Center	Room 221 D	Symposia
Monday 3/7/2022 8am - 12pm	Real Time Corrosion Monitoring for Process Applications: Technology, Experiences, Case Studies	Chair: Xiaoji Li Vice Chair: Evan Huang This symposium features technical papers on real time corrosion monitoring with an emphasis on advances in technology, user experience or case studies. All of the various techniques of real time monitoring are welcomed.	Henry B. Gonzalez Convention Center	Room 221 A	Symposia
Monday 3/7/2022 8am - 12pm	Leadership From The Inside Out	Hosted by Stephanie Biagiotti Corey, Xcel Energy; and Kelsey May, MESA Leadership from the Inside Out: It's tempting to view leadership through a results-driven mindset, focusing only on outcomes. But successful leadership relies on more than metrics. Diversity, inclusion, social responsibility, and ethical decision making are all crucial to a strong leadership culture. Leadership is not just a numbers game – it's a people project.	Henry B. Gonzalez Convention Center	Room 206 AB	Forum

By challenging ourselves to be better leaders, we can change the world… from the inside out. This forum will provide tools to learn how you can make a difference in your own leadership for yourself and your teams.

Presentations in this forum include the following:

Reimagining Business as a Force for Good
Presented by Kailey Dharam, Dairyland
This session will outline the Live Engaged initiative at Dairyland Electrical Industries, while discussing the broader concept of merging business and community involvement in a wholistic approach to corporate social responsibility.

How Labor & Industry Interact in an Ever-Evolving Society
Presented by Jim Williams, IUPAT

Discover the role that Labor Unions can play in raising the bar for workers, ensuring quality on the jobsite, & uplifting equality for the next generation of workers in our industry.

Putting People First at Work
Presented by Kelsey May, MESA

This session will explore the positive impact of creating inclusive, people-first policies.

To Cancel, or Not To Cancel: Navigating Microagressions in the Workplace
Presented by Nick D'Angelo

This session will lead you through navigating instances of unconscious bias and microagressions in the workplace while maintaining productive professional relationships.

Monday 3/7/2022 8am - 12pm	SC 24 - Environmental Health and Safety (EHS)/Regulatory		Henry B. Gonzalez Convention Center	Room 221 B	Standards
Monday 3/7/2022 8am - 2pm	RIP - Biomedical Materials	Chair: Shiril Sivan Nagaraja Vice Chair: Danieli Rodrigues This RIP symposium is seeking abstracts that cover advancements in the biomedical field with respect to corrosion, degradation, and biocompatibility. Topics of interest include, but not limited to: emerging materials (e.g., biodegradable alloys), fretting corrosion (e.g., orthopedic joints), device interaction with the biological environment, implant retrieval analysis, novel corrosion evaluation methods, electrochemical techniques in biosensors and active implants, and surface treatments to inhibit infection and modulate degradation. Presentations will focus on recent advances in corrosion of implants and will span a wide range of product application areas such as cardiovascular, orthopedic, neurological and dental devices.	Henry B. Gonzalez Convention Center	Room 214 B	RIP
Monday 3/7/2022 8am - 2pm	Coatings and Corrosion Control for Storage Tanks	Chair: Khalil Abed Vice Chair: Mohammed Alrudayni This symposium features technical papers on the inspection, monitoring, coating, cathodic protection, VCI and other innovative methods of corrosion management for above ground storage tanks.	Henry B. Gonzalez Convention Center	Room 302 BC	Symposia
Monday 3/7/2022 8am - 3pm	SC 16 - Oil and Gas - Downstream		Henry B. Gonzalez Convention Center	Room 221 C	Standards
Monday 3/7/2022 8am - 3:30pm	SC 01 - Cathodic/Anodic Protection		Henry B. Gonzalez Convention Center	Room 301 A	Standards
Monday 3/7/2022 8am - 3:30pm	SC 12 - Concrete Infrastructure-Day 2		Henry B. Gonzalez Convention Center	Room 211	Standards

Monday 3/7/2022 8am - 3:30pm	Pipeline Integrity - Day 1	Chair: Tod Barker Vice Chair: Matt Ellinger This symposium features technical papers on all aspects of pipeline integrity that can include pipeline integrity management, inspection, assessment, mitigation, operational aspects, regulatory issues, present and upcoming technologies, methods, experiences, and case studies, be it new technologies, new inspection methodologies, or new analyses.	Henry B. Gonzalez Convention Center	Room 304 ABC	Symposia
Monday 3/7/2022 8am - 3:30pm	Flow Assurance in Oil and Gas Productions - Day 1	Chair: Qiwei Wang Vice Chair: Zhengwei Liu This symposium features technical papers on flow assurance which is critical for the safe, economic and efficient oil and gas recovery and processing. This symposium will present the new advancements in understanding and technical solutions related to corrosion, scale and other oilfield chemistry issues in hydrocarbon production and transportation, covering modeling, laboratory investigations and field case studies.	Henry B. Gonzalez Convention Center	Room 301 BC	Symposia
Monday 3/7/2022 8am - 3:30pm	Control of Corrosion in Oil and Gas with Inhibitors Day 1	Chair: Zineb Belarbi Vice Chair: Pierre Mékarbané This symposium features technical papers on the study of the application of corrosion inhibitors and/or scale/deposit inhibitors and their mechanisms of inhibition.	Henry B. Gonzalez Convention Center	Room 217 C	Symposia

Monday 3/7/2022 8am - 3:30pm	Advances in Materials for Oil and Gas Production Day 1	Chair: Filippo Cappuccini Vice Chair: Julio G. Maldonado This symposium features technical papers on present advances in materials technology and research for oil and gas. Focus is on new and improved metallic materials and applications. This includes consideration and evaluation of the material's performance in its envisaged exposure environment. Submission of Papers on field experiences, failure analysis and mitigation through metallurgical innovative solutions are also encouraged.	Henry B. Gonzalez Convention Center	005 Juan O'Gorman	Symposia
Monday 3/7/2022 8am - 3:30pm	Fouling and Scaling in IWS: Mechanisms, Research Methods, and Control	Chair: Zahid Amjad Vice Chair: Tao Chen This symposium features technical papers related to mechanisms of fouling and mineral scaling, traditional and novel research methodologies, modeling and monitoring approaches, real cases and failure analysis, as well as strategies to control fouling and scaling in industrial water systems (IWS). The IWS may include boiler, cooling, desalination, geothermal, oil and gas production, sugar processing, wastewater treatment. Contributions on impact of process variables such as temperature, pH, water quality, soluble and insoluble impurities, suspended matter, on the performance of water treatment additives such as scale inhibitors, dispersants, biocides, etc., may also be included. Papers may also include recent developments in removing scales from equipment surfaces.	Henry B. Gonzalez Convention Center	Room 217 A	Symposia

Monday 3/7/2022 8am - 3:30pm	Improving Atmospheric Corrosion Simulation and Stimulation through Modeling and Control	Chair: Sean Fowler Vice Chair: Erica Macha This symposium features technical papers on the significant economic and social costs of atmospheric corrosion. Reducing these impacts requires, in part, an understanding of the physicochemical interactions between the environment and a material that result in the degradation of relevant properties, techniques to impede these interactions or minimize their effects, and engineering principles that apply a multi-disciplinary approach to designing corrosion-resistant structures, transportation systems, or other high value assets. This understanding has been advanced in recent years by a growing body of work on modeling and computational tools for the designer as well as physical stimulations of atmospheric corrosion damage modes in controlled tests. Computational simulations and controlled stimulations each produce knowledge that can reinforce the other's value. This symposium aims to explore corrosion simulations and controlled stimulations of corrosion modes, how they complement each other, how they are being improved, and how they are being applied to real world corrosion challenges. Paper topics may include, but are not limited to: corrosion model development, refinement, validation, or application to product or material design; characterizing or improving controlled stimulations of atmospheric corrosion, including test methods and corrosion measurement and characterization techniques; and material development for enhanced corrosion resistance with an eye towards sustainability. Submissions from all industries are welcome and encouraged.	Henry B. Gonzalez Convention Center	Room 217 B	Symposia

Monday 3/7/2022 8am - 3:30pm	Mechanisms of Localized Corrosion	Chair: Mariano Kappes Vice Chair: Helmuth Sarmiento Klapper This symposium features technical papers that discuss mechanisms, traditional and novel research methodologies, modeling and monitoring approaches, real cases and failure analysis, as well as strategies to control localized corrosion.	Henry B. Gonzalez Convention Center	Room 217 D	Symposia
Monday 3/7/2022 8am - 3:30pm	Advanced Protective Coating Technology - Day 1	Chair: Benjamin Chang Vice Chair: Matt Dabiri This symposium features technical papers that cover the following themes: (1) Rust Creepage Mechanism, (2) Cathodic Disbondment Mechanism, (3) Coating Blister Mechanism, (4) CUI Coatings, (5) Salt Decontamination Chemicals, (6) Offshore Coating Evaluation Methods, (7) Offshore Windmill Coatings, (8) Nanotechnology, and (9) Passive Fire Protection.	Henry B. Gonzalez Convention Center	Room 210	Symposia

Monday 3/7/2022 8am - 3:30pm	RIP - Localized Corrosion	Chair: Jason Lee Vice Chair: Brendy Rincon Troconis This RIP symposium is seeking abstracts that cover fundamental studies of localized corrosion and cracking regardless of environment or material type. Topical phenomena of interest include, but are not limited to: pitting, stress corrosion cracking, corrosion fatigue, inter-granular attack and crevice corrosion. Fundamental aspects of the on-going research including occluded chemistries, electrochemical techniques, metallurgical influences, and mechanistic initiation/propagation studies are of particular interest. Prevention strategies of localized corrosion and cracking will also be considered if they do not fall within another session domain. Laboratory experimentation, computational modeling and environment-specific case-studies are welcome. Submissions should include the most recent results, accomplishments and/or theories.	Henry B. Gonzalez Convention Center	Room 214 A	RIP
Monday 3/7/2022 8am - 3:30pm	SC 04 - Linings & Internal Coatings		Henry B. Gonzalez Convention Center	Room 212	Standards
Monday 3/7/2022 8am - 3:30pm	RIP - Multi-Functional Coatings	Chair: Homero Castaneda Vice Chair: Nikole Kucza This RIP symposium is seeking abstracts on sustainable corrosion protection provided by multi-functional corrosion-resistant coatings. A multifunction/multiscale design of such coatings requires working out elaborate processing (manufacturing), internal structures and chemical compositions. Surface coatings enhance the material performance and lifetime by providing protection from harsh environments such as high temperature, oxidizing and corrosive species, and/or erosive environments. This session includes	Henry B. Gonzalez Convention Center	Room 214 C	RIP

presentations on the processing, materials characterization, and performance of coatings produced by a wide variety of functionalities (barrier, sacrificial, inhibition, self-healing, hybrid, etc.) that encompass different manufacturing routes (including traditional and additive manufacturing).

Topics of focus include new innovations in process technology, characterization, non-destructive evaluation, modeling, and emerging applications.
• Corrosion, wear and galling resistant performance of coatings and surface treatment produced by different processes, including but not limit to additive manufacturing processes.
• Understanding of degradation mechanisms of coatings through mechanical load, wear and corrosion; the relationship between coating composition, corrosion control mechanisms, microstructural and nanostructure features, and test environments, and their effects on performance and life.
• The latest development of test methods considering the interplay between mechanical, chemical, and electrochemical interactions and the ability to predict performance. Emphasis on valid, accelerated performance tests and the relation between test technique and field performance data is specifically appreciated.
• Theoretic modeling to predict coating properties, performance, durability and reliability in service environments.

Monday 3/7/2022 8:10am - 8:35am	Assessment Of Corrosion Behavior Of High Entropy Alloy In Simulated Soil Environments With Varying T	Olivia Esmacher, Avery Barlow, Lin Chen, Homero Castaneda-Lopez - High entropy alloys have recently marked several pathways for corrosion resistant materials, the unification of several elements in one material and the active-passive behavior can bring different applications for such materials. Buried metallic structures in soil is a plausible application for these materials due to the need for corrosion resistance properties in an aggressive environment. Electrochemical tests were performed on a FeCrAlNiCu high entropy alloy (HEA) to assess the corrosion behavior and resistance of the material in soil environments. An NS4 solution was used to simulate the soil environments at varying temperatures inside a temperature-controlled cell, and EIS and LPR tests performed to observe the response of the material under the range of conditions. Two different alloys used for underground applications API 5LX60 Steel and AISI 1008 Carbon Steel were characterized to determine the comparative per	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 8:10am - 8:35am	Accelerated Corrosion Testing Of Cold Spray Coatings On 304L In Chloride Environments	Erin Karasz, Timothy Montoya, Jason Taylor, Ken Ross, Rebecca Schaller - Cold spray coatings have the potential to be used for prevention and mitigation of corrosion and stress corrosion cracking. In this research, wrought 304 stainless steel was cold sprayed with several coating types: Inconel 625, super carbon, and commercially pure nickel. The primary gas used in the study was nitrogen, some were processed with helium. The corrosion properties of these coatings were assessed with electrochemical testing in a sodium chloride solution and compared to the behavior of the base material. The pitting susceptibility of the coatings on 304 were examined with ferric chloride testing according to ASTM G48 Method A. Sandia National Laboratories is a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC., a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy’s National Nuclear Security Administ	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 8:10am - 8:35am	Exploring Risk Factors Of Implants Under Inflammatory And Infectious Chemical Environment	Mathew Mathew Thoppil - Metal-based implant devices have become increasingly prevalent due to their ability to restore the physical function of patients with disabilities. However, this growth has proportionally resulted in an increase in implant failures due to wear and corrosion, with recent data reporting infection as its primary cause. The clinical reports on peri-implantitis and peri-prosthetic infections are very common in dentistry and orthopedics. Despite recent studies on implant failure, there is a lack of research regarding the cellular response to an inflammatory/infectious environment when exposed to metal ions released from implants. Additionally, our recent study demonstrated that the body's immune response to infection, specifically the release of macrophages, might accelerate implant corrosion. Therefore, this lecture will address, the effect of infectious and inflammatory conditions on the cellular viability of osteoblast cells (MG-63), and the corrosion aspects of	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 8:10am - 8:35am	Naval Aviation Environmental Severity Correlation	Christine Sanders, R Santucci - Beginning in 2020, 16 Navy and Marine Corps locations were selected to compare to Key West for one year. Two standard Navy coatings (chrome and chrome-replacement) were exposed in addition to steel and silver corrosion coupons. The data received allows for an updated ranking of these sites to include the Total Corrosion Risk (TCR). Data presented will include steel mass loss, galvanostatic reduction of silver, and evaluation of the coated samples. In addition, select sites also received environmental dataloggers which will be compared against the exposure samples and nearby publicly available weather data. Although many of the 16 test site environments are very different from the ambient conditions in Key West, there is an opportunity to simulate the environments of various bases at this one location. This can be achieved by altering the Key West environment through seawater application and sample sheltering or by adjusting the location and duration of	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	Enhancing The Reliability Of Ageing Assets In Utility Plants Though The Application Of RTR	Musab Talal, Faris Alkordy - Maintaining the constant supply out of aging hydrocarbon facilities always remains as a challenge for the operating plants. The critical nature of well-established reliable facilities create no room for error or operational outages. In order to ensure that the processing of hydrocarbons is constant, aging facilities must also ensure that the stream and processing of the supporting utilities is also meeting the operational requirements. Utility streams in plant facility may encounter several challenges especially in the ageing facility (70+ year) that might result in a shutdown and thus it can interrupt the feed. This in return would result the operation to be forced to rely on the steam reserve until the return of normal operation. In this paper, a case study will be presented on a component failure and the rectification to return the service to normal operating condition in a timely manner through the utilization of an optimized nonmetallic solution base	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	Metallic Film-Coated Optical Fiber Sensor For Corrosion Monitoring At High Pressures	Ruishu Wright, Nathan Diemler, John Baltrus, Margaret Ziomek-Moroz, Michael Buric, Paul Ohodnicki - It is important to monitor and locate corrosion incidents along the long-distance transmission and distribution gas pipelines. We have previously demonstrated an optical fiber-based corrosion sensor for early corrosion detection which incorporated corrosion proxy materials (i.e. metallic films) along with an optical backscatter reflectometer operating at the ambient pressure. In this work, metallic film-coated optical fiber sensors were developed for demonstrating corrosion monitoring capabilities at high pressures up to 1,000 psi, representative of the gas pipeline conditions. The metallic film was coated onto the optical fiber sensor via electroless plating. Corrosion was detected through the light intensity changes associated with corrosion of the proxy material on the optical fiber. The sensor was tested in pressurized aqueous brine solutions and a humid gas (e.g. CO2) phase to det	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	Corrosion Protection Status And Countermeasures Of Shield Tunnel Pipeline	Huatian Xu - The corrosion protection problems of shield tunnel pipelines have been ignored. In this paper, by investigating the corrosion and protection status of 5 shield tunnel pipelines, the corrosion situation of shield tunnel facilities such as hot-bending bends, straight pipe sections and joints of coating, and pipeline steel components of shield tunnels are analyzed. It is clarified that mechanical damage during the installation of hot-bending elbows is an important source of damage to the anti-corrosion layer. The joint patching method of viscoelastic body and heat shrinkable tape can effectively prevent the failure of the coating joint, and the sacrificial anode method can inhibit the corrosion of pipeline steel components. And through the analysis of the current corrosion situation, it will provide countermeasure support for the corrosion protection design of the shield tunnel pipeline in the future.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	A Methodology, Database, And Maps For Seasonally-Adjusted Soil Resistivity	Thomas Hayden, Joseph Mazzella, Paul Murray, Len Krissa, Alfonso Garcia Rojas - When assessing corrosion growth rates, the properties of the electrolyte are one of the most critical parameters. For underground pipelines, this electrolyte is the soil. Soil has a variety of corrosion properties such as porosity, composition, and water retention. One of the most critical properties is the soil's resistivity, the electrolyte's ability to conduct electric current. The soil's resistivity is not constant; it is highly seasonal and varies based on weather patterns, local conditions, and contamination. This work presents a database for collecting soil resistivity measurements and a methodology to assemble high-resolution seasonal maps. In working closely with government agencies that use this data for agriculture, this work demonstrates a process to re-use agricultural conductivity datasets for estimating soil resistivity. This process is validated against field resistivity measurements coll	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	Carbonate And Sulfide Scale Formation In Multiphase Conditions	Olujide Sanni, Thibaut Charpentier, Anne Neville - Scale formation is recognized as major problem affecting production and transportation in the oil and gas industry. This work aims to study calcium carbonate surface deposition in a multiphase environment that can replicate more accurately conditions encountered during secondary and ternary oil production. Multiphase conditions induced by introduction of a light distillate within the system were used to create oil in water (o/w) emulsions in order to reflect more accurately the scaling process in oil pipeline transportation. Using a set of bulk and surface analysis techniques such as Inductively Coupled Plasma (ICP) spectroscopy, X-ray powder diffraction (XRD), or Scanning Electron Microscopy (SEM), the results showed that the presence of an oil phase within the system retard the nucleation as well as the dissolution of vaterite. This affects the growth kinetic of calcite and contribute overall to hinder mineral surface fouling. When	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 8:10am - 8:35am	Downhole Sour Corrosion And Scale Deposition In Oil Wells	Tao Chen, Frank Chang, Feng Liang, Steven Hochanadel - A downhole corrosion and scale monitoring (DCSM) tool was applied in sour oil wells to monitor the corrosion and scale formation under real downhole flow conditions. The material of the cylinder test coupon was T-95 carbon steel, identical to the metallurgy of the downhole completion tubing. The corrosion and scale deposited on the surface of the cylinder test coupon effectively simulated the corrosion and scale deposited on the surface of downhole completion tubing. The DCSM was installed at the desired depth downhole and retrieved after a 3-month deployment. The retrieved coupons were thoroughly characterized to assess the corrosion and scaling mechanisms using advanced post-analysis methods. Scanning electron microscopy (SEM) and energy-dispersive X-ray spectroscopy (EDS) analyses were performed to characterize the morphology and mineralogical changes of the coupon surface. X-ray diffraction (XRD) was applied to characterize	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	Application of Electrochemical Noise to Identify Corrosion Development of Steel with Galvanized Pro	Samanbar Permeh, Kingsley Lau - Protective coatings for structural steel bridges include three-coat paint systems and galvanized steel. The zinc pigments in the three-coat paint systems and the zinc alloy layers of galvanized steel provide beneficial galvanic coupling with the steel substrate to mitigate corrosion activity. However, for both coating systems, coating defects exposing the steel substrate to the chloride exposure environments, can affect the zinc corrosion activity and thus the mitigation of steel corrosion. Electrochemical measurements including open-circuit potential, linear polarization resistance, and the electrochemical noise (EN) technique were conducted on coated steel plates with coating defects subjected to various chloride solutions to identify the zinc activity and steel corrosion. The EN testing was used to identify the local electrochemical activity of the zinc and the steel substrate and corrosion mitigation afforded by the coatings when subjected to a ran	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	Chemical Mitigation Of Alkaline Carbonate Stress Corrosion Cracking	Oussama Zenasni, Philip Thornthwaite, John Scholz, Maria Marquez - In the crude oil refining industry, alkaline carbonate stress corrosion cracking (ACSCC) has been a well-documented corrosion mechanism found in the overheads of fluid catalytic cracking units (FCCU), sour water strippers (SWS), and associated gas separations units (GSU). Typically, ACSCC occurs in non-stress relieved carbon steels with high levels of residual stresses and in the presence of both condensed alkaline sour water where the pH is equal to or greater than 8.5 and carbonate concentrations greater than 1000 ppm. The equipment most likely to be exposed to these conditions are the overheads of the FCCU and GSU main fractionators, overhead accumulators, wet gas compressor knock drums, condensers, and associated piping around these areas. Traditional methods used to mitigate this type of corrosion include the use of post-weld treatments or costly metallurgy upgrades. With a limited number of examples highlighting	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	Determination Of Oxygen Limits For Corrosion Resistant Alloys (Cras) In Oil & Gas Produced Water Bas	Roy Johnsen, Marie Edvardsen, Martin Hestvik, Jan Skar, Sven Hesjevik, Marion Duparc - CRA are often used in oil & gas processing plants due to their high resistance towards uniform corrosion. Stainless steels are, however, susceptible to localized corrosion like e.g. pitting or crevice corrosion under exposure to various environmental parameters, such as temperature, chloride concentration, pH and oxygen. In some process systems the oxygen content is normally kept at a level below 10 ppbw. Under such conditions, stainless steel alloys are often seen as a robust material selection. However, oxygen ingress in the processing system can be detrimental for stainless steel alloys and critical oxygen levels are frequently discussed in the corrosion community. The aim of this work was to investigate the effect of different environmental parameters on crevice corrosion of stainless steels Type AISI 316, Type 22% Cr and Type 25Cr DSS in simulated in produced water systems in low containing o	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 8:10am - 8:35am	Corrosion Issues In Sweet And Sour Oil & Gas Wells	Janardhan Saithala - Material selection of Oil & Gas wells must be reliable, cost-effective and meet corrosion resistance criteria during a well-operating lifecycle. During well lifecylce significant changes can occur in the fluids produced or the way wells are operated. Some anticipated and unanticipated changes can occur during design life, and material selection shall be adequate for primary and secondary exposures from design to final abandonment. Various well components such as Christmas tree, wellhead, production tubing, tubing hanger, downhole jewellery, elastomers and surface casing are exposed to excursions during production/interventions. Any level of corrosion of these critical components is not acceptable, and compromise of the integrity of these components would result in functional failure and incur production deferment and HSE consequences. Materials of these components are continuously exposed to corrosion risks due to reservoir souring, sand production, water breakth	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:10am - 8:35am	Flame Retardant Polyurethane Corrosion Protective Coating	Mohammad Mizanur Rahman - It is very common to use corrodible and flammable raw material hugely in industry. The metal and metal structures corroded shortly due to using corrodible materials in local industry. Many cases, the local weather further accelerates the corrosion rate. Mainly chemical (as inhibitor) and protective coating (metallic and organic) applied to oppose the corrosion process. At the same time, it is also needed to use the flame retardant chemicals to protect the equipment and construction from possible flame/fire incidents. The fact is that the flame retardant material is mostly corrosive. Thus, the common practice is to use the protection method for priority purposes, either corrosion or flame. Though, both corrosion and flame/fire are concerned, but corrosion mainly counted in industry due to its confirmed scenario. Very little initiative was found on to protect the plants form flammability incidents. In this study, a series of multifunctional polyurethane (PU) p	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:30am - 12pm	Premature Coatings Failures Forum	Presented by Mike O'Brien, Mark 10 Resource Group, Inc. Premature coating failures continue to cost asset owners, paint manufacturers, fabricators, contractors, shipbuilders, and others substantial amounts of unbudgeted money each year. Most of these failures are preventable if the proper principles are employed for selecting, applying, and inspecting the coatings. This tutorial is based on hundreds of real-life coating failures investigated by the presenter during his 40 years in the coating industry. This practical and informative tutorial is presented using many real-life case histories. It addresses coating failures that occur on steel, concrete, hot-dip galvanizing, and ductile iron substrates and explains the important properties for each of these substrates to consider when selecting and applying coatings to them. Failures involving most of the commonly applied coatings, including, but not limited to, inorganic zinc, organic zinc, epoxy, polysiloxane, polyurethane, water-based acrylic, and polyurea are discussed and pictures of the actual failures with these coating types are shown. NEW—When a premature coating failure occurs, it is important to investigate it using proper principles, techniques, and procedures. During the presentation this year, the tutorial will include a new section on some basic principles to employ when investigating a premature coating failure, including how to prepare for a coating failure investigation, how to conduct the on-site investigation, how to determine the laboratory testing to perform, and how to analyze the results and write the report.	Henry B. Gonzalez Convention Center	Room 004	Forum

Monday 3/7/2022 8:35am - 9am	Comparison Of Atmospheric Corrosion Of Silver Across Multiple Locations	Ronald Zeszut, David Rubino, Douglas Hansen - Atmospheric corrosion of silver from multiple beachfront sites in Florida was examined by coulometric reduction. Exposure was performed at the US Naval Research Laboratory in Key West, Kennedy Space Center, and Daytona Beach. Coupons were exposed for 3-18 months, with replacement coupons added to capture 3-month intervals across the entire 18-month exposure duration at each site. Coulometric reduction showed both the presence and amount of specific chemical compounds on the silver coupons. Increasing exposure times of the coupons showed increasing corrosion film thickness, and exposure at different sites showed different corrosion film thicknesses and compositions. Additionally, seasonal exposure condition changes at each site were observed to result in changes in the corrosion film thickness and composition. Correlations of the observed changes in corrosion film thickness and composition have been made to environmental conditions and wil	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 8:35am - 9am	Impact of Titanium Corrosion Products on Cellular and Molecular Events Involved in Oral Osseointegra	Claudia Biguetti, Danyal Siddiqui, Angélica Fonseca, Sutton Wheelis, Danieli C. Rodrigues, Gustavo Garlet - In this study, we characterized the cellular and molecular events related to early failure towards corroded Ti64 implants placed in the maxillary bone of C57Bl/6 mice. Prior to in vivo implantation, Ti64 devices were exposed to electrochemical polarization in 30% citric acid, producing structural and chemical changes on the surface. Then, osseointegration following Ti control and corroded implantation in mice was investigated at 3-, 7-, 14- and 21-days post-surgery. The host response was evaluated micro-computed tomography (MicroCT), histology, and real-time PCR array. Ti corroded screws induced a strong foreign body response from 3 to 21 day-post implantation, with unremitting inflammation lasting up to 21 days. The corroded devices induced a dominant M1-type response, while pristine Ti encouraged, an M2-type response, and suitable osseointegration. In conclusion, Ti corrosio	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 8:35am - 9am	Adhesion Durability Of Coatings On Aluminum Alloys Using The Blister Test, Digital Image Correlation	Drishya Dahal, Brendy Rincon Troconis, David Restrepo - The adhesion strength of coatings on aluminum substrate for automotive applications was investigated using the Blister Test (BT) along with Digital Image Correlation (DIC), and Finite Element Methods (FEM). The BT was performed by pressurizing a fluid through a hole in the substrate, which causes blistering on the coating, ultimately leading to delamination. This test is performed after exposure of samples to an accelerated corrosion exposure. The DIC system obtains a full field displacement history of the de-adhesion mechanism using high speed cameras by tracking small subsets of the material in its field of view. This full field displacement history obtained from the BT will be compared against theoretical displacements obtained through FEM. Then, an inverse optimization algorithm will be implemented to quantify the adhesion strength. Along with the BT, the effects of the surface treatments will be appraised through filiform c	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 8:35am - 9am	Atmospheric Corrosion Evaluation of Sea Salt and MgCl2 Salt Solution Droplets on Austenitic Stainles	Tasnia Fatima, Ricardo Carvalho, Brendy Rincon Troconis - The objective of this paper is to evaluate the atmospheric corrosion of sea salt and MgCl2 salt solution droplet on Austenitic Stainless Steel 316L. To this effect, droplets of sea salt and MgCl2 solutions were deposited on unsensitized and different types of sensitized SS316L stainless steels to investigate the influence of relative humidity (RH) and temperature on the propagation and morphology of the pits. Aqueous sea salt solution and MgCl2 salt solution of same chloride deposit density (CDD) and volume were used. Also, thermodynamic modeling was performed using ThermoCalc and JmatPro to predict the carbide content in the sensitized specimens. Pitting corrosion resistance of these alloys was also evaluated, using cyclic polarization curves at room temperature (23oC) and constant RH of 85%. For the evaluation of the corrosion mechanism the pitting potential and re-passivation potential under salt solution droplets, were det	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 8:35am - 9am	Development Of Technique For In-Situ Measurement Of Oxide Film Thickness In High Pressure And High T	Florent Bocher, Jeffrey Boehme - Oxide film thickness growth was measured in-situ and in real time under high temperature and high pressure conditions using optical ellipsometry to better understand material degradation. Ellipsometry is an optical technique where the light from a laser is reflected off the specimen surface into a sensor to measure the polarization change (phase and amplitude changes). While this technique is used at ambient pressure and temperature, it is rarely used at both high temperature and high pressure (HTHP) simultaneously. In this study, the laser light was radiated through an HTHP window attached on an autoclave. This technique was used to measure nanometer to micrometer changes in thickness of an oxide film in supercritical CO2 and upstream O&G environments. The oxide film thickness measurements were compared to measurements of the thicknesses using SEM imaging of the cross section and to data found in the literature.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Toward Objective Evaluation Of FRP Corrosion Barrier Condition	Geoff Clarkson - Fiber reinforced polymer (FRP) and other polymeric materials are used in many ways to reduce corrosion damage for industrial, infrastructure and municipal applications. Applications include storage tanks, scrubbers, reactors, piping and linings of steel and concrete. For new constructions, a variety of standards and codes are used that stipulate resin and reinforcement material selection, design, manufacturing and quality control details. One of the key standards used at this stage involves the selection of the polymer, or resin, which provides the major contribution to corrosion protection. Since the 1950’s when the use of FRP started in corrosion service, inspectors have assessed the condition of the polymer that has been exposed to chemical corrosion using some of the same tests used to qualify the resin for service. Objective criteria for condition assessment have not been available, so conclusions from these inspections have been subjective. In some cases, quan	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Chemical Resistance Of Epoxy Coatings In High Temperature And High Pressure And Aggressive Service C	Sudhir Ananthachar - Epoxy coatings can be found in a broad range of industries and applications due to their exceptional performance such as corrosion and chemical resistance, mechanical properties, adhesion to wide range of substrates, Within the protective coating market, epoxy systems have been used for many years to the line the inside of chemical storage tanks, vessels and pipelines due to their good thermal and chemical resistance properties. In the petrochemicals industry, high solid-epoxy coatings are also used for lining the rail cars that transport crude oil. Specific to the petrochemical industry where facilities handle both conventional crude or shale crude, the requirements placed on the coatings are extremely demanding since quite often the coatings are exposed to highly corrosive chemicals and gases such as hydrogen sulfide, sulfuric acid, and carbon dioxide at both elevated temperatures and pressures. To better serve the petrochemical sector coating manufacturers nee	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Corrosion Of Wrought And Cast Ni-Fe-Cr-Mo Alloys In High-Temperature Brines And CO2-Rich Supercritic	Manuel Marya - Corrosion-resistant alloys, among Ni-Fe-Cr-Mo alloys, traditional and proprietary cast Fe-Ni-Cr alloys for pressure pumping were tested in both mill-finished and liquid nitrided conditions, with general, pitting, and crevice corrosion as main focus. All environmental tests were completed over a 30-day period in ~276 bars (4000psi) autoclaves at ~220°C (425°F) with either oxygen (0.5% O2) or hydrogen sulfide (20% H2S). The test materials were exposed to both a denser NaCl-rich brine, purposely supersaturated with oxygen or hydrogen sulfide, and a less dense supercritical carbon dioxide phase with water, oxygen, or hydrogen sulfide. The testing has shown: (1) corrosion in the liquid brine is often greater than in the dense phase, and in general rarely alarming, (2) all tested Ni-Cr-Mo wrought alloys consistently exhibited lesser corrosion than the selected cast alloys, with exception of the novel cast alloys, (3) Nitriding reduces corrosion on all selected CRAs, yet inco	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Determination Of Oxygen Limits For Corrosion Resistant Alloys (Cras) In Oil & Gas Produced Water Bas	Marion Duparc, Tov Saxegaard, Jan Skar, Roy Johnsen, Martin Hestvik - CRAs have been widely used since the 1980s in Oil and Gas process systems due to their excellent resistance towards uniform corrosion in aggressive environments such as seawater and produced water containing organic acids and/or production chemicals. However, cases of localized corrosion in the form of pitting and crevice corrosion are regularly being reported for CRAs exposed to corrosive environments in Oil and Gas processes. Localized corrosion is influenced by multiple parameters such as temperature, chloride concentration, pH and oxygen concentration. Among them, oxygen is considered as critical since even small oxygen ingresses can be responsible for the initiation of localized corrosion on CRAs. Current Oil and Gas requirements define a maximum dissolved oxygen (DO) concentration of 10 ppb in water phase for the use of CRAs in produced water systems. Field experience and operatory testing data indicate that	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Corrosion Inhibition Of Carbon Steel In Carbonate Acidizing At Elevated Temperature	Limin Xu, Tao Chen, Ming Han, Mohammed Bataweel - The corrosion inhibition of N80 steel coupons in HCl solution was evaluated using a gravimetric method and microscope. At 90°C and 120°C, the corrosion rates of N80 steel coupons in 15 wt% HCl were extremely high at 0.73 lb/ft2 and 1.32 lb/ft2, respectively. In the presence of 0.5 vol% corrosion inhibitor AN-P1, the corrosion rate reduced to 0.0085 lb/ft2 at 90°C, which is sufficient to prevent corrosion mass loss during an operation. At 120°C, the corrosion rate reached 0.18 lb/ft2. Higher concentrations of AN-P1 or a new corrosion inhibitor are required to prevent corrosion at 120°C. The results showed 2.0 vol% AN-P1, RX-M2 and YT-M2 reduced the corrosion rate to 0.039, 0.028 and 0.0036 lb/ft2, respectively. Pitting corrosion occurred on N80 steel coupon in HCl solution with RX-M2. For the coupon in HCl with YT-M2, the surface was as smooth as before the test. Considering the general and pitting corrosion, YT-M2 was identified as a	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Effect Of Glass Flake In Anti-Corrosive Coatings For Extreme Conditions	Suprita Jharimune, Mary Lyn Lim, Melinda Dent, XinZhu Gu, Chinming (Benjamin) Hui, C.Y. LEE, Nicole Rakers, Arif Mubarok, Hongbing He - Glass flake reinforced epoxy coatings have been widely used for many years on substrates exposed to extremely aggressive environments (such as splash zones of offshore installations). Glass flakes with high aspect ratio (large surface area and low thickness) can be dispersed in the epoxy coatings and increase the path length for the diffusion of moisture and chemical ions. Therefore, it is believed that glass flake additives are particularly useful for harsh environments. In addition, glass flake additives are also known to enhance the durability of coatings. In this article, we used different analysis tools to study the effects of glass flakes on performance and anti-corrosive properties in epoxy coatings based on glass flake type.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Closed Loop Corrosion Control: Case Studies Of A Reliable, Robust, & Sustainable Treatment Program	Michael Weberski, Bingzhi Chen, Daniel Meier, Claire Rayner, Renate Ruitenberg, Steef Vrijhoeven, Sairam Sudhakaran - Closed cooling loops are used to provide the required cooling to critical industrial equipment and processes that cannot tolerate the variability from open recirculating cooling towers. The key challenges in operating a closed loop are corrosion control and microbiological growth. A new non-toxic closed loop corrosion inhibitor program was developed that does not contain nitrite, heavy metal, P, B, or filming amine. This paper will present results from recent field trials using this new digitally enabled, sustainable corrosion inhibitor program. The first field trial was conducted at a refinery in the Middle East that provided an opportunity to evaluate the new program in a hot loop (>90 °C) that experienced upsets and hydrocarbon ingress. A second field trial was conducted at a steel mill in Europe with a significantly more challenging makeup water that included mode	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Evaluation Of Scale Deposition And Inhibition Using A Pilot-Scale Test System	David Nichols, Andrew Fyfe, Mark May, Neil Goodwin - The design and use of a large pilot-scale test system to evaluate scale deposition and inhibition is described in this paper. The system involves flowing large quantities of brine through a test piece at high flow rates for several hours. Different test piece configurations can be used and these are constructed from shorter lengths of pipe allowing scale deposit location and quantity to be readily analysed. An example is given in which sections of pipe made from different materials are used to investigate the effect that this has on scale adhesion. Chemical inhibition has been investigated by the injection of scale inhibitor into the flow stream and evaluating the reduction in surface deposits. Design considerations for these tests are also discussed with results from smaller scale preliminary tests used to ensure that sufficient deposits will be formed in the full scale tests.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	A real-time matrix based corrosion monitoring system	Hanne Martinussen, Fredrik Sandquist - A real-time and online corrosion monitoring system that provides reliable wall thickness data is presented. The system has monitored a weld for four years on a wet gas pipeline, and the operator has used this data as part of their risk-based planning strategy. The monitoring system is based on the well-established ultrasound pulse-echo technique. As the sensors are installed directly on the pipe outer wall, and measure wall thickness as a function of time, it provides high resolution data on material wall loss and corrosion rate. The system is modular in terms of number of sensors, and the ultrasound sensors can be installed in a ring on straight pipe, on top of the weld, or any matrix that the operator finds necessary to obtain sufficient information about the corrosion mechanisms. We present field data and correlate with flow rates and flow temperature to demonstrate the strength of the systems performance.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 8:35am - 9am	Horizontal Directional Drilling In External Pipeline Coating Integrity	Eric Pintueles - External coating testing for pipeline directional drilling installations or informally “Bore Test”. It is a very much requested test in Alberta, Canada. The conditions of the installation are severe for the integrity of the external coating. So, a procedure has been developed after the involvement in several projects. This presents the synergies between field data and cathodic protection theories. Two different field tests are presented by using DC and AC power sources furthermore a theoretical calculation but with given field data. Also, it is introduced a specific theory how to get the resistance of the soil. As the results, pipe-to-earth resistance was similar for both field tests and consistent with the theoretical calculation given field resistivity data. Any HDD external pipeline coating integrity evaluation has its own limitations. Such as, site conditions, backfill settle, aboveground survey techniques access, as well as suitable equipment. Bore tests are run	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Laboratory And Full-Scale Qualification Of An Abrasion Resistant Overcoat Wrap	David Futch, Tre Bischof, David D'Ambrosio, Chris Alexander - As onshore pipeline rights-of-way become more congested and urban sprawl increases, the use of horizontal directional drills (HDDs) will likely increase in popularity over the coming years. An HDD is a trenchless pipeline installation method that requires drilling a larger pilot hole where the mainline pipe can be subsequently pulled through the drilled hole. However, HDDs have an increased probability for coating damage, even when coated with traditional mill or field applied abrasion resistant overcoat (ARO). This coating damage includes abrasion, impact, gouging, denting, tearing, bending, etc. and that damage may exist for the life of the pipeline due to an HDD being inaccessible for future maintenance. Therefore, there remains a need for a high quality, sacrificial overcoat to protect the underlying coating, both on the mainline or field joints. This paper details the development of a new moisture-cured urethane ARO	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	A Remote Monitoring System Featuring GPS Synchronized Instant-Off Potential And Line-Current Measure	Andreas Junker Olesen, Lars Nielsen - The traditional instant-off campaign is time-consuming and will not provide information on the continuous evolution of the pipeline off-potential. This paper presents results from a small and large scale test of a remote controlled time synchronized remote monitoring system, that is capable of capturing the instant-off potential at every logger position, when synchronized with a T/R interrupter unit. Additionally the loggers have a built in line current measurement module, that allows for detection of changes in the CP consumption in between logger positions, allowing for detection of 3rd party coating damage incidents. Finally, the loggers are capable of full AC/DC interference analysis with associated ER probe corrosion rate measurements.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	How To Acquire A Reliable Scale Inhibitor MEC Number Based On Laboratory Testing Results – A Field C	Dong Shen, Jeffrey Russek, Hines Larry, Haiping Lu, Michael Oney - Laboratory scale inhibitor performance tests have been widely accepted to screen products and determine the minimum effective concentrations (MEC) of selected products for field treatment. The dynamic tube blocking test is the most common lab testing method used to obtain an inhibitor MEC number because the testing temperature, oxygen level, pH, and pressure can be well controlled to duplicate the field scaling conditions. A new benchtop testing method, the Kinetic Turbidity Test (KTT), has drawn increased attention for scale inhibitor evaluation and MEC determination under some scaling circumstances due to its ability to monitor the formation and growth of mineral scales continuously. In west Texas, a well being tested had failed three times within 1.5 years due to the formation of scale on ESP pump, even though it had an aggressive squeeze treatment with the inhibitor residuals of 20 ppm and above. Both lab dynam	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Overview Of Scale Issues And Treatment For Sour Water Strippers	Haiping Lu, William Watson, Swamy Margan, William Mansfield, Jim Kiolbassa - Sour water strippers are critical units to remove ammonia (NH3) and hydrogen sulfide (H2S) from sour water streams to condition the waters for the discharge or reuse within the refinery. Different streams from various sources may induce different scale issues to cause operation productivity reduction and even equipment failure. The most common scales in sour water strippers are calcite, iron sulfate, silicates, etc. depending on the water source stream chemistry. This paper presents case histories of scale issues and treatment in sour water strippers from various refineries. For each case history, the specific scale problems and treatment strategies are discussed. Based on the lab and field testing results, scale inhibitor treatment or even cleaning-up program were recommended. This paper provides valuable information on scale problems and treatment for sour water strippers with various water sources, and	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Fouling, Corrosion, And Wear Protection Of Power Take Off Rods For Wave Energy Conversion - Laser Cl	Johan Lindén, Kjell-Åke Andersson, Emiliano Pinori, Ross Harnden, Antoine Bonel, Pedro Vinagre, Gonçalo Fonseca - Laser cladded coatings for biofouling, corrosion and wear protection of the steel rod for power take off of a wave energy conversion unit are evaluated. A custom-made scraper rig is utilised at field test sites in Portugal (WavEC) and Sweden during the summer of 2021 to evaluate effect of different scraping/cleaning intervals on the biofouling control: one, two, and three weeks between scraping/cleaning. The results are expected to provide knowledge of how often cleaning strokes are required in order to control biofouling and avoid hard fouling establishment which potentially leads to failure of components and function. Studying cleaning intervals will also indicate the time to re-establishment of foulants after removal leading to findings pivotal for designing cleaning programs to secure reliability. The corrosion protection from different laser cladded coatings will als	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Corrosion Inhibitor Encapsulation For Enhanced Chemical Efficiency And Performance	Fang Cao, Yao Xiong, Satish Bodige, Dennis Schmatz, James Oxley - Liquid corrosion inhibitor (CI) package injection is one of the most cost-effective solutions and commonly applied methods to control internal corrosion and prevent corrosion failures of carbon steel pipelines in the oil and gas industry. However, due to the amphiphilic nature of CIs, a significant fraction of the injected CI is lost into the oil phase through partitioning, significantly decreasing the efficiency of CIs due to lowered CI concentration in the water phase. To enhance CI efficiency, a novel CI encapsulation technology was developed to bypass the oil phase and deliver inhibitors directly to the water phase. In this study, commercial CI packages as well as custom CI blends were encapsulated with water soluble matrix materials into microsphere morphology via spray drying technique. The stability of the encapsulated CIs in crude oils as well as synthetic oil was evaluated via weight loss measurement and the	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Improved Localized Corrosion Models For Stainless Steels In Aqueous Chloride Environments With Low L	Guru Prasad Sundararajan, Andre Anderko, sinchana rao, Wilhelmus Bos, Deepti Ballal, Deepti Ballal - Improved localized corrosion models were developed for stainless steels exposed to aqueous chloride media with low levels of dissolved oxygen. Repassivation potentials were measured for UNS S31600 and UNS S32305/S31803 Duplex Stainless Steels in chloride electrolytes at room and elevated temperatures using Tsujikawa-Hisamatsu Electrochemical (THE) method, a modified Cyclic Potentiodynamic Polarization (CPP) and artificial 1-D pit (pencil electrode) methods. It was observed that the repassivation potential values measured from 1-D pit method and CPP were lower than the ones obtained from THE method for the same environmental conditions and is also a function of reverse scan rates. Methods of assessing accurate repassivation potentials with reduced conservatism are suggested for these alloys in aqueous chloride media. Long-term corrosion potentials were measured in chloride media with c	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Development Of The NACE “MR-01-75” And NACE “TM-01-77” Standards: Part I – Field Observations And Me	Eric Caldwell, Brent Sherar, Russell Kane, Peter Ellis2 - This is Part I of a two-part series intended to provide insight to the history leading up to the publication in 1975 of the first Material Requirement (MR-01-75) standard prepared by NACE and its subsequent auxiliary standards which may have been lost to time. Part I covers the field observations and reviews the metallurgical issues the that were being investigated in support of the MR-01-75 precursor documents/standards that the NACE T-1B and 1F committees used to develop a sour service materials standard. Part II focuses on the rationale behind the use of accelerated laboratory test procedures and their development used to differentiate metallurgical behavior in sour environments. The original SSC test methodologies would later be codified as a Test Method in NACE TM-01-77 (1977). Part I is a review of the field experience and research studies was conducted to provide background on some of the more historic metallurgical	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Exploring The Truth About Aluminium Flakes As Pigments In Corrosion Protective Coatings	Andreas Loken, Anders W. B. Skilbred, Magne Kringberg, Torstein Ledre - For a protective coating to work successfully, it generally needs to exhibit a high barrier property. This property is the coating’s inherent ability to withstand permeation of seawater and oxygen to inhibit or delay corrosion of the underlying substrate. Although there are various pigments and additives that can be used to promote a coating’s barrier property, aluminium flakes are among the most widely adopted pigments, and have been so for decades. The idea behind their use is simple, and relies on having the aluminium flakes oriented parallel to the substrate such that the pathways for oxygen and seawater effectively increase. However, while having been employed in numerous coating formulations for a number of years, the evidence for the success of aluminium flakes as barrier pigments is still lacking. In the present contribution, we explore the truth about aluminium flakes in corrosion protective coatings.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Volatile Corrosion Inhibitor For External Aboveground Oil Storage Tanks Bottom Plates Corrosion Prot	Anwaar Al Kindi, Naveed Munir, Monica Fernandez, Phil Low - Corrosion management of Storage Tanks (AST) bottom plates has been identified as an area of improvement for corrosion protection. Historically, external corrosion is managed with cathodic protection and externally coated plates. Currently, there is an industrial concern regarding CP effectiveness in old constructed tanks and current drainage due to isolation issues. Alternatively, Volatile Corrosion Inhibitors (VCI) can be applied as an additional barrier, or as a standalone means of corrosion protection. Control by VCI is achieved by the ability of vapor phase particles to diffuse toward the surface, adsorb in steel, and provide a continuous, adherent, self-healing microlayer. In addition, the chemistry also contains a unique soluble corrosion inhibitor (SCI) which will alter the pH balance to a neutral manner. This paper presents the results of VCI application on a 92-diameter tank bottom with minimum foundation interven	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Monitoring Localized Corrosion Distribution Of Steel Bar In Concrete With OFDR Distributed Optical F	Fujian Tang, Jialiang Hu, Liang Ren, Hong-Nan Li, Els Verstrynge - In this study, use of optical frequency domain reflectometry (OFDR) distributed optical fiber to monitor distribution of localized corrosion of steel bar in concrete slab is experimentally investigated. Concrete slab containing eight pieces of steel bars was fabricated and distributed optical fiber was glued on its surface. The slab was subjected to accelerated corrosion test, during which open circuit potential (OCP) was recorded and the change of the OFDR fiber strain induced by steel bar corrosion was also measured with an optical sensing instrument. Results showed that the distribution of localized corrosion could be monitored with both OCP and OFDR fiber, and the distribution of local corrosion from OCP measurement is consistent with that from OFDR optical fiber. Moreover, OCP is able to monitor initiation stage of local corrosion, while OFDR distributed optical fiber is capable for monitoring the propagation sta	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9am - 9:25am	Atmospheric Corrosion Of Laser Powder Bed Fusion 316L Stainless Steel	Michael Melia, Erin Karasz, Kasandra Escarcega Herrera, Jason Taylor, Rebecca Schaller, Eric Schindelholz, Michael Heiden, Jeffrey Rodelas - The difference in local corrosion susceptibility of laser beam powder bed fusion (LB-PBF) and wrought austenitic stainless steels will be explored in this presentation under real and laboratory accelerated atmospheric conditions. The impact chemical heterogeneities, inherent to the LB-PBF as-printed microstructure and surface, have on local corrosion susceptibility will be the focus. Pit density, depth, and volume of polished LB-PBF and wrought stainless steel samples will be compared after exposure to several environments including a 21 month exposure off the coast of Florida and a 1 year exposure under constant humidity (40 or 76% relative humidity) and salt loading (NaCl and artificial sea water). Pitting statistics and morphology of as-printed LB-PBF 316L stainless steel samples exposed to the ASTM G85-A2 acidified salt fog test will also be	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 9am - 9:25am	Corrosion Performance Of Chromized Type 409 Stainless Steel In A Simulated Inorganic Hydrothermal Li	Elliott Asare, Joseph Kish, Yimin Zeng - Biomass hydrothermal liquefaction (HTL) is operated in harsh environments due to the presence of hot pressurized water medium, catalysts, inorganic and organic corrodants released during the conversion. Candidate materials are often subjected to general corrosion and stress corrosion cracking (SCC) failure modes. Current candidate alloys for this application require suitable resistance to both general corrosion and SCC modes to withstand the HTL process conditions (250-374°C and 4-22 MPa). Cr-based coatings on a SCC-resistant Type 409 ferritic stainless steel (UNS S40900) substrate are currently considered to reduce corrosion relative to a mechanically-ground surface baseline condition (MG). The Cr-based coatings considered include electroplated Cr (EP) and chromized (CR). Samples are immersed in a simulated aqueous phase (KCl (aq) + K2CO3 (aq)) at 310 °C and 10 MPa at three different exposure times (10, 15, and 20 days) using a static autocla	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 9am - 9:25am	Corrosion Of Additive Friction Stir Deposited AZ31B Utilized In Biomedical Applications	Yoel Emun - A major advantage of Mg implants is the reduction in stress shielding leading to less bone loss, as well as excellent biocompatibility. Due to hot cracking and vaporization which occurs during most commercial beam-based AM processes, this work will focus on a solid-state process, Additive Friction Stir Deposition (AFSD). The aim of the following research is to compare the corrosion resistance of AFSD AZ31B to wrought AZ31B for biomedical applications. The comparison will be by means of testing both wrought AZ31B and AFSD AZ31B in a corrosive environment common for orthopedic devices. Immersion tests as well as electrochemical tests in a phosphate buffers saline (PBS) solution heated to 37 °C were used measuring resistance to both uniform and pitting corrosion resistance. To determine the present corrosion mechanisms, grain size, and precipitate morphology were compared using Scanning Electron Microscopy (SEM) coupled with Energy Dispersive X-Ray Spectroscopy (EDX). X-Ray	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 9am - 9:25am	Corrosion Severity Comparison Of Three Beach Sites	David Borth, Douglas Hansen, Gregory Wolters - A comprehensive corrosion study was conducted over a period of 12 months at three sites along the Florida coast: Daytona Beach, Kennedy Space Center (KSC), and US Naval Research Laboratory in Key West. Measurements included weather parameters, mass loss of AA2024-T3 and 1018 steel, and pitting characteristics of cleaned AA7075-T6. Samples were coupons cut from rolled sheet stock, and wet polished with isopropanol to a 600-grit finish. Exposure was carried out on a south-facing exposure rack angled sixty degrees from horizontal. Five replicates were collected on a quarterly basis and placed in desiccated vacuum bags for return shipping. Mass loss was calculated using the ASTM G1 cleaning procedure. Pitting on aluminum was measured with a Keyence VK-X1000 laser microscope at a magnification of 200x. Pit characteristics of AA7075 and mass loss values of the exposed alloys as a function of exposure time and location will be presented and di	Henry B. Gonzalez Convention Center		Symposia
Monday 3/7/2022 9am - 10:30am	Student Poster Orientation		Henry B. Gonzalez Convention Center	HemisFair C3	Other
Monday 3/7/2022 9am - 12pm	Coating Failures	Chair: Robert Lauer Vice Chair: Mohamed Ahmida This symposium features technical papers on protective coating failure analysis and guidance for diagnosing protective coatings failures for the industry.	Henry B. Gonzalez Convention Center	Room 213	Symposia

Monday 3/7/2022 9:10am - 9:35am	Extending Asset Lifecycle With Inspections And Maintenance	Cortney Chalifoux, Timothy Widing - Consistent coating inspections and planned maintenance are essential to the integrity of an asset. Delayed and cursory inspections can lead to premature coating breakdown and corrosion, resulting in costly failures. Additionally, improper maintenance can be ineffective, costly, and wasteful. The challenges involved in executing effective inspections and maintenance practices are identifying and understanding the numerous conditions that can contribute to a reduction in the lifecycle of an asset. This presentation will discuss some of the aspects involved in identifying coating conditions that are likely to result in failures, predicting the remaining life of coatings on in-service and aging assets, and developing cost-effective coating repair strategies that will extend the life of the asset. This presentation will also navigate the process involved in establishing a maintenance program specific to each asset to ensure the best corrosion protection	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:25am - 9:50am	Characterization Of The Surface Chemistry At Corroded And Non-Corroded Sites On Aluminum Alloy 7075 -	Douglas Hansen, David Borth, Farrah Cole - Replicate samples of bare aluminum alloy AA7075-T6 were exposed at three coastal atmospheric test sites: Kennedy Space Center (KSC) FL, US Naval Research Laboratory in Key West, FL (NRL-KW), and Daytona Beach, FL. The samples were cross sections of rod stock mounted in standard two-part epoxy metallurgical mounts and wet polished with isopropanol to 600 grit finish. The samples were installed on atmospheric exposure racks and retrieved at intervals of 3, 6, 9, and 12 months. Elemental composition of baseline (non-exposed) and exposed samples were measured using a Zeiss EVO-50XP Environmental Scanning Electron microscope equipped with a EDAX Genesis 2000 energy dispersive X-ray spectroscopy (EDS) system. Pitted and non-pitted sites on each sample were analyzed for compositional elements of the alloy as well as non-compositional (i.e. environmentally-derived). Pit morphology and elemental analysis of the exposed alloys as a function of exposur	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:25am - 9:50am	Diabetes As A Risk Factor For Orthopedic Implant Surface Performance: A Retrieval And In Vitro Study	Alexandra Arteaga, Jiayi Qu, Sara Haynes, Brian Webb, Javier LaFontaine, Danieli C. Rodrigues - This study characterized the surface of thirty-nine retrieved titanium and stainless-steel orthopedic implants from diabetic and non-diabetic patients. Optical microscopy, scanning electron microscopy, energy dispersive X-ray spectroscopy, and X-ray photoelectron spectroscopy revealed changes in morphology, chemical composition, oxidation state, and oxide thickness of the retrieval specimens, respectively. Additionally, titanium disks were immersed for 28 days in simulated in vitrodiabetic conditions followed by inductively coupled plasma-optical emission spectroscopy to quantify metal dissolution. Retrievals demonstrated surface discoloration, pit-like formations and oxide thinning when compared to non-implanted controls, suggesting exposure to unfavorable acidic conditions. Cyclic load bearing areas on fracture-fixation screws and plates depicted cracking and delamination. The corrosion	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 9:25am - 9:50am	Corrosion-Resistant Sacrificial Metallic Coatings With An Ability To Release Inhibitor On Demand	Chathuranga Witharamage, mohammed alrizqi, Ahmed Darwish, Rajeev Gupta - A sacrificial metallic coating with outstanding corrosion resistance is presented. Al was alloyed with V using high-energy ball milling (HEBM) which enabled the formation of a superstrated solid solution of V in Al. Al-V alloy powder produced by HEBM was used for coating a high-strength commercial Al alloy substrate using the cold spray. The corrosion behavior and corrosion mechanisms of cold sprayed specimens were investigated using advanced electrochemical and analytical techniques. The cold sprayed specimens exhibit high pitting potential, low corrosion current density, and a less noble corrosion potential than the substrate. This indicates that in any event of coating breakdown, the coating would corrode (i.e., act as a sacrificial anode) and prevent the substrate from corrosion. Alloy composition is chosen such that corrosion of coating releases chemical species that could inhibit corrosion by decreasing th	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 9:25am - 9:50am	Effect Of Crude Oil Chemistry On Wetting State And CO2 Corrosion Mitigation In Oil-Water Two Phase F	Neda Norooziasl - In this study the effect of intermittent oil wetting on CO2 corrosion using LVT-200 model oil containing naturally occurring surface-active compounds were simulated. Myristic acid and acridine which are representative of naturally occurring compounds in crude oils have been chosen as surface-active compounds due to their effect on altering the steel surface wettability from hydrophilic to hydrophobic which leads to a lower risk of corrosion. Several series of corrosion rate measurements were obtained in the presence of LVT 200 model oil containing myristic acid and acridine, using LPR and EIS electrochemical measurements in a 2-liter glass cell with an X65 RCE (rotating cylinder electrode) at pH 4 and pH 6.5 at 1000 rpm. Myristic acid was observed to inhibit corrosion at pH 4 and pH 6.5 through direct inhibition, but not by partitioning. Acridine was observed to inhibit corrosion at pH 4 through both partitioning and direct inhibition, while it can affect corrosion	Henry B. Gonzalez Convention Center		RIP
Monday 3/7/2022 9:25am - 9:50am	Development Of For Multifunctional (Pit Detection + ER) Corrosion Monitoring Probe For Oil And G	Byeong Ho Ki, Cheolho Kang - In this paper, patented corrosion monitoring technology for pit detection will be introduced. This pit detection probe system is capable of monitoring real time pitting corrosion in any kinds of environment. In addition, pit penetration rate can be easily determined. Multifunctional probe (pit detection technique+ electrical resistance technique) was also developed which can provide not only pit detection rate but also general corrosion rate.	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 9:25am - 9:50am	Case Study: HDD CP Retrofit For Existing Critical Service Ethylene Above Ground Storage Tank.	Shailesh Javia, Venkat Sreenivas - This case study details the retrofit installation of a replaceable linear anode based impressed current cathodic protection for a critical service double wall cryogenic Ethylene Storage Tank in Kuwait. The ground bed underneath the tank bottom has been provided with the heaters to maintain the temperature of soil, preventing the ice film formation below the tank bottom. This critical service tank could not be taken out of service and the existing CP system consisting of discreet anodes around the perimeter of the tank proved ineffective in meeting NACE criteria for cathodic protection. Utilizing Horizontal Directional Drilling (HDD) to bore under the tank, offered the opportunity to install directly below the tank linear anodes and a portable reference electrode profile tube while remaining in service. This novel approach to installing cathodic protection on existing tanks offers several critical benefits but had not previously been attempted in the	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:25am - 9:50am	Electrochemical Assessment Of The Influence Of Temperature On The Pitting Corrosion Reistance Of Met	Helmuth Sarmiento Klapper, Sebastian Jesse - To rate the pitting corrosion susceptibility of corrosion resistant alloys (CRAs) used in oilfield technology the pitting resistance equivalent number (PREN) is commonly used. The PREN is an empirical relationship of the mass fraction of the elements chromium (Cr), molybdenum (Mo), tungsten (W) and nitrogen (N) in the corresponding alloy. Even though it was developed from research work done on stainless steels, it has been also applied to nickel (Ni) alloys. The critical pitting temperature (CPT) is also frequently used to benchmark the susceptibility to localized corrosion of CRAs. ASTM G48 standard describes the test methodologies for determining the CPT in acidified ferric chloride solutions of stainless steels and Ni-alloys. Among these two methods, the experimental determination of the CPT appears to be the best way to infer pitting corrosion resistance in service though. However, the thermal stability of many of the standardized elec	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:25am - 9:50am	Corrosion Inhibitors In O&G Industry: A Review Of Current Application Challenges And Research Ga	Rakan Alshebel, Faisal Al-Mutahhar, Hassan Al-Ajwad - Corrosion continues to be a threat to the petroleum industry. It risks people’s lives, assets integrity and the environment. These risks are mitigated by different means such as selection of appropriate materials, chemical treatment, cathodic protection, protective coatings, and process control. One of the most common corrosion control measures is the use of corrosion inhibitors. This is a cost-effective option that can be applied to upstream, mid-stream and downstream facilities. This has driven the research institutes and the chemical manufacturers to invest on developing corrosion inhibitor chemistries for field-specific applications. In spite of all the efforts being put, there are still many important aspects about corrosion inhibition treatment that need to be researched for a better understanding of the chemical’s performance, monitoring, laboratory testing, and field application. This paper highlights knowledge gaps to inv	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:25am - 9:50am	Anticorrosion Performance Of Smart Release Bionanocomposite Coatings On Aluminium Alloy 6061	Sarah Ulaeto, Rajan TPD, Gincy Mathew, Jerin Pancrecious - Protection and maintenance processes are very important in the various sectors utilizing metallic materials. Protection routes can either be passive or active depending on the components of the coating material. Active corrosion protection for metallic substrates is being widely explored with the use of smart release coatings delivering corrosion inhibitors to defective sites upon damage of protective coatings. The incorporation of modified additives into polymers such as epoxy resins offers robust solutions and aims at maximizing the materials' compatibility for the fabrication of protective surfaces. The present investigation describes the contribution of neem phytochemicals as corrosion inhibitors loaded in biocompatible silica nanocontainers providing a protective primer to the corrosion process. The hybrid particles inside the organic matrix were pH-sensitive and the triggered release of encapsulated inhibitors was meant	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:25am - 9:50am	Development Of The NACE “MR-01-75” And NACE “TM-01-77” Standards: Part II – Accelerated Material Qua	Brent Sherar, Eric Caldwell, Russell Kane, Peter Ellis2 - This is Part II of a two-part series intended to narrate the history, some of which has been buried by time, leading up to the publication of the first Material Requirement (MR-01-75) standard prepared by NACE and its subsequent auxiliary standards. Previously, Part I described the field observations and discussed the metallurgical factors the that were being investigated in support of the historical NACE T-1B and 1F committees to develop a sour service materials standard. In Part II, we focus on the rationale behind the use of accelerated laboratory test procedures and their development to differentiate metallurgical behavior in sour environments. The original sulfide stress cracking (SSC) test methodologies would later be codified as a Test Method in NACE TM-01-77 (1977). A review of the historical events culminating in NACE MR-01-75 and NACE TM-01-77 provides a technical basis for the historical use of NACE Solution A (5 w	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 9:25am - 9:50am	Investigating Alternative Mechanisms For Metal-Silicate Scale Formation: Do Metal Hydroxides Play A	Kostas Demadis, Michaela Kamaratou - Colloidal silica is one of the most undesirable deposits in industrial water treatment. It is rare compared to other mineral scales, such as CaCO3, but its formation and deposition onto critical equipment surfaces can be problematic. Control approaches usually include: (a) removal of “soluble” and colloidal silica before entering the water system, and (b) use of chemical scale inhibitors/dispersants. Nevertheless, silica scale inhibition is not easy because of the chemical nature of colloidal silica. Silica is a random, three-dimensional polymer that forms by propagation of Si-O bonds, which form by polycondensation of monosilicic acid. The amorphous nature of silica precludes use of the “traditional” scale inhibition approaches (usually phosphonate additives and polyacrylate-based polymers) that are principally applied for mineral scales. Silica formation is further complicated by the presence of metal hydroxides (commonly iron, aluminum, and mag	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:25am - 9:50am	Development Of A F22 Compatible Scale Inhibitor	Ya Liu, Benton Hutchinson, Rose Lehman, Jeffrey Russek, James Outlaw - F22, a low alloy steel, has become widely used in oil field production systems. However, current scale inhibitor technologies on the market are often F22 incompatible and thus can cause severe corrosion to components such as a wellhead that contains F22 in the production system, which is particularly severe at high temperature conditions. Hence, F22 compatible scale inhibitors are in demand in the oil and gas industry. A F22 compatible scale inhibitor is required to be only mildly corrosive on F22, which is defined as a general corrosion rate ≤ 4 mpy with no evidence of pitting corrosion, while maintaining high scale inhibition efficiency with a low minimum inhibitor concentration (MIC). A wide range of scale inhibitor products were evaluated for F22 corrosion rates, inhibitor compatibility test, and scale inhibition in dynamic tube-blocking (DTB) testing. The test temperature was as high as 240ºF (116ºC), and th	Henry B. Gonzalez Convention Center	Symposia
Monday 3/7/2022 9:25am - 9:50am	Case Study: Foreign Operator DC Interference On An Existing Pipeline Systems	Jessica Jaskolka - Close Interval pipe-to-soil Surveys (CIS), Alternating Current Voltage Gradient (ACVG), and In-Line Inspection (ILI) data suggested corrosion activity on a buried gas transmission pipeline. An analysis of the survey results and additional testing in the field determined a foreign operator was responsible for static DC interference on the pipeline. This paper is a case study for the testing, analysis, and design for the interference.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:25am - 9:50am	Risk Evaluation Of Potential Coating Damage From HDD	Ron Raphoon - This paper will identify the potential causes of pipe coating failure, from the design angles, to the soil types, to the fracture methods of rocks, and pull forces. it will present a logical method for evaluating the condition of an HDD pull prior to its installation so that the right level of coating protection may be applied.	Henry B. Gonzalez Convention Center	Symposia
Monday 3/7/2022 9:35am - 10am	Corrosion Under Insulation Behavior Of Phenolic Epoxy Coatings Under Contacting And Contact-Free Ins	Ahmad Raza Khan Rana, Graham Brigham, Omar Chaar, George Jarjoura - CUI (corrosion under insulation) is reportedly a contributor to the failure of insulated piping and process equipment. Protective coatings are among various effective measures to manage the CUI of industrial assets. Phenolic epoxy is among the widely used coatings under thermal insulations. This research work involves CUI testing of phenolic epoxy coating for 192 hours as per applicable ASTM standard G189-07 using cyclic wet operating conditions. The resulting weight loss from the test was converted to corrosion rate followed by microscopic checks. The as-coated (i.e., new) surface and post-test coatings were characterized using microscope and surface topography to account for damage modes and surface roughness. Phenolic epoxy coating under contacting insulation suffered a higher material loss rate, dis-bonding, and holiday defects tendency in comparison to contact-free insulation with low-point drainage.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 9:45am - 10:10am	Intellisyn™ - A New Class Of Multifunctional Smart Particles For Advanced Corrosion Protection	Benjamin Pearman, Jun Zhang, Victoria Scarborough, Steve Dickey, Dillon Campbell - SynMatter™ has developed a new class of patent-pending multifunctional smart coating additives, IntelliSyn™, that deliver performance features like corrosion resistance, superhydrophobicity and surface self-cleaning for water-based, solvent-based or powder coatings. Upon exposure to changes in pH caused by metal corrosion, the additives release encapsulated corrosion inhibitors preventing further metal deterioration. Simultaneously, they impart hydrophobicity, preventing water intrusion throughout the coating, and imparting surface self-cleaning effects. The patent-pending platform technology allows for use of numerous types of corrosion inhibitors that can be incorporated into various types of coating systems. In contrast to current solutions, this unique approach delivers durable, highly water repellent coatings and can be produced cost-effectively at large scale. B117 salt spray testing, cyclic corr	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 10am - 10:25am	Aesthetic Issues With Spray-Applied Fluoropolymer Coating System	Kimberly Steiner - A large building in a municipal area of the coastal United States was partially clad with aluminum panels. Due to the exterior and coastal service environment, the panels were coated with a AAMA 2605-compliant fluoropolymer-based coating system. However, after installation of some of the panels, the contractor noticed an unacceptable “streaked” appearance, particularly under post-dawn and pre-dusk low-light conditions. An investigation was undertaken to document and understand the nature of the streaked appearance. The investigation consisted of the following: 1) on-site measurement of color, gloss, and coating system thickness along the length of installed panels, 2) comparative measurements on accepted visual on-site mock-up panels, 3) observations of coating application and quality control processes at the applicator site, and 4) laboratory analysis of the coating system color, gloss, thickness, distribution, composition as well as an evaluation of the underl	Henry B. Gonzalez Convention Center		Symposia
Monday 3/7/2022 10am - 12pm	Accreditation Program Committee		Henry B. Gonzalez Convention Center	Room 225 B	Administrative

Monday 3/7/2022 10:10am - 10:35am	Reduction Of Conservatism In SSC Testing For Sour Gas Well Tubulars	Marc Wilms, Johan Smit, Daniela Garcia, Edmund Dickinson, Gareth Hinds, Michel Bonis, Harold Evin, Herve Marchebois, Willem Maarten van Haaften, Sytze Huizinga - Due to their high strength and relatively low cost martensitic stainless steel well tubulars are preferred where low alloy steel is likely to corrode. However, for sour wells their safe operating envelope is in most cases limited by their susceptibility to Sulphide Stress Cracking (SSC) under shut-down conditions, when the pressure is the highest and the temperature the lowest. Typically, the susceptibility to SSC at ambient temperature, as determined in laboratory tests, limits their use more than the high temperature pitting and Stress Corrosion Cracking (SCC) mechanism. A comparison between field experience in mildly sour gas wells and laboratory test data on 13Cr tubulars showed that in the laboratory SSC tests, cracking is found under conditions that are significantly less severe than the field conditions at which thes	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 10:10am - 10:35am	Review Of Coating Current Test Methods For Simulating CUI Conditions And Introduction Of A New, Smal	David Morton, SIMON DALY, Vadimas Verdingovas - Corrosion Under Insulation (CUI) is widely acknowledged to be a critical issue facing plant operators in the oil, gas and process industries. CUI studies from a petrochemical facility have shown that 40-60% of pipe maintenance costs are due to CUI and approximately 10% of the total maintenance budget is spent repairing damage caused by CUI, mainly on pipes. The risk of corrosion under insulation is considered high in the temperature range 50 – 175°C (122 – 347°F) and extreme when in cyclic temperature service between -20 and 320°C (-4 – 608°F). Periodic inspection remains the best way to prevent CUI failures but is costly and time consuming. Many failures might still not be captured even with a reliable inspection scheme and in this regard the coating barrier does truly act as the last line of defence. If CUI is not found in time, then the consequences can be severe for personnel, the environment and company reputation. Due to the lac	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:10am - 10:35am	Corrosion Inhibitors Use: Case Study For Guinea Gulf Assets Application	Mioara Stroe, Alvaro De Sousa, Raquel Araujo, Laurent Dehays, Francisco-Mateus Garcia - The Company strategy is to use CI that are selected via laboratory testing program. The corrosion inhibitors are evaluated via a series of tests aiming to be representative for the future use conditions. Parameters like carbon dioxide (CO2) content in the associated gas, temperature and produced water salinity, flow velocity and flow regime, the presence of sand are considered when the anti-corrosion efficiency is evaluated. Nevertheless, the field conditions cannot be fully reproduced in the laboratory and some aspects like foaming and emulsion tendency, are not fully assess during testing. This can be assessed only during a field test, where the CI is exposed to the real conditions. The paper presents the experience of the use of 5 corrosion inhibitors (CIs) in our assets in Guinea Gulf. Monitoring results in term of performance of injection and anti-corrosion efficiency are presented. Issues e	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:10am - 10:35am	Corrosion Investigation Of Five Stainless Steels In Oil-Gas-Water Multiphase Flow Containing H2S, CO	Zhu Peike - Corrosion behavior of normal martensitic stainless steel 13Cr, supermartensitic stainless steel HP2-13Cr ,duplex stainless steel 22Cr, super duplex stainless steel 25Cr and Ni-based alloy 2550 exposed in the simulating oilfield downhole H2S-CO2-Cl- corrosive environment and in well head containing oil, H2S, CO2 gas, Cl- and water was investigated by weight loss measurement, scanning electron microscope, energy dispersive spectrum, and X-ray diffraction. The tests of pitting corrosion resistance of stainless steels in the ferric chloride solution, electrochemical measurements and scanning Kelvin probe force microscopy were also employed to investigate their corrosion resistance property. Results show that local corrosion occurred on 13Cr for the heterogeneous adsorption of crude oil and pitting occurred on 22Cr for containing two-phase austenite-ferrite microstructures and the combined effect of passivation film and adsorption of crude oil, while general corrosion occurred	Henry B. Gonzalez Convention Center	Symposia
Monday 3/7/2022 10:10am - 10:35am	Novel Evaluation Of The Failure Of Coatings In A Marine Environment	James Ellor - This paper will discuss methods to evaluate the corrosion of substrates and breakdown of protective coatings subject to wet-dry cycling in natural and accelerated environments. The paper includes data for steel, aluminum, galvanizing, and thermal-spray coated substrates. Principally the discussion concerns the ability to monitor on-going corrosion deterioration to predict coating failure in a real world environment without having to accelerate (i.e., artificially harshen) the environment.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:10am - 10:35am	Composite Repairs And Cathodic Protection	David Futch, Davie Peguero, Casey Whalen, Stephen Barnett - Composite repairs have been extensively used over the past twenty-plus years as a high-integrity repair technology for high pressure transmissions pipelines. Numerous industry test programs have increased the knowledge related to repair techniques, repair design, and quality control of installations. However, little work has been performed related to the interactions of cathodic protection and composite repairs. This paper reviews several approaches for determining if cathodic shielding may occur under a composite repair. Cathodic shielding can be considered in two different phases. First, the coating (or composite repair) must disbond or fail creating a local environment below the coating which is subsequently not protected. Secondly, the coating (or composite repair) must allow for the permeation of cathodic current to the pipe surface providing the corrosion protection. Current industry standards, such as ASME PCC-2, can	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:10am - 10:35am	Investigation Of Scale Inhibitor Interference On Sulfate Measurement And Method To Remove The Interf	Ya Liu, Haiping Lu - The sulfate level in the effluent of sulfate removal unit (SRU) is usually continuously monitored for quality assessment. SulfaVer 4, a Hach method, is typically used for sulfate measurement in the field, as it is convenient and easy to conduct. This method is based on solution turbidity increase caused by barite (i.e. barium sulfate) formation. The higher the turbidity, the higher the sulfate level. Scale inhibitors are often added into the influent of SRU to reduce scale risks on sulfate removal membrane, or the influent contains residual scale inhibitors from previous processes. However, as the scale inhibitor can inhibit barite formation, it would interfere sulfate measurement. A wide range of scale inhibitors, including phosphonate, phosphate ester, sulfonate copolymer, Polyacrylic acid, polymaleic acid, and phophino-polycarboxylate, were tested on their interferences on sulfate measurement. It turned out that phosphonate and phosphate ester did not show si	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:10am - 10:35am	Effect Of Environmental Parameters On Atmospheric Corrosion Of Infrastructures Of Canada	Nafiseh Ebrahimi, Jieying Zhang, Istemi Ozkan - Atmospheric corrosion plays a critical role in infrastructure service life. Since 1920's many studies have focused on the effect of environmental parameters on the corrosion rate of materials used in construction. It has been shown that chloride, pollutants in the air such as sulfur dioxide, temperature, and relative humidity are the primary environmental factors that are affecting corrosion rate. Many studies have tried to develop a dose response function to predict the corrosion rate of a specific metal based on the environmental factor it is exposed to. In design of infrastructure for long-term utilization, when selecting a material or considering the thickness required for a safe performance of the structure in its targeted service life, one must consider the climatic changes since these changes may affect the atmospheric corrosion rates leading to accelerated deterioration of structural components. In current practice, data from pa	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:10am - 10:35am	Zinc Sulfide Solubility Modeling In Aqueous Solution At High Temperature And High Pressure	Xin Wang, Zhaoyi Dai, Yue Zhao, Chong Dai, Saebom Ko, Samridhdi Paudyal, Xuanzhu Yao, Cianna Leschied, Amy Kan, Mason Tomson - Methods In this study, the solubility data of ZnS has been collected from the literature at pH from 2 to 11, temperature from 23 to 250°C, pressure from 0.6 to 150 bar, and ionic strength 0 to 4.6 m. The solubility model was developed based on the combination of the Pitzer theory and speciation of the Zn-HS-OH-Cl aqueous system. In total, around 250 experimental solubility data were collected as the input database. The model is fitted in Matlab 2020b with the particle-swarm optimization. Results and Conclusions The updated model is able to predict the ZnS solubility saturation index (SI = log10(Activity product /Ksp)) within ± 0.5 unit under most conditions (80% of all data points). The 95% confidence interval of the model result is ± 0.04 SI unit, which suggested good accuracy under model conditions. Due to the extremely low solubility of the ZnS itself	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:10am - 10:35am	Effect Of Feedstock Modification On Intergranular Corrosion Of Additively Manufactured 316L Stainles	Evan DelVecchio - Additive manufacturing (AM) is an emerging technology that prints engineering components in a layer-by-layer single-step process. The additively manufactured components serve a wide range of applications, including high-temperatures. The 316L stainless steel (SS) alloy used in high-temperature applications is susceptible to intergranular corrosion. The popularly known strategy of feedstock modification was followed to produce composite feedstock with different selected additives and 316L SS powder using high-energy ball milling. The composite feedstock powders were additively manufactured, and the procured AM printed specimens were subjected to sensitization. This research presents the effect of feedstock modification on intergranular corrosion of additively manufactured 316L after sensitization.	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 10:10am - 10:35am	Effect Of Hbn Exfoliation Method On Barrier And Corrosion Inhibition Performance Of Epoxy-Hbn Nanoco	Darlyn Quiroz Fonseca, Homero Castaneda-Lopez, Ahmed Abdala, YUSRA AHMED - 2-D nanosheets of hexagonal boron nitride (hBNNs), have received tremendous attention over the past years, as analogous to graphene. This latter is considered for the corrosion control action due to physical barrier approach used for steel alloys. In this work, epoxy-hBNNs nanocomposite coatings are prepared and the effects of hBNNs loading and exfoliation method on the barrier and anti-corrosion properties are investigated. The structure and morphology features of hBNNs prepared by liquid exfoliation and ball milling are characterized by XRD, SEM, FT-IR, and surface area/porosity/pore size measurements. The epoxy-hBN nanocomposites were used to coat mild steel substrate with 70 deposit µm film. Study of the surface fracture and contact angle of the coatings were employed to analyze the interface interaction between the fillers and epoxy matrix and hydrophobicity. The long-term corrosion resistance and barrier	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 10:10am - 10:35am	Degradation Control Of Bio-Function Surfaces For Orthopedic Implants	Amir Eliezer - Today there is an increasing need for biofunctional surfaces for both nondegradable orthopedic implants and biodegradable resorbable implants. Such surfaces would reduce the risk of foreign body related infections and medical concerns related to several years post implantation. One of the major challenges is to stimulate between the degaradation mechanism to the regulatory requirements for orthopedic implants. The lecture will present results for titanium and magnesium alloys and will focus on biocompatabilty requirements under stimulation of real time conditions for biofunction mechanism including the antibacterial need. In addition the mechanical concept will also be discussed. Overall such surfaces were found to be essential for degardation control and safety of biomedical orthopedic implants.	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 10:10am - 10:35am	Fiber-Reinforced Polymer (FRP): Resin And Corrosion Barrier Selection - The Testing Behind The Recom	Lisa Adkins - Corrosion challenges exist in many industries including the chemical and mineral processing industry as well as in the oil and gas production industry. Many of these corrosion challenges can be solved using equipment fabricated with fiber-reinforced polymer (FRP). FRP has been used for over 60 years in these industries to control corrosion problems where stainless steel or higher nickel alloys are required because of the severity of the chemical environment. The use of the correct FRP material provides a product resistant to the chemical environment with a long service life and often at a more economical price. FRP corrosion resistant equipment consists of a chemical resistant resin reinforced with fiberglass. In order to determine the proper resin and corrosion barrier construction for a specific chemical service, resin coupons are evaluated in the laboratory (per ASTM C581) as well as in the field. Corrosion coupons are immersed in a specific chemical environment in t	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:10am - 10:35am	Continuous Corrosion Monitoring In HF Alkylation Units Including The Effects Of Iron Fluoride Scale	William Fazackerley - Traditional expectation is that iron fluoride scale layers that build up will not affect ultrasonic thickness results. However, through monitoring the same locations using permanently installed ultrasonic sensors, it was observed that the iron fluoride layer did affect the ultrasonic signal – producing an effect on the recorded ultrasonic signals. Our field experience has lead to the development of an advanced signal processing algorithm, designed to be less affected by the effects of ultrasonic distortion due to the scale build-up. Data examples will be presented to explain this effect and comparisons between traditional signal processing methods and the advanced methods developed for this application. We close with a case study from a refinery who, via online monitoring of their HF alkylation unit, were able to detect elevated corrosion rates and take action to bring the corrosion under control, in advance of any loss of containment.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:25am - 10:50am	Case Study Based On Coating Failure Analysis Of Cargo Container	Syed Umair Niaz Bukhari - Coatings are a composite blend of raw ingredients that are mixed, applied to a prepared substrate, and dried and cured correctly to perform to their maximum capability. Failures and defects can appear themselves at numerous times in the life of a coating. Prior to application, they can take the shape of settlement and skinning, during application as runs and sags, shortly after application as solvent popping and orange peel, and during service as blistering and rust spotting. Therefore, it is not unexpected that those coatings can suffer from premature failure and/or exhibit defects that may or may not result in failure. In this paper, a case study related to failure of coating system applied to a cargo container is given where paint cracking was observed just after one month of coating application. This article addresses the failure incident of a newly applied coating system on the outer surfaces of a steel cargo container that rendered the whole process u	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:35am - 11am	Examination Of Corrosion Sensor Data From Long-Term Field Exposures	Erica Macha, Erin DeCarlo, James Dante - This work examines data from a multi-year, large deployment of corrosion sensors in a variety of locations representing a range of corrosivity severities. The corrosion sensors used in this work measure atmospheric parameters such as relative humidity and temperature in addition to electrochemical parameters such as the conductivity of the electrolyte formed by salt deposition and possible deliquescence, and the polarization resistance measured on a variety of structural materials including 7075 aluminum, 2024 aluminum, and 4310 steel. Comparisons between sheltered and unsheltered sensor exposures show the difference precipitation and other rinsing events have on sensor measurements. In particular, the interplay of relative humidity and electrolyte conductivity is discussed in the context of using conductance sensors as a proxy for salt loading. The tendency for protective corrosion product films to form on the sensing materials, resulting in	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 10:35am - 11am	Synergistic Effects Of Bacterial Contamination And Citric Acid Detoxification On Titanium Dental Imp	Bhuvana Lakkasetter Chandrashekar, Danyal Siddiqui, Danieli C. Rodrigues - This study evaluated surface characteristics and oxide behavior of Ti post-bacterial biofilm formation and citric acid detoxification. Ti specimens were immersed with oral bacteria under aerobic and anaerobic conditions for 4 h or 7 days (n=3) followed by mechanical debridement with 0.9% saline or 40% citric acid (CA) for 8 min. Next, the surface morphology, microstructure, corrosion behavior and oxide layer state were studied by optical microscopy, Raman spectroscopy, electrochemical testing, and X-ray photoelectron spectroscopy, respectively. While signs of pitting and corrosion attack on Ti exposed to bacteria and/or detoxification were evident, no surface oxide phase changes were detected. Samples treated with CA had higher corrosion rate after aerobic and anaerobic immersion. Samples exposed to bacteria and CA treatment had higher oxide thickness under aerobic but not anaerobic immersion conditions. In co	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 10:35am - 11am	Improving Zinc-Rich Epoxy Primer With Lamellar Zinc Incorporation	Zehbour Panossian, Alessandra Motta, Danae Francisco, Marília Menossi, Neusvaldo de Almeida, Paloma dos Santos - A paint formulation is proposed in which the metallic micro particles of zinc are partially replaced by lamellar zinc particles, aiming at improving the mechanical properties of a paint scheme. Mechanical-property characterization tests (pull-off adhesion, cross-cut adhesion, direct impact resistance, Erichsen test, conic mandrel banding) and corrosion performance tests (salt spray and humidity chamber exposition, and electrochemical measurements) were performed. A significant increase in mechanical properties of the new formulation was observed when compared to a commercial ZRP without compromising the corrosion protection ability.	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 10:35am - 11am	Effects Of Cl – And H2S Concentration On Passive Film Breakdown Of Modified 13Cr Martensitic Stainle	Alan Martinez, Raymundo Case, Yuan Ding - Modified 13Cr Martensitic Stainless Steels (M13Cr) are a class of materials used for operations involving natural gas production under extreme conditions. The effects of temperature, Cl- concentration, and H2S content on the passive film behavior were evaluated by performing polarization experiments at high pressures. Barrier Layer performance were based on changes in cation vacancy annihilation rate (Jm), polarizability of the film/solution interphase (α), and cation vacancy diffusivity in the barrier layer (D). At 75 °C without H2S, the film achieved the highest resistance to pitting susceptibility in the current research. Changes in the semiconductor behavior of the layer are shown as the nature of charge carriers transition from n-p to pure p type when H2S is introduced. The use of secondary-ion mass spectroscopy is in preliminary stages but has been successful in characterizing film constituents.	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 10:35am - 11am	Evaluation Of The Impact Of Iron Oxide Deposit On The Eddy Current (ECT) Measurements Of Heat Exchan	Muazu Mohammed, Aamir Saddiq - ECT Inspection was conducted on the tubes of a shell-and-tube heat exchanger as part of turn-around scope, it revealed severe wall loss on tube OD. The shell is medium pressure steam and tube sodium hydroxide. A metallurgical characterization was conducted on the heat exchanger Nickel tubes to investigate the failure mechanism and to provide recommendations for mitigation, Two tubes with over 80% wall loss from the ECT reports were pulled out for the studies. Profile radiography (PRT), SEM/EDX and XRD techniques were conducted on Tubes. The investigation showed the tubes were satisfactory contrary to the two ECT report, the corrosion products iron oxides formed a thin layer on the OD of the tubes, this thin layer of iron oxide from corrosion of upstream carbon steel steam piping on the surface of the Nickel tubes resulted in erroneous signal to ECT probes.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:35am - 11am	Sustainable Coatings For Above Ground Storage Tanks	Martin Gagne, James Weber - Above ground storage tanks display a large surface area that can often be covered in unsightly rust. A long term coating is needed to reduce maintenance costs as scaffolding and tarping a tank for coating typically costs more than the actual blasting and re-painting costs. Thermal spray zinc (TSZ) duplex coatings have been shown to be highly durable. In a life cycle comparison with paint, the durability of metallic zinc coatings eliminates the repeat burdens of maintenance painting, significantly reducing the total cost of ownership of a structure. Furthermore, zinc coatings have significantly lower life cycle impact in terms of global warming potential, acidification potential, and photo-chemical ozone creation potential, providing a more sustainable corrosion maintenance strategy. A thermal spray zinc duplex coating applied with three man lifts can eliminate the need for scaffolding and tarping and provide an economical and sustainable coating system wit	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:35am - 11am	Polymer Architecture Effect On Zinc Ions Stabilization In Aqueous Systems	Zahid Amjad, Petros Koutsoukos, PANAGIOTA NATSI -	Henry B. Gonzalez Convention Center	Symposia

Over the past three decades the incorporation of scale and deposit control additives in water treatment formulations has increased significantly. These additives containing different functional groups, monomer type, monomer ratios, and varying molecular weights exhibit variable, often tunable effects, including scale inhibition, dispersancy, crystal morphology modification, and co-corrosion inhibition. Recently, cooling water treatment programs such as ‘all organic,’ ‘stabilized phosphate,’ and ‘alkaline zinc’ have become the standard for cooling system operation. In ‘alkaline zinc program,’ the role of polymer is to control the formation of corrosion inhibiting film formed by zinc hydroxide or zinc phosphate precipitation due to locally high pH at the cathode. This paper explores the impact of polymer architecture in stabilizing zinc ions in aqueous systems. The polymers tested include acrylic acid, maleic acid-based homo-, co-, and

Monday 3/7/2022 10:35am - 11am	Corrosion Control In Water Injection Pipelines	jonathan marsh - Dubai Petroleum (the Operator) operates five oil fields in the offshore Dubai area of the United Arab Emirates. Within these operated fields there is a network of over 30 unlined carbon steel sea water injection pipelines that are presently in use, with abandoned or mothballed pipelines taking this number to over 50. This publication discusses the experience of the Operator, where the operating life of these pipelines has typically exceeded 20 years, and on occasion has exceeded 40 years. This is compared with the experience of the UK sector, where failures in as little as four years have been noted and many pipelines have failed to reach 15 years of service. The prevalent corrosion mechanisms are discussed and a comparison of corrosion control measures is made. An assessment of the Operator’s experience of pipeline corrosion management, chemical treatment, monitoring and inspection is discussed. Evidence is presented that operational pigging of sea water injection p	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:35am - 11am	Development of Iron Sulfide Scale Inhibitor For Ultra-Tight Sandstone	Cyril Okocha, Tao Chen, Qiwei Wang, ALEXANDER RUSSELL THORNTON - Most of the iron sulfide inhibitors work through continuous injection. To improve the inhibitor adsorption on the rock surface and make the inhibitors suitable for squeeze application, new polymeric inhibitors have been developed with introduction of specific functional anchoring groups. A coreflood study was carried out to evaluate the potential formation damage and scale inhibitor returning profile of this novel sulfide scale inhibitor in an ultra-tight sandstone core under simulated real-field conditions of a high temperature, high calcium brine sour gas producer. The tested sandstone core is ultra-tight with a permeability less than 0.001 millidarcy. The coreflood test was performed without interruption or issue, and achieved consistent and continuous formation damage data assessment throughout flowback period at flowrates below 0.1 mL/min due to its characteristics of ultra-tight with extremely low permeability.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:35am - 11am	Offshore Marine Corrosion Rates - A Case Study	Alex Delwiche, Patrick Lydon - Corrosion Rates of flooded internal windturbine monopiled structures is a concern to the upcoming renewable industry. Many owner operators were shocked to discover higher than antictipated corrosion rates on the sealed flooded section in the monoopile structures that are considered gas and water tight. For a number of reasons these seals either failed and the corrorsion rates were not known. This case study is based on a project conducted over a number of years where corrosion coupons were installed, inspected and removed for analysis, cleaned and weighed to determine the mean corrosion rate. Pitting was also evident and this study presents both the mean and pitting corrosion rates for a number of monopiles studied.	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 10:35am - 11am	Investigation on Localized Corrosion Resistance of Nickel-based alloy UNS N07718 under Sour conditio	Erfan Abedi Esfahani, Frederick Pessu, Jiong Qian, Anne Neville, Richard Barker - Appropriate material selection for high temperature and high H2S/CO2 partial pressures environments within oil and gas wells is essential for a robust corrosion management strategy. CRAs are routinely considered as an alternative to carbon steel for oil and gas applications under such conditions. However, published research relating to CRAs passive layer composition and their protective properties in combined H2S/CO2-containing environments is limited, particularly in the presence of chloride ions. This study focuses on understanding the pitting corrosion mechanisms of Solution Annealed (SA) and aged INCONEL 718 in comparison to INCONEL 625 and Incoloy 825. Corrosion experiments are conducted in simulated environments analogous to the PuGuang field, with testing temperature between 80-150°C and the testing brine containing chloride and sulphate ions. A combination of high temperature/high pressure (HTHP	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 10:35am - 11am	Effect Of Inhibitor Component On Inhibitor Efficiency - Inhibitor Types And Intensifier-	Hirotaka Mizukami, Ayano Yasui, Susumu Hirano, Toshiyuki Sunaba, Akiyoshi Kimura, Mitsuru Uno, Takashi Ito, Sei Tatsuya, Reiko Ikeda - Imidazoline, which is known as one of the active ingredients of corrosion inhibitors, is hydrolyzed to amide, and this reaction could progress in the stock tank exposed to the weather. This change would affect not only physical characters but also the inhibitor efficiency, so the inhibitor efficiency of these two types, imidazoline and amide, was evaluated by several tests such as weight loss test and electrochemical measurements. As a result, the imidazoline-type inhibitor had better inhibitor efficiency than the amide-type under turbulent flow. Therefore, the imidazoline-type inhibitor should be preserved without water ingress from the outside. Furthermore, some intensifiers might be added to inhibitor products in order to improve inhibitor efficiency. In this study, one intensifier was selected and added to inhibitors, and evaluation tests were ca	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:35am - 11am	A Novel Methodology For Addressing Corrosion Under Insulation (CUI) Utilizing Corrosion Inhibitor Im	Phil Low, Thomas Rehberg - Corrosion under insulation (CUI) is highly regarded as one of the largest corrosion threats across oil and gas and petro-chemical sectors. CUI as its commonly known, is a condition which results in aggressive localized external corrosion, typically found in carbon and low alloy steel. This form of corrosion occurs when water is absorbed by or collected in the insulation. The equipment begins to corrode as it is exposed to water and oxygen. CUI is common in refineries and process plants through midstream and downstream where equipment operates at higher temperatures. It is estimated between 40 - 60% of pipeline maintenance costs are a result of CUI. Zerust Inhibitor Tape (ZIF) was specifically designed to combat the many areas to address when we evaluate a corrosion protection mechanism for CUI, the main challenge is creating a physical barrier between the steel substrate and insulation medium, ZIF provides this barrier in the form of a robust silicone bas	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 10:35am - 11am	New Insights On Groove Criticality Formed Onto Carbon Steel After Sulfide Stress Cracking Test	Christophe Mendibide, Flavien Vucko - Common tests methods to evaluate the sulfide stress cracking (SSC) resistance of carbon steels are uniaxial tensile or 4-point bend tests according to NACE TM0177 and NACE TM0316 respectively. After testing, so-called grooves are sometimes also observed through cross-sectional observations of non-broken SSC specimens. These grooves can be different in shape and depth depending on the test conditions and can sometimes render difficult the decision on material qualifications. In a recently published work completed on C110 casing steel, we demonstrated that microgrooving cannot be considered as SSC cracks but the question of groove nature and criticality is still open for other grades; as well as the possibility to have SSC crack initiating from superficial grooves. This paper presents some results of a work conducted in the frame of a French Corrosion Institute Membership program. Through the presentation of grooves observed on different grades a	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	The Development Of Eta Function For Notch Tensile Testing Of Sulfide Stress Cracking (SSC) Susceptib	Yuan Ding, Sebastian Cravero, Raymundo Case - In this study, a new method of calculation for the KISSC / JISSC values from the NTSSRT is introduced, based on the eta function coefficient mode. This approach is necessary to simplify the required computation of the KISSC / JISSC values across different sour environment severities. In the present study, to obtain the η-values, FEA simulations of the tensile behavior and J values of a C110 carbon steel were performed. The differences were calculated by comparing with different materials properties (full plastic vs. only linear elastic) and non-dimensional η-factors were then calculated. Moreover, the effect of notch ratio on the η-factors was also investigated to verify the validity of the calculated η-factors. In addition, the role of sample size was also studied to understand the application range of the eta function. The results show that an eta function was successfully developed for the C110 carbon steel tensile sample as indicate	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	Third Generation Polysiloxane Coatings For Elevated Temperature; Field Performance	Peter Bock, James Reynolds - Abstract: Third Generation Polysiloxane (TGPS) ambient curing CUI mitigation coatings have been used in the petrochemical industry for over five years since the “third generation” concept was introduced at NACE Corrosion 2017. These coating technologies have demonstrated positive results in both shop and field application for asset management in elevated temperature, cryogenic and cyclic applications across -196 to 650o C/ -321 to 1200o F operational temperatures. TGPS coatings have also demonstrated effective use of a two-step (primer-insulation) CUI mitigation coating approach operating up to 400o C/750o F, when compared to the traditional (CUI coating-fibrous insulation-cladding) systems.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	Effect Of N-Furfuryil-Aniline And N-Furyl-C-Phenyl-Nitrone On Corrosion Inhibition Of Low Carbon Ste	Ana Fonseca, Enrique Vera, wilson Rozo, Edgar Almanza - Carbon steel is one of the most commonly used metals in the oil, gas and hydrocarbons transport industry given its mechanical properties and low production cost; however, its low corrosion resistance to different aggressive environments has been considerably reported. Worldwide, there is a special interest to mitigate the corrosion and minimize the associated cost. The use of inhibitors has become one of the best practical methods to avoid the internal corrosion damage, especially in hydrocarbons transport lines. This investigation aims to develop, characterize and evaluate the molecules n-furfuryil-aniline and n-furil-c-phenyl-nitrone in 3% NaCl on a low carbon steel, by using Tafel polarization and impedance spectroscopy measurement techniques. Concentrations of the molecule of 5, 10, 25, 50 and 100 ppm were used in this study. The results show that the inhibition efficiencies increased with increasing the concentrations of th	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	In-Situ Determination Of The Degree Of Sensitization In Austenitic Stainless Steels	Pablo Altamirano, Mariano Kappes, Martin Rodriguez - The aim of this work is to develop an electrochemical test for determining the DOS of austenitic stainless steels nondestructively in the field. The double loop electrochemical potentiokinetic reactivation (DL-EPR) method, according to ISO 12732, was taken as a reference. Tests were performed in austenitic stainless steel type AISI 304 (UNS S30400). The specimens were thermally aged at 677 ºC for periods ranging from 1 to 10 hours, in order to obtain different DOS. The influence of oxygen content in solution on measured DOS was studied, in order to simplify and optimize the field deployment of the technique. The effects of cold work and inclusions content on DOS were studied to identify possible false positives. Specimens with various percentages of plastic deformation and heat treatments, and stainless steel heats with different inclusions content were analyzed. The aging of the test medium and the design of a measurement cell are	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	Inhibitor Exhaustion From Aerospace Primers	James Dante - The functional life of paint in DoD is defined by the barrier properties and protective corrosion inhibiting capacity of the coating system. The time unitl corrosion initiation of an underlying substrate can thus be defined in general terms as 1) the time for an external environment to reach the coating/substrate interface through coating porosity, coating cracking, or mechanical damage and 2) inhibitor exhaustion/depletion. In other words, once a coating system has been breached, protection is afforded by the availability of inhibitors at the defect site. In this work, we seek to understand the parameters that influence inhibitor exhaustion. A aluminum alloy Multi-Electrode Array (MEA) probe is used to measure corrosion currents directly as a function of exposure time. Both inhibitor leach rate and residual coating protectiveness are measured as a function of time and compared for four aerospace primer systems. Leaching of inhibitors is measured using Ion Coupled Plasm	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	Precision Navigation For Hull Crawling Robots - Efficient Robots For Automated Grooming	Karl Lander - This paper will present an analysis of how precision navigation for a man-portable, sailor-operable subsea robot can positively impact ship operations by making hull grooming more accessible, thus improving fuel consumption, reducing emmissions and limiting transport of invasive species while minimizing risk to coating systems. By merging an advanced inertial navigation system and feature-based sonar navigation into an optimally designed crawler assembly, Greensea’s technology is able to provide a previously unavailable level of precision positioning and control for a remotely operated vehicle (ROV) on a ship’s hull. Building on proven vehicle architecture, user interface and task automation, this precision navigation capability enables autonomous operation in an efficient manner. By retaining both free flying and crawling capabilities, as well as a non-magnetic method of attachment, this technology offers greater flexibility of application being able to be used on al	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	Development Of Fes Scale Control Technology Using Polymeric Dispersants In Sour Environment	Saebom Ko, Xin Wang, Wei Li, Zhaoyi Dai, Amy Kan, Mason Tomson - The goals of this study is (1) to develop efficient and effective technology preventing iron sulfide particle deposition on the surface as well as maintaining iron sulfide in the water phase; and (2) to understand FeS scale controlling reaction mechanism. Our studies indicate that carboxymethy cellulose (CMC) displays the excellent performance of iron sulfide dispersion over wide ranges of reaction conditions, for examples, pH from 4 to 7, and ionic strength from 1 to 4 M. The combination of phosphonate inhibitor and CMC shows the synergistic effect to disperse iron sulfide particles at much lower concentrations than by themselves. Amide-group containing polymeric compounds also disperse iron sulfide particles, but are less effective than CMC. The dispersed iron sulfide particles remain in nanometer ranges. Dispersed iron sulfide particles are not transferred to the oil phase. The more effective dispersant formulas and	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	Corrosion Under Pipe Supports - Beyond Simply Inspection	Connor Tiegs - Many on-stream inspection techniques exist that inspect for Corrosion Under Pipe Supports such as EMAT and Guided Wave. These methods tout their ability to evaluate corrosion severity without the need for lifting the pipes which before their arrival was required in order to perform a direct visual inspection and/or UT measurement at the touchpoint. While this allows operators to reduce costs and job complexity to perform inspections, line lifting is an absolute requirement when it comes to performing the necessary repairs at the touchpoint to mitigate the problem. Many pipe lifting methods have been implemented that are unsafe, costly or impractical resulting in operators only to rely on these in critical situations such as when a leak occurs. This paper discusses methods of pipe lifting, their benefits and shortcomings for various pipe sizes and layouts that supports a proactive approach to addressing Corrosion Under Pipe Supports before leaks occur.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	Mechanisms And Polymorphic Transformation Of Calcium Carbonate Inorganic Scale In Oil-Water Emulsion	Olujide Sanni, Ogbemi Bukuaghangin, Wassim Taleb, Richard Barker, Frederick Pessu, Thibaut Charpentier, Anne Neville - This work studies the mechanisms and behaviour of precipitation of calcium carbonate scale in the presence of oil - water emulsion. A total of 100ml of different oil fractions including cyclohexane, kerosene, toluene and asphaltene is introduced to a vessel with 1000ml of brine at temperature, T=30°C. Using the Rotating Cylinder Electrode (RCE) technique, the mixture is continuously stirred with an overhead impeller blade at 520 rpm to create homogeneous dispersion in the two-phase mixture. Samples are collected and analysed using the SEM, XRD and Atomic Absorption Spectroscopy (AAS) techniques to determine the sizes, morphology, polymorphic transformation and calcium ion concentration at different time intervals. The study shows that the presence of the different fractions of oil have a pronounced effect, by hindering the formation of calcium carbonate and signifi	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 11am - 11:25am	Improved Cathodic Protection Current Distribution for Above Ground Storage Tank Bottoms Due to Low R	Sujay Math - Above ground storage tank (AST) soil-side tank bottom corrosion prevention state-of-the-art technique is to use a MMO anode grid cathodic protection (CP) system. In grid system, the anodes are spaced based on the depth of the anode from the tank bottom. CP design guidelines recommend using a washed clean sand free from anions which could potentially cause corrosion, the resultant clean sand is a highly resistive sand bed for CP system. Over the life cycle of the tank bottom CP system, the sand resistivity changes due to the ingress of rain and floodwater or due to the loss of moisture and excessive drying. The addition of Portland cement and limestone to increase pH also reduces the electrical resistivity of sand pad. CP design guidelines suggest accommodating for the changes in soil resistivity over their design life; however, this is not always considered. The change in the sand resistivities directly affect the CP current distribution, inadequate CP distribution will	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	IOW Analysis With Installed UT Sensors: How Process Changes Impact Corrosion Rates	Mitch Gribi, Ivan Morales, Zackary Lerch, Rebecca Henderson, Rebecca Franco - Installed UT sensors can provide better visibility around how, when, and why corrosion is happening in assets and allows people to track and monitor with extremely high precision (.001”). Owner operators can then overlay corrosion rate data with process data to analyze Integrity Operating Windows (IOWs) and help them better understand how to most efficiently and safely operate their assets and either remediate or extend their useful life, thus moving from a time-based maintenance interval to that of a predictive based interval. This paper will cover real life examples of how owner operators have used permanent or temporarily installed wireless UT sensors to monitor problematic areas, track remediation tactics, and verify the ramification of operational changes.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11am - 11:25am	Environmental Influences On Maximum Pit Sizes For Austenitic Stainless Steels Utilized In Spent Nucl	Ryan Katona, Nathan Porter, Dusty Brooks, Robert Kelly, Charles Bryan, Rebecca Schaller - Austenitic stainless steels (SS), utilized extensively in coastal environments due to their enhanced corrosion resistance, are susceptible to localized corrosion and stress corrosion cracking (SCC) when exposed to chloride environments. One potential scenario under which SCC may pose a concern is the interim storage and the eventual transport of spent nuclear fuels in SS canisters. The SS canisters may be subjected to marine sea-salts and elevated temperatures; however, assessing the current damage state on the surface of these canisters is difficult; high radiation levels dictate confinement within a limited-access overpack. Hence, prediction of the surface pitting corrosion damage is beneficial to determining SCC susceptibility. Recent work in which the maximum attainable pit size can be calculated could form the foundation for predictions. Deliquescent brine compositions are constantly changi	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 11am - 11:25am	Machine Learning Approaches To QSAR Modelling Of Pyridine-Based Corrosion Inhibitors Of Mild Steel I	Taiwo Quadri, Lukman Olasunkanmi, Omolola Fayemi, Eno Ebenso - This present study explores the quantitative structure activity relationship (QSAR) between relevant structural features and the obtained inhibition efficiencies of sixty reported pyridines using machine learning techniques. Density functional theory and Dragon 7 software were used to obtain numerous molecular descriptors of the pyridine derivatives. The obtained molecular descriptors were reduced to few significant descriptors via feature selection tools. Multiple linear regression, artificial neural network and support vector machine were utilized to model the corrosion inhibition of the studied pyridine molecules. The developed models were characterized using several statistical parameters. Reliable results obtained from the machine learning approaches revealed their potential to provide insight into the inhibition mechanism of organic inhibitors. Furthermore, the inhibition efficiencies of twelve novel and non-synthes	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 11am - 11:25am	Electrochemical Behavior Of Directed Energy Deposited (DED) Co-Cr-Mo Alloys In Simulated Electrolyte	Deeparekha Narayanan, Michael Liu, Matthew Kuttolamadam, Homero Castaneda-Lopez - Biomedical implants used in load bearing orthopedic applications such as total hip, ankle and knee replacements require high strength, wear, fatigue and corrosion resistance. Co-Cr-Mo (CCM) alloys such as ASTM F75 and F1537 alloys have been used commonly for these applications as they satisfy the property requirements while being biocompatible. However, due to the poor machinability of these alloys, it is very difficult to produce the intricate shapes required in implants by methods other than casting. Casting leads to the formation of undesirable precipitates and coarse microstructures that deteriorate the mechanical and corrosion properties and hence paves the path for the use of additive manufacturing (AM) techniques to manufacture these implants. AM techniques can not only produce intricate shapes with ease but their high cooling rates can help prevent the formation of hard precipitates. In this wor	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 11:10am - 11:35am	Coating Failures By Design	Leonard Phelps, Ralf Leistikow - Although many industry resources for the design and selection of effective and durable coating systems are available to coating specifiers and manufacturer’s technical representatives, too often the wrong surface preparation and/or coating system are specified and completed during construction and rehabilitation projects. This results in less effective coating systems and costly future remedial work. A case study of a project in a coastal environment will be reviewed to illustrate an installation which resulted in significant remedial work on existing structures. As a result of poor project specifications, limited or improper technical support, and deficient construction, the structural framing on this project deteriorated prematurely and required extensive remedial work. A review of the project specification and construction deficiencies that resulted in widespread coating failures and deterioration of the structural framing will be reviewed. In addi	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Electrochemical Characterization Of Novel Titanium Alloys In Biomedically-Relevant Electrolytes	Jaewan Bae, Jacob Benoun, Vilupanur Ravi - In this study, the behavior of Ti-6 Al-4V-0.01 B, Ti-6 Al-4 V-0.04 B, Ti-39 Nb-6 Zr, and Ti-28 Nb-20 Zr in phosphate-buffered saline (PBS) and artificial saliva solutions at 37 ºC was evaluated using a modified ASTM F2129-19a test protocol. The electrochemical response of Ti-6 Al-4 V (Grade 5 Ti) and commercially purity Ti (Grade 2 Ti) in these solutions was also studied as a benchmark. Additional DC polarization tests were conducted in accordance with ASTM G59-97 protocols, i.e., open circuit and linear polarization resistance measurements, and potentiodynamic polarization scans. Electrochemical impedance spectroscopy measurements were conducted to obtain deeper insights into corrosion behavior. The effect of the Zr/Nb ratio in the near beta alloys, and that of boron in the alpha plus beta alloys, on the electrochemical response of these alloys will be discussed.	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 11:25am - 11:50am	Microbial Induced Corrosion Protection By Single-Layer Graphene Coating On Single Crystal (111) Copp	Md Mahmudul Hasan, Pawan Sigdel, Jawahar Kalimuthu, Alexey Lipatov, Jasthi Bharat, Venkataramana Gadhamshetty - The cost of corrosion worldwide is increasing every year and microbially induced corrosion (MIC) contributes to this substantially. Here we have explored the effectiveness of graphene coating on {111} single crystal copper exposed to Desulfovibrio alaskensis G20 (DAG-20) sulfate-reducing bacterial atmosphere (10% DAG-20) because of the inherent barrier property of graphene. In this study, we carried out microbial corrosion test on bare {111} single crystal copper (SC-Cu) and single-layer graphene-coated single crystal copper (SLG/SC-Cu) and compared values such as open circuit potential, electrochemical impedance, and polarization resistance. The SLG/SC-Cu showed higher open circuit potential, higher impedance, and a lower corrosion rate while compared to that of bare SC-Cu. The single-layer graphene coating acted as a barrier to corrosion and yielded lower corrosion than t	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 11:25am - 11:50am	Exploring The Role Of Different Additives On Corrosion Performance Of Additively Manufactured 316L S	Venkata Vukkum, Jijo Christudasjustus, Ahmed Darwish, steven storck, Furkan Ozdemir, Rajeev Gupta - Selective laser melting (SLM) is a popular powder bed fusion-additive manufacturing (PBF-AM) technique used to fabricate complex 3D components layer-by-layer. The corrosion performance of SLM printed 316L Stainless steel (SLM-316L) was often reported inconsistent in the literature. This research presents a strategy of feedstock modification to improve the corrosion performance of SLM-316L. The feedstock was modified via high energy ball milling of specific additive and 316L Stainless steel powder, and the collected composite powders were selectively laser melted. Different additives have been explored that can improve the corrosion performance of SLM-316L. Additives that could not distribute themselves in the 316L alloy matrix were segregated and showed localized galvanic corrosion, whereas the additive that distributed itself showed significantly improved corrosion performance in term	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 11:25am - 11:50am	Aggregating And Standardizing Disjointed Integrity Management Data	Robert Floria, Alfonso Garcia Rojas - Data management is a critical component of an integrity management plan. Current products and services in the integrity management sector can generate an enormous amount of uncontrolled and disjointed data, housed on multiple platforms. “Aggregating and Standardizing Disjointed Integrity Management Data” examines methods of mapping and linking multiple data sources to achieve optimal data usefulness, while reducing redundant data. The text explores methods of using spatial and relational data. By defining relationships between fixed points, linear values can be generated from calibrated routes. Developing methods to introduce new data, standardized from spatial data, serves to maintain data quality. Recurring data logistics, using relational keys in conjunction with ETL procedures, serve to link databases. Value is achieved on a large-scale using girth welds to automate the process of generating mile post values for point features. Data generated	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Highly Durable Solventborne Silicone Organic Hybrid For Protective Coating Applications	Erin Vogel, Gary Wieber, Adam Tomasik, Yanxiang Li - Advances in understanding of the compatibility between silicone and organic resins has led to the development of a new isocyanate-free hybrid resin technology that provides excellent weatherability and corrosion resistance for protective coating and general industrial finishes applications. Salt spray testing shows excellent corrosion resistance in a two-coat system after 3000 hours exposure with no evidence of blistering, cracking or rusting as well as after 1000 hours as a direct to metal coating. Weathering tests show exceptional gloss retention over 4000 hr under accelerated test conditions such as Xenon and QUV A, and after >2 years South Florida exposure. The hybrid technology also has low VOC and favorable labelling when compared against those of standard PU coatings.	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 11:25am - 11:50am	Ph-Responsive Copolymers As Silica Scale Inhibitors	Kostas Demadis, Georgia Skordalou - In the present work two synthetic, pH-responsive co-polymers, U-PVPyPEGMA-H and Q-PVPyPEGMA-H, with pyridine and polyethylene glycol grafts, were studied for their potential to influence silicic acid polycondensation in vitro in silicate-supersaturated (500 ppm, 8.3 mM) aqueous solutions. The aim of this study was to evaluate the impact of several experimental parameters on the silicic acid polycondencation process. Working pH plays a significant role on the silicification reaction either in the absence or presence of polymers. In the presence of polymers, pH affects the protonation state of the pyridine N atom, transforming U-PVPyPEGMA, for example, from a silica formation catalyst (at pH=5.0) to a silicic acid stabilizer(at pH`=7.0). Furthermore, the state of N atom on the pyridine ring (non-protonated, protonated, quaternized) strongly affects the silicic acid autocondensation process. Based on our results, a “free” (non-protonated) pyridine rin	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Datascience To Enhance Pipeline Maintenance	David Toschini, Anthony DEQUICK, Marketa PICHLOVA LALLEMENTOVA, Masson Bernard, Thomas ZAMOJSKI - Improvements are possible for Assessment of the external coating condition of underground pipelines. We have tested an analytical approach based on historical data to increase the success rate (from the understanding of the problem to the construction of algorithms with optimization of their parameter). Different data sources to extract new knowledge have been used, works and ecavations have been prioritized in order to make less but more relevant.The development and validation of the predictive model has been ensured by a multidisciplinary team : IT department, corrosion experts, project managers. The model has been calibrated taking into account both the indications of greater probability of metallic faults and those of lower probability, in order to prioritize the likehood of corrosion along the pipes which can’t be pigged.The construction method is based on Bayesian networks. The fir	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Corrosion Under Insulation Performance Of Insulation Stand-Offs And Non-Metallic Membranes	Ahmad Raza Khan Rana, Graham Brigham, George Jarjoura, Omar Chaar - CUI (Corrosion Under Insulation) is among the key damage mechanisms affecting equipment and piping in hydrocarbon processing facilities, as well as pipelines. The key reason behind CUI is the contact of soaked insulations with the metal(s). Insulation stand-offs and membranes can keep the soaked insulation off the pipe and mitigate CUI risk. This research study addresses the CUI simulation tests to characterize the corrosion behaviors of carbon steel under isothermal wet and cyclic wet conditions, in the presence of insulation stand-offs, low point drains, and Teflon membranes. The corroded coupons were characterized using microscope and surface topography to investigate the damage modes namely pitting, uniform corrosion, etc. Insulation stand-offs with low point drains showed uniform corrosion in comparison to closed-contacting insulation, which mainly caused localized corrosion and pitting. Teflon membrane with low	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Understanding Effect Of Scribe Method On Variability In Accelerated Corrosion Test Results	Sarah Specht, Melinda Dent, James Begley, Suprita Jharimune, Nicole Rakers, Arif Mubarok - Accelerated corrosion tests are commonly used across the coatings industry to predict performance of coating systems and aid development of new coating systems for a variety of exposure environments. Variability in the results exist in almost all accelerated testing. To improve efficiency in coatings development and to gain better confidence in test results, it is important to understand the root cause of variability. This work investigates the effect that different scribe requirements (such as dimension or orientation) have on the outcome and comparability of accelerated corrosion test results. Discussion will focus on coating application and sample preparation prior to accelerated corrosion test exposure, as well as the analytical tools used to understand scribe corrosion after various preparation protocols.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Factors In Galvanic Corrosion Between Steel And Iron Sulfides In Acidic Solutions	Payman Sharifi Abdar, Bruce Brown, Srdjan Nesic - With the increase in producing sour oil and gas fields in the world, mitigation of production related failures due to H2S corrosion is a key challenge. In H2S environments, the corrosion product layer could include different types of iron sulfides with various electrical and physiochemical characteristics. One of the main characteristics of iron sulfides is their electrical conductivity which could enhance the galvanic coupling between steel and the corrosion product layer. On that account, galvanic coupling between steel and iron sulfides is considered as the main culprit of higher risk of localized corrosion in H2S environments. However, the mechanism and the effect of experimental parameters on the galvanic coupling between steel and iron sulfides have not been understood yet. The present study investigates the effect of three different experimental parameters: iron sulfide type, cathode to anode surface ratio, and salt concentrati	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Effect Of Temperature On Inhibition Efficiency And Data Analysis With Different Adsorption Isotherms	Yi He, Shuai Ren, Xi Wang, David Young, Marc Singer, Maalek Mohamed-Saïd, Sheyla Camperos - In the oil and gas industry, long-distance transmission of produced hydrocarbons is usually carried out in large-diameter steel pipelines. However, water co-produced with the oil and gas, combined with CO2/H2S, can cause severe corrosion of internal pipeline surfaces. A widely applied, economically effective, method of corrosion control is to inject corrosion inhibitors (CIs). Adsorption of their organic molecules on surfaces through heteroatom functionalities, containing nitrogen, oxygen, sulfur and/or phosphorus, can markedly change the corrosion resistance characteristics of the exposed metal; typically mild steel for pipelines. Among these organic compounds, heterocyclic molecules containing nitrogen atoms have been demonstrated to be excellent corrosion inhibitors (CIs) for many alloys in various aggressive media. In this research, surface saturation concentrations as well as inhibition	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Changing The Landscape Of Thermal Insulation Coatings	Selwyn Williams - For many years the use of 1st generation thermal insulation coatings TIC’s have been used for personal protection against burns, solar radiant heat gain protection and limited energy or process preservation as an alternative to conventional insulation such as mineral wool or calcium silicate. However, the downside of these conventional systems is that they leave an air gap to the primed surface and when damage to the jacketing occurs then corrosion under insulation (CUI) can become a real issue for the plant as it can often go unseen for years. Thermal insulation coatings attempt to alleviate this issue as they are applied direct to the primed surface forming a monolithic barrier and can be inspected visually without removal of the insulation system. Hence CUI is no longer an issue. There are many examples of these 1st generation systems on the market but all have similar issues related to application and thermal performance. In most cases multiple applications, i.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 11:25am - 11:50am	Design Of Sour Service Material: Combining Metallurgical Design, Laboratory And Full Scale Testing T	Michel PIETTE, Florian Thebault, John FORTAILLIER, Livia Cupertino Malheiros - The needs of oil and gas operators are challenging us to push the limits in materials sour service always further by finding the best compromise between high strength steels and good resistance to sulphide stress cracking (SSC). It is in this context that materials have been recently developed, so as to respond to increasingly severe service with high level of Specified Minimum Yield Stress (SMYS). This communication presents the combination of computational modeling methods, advanced metallurgical characterization techniques, scale-up methods (from laboratory to mass production) for designing sour service steel grades with improved SSC resistance. Basics, pros and cons of several tools are discussed; namely X-Ray Diffraction from synchrotron beam, Transmission Electronic Microscopy, Electron Back Scatter Diffraction, Thermo-Calc. Their efficiency to optimize design has been validated on a selection of l	Henry B. Gonzalez Convention Center		Symposia
Monday 3/7/2022 11:30am - 1:30pm	CORROSION Journal Editorial Board		Henry B. Gonzalez Convention Center	Room 225 A	Administrative

Monday 3/7/2022 11:35am - 12pm	Corrosion Perforation Failure Analysis Of Inside Coating Sewage Pipeline	Zhiwen Yang, zheng ZHAN, xiaotong Liu, Wenguang Zeng, Jiangjiang Zhang, Yunying Xing, fang Li, Yingfeng Chen, Lei Zhang - The corrosion morphology, material properties and corrosion products of corroded perforated L290M sewage pipelines were analyzed, and the reasons for corroded perforated gas pipeline were discussed in combination with the analysis of service environment and operation of pipeline. The results show that corrosion pits of L290M sewage pipelines are round, and there are corrosion pits at the side of the pipeline segment. At the same time, the material performance of the failed pipeline conforms to the requirements of GB/T 9711-2011 standard for L290M steel. There are two reasons for pipeline failure. On the one hand, coating damage leads to contact between pipeline matrix and corrosive medium, which leads to pitting corrosion under the joint action of bacteria and harmful ions in sewage. On the other hand, the undamaged parts and damaged parts form a "large cathode, s	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1pm - 1:25pm	Impact Of Chromate On The Cathodic Behavior Of The Micro- And Macro-Cathodes Pertinent To AA7050-316	Utibe Eno Charles Granville, John Scully, Robert Kelly - The rotating disk electrode (RDE) technique is used for a comparative study of the inhibitive effect of Na2CrO4 on the cathodic kinetics on AA7050, Cu and 316SS, as a function of chloride concentration. In separate experiments, Al3+ is added to simulate an actively corroding AA7050 surface, in a low pH environment, such as within a pit or a crevice. The RDE is used to simulate thin electrolyte films with varying diffusion boundary layer thicknesses as rotation rate is increased. In inhibitor-free solutions, Pt is used to determine boundary layer thickness as a function of rotation rate, eliminating the effects of a surface oxide film. Surface characterization techniques include scanning electron microscopy and optical imaging. The results will reveal the likely dominant cathode(s) during damage initiation and propagation stages, and whether or not chromate suppresses damage propagation on AA7050 when coupled to 316SS.	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 1pm - 1:25pm	One-Coat Anticorrosive Non-Skid Coating System	Ted Hammer - This presentation reports on the development of a one-coat anticorrosive non-skid epoxy coating capable of providing good mechanical properties, excellent slip resistance, and cathodic protection if the coating is damaged. These properties were achieved with a unique balance of inert fillers, coarse aggregates, zinc particles, and carbon nanotubes (CNTs). The CNTs are responsible for enhancing the electrical conductivity of the coating system, which allows the percolation threshold to be reached at lower zinc loading levels. This lower zinc demand was essential for maintaining good mechanical performance without sacrificing the corrosion resistance of the system. Furthermore, the CNTs provide the added benefit of enhanced mechanical properties, e.g. substrate adhesion. Accelerated corrosion testing showed that the one coat system had excellent corrosion resistance after 1,440 h of neutral salt spray testing. The coating also demonstrated excellent substrate adhesion (~3,	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 1pm - 1:25pm	Enhanced Corrosion Resistance And Biocompatibility Of Pure Magnesium Modified By Calcium Phosphate /	Lizeth Gutierrez, Lily Arrieta Payares, Juan Rincón Montenegro, Ana Fonseca, Virginia Paredes Méndez - The purpose of this work is to biofunctionalize magnesium with calcium phosphate (CaP) and biomass from Chlorella sp. independently (monolayer) and jointly (multilayer). Electrochemical tests (corrosion potential, EIS, TAFEL) and surface characterization (SEM, XRD, optical microscope) will be implemented. The experimental design consists of evaluating three times of immersion in microalgae (1, 3 and 5 hours) and electrodeposition of CaP (20, 60 and 120 minutes). For each monolayer, the time that provides the best corrosion resistance will be selected. Subsequently, the CaP / Microalgae multilayer will be designed. The results obtained show that biofunctionalization with microalgae for 3h and electrodeposition of CaP for 120min considerably improve the corrosion resistance of magnesium. The multilayer design is expected to allow for better performance and surface stability of magne	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 1pm - 1:25pm	Use Of Vapor Phase Corrosion Inhibitor For Tank Bottom Protection	Muhammad Arsalan Khan Sherwani - The use of Vapor Phase Corrosion Inhibitor (VPCI) for the protection of above-grade storage tank bottom plates from soil side corrosion is one of the emerging technologies, especially for the tanks with oily sand pads and/or partially intact with underneath soil/sand. Recently East West Pipeline Department of Saudi Aramco has utilized this technology on one of its tanks, which was captured during the shutdown inspection with high metal losses due to external corrosion. The tank undergoes for major repairs of bottom plates which causes enormous unplanned activities in term of time and cost. This paper mainly focuses on the methodology of VPCI installation, corrosion monitoring system, cost of implementation and the expected results of protection.	Henry B. Gonzalez Convention Center	Symposia
Monday 3/7/2022 1pm - 1:25pm	Very High Strength Low Alloy Steels For HPHT Applications	Julien PENNEQUIN, Florian Thebault, John FORTAILLIER, Carine LANDIER - High Pressure and High Temperature (HPHT) applications request OCTG with increasing yield strengths, at least up to 140ksi. Due to high total pressures, even traces of H2S lead to significant partial pressures of H2S in wells. Consequently, the risk of SSC needs to be tackled. Typical sour conditions in such wells are pH 3.9-4.5 and 0.0035-0.03 bar of H2S. A single steel grade has been designed so as to be suitable for a wide range of tubular products, from casing to thick accessories (up to 2.2 inch). The present paper describes the qualification approach applied for field projects using NACE TM0177 method A and D.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1pm - 1:25pm	An Innovative Thermoplastic Coating For CUI Applications	Hindrik Harm Broesder, Dinko Cudic, Somaieh Salehpour - Corrosion Under Insulation (CUI) typically occurs on thermally insulated pipes. A systematic approach is needed to minimise the risk of CUI, and part of this approach is to choose coatings that protect the pipe from corrosion and can resist the often aggressive environment with insulated pipes. Presented is an innovative thermoplastic type of coating material for CUI purposes that can be used for both newly constructed pipes and coating repair. Presented are the technical assessments that were carried out to evaluate performance under CUI conditions, including tests as specified in various industry standards like ISO 21809-3 (e.g. accelerated ageing tests), ISO 12944-9 (corrosion at scribe), and additional customised tests like resistance to thermal shock and freeze/thaw cycling. Case histories of the use of this innovative thermoplastic coating are also presented.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1pm - 1:25pm	Formulation Of Novel Combination Production Chemicals For Deepwater Oil And Gas Fields	Alyn Jenkins, Alex McRae, Andre Saraceno Meliande, Brett Cardwell - Deepwater oil and gas fields are generally classified as developments located in water depths greater than 500m. Applying production chemicals in deepwater fields poses several challenges as the operating temperature of deepwater oilfields is often higher compared with shallow or onshore developments. Furthermore, the extended reach of deepwater chemical umbilicals results in longer residence times for chemicals within them, which results in lengthy exposure to the high-pressure (HP), low temperature environment. Long term stability of chemicals under these conditions is an essential requirement to maintaining the integrity of the injection system and product efficacy. The HP in the umbilical may increase viscosity of a product to such a degree that it cannot be injected. In extreme circumstances, production chemicals can become totally unstable in the umbilical causing a blockage resulting in costly remediation work	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1pm - 1:25pm	Galvanic Interactions Between Surface Layers And Bare Carbon Steel In Aqueous CO2 Environments	Joshua Owen, Gaurav Joshi, Jean Kittel, Francois Ropital, Richard Barker - In this study, the role of FeCO3, Fe3O4 and Fe3C layers on galvanic corrosion when coupled to bare X65 carbon steel was investigated using electrochemical and surface analysis techniques. Initially, thick individual layers (< 10 µm thick) were formed on X65 carbon steel surfaces. Fe3C layers were revealed (pH 3.8, 1 wt.% NaCl, 50 °C) and FeCO3 layers grown (pH 6.8, 3.5 wt.% NaCl, 80 °C) in CO2-saturated solutions, whilst pure Fe3O4 layers were formed by electrodeposition in a sodium hydroxide solution containing iron (III) sulphate. Once layers were established, the filmed-coupons were galvanically coupled to a bare X65 carbon steel coupon at different area ratios (AR = 1 and 10) in a pH 5, 1 wt.% NaCl, CO2-saturated solution at 50 °C, conditions chosen to minimise chemical dissolution of the layers and prevent further layer growth. Galvanic currents were measured using zero resistance ammetry over 24 h, with	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1pm - 1:25pm	Predictive Coating Condition Model For Coating Lifetime Under Environmental Stressors	Victoria Avance, Brandi Clark, Liam Agnew, Fritz Friedersdorf - In this work, laboratory test methodologies that employ combined environmental stressors time of wetness and salt loading were used to excite corrosion failure modes of coating systems. Real-time measurements via interdigitated electrodes are correlated with reference panels to monitor the evolution of coating damage. These data can give insights to the coating degradation process and can be used as parameters for developing a PCCM. A description of the sensors, electrochemical measurements, and methods for coating testing are reported along with the results of atmospheric tests using a range of conditions to produce coating degradation.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1pm - 1:25pm	Flow Assurance Testing With Re-Livened Oil – A Cost-Effective Analogue For Live Oil	Andrew Farrell, Dario Frigo, Gordon Graham - We have investigated the use of re-livened oil as an analogue for live oil in flow assurance testing for asphaltenes and waxes. Re-livened oil is composed of dead oil and one or more volatile ends so as to reproduce much of the behaviour of live oil. Where behaviour differs, it does so in a predictable manner that can be readily modelled using an equation of state simulator. Data are presented to compare the behaviour of live oil, dead oil and re-livened oil prepared by adding only gas, only liquid or a mixture of both. We discuss the benefits and drawbacks of each approach as applied to asphaltenes and wax testing with illustrative examples of the behaviour of each fluid using test data from pressurised flow rigs. The test data are also compared with behaviour predicted using the EoS simulator to illustrate that a calibrated model can be used to predict properties and behaviour under a wide range of conditions.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1pm - 1:25pm	Decision Making Under Uncertain Erosion Conditions Using The Probabilistic Model	Guanlan Liu, Jose Vera, Francois Ayello, Rick Eckert - Erosion threatens the integrity of pipeline system through wall thinning. This effect can be worsened when corrosion and erosion interact. Therefore, it is necessary to estimate the ranges of possible erosion under a set of operating conditions rate for the safe operation of pipeline. However, data uncertainty (including missing data) challenges the erosion rate estimation. This study shows how to use and erosion probabilistic model to (1) gather the most useful data (the most useful data depends on threat mechanism and already collected information about pipeline conditions), (2) help pipeline operators use probabilistic results to inspect for threats in the most useful locations (number of inspection sites is also considered), (3) help pipeline operators optimize inspection time intervals and (4) help pipeline operators tailor erosion mitigation strategies to specific pipeline and operating conditions.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1pm - 1:25pm	Mitigation Of Scaling Potential Using Organophosphorus Phosphonates In High-Temperature And High-Har	Jian Hou, Tao Chen, Ming Han, Mohammed Bataweel - In this study, the performance of four different phosphonate-based scale inhibitors was evaluated at high temperatures in high total dissolved solids (TDS) brines. A series of tests was applied, including the brine compatibility test, the inhibition efficiency against three typical carbonate and sulfate scales (CaCO3, CaSO4 and SrSO4), thermal stability, and rock interaction test. Scale inhibitor SI-T2 demonstrated the highest inhibition efficiency against the three types of scales at 105°C in the high TDS test brines. It was fully compatible with the high TDS test brines and had a strong adsorption capability on the limestone. Interestingly, the aged SI-T2 kept the same level of inhibition performance for CaCO3 as the non-aged inhibitor, but lost inhibition performance against CaSO4 after thermally aged at 135°C. SI-T3 also presented good inhibition performance, brine compatibility and thermal stability. SI-T1 and SI-T4 did not show	Henry B. Gonzalez Convention Center		Symposia
Monday 3/7/2022 1pm - 2:30pm	Area Workshop		Henry B. Gonzalez Convention Center	Room 224	Other
Monday 3/7/2022 1pm - 3:30pm	Coating Failure Investigations Workshop– Why did this happen?	Presented by Lake Barrett, Valerie Sherbondy, and Jay Helsel KTA-Tator, Inc. One of the most interesting things about coatings is the way that they fail. Coating materials are designed to work in many environments and stay in place for many years. If the coatings do not perform as expected, then there are often lengthy discussions and hypotheses about the reasons for coating failure. While presenting a hypothesis is a starting point, that does not provide the fix. Remediation of the failure involves figuring out why the initial coating did not	Henry B. Gonzalez Convention Center	Room 208	Workshop

		perform, then a designing plan to fix it or designing a specification that provides a path to successful performance. Unfortunately, the fix will cost money – usually money that was not in the budget, so someone will have to PAY. The two driving factors for a failure investigation are to determine the correct fix for the issue and to determine which party will pay for the fix. Although there are often points of contention, the failure investigation should be based on real information and facts that lead to an understandable and defensible conclusion. The process is multi-faceted and can resemble more of a maze than a path of discovery. This presentation will follow three failure investigations (Pipeline, Tank Lining & ?) through the maze of background information, a site visit to collect information and samples, and a forensic investigation in the laboratory. All these pieces of information are used to guide the investigator through the maze to the final conclusion. The participants will be able to choose their path of investigation by picking from the data selections. Using the information collected, the participants will determine what went wrong, who is at fault, and how to remedy the situation so that failure does not reoccur.			
Monday 3/7/2022 1pm - 3:30pm	Corrosion Issues in the Pulp, Paper, and Biomass Conversion Industries	Chair: Catherine Noble Vice Chair: Matthew Tunnicliffe This symposium features technical papers related to the pulp, papermaking, and biomass conversion processes. Topics can include new materials, case studies, or trends in corrosion issues in the industry.	Henry B. Gonzalez Convention Center	Room 302 A	Symposia
Monday 3/7/2022 1pm - 3:30pm	Education Program Committee		Henry B. Gonzalez Convention Center	Room 214 D	Administrative

Monday 3/7/2022 1:10pm - 1:35pm	Corrosion Of Nickle Based Alloy In Batch-Mode Biomass Supercritical Water Gasification(SCWG) System	Haoyang Li, Yimin Zeng, Minkang Liu, Xue Han, Kaiyang Li - Supercritical water gasification (SCWG) is a promising technique that uses supercritical water to transform raw biomass materials, crude bio-oils, and bio-wastes into syngas (a combination of CO and H2). Despite extensive research efforts, the optimal operating parameters of SCWG processes have yet to be determined due to the complexity of feedstocks and reactor configurations. Moreover, it is still unclear which alloys are more suitable, in terms of both corrosion resistance and cost, as the reactor construction materials for safe operation under the conditions of lignocellulosic biomass SCWG. Inorganic elements (such as Na, K, and Ca) in raw biomass are found to catalyze the SCWG conversion of biomass. In this work, the corrosion performance of a Ni-based alloy, UNS N06625, which has exhibited acceptable long-term corrosion resistance in supercritical water system was evaluated in a batch reactor containing typical biomass	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:25pm - 1:50pm	Implications Of NSF Std. 61 Changes And An Asset Management Based Data Driven Protocol For Potable W	Randy Moore, Cameron Walker - The National Sanitation Foundation (NSF) has recently announced and published a new NSF/ANSI/CAN Std. 61 “Drinking Water System Components –Health Effects Standard” which resulted in the creation of a new reference standard, NSF/ANSI/CAN Std. 600 “Health Effects Evaluation and Criteria for Chemicals in Drinking Water” resulting in changes in potable water asset owners’ options for protective coating systems. Many owners might not realize a protective coatings system protecting one of their most valuable assets, is itself an asset.The cost of coating materials is a very small portion of an expensive lining project, and therefore asset management principles should be applied to the selection of a protective coating system. This presentation will review the changes in the NSF Std 61 and the implications for the coating options used in the protection of steel assets in potable water service. The presentation will explain how the application of asset managem	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:25pm - 1:50pm	Laser Shock Peening Effect On Sensitization And Exfoliation Of AA5xxx	Katrina Catledge, Saba Navabzadeh Esmaeely, Allison Akman, Gabriella Marino, Jenifer Locke - This study aims to investigate the effect, if any, of laser shock peening (LSP) on exfoliation (per ASTM G66) and intergranular corrosion (per ASTM G67) in sensitized Al-Mg alloys for thin and thick product that may produce differences in degree of recrystallization and grain elongation. In terms of exfoliation, current findings show that thin (3/8”) 5083-H116 without LSP is not susceptible to exfoliation at any level of sensitization, while thick (3”) 5083-H116 exhibits increasing susceptibility (ED per G66) with increasing sensitization time. For thick (2.5”) 5083-H128 with no LSP, all sensitization levels appear to have equal susceptibility to exfoliation (EA). The effect of LSP on the exfoliation susceptibility of thick 5083-H116 and 5083-H128 is currently being examined. In order to ensure laboratory sensitization at 100°C is not relaxing the compressive stresses imparted from LSP, XRD s	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 1:25pm - 1:50pm	Use Of The Microalgae Chlorella Sp. To Biofunctionalize Magnesium Surfaces In Order To Decrease The	Lily Arrieta Payares, Lizeth Gutierrez, Juan Rincón Montenegro, Margareth Dugarte, Virginia Paredes Méndez - There has been growing interest in implementing biodegradable materials such as magnesium for temporary orthopedic implants in order to decrease the need for a second surgery. However, the rapid rate of magnesium degradation in biological media requires seeking strategies to improve its corrosion resistance and biocompatibility. The biofunctionalization of surfaces with biomolecules has been a methodology used to improve cell adhesion, which is why in this work Mg is being biofunctionalized with the biomass of Chlorella sp, to promote osseointegration and improve resistance to Mg corrosion. This experimentation has been divided into three stages: activation, silanization, and immobilization of the microalgae; these have been characterized by electrochemical tests (EIS-TAFEL), atomic absorption, SEM, XRD, and cell adhesion. As a result, the biofunctionalized material is expect	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 1:25pm - 1:50pm	Poly(Phenylene Methylene) & Its Derivatives: The New Generation Of Smart, Self-Healing And Corro	Marco D'Elia - Poly(phenylene methylene) (PPM) is a multifunctional polymer featuring a range of interesting properties such as hydrophobicity, high thermal stability, fluorescence and thermoplastic processability. Accordingly, smart corrosion resistant coatings made by PPM-based blends and copolymers were prepared and applied by hot pressing on the light aluminum alloy AA2024. The resistance toward corrosion in presence of chloride anions of those coatings was assessed by potentiodynamic and potentiostatic methods. The corrosion protection durability and the self-healing ability of the coatings were further evaluated over time and under stress conditions by electrochemical impedance spectroscopy (EIS) and accelerated cyclic electrochemical technique (ACET), respectively. Remarkably, the self-healing behavior and its mechanism were further investigated synergistically combining electrochemical techniques (potentiostatic methods, EIS, ACET), rheology experiments and fluorescence inve	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 1:25pm - 1:50pm	Decontamination Chemical Compatibility With Protective Coatings	Xiaoxia Zhu, Benjamin Chang - Offshore maintenance atmospheric coatings and tank linings are conventionally applied on rusted steel after dry grit blasting. It is well known that the salt contamination on rusted steels cannot be completely removed by dry grit blasting alone. Residual salt contaminations are hidden in the corrosion pits and hard to be removed mechanically. The residual salt content on the abrasive blasting steel surface can be in the range of 5-65 µg/cm2, depending on the rust severity. Even a slight salt contamination above 2 µg/cm2 can be detrimental to coating performance, causing blistering, adhesion degradation, and underfilm corrosion which will result in a shorter service life, particularly in immersion service such as pipeline coatings or tank linings. Recently newly developed wet abrasive blasting (WAB) is used as the surface preparation method in conjunction with the decontamination chemicals. There are five decontamination chemicals available in the market	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:25pm - 1:50pm	Local Hard Zones On TMCP Large Diameter Line Pipes: What Do We Know?	Herve Marchebois, Thierry Cassagne, Bruce Cowe - The manufacturing and field experience of steel plates produced by Thermo-mechanically Controlled Processing (TMCP) are well defined in industry standards and literature. Compared to the Quenched & Tempered heat treatment process, TMCP plates are designed with a leaner chemical composition combining micro-alloying elements, precipitation, recrystallization and phase transformation during rolling and accelerated cooling. Technical challenges and process improvements moved older generation TMCP pipes from coarse microstructures and presence of non-metallic inclusions and/or mid-thickness segregation, to finer, homogenized microstructures and improved properties typically present in modern TMCP pipes. Despite such an improvement, local hard zones (LHZ) have recently been experienced in the Oil & Gas industry on large diameter line pipes manufactured from TMCP plates. These LHZ must be distinguished from regular hard spot formation mecha	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:25pm - 1:50pm	Bayesian Modeling Coating Performance	James Ellor, Anthony Florimbio, Lisa Barker, Daniel Pope, C Thomas Savell - The research describes the effort to develop a predictive model for coating degradation and substrate corrosion on Army assets. The model incorporates the learning from field surveys of over 100,000 assets and components; coating performance in standardized testing; and observations of coating condition as-applied to fielded items. The model outputs would provide a basis to (1) support a Commodity Manager to determine repaint intervals, optimizing expenditures and (2) develop new products / processes (impacting coating performance) increasing life of an asset protective coating system.	Henry B. Gonzalez Convention Center	Symposia
Monday 3/7/2022 1:25pm - 1:50pm	Brake Pads: Effect Of Galvanic Current On The Corrodibility Of Friction Materials And Backplates	Federico Bertasi, Marco Bandiera, Arianna Pavesi, Bozhena Tsyupa, Andrea Bonfanti, Alessandro Mancini - The work reports for the first time galvanic current measurements for the friction material – backplate couple. In particular, five configurations including different friction materials and steel-based backplates are considered. Measurements are performed using Linear Sweep Voltammetry (LSV) and Zero Resistance Ammeter (ZRA) –based techniques and allow to: 1) investigate the interplay between galvanic currents and growth of corrosion products at the interface between each investigated friction material and the corresponding backplate; 2) correlate the corrosion potential of stand-alone friction material with that of the whole brake pad; and 3) identify friction materials which could show a sacrificial anode behavior with respect to the backplate. It is demonstrated that selected elements in the composition of the friction material (e.g. Zn or Cu) are strongly modulating the galvan	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:25pm - 1:50pm	Laboratory Evaluation Of Corrosion Inhibitor And The Performance Requirements In Gas Gathering And T	CHEN WEN, Yuan Tian, Yu Li, Chang Gang - The performance requirements, corresponding indexes and laboratory evaluation methods of corrosion inhibitors have a direct impact on the selection of corrosion inhibitors. The performance requirements of corrosion inhibitor for natural gas gathering and transportation pipelines can be summarized into two aspects: usability and environmental performance. Usability includes corrosion inhibition, compatibility, stability, pouring point, emulsifying tendency, etc. Flash point, pH value, and toxicity are part of environmental performance indexes. Based on the literature research and summary 5 different types of gas fields corrosion environment in the world, the performance requirements and corresponding indexes of corrosion inhibitors for wet gas gathering and transportation pipeline are analyzed, and the corresponding performance indicators of corrosion inhibitors for different types of gas fields are proposed. Finally, the commonly applied labor	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:25pm - 1:50pm	Polymeric Silica Scale Inhibitors: Computational Predictions And Experimental Studies On Inhibitor E	Kostas Demadis, Efstratios Korhatzis, Konstantinos Xanthopoulos - In the present work we present experimental and computational results on the efficacy of two simple polymers, polyethylene glycol (PEG) and polyvinyl alcohol (PVA) on silica scale inhibition. The aim of this study is to compare the experimental and computational approaches, in order to explain why PEG is an effective silica inhibitor, while PVA is not. Based on the computational studies, PVA prefers to form interactions between the polymeric chains and not between the polymeric chains and the silicic acid molecules. In contrast, PEG does induce stabilizing interactions between the polymeric chains and the silicic acid molecules. These computational predictions are confirmed by experimental scale inhibition studies, which prove indeed that PEG is an efficient silica scale inhibitor, whereas PVA is not.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:25pm - 1:50pm	Detection And Location Of Coating Defects And Disbondments On Buried Pipelines With Differential Ref	Tristan De Servins, Homero Castaneda-Lopez - An apparatus and a method have been designed to wield reflectometry of electromagnetic waves in buried, parallel pipelines systems. A case of study has been conducted with a utility company on their network of 10-inch, double line of HPFF feeders to validate the effectiveness of this technology in the field, named: Differential Reflectometry Mapping (DRM). Surveys have been performed using manholes as access points, which is where the signal has been injected and measurements have been performed. Different types of pipeline coatings were assessed. The collected data has been analyzed, and corrosion-inducing coating defects have been detected and characterized by using proprietary signal reflection modeling. The coating anomalies and defects have been successfully identified and repaired at the predicted location.	Henry B. Gonzalez Convention Center	Symposia
Monday 3/7/2022 1:25pm - 1:50pm	Interpreting H2S Scavenger Laboratory Test Results Using A Kinetic Model	Jose Vera - A kinetic model was developed and implemented to assist in the interpretation of H2S scavenger test results obtained from the CSTR with continuous gas flow procedure. Using this kinetic model, parameters related to the H2S scavenger reaction kinetics can be extracted and used for qualifying chemicals for a specific application. This kinetic model also simulates the effect of different test parameters on the experimental results and can be used to extrapolate laboratory results to field conditions.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:30pm - 2:30pm	The Enbridge Case: The Value Add of an Asset Owner's Corrosion Management Audit Process Forum	Presented by Elaine Bowman, AMPP This forum will share the benefits and value Enbridge realized after conducting a critical, inward-looking audit of their asset integrity program utilizing the IMPACT PLUS audit process. Through the audit process, Enbridge measured the maturity of their asset integrity activities and also benchmarked their results against other organizations in the corrosion industry. Even though there are very structured processes and procedures to manage asset integrity throughout the life cycle of an asset within Enbridge, the IMPACT PLUS audit helped pinpoint areas for improvement to further improve performance.	Henry B. Gonzalez Convention Center	Room 206 AB	Forum
Monday 3/7/2022 1:30pm - 3:30pm	EMERG Student Outreach Committee		Henry B. Gonzalez Convention Center	Room 225 C	Administrative

Monday 3/7/2022 1:35pm - 2pm	Corrosion Performance Of Reactor Candidate Alloys During Hydrothermal Liquefaction (HTL) Of Cellulos	Haoyu Wang, Kaiyang Li, Minkang Liu, Xue Han, Yimin Zeng, Haoyang Li - Hydrothermal liquefaction (HTL) is a promising thermochemical approach converting wet and waste biomass feedstocks into biocrude oils and other valuable chemicals. A technical barrier that must be addressed for the scale-up of HTL technology is the corrosion of process core equipment, especially the reactors. A range of conversion intermediate and final products of biomass HTL (such as aggressive sulfur and/or chlorinated compounds, organic acids), and the reaction medium in HTL process (usually hot-compressed water with the presence of alkali catalyst) potentially create a harsh environment to reactor materials. In this study, the corrosion of candidate alloys was investigated in a batch reactor containing hot-compressed water and cellulose (a typical model compound of lignocellulosic biomass). The corrosion performance was evaluated using weight change measurement methods, and the corrosion products were charact	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:50pm - 2:15pm	Solids Formation In MEA Triazine Contact Towers, Prevention And Advice	Willem-Louis Marais - Triazines (Hexahydrotriazines) are one of the most commonly used H2S scavenger chemistries in the North American oil and gas industry, specifically MEA Triazines. The chemistry and application methods are well known due to over 2 decades of use, it has gained a commodity status and is thus a highly cost effective H2S treatment solution. Currently it offers one of the lowest cost per mass of H2S removed available in the market. There are however risks when using Triazines, one being the formation of polymeric solids. This is mainly due to “overspending” the Triazine (over exposure of the Dithiazine to H2S). The term “over spent” was commonly referred to the creation of Trithiazines, recent studies have shed more light on this and provided a more realistic reaction pathway to the creation of polymeric solids instead of Trithiazines. This paper will focus on the use of MEA Triazines in static and dynamic systems, specifically co-current and counter-current flooded	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:50pm - 2:15pm	Promising Biobased Organic Corrosion Inhibitor Libraries Derived From Pyrones	George Kraus, Brent Shanks, Jiajie Huo, Kyle Podolak - Organic corrosion inhibitors based on triacetic acid lactone and 4-hydroxycoumarin have been synthesized with good yield and tested for corrosion inhibition on mild steel in both sulfuric acid and hydrochloric acid in this research. Sixteen novel corrosion inhibitors derived from triacetic acid lactone and 4-hydroxycoumarin have been successfully synthesized and twelve of them showed high corrosion inhibition efficiency (no less than 78%) confirmed by electrochemical impedance spectroscopy and polarization. While triacetic acid lactone based compounds showed good corrosion inhibition performance, 4-hydroxycoumarin based compounds showed further improvement of the corrosion inhibition performance. Scanning electron microscopy (SEM) and X-ray photoelectron spectroscopy (XPS) analysis of the mild steel coupon after corrosion with the presence of selected corrosion inhibitors revealed that the corrosion inhibitors strongly adsorbed o	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 1:50pm - 2:15pm	Localized Growth Mechanism As A Function Of Cyclic RH And Variable pH	Vangelina Osteguin, Brendy Rincon Troconis, James Dante - The effect of cyclic environmental exposure parameters on localized corrosion of aluminum alloy (AA) in a simulated structure was studied. Flat AA7075-T6 specimens containing a single stainless-steel screw were exposed to different relative humidity (RH) cycles. Variables studied include RH, RH duty cycle, solution pH, and exposure time. Cross-sectional corrosion morphology was characterized using an image analysis tool developed by the authors. To supplement quantification of damage morphology, electrochemical polarization tests were employed to analyze the corrosion kinetics of AA7075 and SS316 when exposed to variable pH levels of simulated seawater and simulated crack tip chemistry. A proposed localized corrosion mechanism applicable during cyclic RH under galvanic coupling is explained through polarization work and corrosion damage observed from atmospheric testing.	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 1:50pm - 2:15pm	Impact Of Material Properties Of Thick-Wall X65 TMCP Plate Steel For Sour Service	Thomas Haase, Christoph Bosch, Matthias Frommert, Markus Schürmann, Alexander Voelling, Sven Casper - Low-alloy steel of API 5L grade X65 is commonly used as line pipe material for sour-service applications. Within recent years more challenging requirements have been introduced, including more severe corrosion test conditions, increased mechanical properties, and extended limitations regarding hardness, to enable application to increasingly severe sour service conditions. Within this study a systematic investigation of material properties related to corrosion resistance was performed for low sulfur X65 TMCP-based steel plates with a thickness in the range of 28 mm to 35 mm. Plate-to-pipe forming simulation to different wall thickness to diameter ratios (t/D) was undertaken and HIC testing according to NACE TM0284 was performed to investigate the HIC resistance after cold forming of heavy plates to SAWL pipes. Wall thickness to diameter ratios of 5 % and above were found to be accompl	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:50pm - 2:15pm	Long Term Performance Of Glassflake Reinforced Polyesters - A Case Study After 35 Years Under Offsho	Anders W. B. Skilbred, Andreas Loken - The offshore Oil&Gas industry started in the early 1970's on the Norwegian Continental Shelf. Some of the first jacket installations were first applied with traditional three layer protective coating systems. However, good esperience with glasflake reinforced polyester coatings in the early 1980's convinced operators to apply these high build coating systems for all new structures, as well as refurbishing several existing structures during offshore maintenance campaigns. Glassflake reinforced polyester coatings have now been used for more than 35 years under offshore conditions on the Norwegian Continental Shelf. High film thickness and highly abrasion resistant coatings have proven to be highly durable in the tidal/splash zone of offshore constructions. Some of the first Oil&Gas offshore structures are now being decommisioned. This enables investigations on the long term performance of coatings exposed to harsh conditions with limited access.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:50pm - 2:15pm	Localized Corrosion Studied Via Interferometry Using Modified Surfaces	Tracey Jackson, Haitao Fang, JAGRUT JANI, Johnathon Brooks, Lei Huang - Localized corrosion in the oil industry is a dominant area of study that still remains elusive to researchers. Most infrastructure failures in the oil industry result from localized corrosion defects not general corrosion. Most corrosion testing relies on polished surfaces and relatively short tests resulting in detection of small features that may not be representative of field conditions. This paper looks at media blasted surfaces that are imaged at high resolution before and after corrosion testing. This methods of corrosion testing shows that these modified surfaces contain populations of features that can be studied in aggregate to evaluate the effectiveness of corrosion inhibitors. This technique maximizes the utility of interferometry as a microscopy technique while also providing a surface that may be more representative of field conditions than a 600 grit polished surface.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:50pm - 2:15pm	Spatial Variation Analysis Of Localized Corrosion Of Steel Bar With Spectral Analysis Technique	Fujian Tang, Lizhi Zhao, Zhibin Lin, Hong Pan, Els Verstrynge, Charlotte Van Steen, Hong-Nan Li - This study aims to statistically analyze the distribution characteristics of localized corrosion along the length of corroded steel bars with spectral analysis technique. Steel bars embedded in concrete were subjected to accelerated corrosion tests and the corroded surfaces were scanned with a 3D laser scanner. Empirical mode decomposition (EMD) was performed by considering the area distribution of steel bar as a nonlinear and non-stationary time series and the length as time. The intrinsic mode functions (IMFs) extracted from the EMD reveal the characteristics of pitting corrosion of various sizes, and the magnitude is related to the cross-sectional area of corrosion pits. Fast Fourier transform (FFT) was performed on each IMF. Results show that the EMD-FFT successfully extracts the spatial distribution characteristics of corroded steel bars including surface irregularity, deformation,	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 1:50pm - 2:15pm	Advances In Digital Twin And AI To Predict And Manage External Corrosion - A Smart Tool For Decision	Otavio Correa, Jorge Selene - This paper focuses on reviewing and offering a solution to manage the complex atmospheric corrosion process and its protection within industrial plants such as Oil & Gas, Petrochemicals, Pulp and Paper, and Mining. A review of the main protective coating failure mechanisms, as well as corrosion evaluation methods are presented. Our objective is to gather the main parameters for a maintenance/inspection management tool, by developing a field data collection processing that feeds a digital model to predict coating failure and to enhance time, costs, and performance of asset integrity management activities. The development of a software is discussed, bringing a view on how to merge the Industry 4.0 technologies such as Digital Twins, Artificial Intelligence, Cloud services and Mobile concepts to deploy predictive models. Advances in the platform showed ways to outline optimized inspection and maintenance plans, using condition data. It was possible to devel	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:50pm - 2:15pm	Erosion Corrosion Phenomena In Oil And Gas Facilities: Evaluation And Monitoring	Mioara Stroe, Raquel Araujo, Laurent Dehays, Igor Pipas, Rheingold KUATE TEKU, Francisco-Mateus Garcia - The C factor, as derived from API RP 14E equation, is used as criteria to limit the flow velocity to avoid such severe phenomena. This criterion is dependent on fluid corrosiveness, efficiency of the inhibition and the presence of solid particles. The Company uses PreCorr software, an in-house developed tool, created to predict and evaluate the risk of erosion-corrosion for different oil and gas production equipment. Typical parameters influencing the corrosiveness of the fluid (water phase composition, CO2 content in the associated gas, pressure, temperature), the production data (GOR, BSW) and the geometry of the equipment are considered when evaluate the likelihood of erosion-corrosion occurrence. Two case studies are presented, both concerning multiphase subsea production pipelines in service on our offshore assets. As per COMPANY strategy this equipment is periodically insp	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 1:50pm - 2:15pm	Review Of The State Of The Art Of Siliceous Scale Management In Industrial Systems	Zahid Amjad, Petros Koutsoukos, PANAGIOTA NATSI - Siliceous or silica-based scale (e, g., amorphous silica, metal silicates, etc.) formation on equipment surfaces continues to pose serious operational problems in several industrial systems such as cooling waters, distillation plants, geothermal energy, petroleum produced waters, membrane-based processes, etc. A failure to manage siliceous scale deposits can lead to loss of system efficiency, equipment failure, enhanced corrosion, unexpected shutdown of operations, and premature equipment replacement. Even if mechanical and/or chemical cleaning are viable options, the overall cleaning process is time consuming and very expensive. The most important single factor determining the severity of silica-based scaling is the supersaturation level of the silica and/or silicate species. Low levels of metal ions are known to not only influence the solubility of silica but may lead to metal silicate precipitation in aqueous solutions. Siliceous	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2pm - 2:25pm	Corrosion Study Of Austenitic Stainless Steels During HDO Upgrading Process By Supercritical Ethanol	Mingyuan Zhang, Xue Han, Kaiyang Li, Yimin Zeng, Minkang Liu - Abstract: Pyrolysis bio-oil is a potential energy to replace conventional petroleum fuels and chemicals. However, the poor qualities of bio-oils such as high water content, high viscosity and acidity limit their applications. Upgrading is an effective way to improve bio-oil quality. However, the degradation of materials during bio-oil upgrading has not been clearly understood yet. The objective of this paper is to investigate the corrosion performance of candidate reactor constructional steels (SS316L and SS304) during the upgrading process. Cyclic corrosion tests were conducted in the batch mode at 325 □ in supercritical ethanol with the commercial NiMoW/Al2O3 catalyst using two hydrogen sources: pressurized hydrogen gas and formic acid. Corrosion rate was measured by weight change method, and corrosion products were characterized using advanced microscopy techniques such as scanning electron microscope (SEM) with energy	Henry B. Gonzalez Convention Center		Symposia
Monday 3/7/2022 2pm - 3:30pm	Technical Program Committee Informational		Henry B. Gonzalez Convention Center	Room 225 D	Administrative

Monday 3/7/2022 2:25pm - 2:50pm	Predicting Atmospheric Galvanic Corrosion Of Aluminum Alloy By Combining Electrochemical Techniques	Raghu Srinivasan, Toomas Kollo, Matt Cullin - Aluminum (Al) alloys are the most commonly used non-ferrous metals (approximately 25 million tons per year) for various technical applications and the second most commonly used metal alloy after steel. Al alloys are also used in combination with other metals or materials to get specific desirable properties for particular applications. But a system of dissimilar materials, however, can lead to potential corrosion problems such as galvanic and/or crevice corrosion. In this work, atmospheric galvanic corrosion of aluminum (Al) alloy was predicted by combining electrochemical techniques and accelerated laboratory corrosion tests. Three different galvanic couples were analyzed where 6061-T6 Al alloy was coupled with a passivating metal (316 stainless steel), noble metal (copper) and a conductive polymer matrix composite reinforced with carbon fiber. The galvanic current flowing between the anode and cathode were measured using zero-resistance	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:25pm - 2:50pm	Robust Non-Phosphorus Cooling Water Treatment Program That Reduces The Biological Control Challenge	Bingzhi Chen - In open cooling water systems, phosphorus-based programs are the most widely used treatment program for corrosion and scale control. Excellent performance of P-based programs has been observed in many institutional and industrial applications. Despite this high performance, phosphorus is one of the limiting nutrients to bacteria and accelerates micro-bio growth. A recently developed and innovative non-phosphorus program has been deployed globally, not only to comply the discharge regulations, but also to provide additional benefits/value to our customers. One feature of the non-P program is to eliminate/reduce phosphorous feed and enhance biological control. This paper describes a case study of a non-P program in a microelectronics plant. The new non-P program showed excellent corrosion, scale, and micro-bio control performance. Superior performance of corrosion and scale control was demonstrated and is fully understood from a mechanistic perspective. For biological co	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:25pm - 2:50pm	Long-Time Exposure Aging Of Oxides On Ni-Cr And Ni-Cr-X (Mo, W) Alloys In Acidic Chloride Solutions	Elena Romanovskaia, Katie Lutton Cwalina, Marshal Amalraj, Laurence Marks, John Scully - Ni-Cr-based alloys are considered some of the most corrosion-resistant available. In the current work, the focus was on Ni-22Cr, Ni-22Cr-6Mo, and Ni-22Cr-6Mo-3W alloys. Most studies of oxide attributes that confer corrosion protection are based on short-term exposures. Potential step passivation studies in 0.1 NaCl pH 4 solutions were investigated over 10 s-10 day. To characterize the formation and exposure aging of oxide films, electrochemical methods were used as well as XPS and three-dimensional APT. The influence of exposure time on oxide film attributes and subsequent protective properties will be reported. Change in passive film corrosion resistance were correlated Cr3+ enrichment promoted by alloying with Mo and W. Passive layers, that resisted dissolution in slightly acidic Cl-containing environments, gradual enriched in the cation fraction Cr3+, while Ni2+ rich oxides where preferential	Henry B. Gonzalez Convention Center		RIP
Monday 3/7/2022 2:30pm - 3pm	IMPACT Canada Study Results and Next Steps	Presented by Monica Hernandez, Infinity Growth and Country Coordinator for IMPACT Canada Study As a bonus to the Enbridge Case Study presentation, Monica Hernandez will present the findings from the recently completed cost of corrosion study (IMPACT Study) that was conducted specifically for the country of Canada. The study revealed a $52 Billion USD annual cost in Canada. Attendees will hear a breakdown of these costs into sectors as well as hear about some barriers that limit effective corrosion mitigation.	Henry B. Gonzalez Convention Center	206 AB	Forum

Monday 3/7/2022 2:35pm - 3pm	Thermal Amorphous Barrier	Richard (Ian) MacMoy, Joshua Jackson -	Henry B. Gonzalez Convention Center	RIP

The paper defines each microlayer role of an Amorphous Anodic Alloy Barrier system.
Microhardness measurements prior and post service will be noted on 4300 material and 1018 carbon steel.Conclusion show that the Zeta layer, Gamma/Base layers and the alpha layer all have different hardness, alloy crystalline structure and different purposes. Top layer is used for dry lubricity, corrosion and middle for hardness/ wear protection. We will show that the substrate is thermally protected in the multistage, multilayer process and that even though the part is subjected to 420ºC for more than an hour it does not affect the substrate tensile, only moving the hardness a few points and staying well below a hardness indifference. These outcomes hope to help tension metals such as bolting, springs and also utilize carbon steels in replacement of stainless, high and low alloy costs. By applying an alloy instead of a coating.

Monday 3/7/2022 2:35pm - 3pm	Electrochemical Corrosion Analysis Of Stainless Steels In LALM Pyrolysis Bio-Oil With Organic Corrod	Jiheon Jun, Dino Sulejmanovic, James Keiser, Michael Brady, Michael Kass - Pyrolysis bio-oils are corrosive to low alloy steels, e.g. 2.25Cr-1Mo, 5Cr-1Mo and 9Cr-1Mo grades. To identify the alloys with sufficient bio-oil compatibility, several commercial stainless steels were examined in bio-oil using electrochemical impedance spectroscopy (EIS) to semi-quantitatively assess their corrosion resistance. Low-Ash Low-Moisture (LALM) bio-oil, produced from a forest residue feedstock by National Renewable Energy Laboratory in Golden, CO, was used as a test liquid for EIS measurements. Addition of three organic corrodents, formic acid, catechol and lactobionic acid, into LALM bio-oil was also performed to produce test liquids with intentionally increased corrosivity. Corrosion reaction resistance, determined from the impedance data, was used to evaluate the corrosion compatibility of each stainless steel in LALM bio-oil and LALM bio-oil + organic corrodent(s). The results from corrosion re	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:35pm - 3pm	Extending the Life of an Ageing Forty Two Years Old Offshore Wet Crude Pipeline	Faisal Al-Abbas - This paper presents the approach used for performing the life extension of an aging forty two years old offshore pipeline thereby providing necessary assurance for safe continued operation. Offshore pipeline systems are susceptible to a number of damage mechanisms including but not limited to internal corrosion, external corrosion, concrete weight coat damage, excessive free spans, loss of supports and mechanical (third party) damage. The life extension approach identified the relevant damage mechanisms, internal corrosion modeling and evaluated the current integrity status of the offshore pipeline. This involved reviewing the available pipeline data including inspection & monitoring records, history of leaks & repairs as well as previous engineering assessments. The key findings from the integrity assessment included discrepancies in wall thickness depth measurement between the ILI results and the actual field measurements, presence of large number of external corr	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:35pm - 3pm	Innovative Biocide Blend Solves Microbial Contamination Issues In Hydraulic Fracturing Applications	Jeffrey Kramer, Christy Wentworth - Detailed comparative laboratory efficacy studies were conducted using relevant field conditions which highlighted the excellent performance of this new biocide compared to other commonly used oil and gas biocides. Results showed that the biguanide-polyammonium blend provided quick and persistent biocidal activity against a range of bacteria, including acid producing and sulfate reducing bacteria at low concentrations. In addition, results show strong performance advantages against corrosion causing biofilms. The blend was also compatible with additives typically found in oil and gas stimulation fluid packages and worked over a broad range of pH, TDS, and temperatures, indicating broad fluid and environmental compatibility across a wide range of oil and gas applications. These results were verified in multiple oil and gas stimulation field trials that confirmed the biocidal performance of the biguanide-polyammonium blend.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:35pm - 3pm	Formicary Corrosion And EAC Of Copper Tubes In Contact With Building Sealant	Kimberly Steiner - Copper tubes for carrying medical-grade gasses were installed as part of multiple medical facilities under construction. Where the tubes penetrated drywall separating individual rooms, the perimeter of the tubes were sealed with building sealant to suppress noise, smoke and fire transmission. During construction, discoloration of the copper tube and sealant where in contact was observed. A laboratory investigation determined the discoloration was copper corrosion product. Further laboratory evaluation of the system was performed to characterize the discoloration, the underlying copper tubes, and sealant using a variety of techniques. Evaluation of the copper tubes indicated nitrogen-containing deposits on the outside diameter (OD) surface as well as features consistent with formicary corrosion and environmentally assisted cracking (EAC). While through wall-cracking or corrosion had not occurred, the investigation indicated that failures were possible if the discolo	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:35pm - 3pm	Multitask Learning Framework For Screening Of Corrosion Inhibitors For Mild Steel	Abhishek Agarwal, Pradeep Rathore, Dharmendr Kumar, Vinay Jain, Sri Harsha Nistala, Sanjana S, Beena Rai - Corrosion inhibitors are useful to mitigate corrosion of metal/alloy components. However, traditional corrosion inhibitors are toxic and need to be replaced by greener alternatives. Efficient screening models are required to find molecules with desired properties from millions of molecules available in public domain. To make these models, publicly available database of experimental inhibition efficiency of molecules is essential. Making a different model for each class of molecules is cumbersome and lacks generalization capacity and hence, a single model is required with the ability to predict with reasonable accuracy. In this work, we have addressed the issues of limited publicly available experimental database, and efficient and accurate models with generalization capability. We have developed a computational framework to accelerate the discovery of new corrosion inhibitors. W	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:35pm - 3pm	Advanced Coating Technology For Refinery And Petrochemical Applications	Sanjay Lodha - TUBACOAT or advanced ceramic coated tubes is disruptive innovation technology from TUBACEX. This new technology of silica ceramic coating has an excellent resistance to corrosion, fouling and coking at extreme conditions and high temperature up to 800 oC 1472 oF)in critical refinery and petrochemical process equipment. TUBACOAT tubes also minimize formation, deposition and plugging due to coke/carbon in Delayed Coker, Visbraker, VDU, Resid and other refinery and petrochemical unit furnaces and thus improve unit reliability, life cycle, throughput and reduced carbon foot-print. This paper tries to bring out the properties and advantages in terms of resistance of ceramic coated tubes to various forms of coking, corrosion, fouling, scaling and the expected cost savings. Chemical inertness and coking resistance study with European University and results from various commercial field trials and runs with major US and Europe refineries and further developments also include	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 2:35pm - 3pm	Improved Girth Welding On Seamless Linepipe For High H2S Partial Pressure Condition	Florian Thebault, Laurent FAIVRE, Antoine Rémy, Sébastien LECONTE, Laurent Ladeuille - O&G industry is more and more cautious about the risk of Sulfide Stress Cracking when low alloyed steels are in contact with aqueous environments saturated by high partial pressures of H2S. According to NACE MR0175 / ISO 15156 part 2, material tested in NACE TM0177 Solution A saturated by 1 bar H2S above 80% Actual Yield Strength is qualified for all regions of NACE environmental severity diagram. Basically, this lab test condition is considered severe enough for widening the admissible field exposure conditions up to 10 bar H2S partial pressure. However, recent works highligted the existence of a threshold partial pressure of H2S below 10 bar for TMCP seamwelded pipes. In the present work, similar situation has been observed for girth welds on X65 seamless pipes: acceptable welds based on hardness data passed at 1 bar H2S NACE Solution A but failed in a fit-for-purpose condition of 6.8 bar H2S. Im	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:50pm - 3:15pm	The AA2024/CFRP Galvanic Couple Under A Dynamic Electrolyte Drop	Juan Genesca Llongueras, Rodrigo Montoya, J. Vega, E. Garcia-Lecina - The galvanic interactions between AA2024 and Carbon Fiber Reinforced Polymer under a dynamic drop of NaCl electrolyte were studied. The use of a dynamic electrolyte provided the unique opportunity to investigate both thick and thin electrolyte systems. A modeling approach was achieved by solving the Nernst-Planck equations in a 2D dynamic domain. The boundary conditions were both electrochemical and physicochemical types. Scanning Kelvin Probe (SKP) measurements were carried out during the drop evaporation in a chamber at 85% RH, 25 ºC, and 1 atm of pressure for 24h. Both experimental and modeling approaches had a proper correlation.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:50pm - 3:15pm	Nucleation And Crystal Growth Of Calcium Carbonate In The Presence Of Zn	Petros Koutsoukos, PANAGIOTA NATSI, Zahid Amjad - The effect of the presence of Zn is solutions supersaturated with respect to calcium carbonate was investigated at 250C, pH 8.50. The stability domain of the calcium carbonate solutions was measured in the supersaturation ratio (SRcalcite) values between 20.89 -32.36. Below the least SRcalcite value the solutions were stable. Above it, precipitation was spontaneous past induction time, inversely proportional to SRcalcite according to the classical nucleation theory (CNT). In the presence of 20 m of Zn in the supersaturated solutions, the stability domain was shifted to higher SRcalcite values (47.86<srcalcite<112.2). the="" presence="" of="" zn="" stabilized="" all="" three="" calcium="" carbonate="" polymorphs.="" in="" absence="" only="" vaterite="" and="" calcite="" were="" identified="" precipitated.="" cases="" no="" oxides="" formed.="" rate="" spontaneous="" precipitation="" zn,="" was="" reduced="" by="" as="" much="" 98%="" at="" least="" srcal<="" span=""></srcalcite<112.2).>	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 2:50pm - 3:15pm	Modeling Sensitization Trends Of 5XXX Aluminum Alloys Of Varying Temper	Lindsey Blohm, Heather Murdoch - Aluminum-magnesium alloys (5xxx) are widely used due to 5XXX's medium strength, good weldability, and corrosion resistance. The alloy 5083 in particular is used in a variety of Department of Defense (DoD) applications, specifically H131 temper for U.S. Army ground vehicles and H116 for U.S. Navy vessels. Due to the impact sensitization can have on properties and service lifetime, it is necessary to address/quantify the level of variation in sensitization behavior between suppliers/lots/batches in 5XXX aluminum alloys. Modeling was performed using the Johnson-Mehl-Avrami-Kolmogrov (JMAK) framework to fit and evaluate experimental Nitric Acid Mass Loss (NAMLT) ASTM G67 tests. This work details the collection and modeling analysis of sensitization of 5XXX alloys found in previously documented literature investigating the impact of temper.	Henry B. Gonzalez Convention Center	RIP

Monday 3/7/2022 3pm - 3:25pm	Understanding The Exceptional Chloride-Induced Stress Corrosion Cracking Resistance Of Stainless Ste	Haozheng Qu, Jayendran Srinivasan, Gabriella Marino, Jenifer Locke, Rebecca Schaller, Eric Schindelholz, Janelle Wharry - The chloride-induced stress corrosion cracking (CISCC) resistance of stainless steel (SS) cold spray (CS) coating is assessed by immersing SS304L CS coated substrate in boiling MgCl2. The SS304L substrate contains an arc-weld, and is pre-stressed in four-point bend fixture prior to CS coating. The CS specimen is resistant to CISCC for over 552 hours, whereas the uncoated counterpart ruptures from CISCC after only 17 hours. Porosity develops throughout the entire coating layer after only 24 hours of exposure, but does not lead to cracking. We investigate the root cause of the robust CISCC resistance of CS coating from mechanical (nanohardness and residual stress characterization), compositional (energy-dispersive X-ray spectroscopy), electrochemical (potentiodynamic measurement), and microstructural (electron backscatter diffraction) perspectives. The CS coating an	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 3pm - 3:25pm	Effect Of Organic Acids In Pyrolysis Oils On The Corrosion Of Constructional Materials For Oil Stora	Xue Han, Yimin Zeng, Kaiyang Li - Pyrolysis oils contain various types of organic acids that may cause corrosion issues to the constructional materials of oil containers. In this work, immersion tests were performed at 60 °C for 7 days to identify the corrosion susceptibility of candidate constructional alloys to pyrolysis oils produced from different biomass feedstocks. The acidity of pyrolysis oils was determined using total acid number (TAN) and carboxylic acid number (CAN). The corrosion rates were measured using weight change method, and the corrosion products were characterized by advanced microscopy techniques. The influence of TAN and CAN on oil corrosivity was investigated.	Henry B. Gonzalez Convention Center	Symposia
Monday 3/7/2022 3pm - 3:25pm	Novel Hybrid Model For Under Deposit Corrosion Risk Assessment Of Crude Pipeline In Sand Producing F	Lay Seong Teh, Faisal Al-Abbas, Nayef Alanazi, Qasim Saleem - Oil and gas production pipelines are susceptible to internal corrosion at locations where flow conditions promote water accumulation and solid particles settlement (precipitation). These deposits form diffusion barrier between the produced fluids and underlying substrate, which results in water chemistry near the steel surface different from that in the bulk fluids. This can potentially lead to an accelerated localized corrosion through under deposit corrosion (UDC). Successful corrosion management of UDC is based on risk assessment, mitigation and monitoring. As a normal practice, mechanical scraping along with chemical treatment is commonly applied as the mitigation for UDC. However, for this case, installing a scraper facility was not economically viable for new pipelines connected to an ageing platform that was meant for temporary period. Therefore, an assessment was conducted to determine if solids deposition and asso	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 3pm - 3:25pm	Frequency Analysis Provides Insights During Close Interval Surveys	Elizabeth Nicholson - When performing a close interval survey (CIS/CIPS), good practice has the surveyor using a oscillicope to obtain a waveform reading. The main purpose of obtaining a waveform is to establish that correctly timed interruption is taking place. However, further analysis in the field or at the office can provide more insight into the rectifier operation and other electronic sources affected the pipe. Examining frequency analysis using the Fast Fourier Transform (FFT) algorithm provides insights about the frequency of interference. Graphing the FFT results against time can confirm proper interruption in noisy circumstances where simple visual analysis fails.	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 3pm - 3:25pm	Localized Corrosion Management For Thermally Insulated Systems Via Insulation Stand-Offs And Low Poi	Ahmad Raza Khan Rana, Graham Brigham, Omar Chaar, George Jarjoura - CUI (corrosion under insulation) is a major damage mechanism affecting the integrity of process equipment, piping, and pipelines. CUI is known to create localized corrosion and pitting under thermal insulations which trigger non-linear corrosion rates and end up in unanticipated leaks in industrial assets. Reportedly, detection and management of CUI-driven damages constitute 10% of the maintenance budget in a typical refinery. This study simulates the CUI behavior of carbon steel under fibrous stone wool insulation using four testing conditions namely Isothermal wet, isothermal wet-dry, cyclic wet, and cyclic wet-dry. The weight loss of coupons under each test condition was converted into corrosion rate followed by characterization of damage modes namely pitting, uniform corrosion via microscope, and surface topography. It also compares the corrosion behaviors in closed-contacting insulation to those produced under c	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 3pm - 3:25pm	Structure And Related Effectiveness Of Naphthenic Acid Corrosion Inhibitors	Oussama Zenasni, Maria Marquez, John Scholz, Philip Thornthwaite - Petroleum refineries often encounter naphthenic acid corrosion when processing opportunity crudes with a high total acid number (TAN). The formation of oil soluble iron carboxylates in refinery units operating at high temperature regimes (200 °C to 400 °C) with corresponding high fluid velocities, can lead to high rates of corrosion in the affected zones. To mitigate naphthenic acid corrosion, the application of chemical additives (i.e., corrosion inhibitors) can be implemented. The type of inhibitor traditionally used to mitigate this type of corrosion are largely composed of phosphorus-based compounds. However, P-based inhibitors have come under scrutiny due to their potential impact on refinery process units. Consequently, a variety of new inhibitors, where the amount of phosphorus has been reduced or eliminated have been developed to mitigate naphthenic acid corrosion. In the present study, a variety of corrosi	Henry B. Gonzalez Convention Center		Symposia

Monday 3/7/2022 3pm - 3:25pm	In-Situ Observation Of Hydrogen-Induced Cracking Initiation Site In Linepipe Steels	Taishi Fujishiro, Kyono Yasuda, Nobuyuki Ishikawa, Eiji Tada, Takuya Hara, Mitsuo Kimura - Hydrogen-induced cracking (HIC) is one of the hydrogen embrittlement phenomena occurs in a linepipe exposed to the sour environment. Generally, the initiation site of HIC is estimated by the observation of the fracture surface after the test. It is reported that typical initiation sites of HIC are nonmetallic inclusions, such as elongated MnS, in the center-segregation region. However, there has not been an in-situ observation technique that can establish the direct link between the initiation site and the inclusion. In this study, an in-situ HIC measurement technique was developed to observe HIC initiation behavior and identify the initiation site of HIC. This technique is based on the combination of an automatic ultrasonic wave inspection (UT) system and energy dispersive X-ray spectroscopy (EDS). As the result from overlaying the C-scan movie obtained by UT system on the EDS map of HIC frac	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 3pm - 3:25pm	Field And Laboratory Studies On The Effect Of UV Degradation And UV Protector Paints On Stockpiles O	Amal Al-Borno, Aissa VanDerVeen - Field and laboratory studies were carried out to investigate the effect of UV degradation on stockpiles of FBE Coated Pipeline. In addition, to determine if three different commercially available UV protector paints can protect the underlying FBE system 1A pipeline coating from UV degradation. This was done under actual field exposure for two years and laboratory tests simulating weathering conditions using Q-SUN Xenon Arc Test Chamber to reproduce the damage caused by full-spectrum sunlight and rain. Flexibility and POI-Photooxidation Index, CI-Carbonyl Index and changes in the polymer chemical structure analyzed by ATR-FTIR were examined at different time intervals. The results indicated that although the tested UV protector coatings were effective in preventing the underlying FBE coating from chemical/oxidative degradation and chalking, maintaining the color of FBE gloss; the underlying FBE coating showed a reduction in the flexibility after nine	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 3:15pm - 3:40pm	Understanding Atmospheric Corrosion Damage On An Aircraft Representative Galvanic Specimen: A Two-Pr	Thomas Curtin, Robert Adey, Andres B. Peratta - Aircraft representative galvanic specimens were subject to atmospheric exposure at the U.S. Naval Research Lab site in Key West, Florida. The specimens included stainless steel fasteners and aluminum bronze bushings installed in AA7075 aluminum plates; the fastener locations were slightly biased toward the larger diameter bushing to assess galvanic interaction. One pair of galvanic specimens was subjected to only ambient environment for a two-month period; a second specimen pair was subject to both ambient environment (initial two-months), and a short duration, twice daily, sea spray protocol over a further two-month period. Corrosion damage results from both of these environmental loading scenarios are assessed, analyzed, and modeled. The creation of a 3D model of the multi-material galvanic specimen is discussed, along with some of the challenges associated with selecting the input parameters needed to best represent the two different	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 3:15pm - 3:40pm	Retention Improvement Of Sulfonic Acid Based Scale Inhibitor On Sandstone Formations At HTHP Conditi	Yasmin Hayatgheib, Thibaut Charpentier, Salima Baraka-Lokmane, Paul Thornton, Wassim Taleb, Anne Neville, John-Richard Ordonez-Varela, Richard Barker - Industry is facing greater challenges to extract oil and gas produced from gas condensate wells with harsher reservoir conditions, mainly with high temperatures and pressures (HTHP) and higher salinity formation water. These HTHP systems are accompanied by a range of scaling issues including BaSO4 and CaCO3, mixed zinc and lead sulfide (ZnS/PbS) scale formation as well as iron sulfide (FeS). Hence, prevention of sulfide scale is a developing area of focus, specifically in relation to sandstone reservoirs. Recent environmental legislation has pushed especially the Netherlands and UK continentals to phase out phosphorous based inhibitors. However, inhibitors/dispersants with other chemistries, mostly suffer from low tolerance to high salinity levels of the formation water or poor retention properties on the sandstone reservoir, which w	Henry B. Gonzalez Convention Center	Symposia

Monday 3/7/2022 3:15pm - 3:40pm	The Roles of Composition and Microstructure in Additively Manufactured Alloy 625 Crevice Corrosion	Yousef Shorrab, Robert Lillard - Alloy 625 is a nickel-base superalloy that has good mechanical and corrosion resistance properties which make it attractive for high temperature, marine and nuclear applications. However, its high strength and thermal resistance make it challenging to manufacture using conventional methods. While Additive Manufacturing (AM) is a method for overcoming these challenges, AM techniques are characterized by rapid cooling rates that result in high residual stress and segregated microstructures which have been shown to increase the susceptibility to localized corrosion. The purpose of this research is to study crevice corrosion susceptibility of additive manufactured Alloy 625 and how it compares to that of wrought Alloy 625. In this study, metal-to-metal and acrylic-to-metal Remote Crevice Assembly Experiments were carried out for wrought, as made AM, solution annealed AM, solution and stabilization annealed AM, and stress relived AM Alloy 625. Results from	Henry B. Gonzalez Convention Center		RIP

Monday 3/7/2022 3:30pm - 4:30pm	Keynote	Former Department of Transportation (DOT) Secretary Ray LaHood will give an in-depth analysis of the current status of America's infrastructure, recommend policies and issues lawmakers should focus on, and discuss the important role the AMPP community can play in revitalizing America's dilapidated transportation systems. This important keynote address highlights the needs of the corrosion and protective coatings sector and offer unique insight into how top officials prioritize infrastructure investments and policies throughout the US. For example, what types of projects does the DOT prioritize? What sort of sustainability and integrity plans do policymakers require? This event is even more important and timely as policymakers nationwide implement the Infrastructure Investment and Jobs Act (IIJA) passed in November 2021. Please join us for this rare opportunity to learn more about what future investments mean for your profession	Henry B. Gonzalez Convention Center	Lila Cockrell Theater	Other
Monday 3/7/2022 3:30pm - 5pm	EMERG Student Meeting		Henry B. Gonzalez Convention Center	Room 224	Networking
Monday 3/7/2022 5pm - 7pm	Exhibit Hall Grand Opening		Henry B. Gonzalez Convention Center	Exhibit Hall	Exhibit Hall

Monday 3/7/2022 5pm - 7pm	Student Poster Session Day 1	Chair: Raghu Srinivasan Vice Chair: Saba Navabzadeh Esmaeely The Student Poster Session at the AMPP Annual Conference + Expo encourages students to become active in AMPP and present the results of their work to membership. Each student who wishes to participate must submit a 300-400 word abstract (maximum of 10,000 characters). Please keep in mind that student attendance is required at the conference to participate. There can also only be one student per poster.	Henry B. Gonzalez Convention Center	Exhibit Hall		Other

Tuesday - 3/8/2022

Date & Time*	Name	Description	Location	Location Detail	Committee(s)	Type
Tuesday 3/8/2022 7am - 8:30am	Speakers Breakfast		Henry B. Gonzalez Convention Center	HemisFair C3		Other
Tuesday 3/8/2022 7:30am - 9:30am	Guest Breakfast	Guest Breakfast is for individuals that purchase the Guest Program Registration only and are not for attendees to the conference.	Grand Hyatt San Antonio	Bowie AB		Other
Tuesday 3/8/2022 8am - 9:30am	Advanced Protective Coating Technology - Day 2	Chair: Benjamin Chang Vice Chair: Matt Dabiri This symposium features technical papers that cover the following themes: (1) Rust Creepage Mechanism, (2) Cathodic Disbondment Mechanism, (3) Coating Blister Mechanism, (4) CUI Coatings, (5) Salt Decontamination Chemicals, (6) Offshore Coating Evaluation Methods, (7) Offshore Windmill Coatings, (8) Nanotechnology, and (9) Passive Fire Protection.	Henry B. Gonzalez Convention Center	Room 210		Symposia