Wednesday 3/9/2022 6pm - 10pm	Honoree Night		Grand Hyatt San Antonio	Texas Ballroom A-C		Networking

Thursday - 3/10/2022

Date & Time*	Name	Description	Location	Location Detail	Committee(s)	Type
Thursday 3/10/2022 7am - 8:30pm	Speakers' Breakfast		Henry B. Gonzalez Convention Center	HemisFair C3		Other
Thursday 3/10/2022 8am - 10am	SC 23 - Coating System Application, Maintenance, and Inspection		Henry B. Gonzalez Convention Center	Room 212		Standards
Thursday 3/10/2022 8am - 10am	Bridge and Infrastructure Coatings & Corrosion Day 2	Chair: Christopher Alexander Vice Chair: I-Wen Huang This symposium features technical papers on methodologies to improve the service life of materials and structures in infrastructure, transportation and utilities industries. Work that covers new developments and solutions for pre-stressed and post-tension reinforced concrete structures as well as updates to existing systems are encouraged.	Henry B. Gonzalez Convention Center	Room 210		Symposia
Thursday 3/10/2022 8am - 10am	Anodic and Cathodic Protection - Day 2	Chair: Daniel Fingas Vice Chair: Spencer Easthope This symposium includes technical papers regarding anodic and cathodic protection papers on ferrous materials in pipeline, oil, gas, and water systems.	Henry B. Gonzalez Convention Center	Room 303 ABC		Symposia

Thursday 3/10/2022 8am - 10:30am	Recent Experiences With Austenitic and Duplex Stainless Steels - Day 2	Chair: Lena Wegrelius Vice Chair: Nicole Kinsman This symposium features technical papers on recent experiences with stainless steels. The focus is on end user experiences from the process industries such as chemical processing, pulp & paper, oil & gas, desalination, pharmaceutical, and power generation. Topics include success, failures, material selection, fabrication, new developments and sustainability.	Henry B. Gonzalez Convention Center	Room 221 A	Symposia
Thursday 3/10/2022 8am - 10:30am	Corrosion Management Day 2	Chair: Hendrik Debruyn Vice Chair: Brian Burgess This symposium is seeking technical papers on recent Corrosion Management implementations, lessons learnt for these, and the development of new Corrosion Management philosophies.	Henry B. Gonzalez Convention Center	Room 217 C	Symposia
Thursday 3/10/2022 8am - 10:30am	Surface Preparation	Chair: Loren Hatle Vice Chair: Taylor Nguyen This symposium features technical papers on the appropriate tools and preparation methods prior to coatings application. Topics may include solvent cleaning, hand-tool cleaning, power-tool cleaning, abrasive blast cleaning, waterjetting, recognizing and repairing surface imperfections, recognizing and removing surface contaminants and assessing surface cleanliness. Work that covers water-soluble salts and their impacts at the substrate/coating interface that can cause premature failure are also encouraged.	Henry B. Gonzalez Convention Center	Room 213	Symposia

Thursday 3/10/2022 8am - 11am	Characterization and Performance of High Temperature Materials/Coatings for Industrial Applications	Chair: William L. Valerioti Vice Chair: Bingtao Li This symposium features technical papers on the characterization and performance of high temperature materials and coatings for industrial applications in refining, petrochemical and power generation industries. Work on material development, properties, testing & characterization, corrosion and performance is encouraged.	Henry B. Gonzalez Convention Center	Room 221 D	Symposia
Thursday 3/10/2022 8am - 11:30am	Water and Wastewater System Challenges and Solutions	Chair: Carlos Palacios Vice Chair: Diana Miller This symposium features technical papers on corrosion issues seen in water treatment systems for industrial, commercial, and institutional facilities.	Henry B. Gonzalez Convention Center	Room 302 A	Symposia
Thursday 3/10/2022 8am - 12pm	Materials and Integrity in Oil Sands	Chair: Duane Serate Vice Chair: Matt Krantz This symposium features technical papers on oil sands industry from owner-operators, vendors, consultants, and researchers. Area of interest include (but not limited to) corrosion, failures, wear, process, material selection, asset integrity, and can be related to steam-assisted gravity drainage, down-hole, mining, and other surface equipment/facilities.	Henry B. Gonzalez Convention Center	Room 301 BC	Symposia
Thursday 3/10/2022 8am - 12pm	Research Program Committee		Henry B. Gonzalez Convention Center	Room 225 D	Administrative
Thursday 3/10/2022 8am - 12pm	SC 17 - Rail & Land Transportation		Henry B. Gonzalez Convention Center	Room 211	Standards
Thursday 3/10/2022 8am - 12pm	SC 14 - Oil and Gas - Upstream		Henry B. Gonzalez Convention Center	Room 301 A	Standards
Thursday 3/10/2022 8am - 12pm	SC 21 - Mining & Mineral Processing		Henry B. Gonzalez Convention Center	Room 216	Standards

Thursday 3/10/2022 8am - 12pm	SC 08 - Metallic Material Selection & Testing-Day 2		Henry B. Gonzalez Convention Center	Room 221 C	Standards
Thursday 3/10/2022 8am - 12:30pm	Progress in Laboratory Testing of Corrosion Inhibitors for Oil Field Applications	Chair: Bruce Brown Vice Chair: Juan Dominguez Olivo This symposium features technical papers on the following issues: Novel techniques and methodologies for evaluation of corrosion inhibitors in the lab, Lessons learned - practical aspects and challenges encountered when using established evaluation methods and techniques, Factors affecting quality of laboratory data, Challenges associated with quantitative evaluation of localized corrosion, Development of formulations for high temperature corrosion, Challenges and gaps in lab-field transference.	Henry B. Gonzalez Convention Center	Room 217 B	Symposia
Thursday 3/10/2022 8am - 12:30pm	Corrosion in Nuclear Systems	Chair: Sheewa Feng Vice Chair: Sandeep Chawla This symposium features technical papers on materials related issues encountered in the generation of nuclear power energy in light, heavy and advanced nuclear power reactors and plants. This can include degradation mechanisms for materials and components in service. Also of interests are materials manufacturing and materials development techniques for current and advanced materials for nuclear power generation, including areas like additive or other advanced manufacturing techniques. Papers are also welcome on materials issues related to Long Term Plant Operations and nuclear waste.	Henry B. Gonzalez Convention Center	Room 214 B	Symposia

Thursday 3/10/2022 8am - 2pm	Thermal & Cold Spray Coatings	Chair: Shiladitya Paul Vice Chair: Martin Gagne This symposium features technical papers on all aspects of thermal and cold spray coatings used to mitigate corrosion of metallic and reinforced concrete structures with a specific focus on (but not limited to) surface preparation, coating consumable selection, spray method selection, spray parameter development, in-line quality and inspection, testing and qualification, operational experience, cost reduction, maintenance and repair. The subjects to be covered include results of basic and applied research on thermal spray processes and coating materials including field experience on thermal spray coatings, materials, processes and strategies for corrosion control. Papers on thermal spray coatings of zinc, aluminum and their alloys for corrosion mitigation with relevant field applications would be of great interest to the symposium. Contributions on conventional and novel thermal and cold spray coating systems used to prevent corrosion on metal and reinforced concrete structures in all offshore and onshore environments will be considered.	Henry B. Gonzalez Convention Center	Room 214 A	Symposia
Thursday 3/10/2022 8am - 5pm	SC 10 - Asset Integrity Management		Henry B. Gonzalez Convention Center	Room 221 B	Standards

Thursday 3/10/2022 8:10am - 8:35am	Refinement Of Citric Acid Passivation Methods And Comparison To Traditional Nitric Acid Based Chemis	David Enos, Derek Wichhart - Citric acid passivation offers a promising alternative to nitric acid passivation, particularly for free machining and precipitation hardened stainless steels where the latter requires the addition of sodium dichromate. While citric acid passivation is defined in industry specifications such as AMS2700 and ASTM A967, it is done with much less specificity than nitric acid passivation. This lack of specificity allows for conditions to be applied where inadequate passivation is achieved. In this work, the citric acid passivation method has been explored and optimized for austenitic and precipitation hardened stainless steels, with 304L, 303, 420, and 17-4 PH stainless steels. A series of commercially available chemistries have also been explored.	Henry B. Gonzalez Convention Center	Symposia
Thursday 3/10/2022 8:10am - 8:35am	Next Step To Advanced Data Analysis With Pulsed Eddy Currents	Gabriel Cyr, Donald Picard, Olivier Bellavance, Andreanne Potvin - The objective of this paper is to introduce an innovation in PEC advanced data analysis, the PermTool™. The new signal representation correlates localized changes in wall thickness measurement with signal amplitude changes to discriminate real wall loss from material property changes or interfering components. The tool provides a simple and easy to interpret vector with orientations illustrating the real or false nature of an indication. The various signatures of the PermTool™ are presented and explained based on a variety of field data and manufactured samples that demonstrate the capabilities and limitations of this new graphical representation.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:10am - 8:35am	The NH-ME Metallized Memorial Bridge	Jerry Zoller - This is the story of the largest moveable bridge replacement in NH’s history, a compelling account of new ideas to match and exceed an historically significant 90-year old lift bridge in design, style, and innovation with today’s unique high-performance features designed to last a century. These features include a first-in-the-world structural character, and the first use of thermal spray zinc coating in New Hampshire and Maine, whose pewter-colored finish blends with the naval and marine river setting, and whose success has encouraged the growth of metallizing in shops and on bridges in New England over the past decade.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:10am - 8:35am	3D Printing Of Cemented Carbide: A Review And Perspectives In Oil Sands	Young Li - Cemented carbides are one of the most widespread powder metallurgy products due to their outstanding combination of high hardness, toughness and wear resistance. The use of 3D printing for cemented carbide has promised to produce components with complex geometries that can’t be produced by conventional powder metallurgical methods. This article gives an overview on 3D printing of cemented carbides and their properties and performance as well as their potential applications in Oil Sands industry. Common 3D printing technologies such as Selective Laser Melting (SLM), Binder Jet 3D Printing (BJ3DP), and Directed Energy Deposition (DED) are introduced. The experimental testing and performance of WC-Co cemented carbide were emphasized including metallography, hardness, fracture toughness, ASTM G65 and B611 erosion testing. Finally, the challenges and restrictions are discussed to motivate the future research on 3D printed cemented carbide in Oil Sands applications.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:10am - 8:35am	Effect Of Organic Solvent On Corrosion Inhibition of Mild Steel in CO2 environment	Xi Wang, Yi He, Shuai Ren, David Young, Marc Singer, Maalek Mohamed-Saïd, Sheyla Camperos - Injection of corrosion inhibitors is an economic and efficient way to combat internal pipeline corrosion in the oil field. Small scale laboratory testing is often necessary to determine the effectiveness of inhibitors in specific corrosive environments. To achieve ppm concentrations of an inhibitor in a small-scale lab setup, the inhibitor often needs to be diluted before addition to the solution, which might lead to some experimental errors. One factor that affects the repeatability of corrosion inhibition testing is the volume of solvent used to dilute or dissolve the small amount of inhibitor prior to addition to the test. In this study, electrochemical measurements, including linear polarization and potentiodynamic polarization, were utilized to evaluate the effect of different volumes (0.1 ml to 3 ml) of isopropanol used as the solvent for two inhibitor[BB1] s in 2 L brine. For certain in	Henry B. Gonzalez Convention Center		Symposia

Thursday 3/10/2022 8:10am - 8:35am	High Temperature Corrosion Resistance Of Alloy N07740 In Solar And Low Emission Ultrasupercritical P	Stephen McCoy, John Debarbadillo, Mark Anderson, Brian Baker - Nickel superalloys are of increasing interest in new and emerging energy production applications for their high temperature mechanical properties, stability, durability and corrosion resistance. The precipitation hardenable Ni-Co-Cr superalloy N07740 has been developed for high pressure – high temperature environments and is an ASME code approved material and originally designed for fossil fuel power generation. New applications for the material include concentrated solar power receiver tubes due to its very high creep and fatigue strength in the temperature range 580 to 825C . The solar receiver tubes contain a heat transfer medium of molten salts used to transfer and store the solar energy. Solar receiver technology is also being combined with new ultrasupercritical power cycles which have potential advantages of high efficiency and reduced demand for water in desert environments. The paper includes molten salt corrosi	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:10am - 8:35am	Atmospheric Plasma: One-Step Precision Process To Remove Coating And Promote Chemical Adhesion	Pietro Ranieri, Pete Yancey, Jason Stimson, Levi Snowden - Presented in this work will be our results on the removal efficiency of the original coating, change in water contact angle (adhesion promotion) before and after plasma treatment, and the increased adhesion strength shown by standard adhesion tests. Increased surface energy after plasma treatment leads to a lower water contact angle. The change in contact angle will be verified using the BTG Labs Surface Analyst to show reduced contact angles between 10° and 20°, which is indicative excellent wetting according to ASTM D7334. The wettability of the substrate will determine how well the adhesive bonds to the substrate and directly affects the adhesion strength of the bonded epoxy. Multiple substrates and adhesives will be presented that represent the commonly used materials for multiple industries. Wettability from plasma treatment will be compared to solvent cleaning wipes as the final preparation step prior to coating. The re	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:10am - 8:35am	Examination Of A Ferritic Martensitic Steel Following Irradiation And High Temperature Water Corrosi	Ronald Clark, Christopher Jones, Tomas Martin, Dong (Lilly) Liu, Kun Mo, Jean-Charles Eloi, David Kumar, Rob Burrows - Nuclear energy currently contributes approximately 10 % of the worldwide energy mix. Nuclear energy generation is a form of base□load, low□carbon electricity, and alongside renewables can help nations toward climate change goals. Nuclear fission reactors make up the majority of the reactors operating today. Nuclear fusion on the other hand is a promising alternative which produces less radioactive waste and does not have a reliance on the finite source of uranium fuel. Eurofer□97, a reduced activation ferritic martensitic (RAFM) steel, will be used as a structural material for fusion reactors. One option for the European demonstration fusion reactor (DEMO) is to use a water□cooled lead□lithium breeder blanket design for heat extraction, which will expose Eurofer□97 to high temperature water. In this work Eurofer□97 has been examined following self□ion irradiation (u	Henry B. Gonzalez Convention Center		Symposia

Thursday 3/10/2022 8:10am - 8:35am	Cathodic Protection Of Mooring Chain In Offshore Environment	Faisal Shahzad, Nils Olav Digre, Kristian Varne - Mooring chains for permanently moored structures – including FPSOs - have shown severe corrosion of the steel chain after a short period of time. Cathodic protection of mooring lines is normally not provided due to discontinuous nature of chain and installation constraints. This study addressed CP of mooring lines with ROV installable clamp anode design. The study is divided into three different sections to examine possible issues and constraints. including 1) Mechanical & Electrical properties testing to examine function and continuity between clamp and chain links and between chain links. 2) Development of a computer-based CP model of the mooring chain to simulate CP attenuation with realistic contact resistances between chain links. 3) Sea trials using a section of used mooring chain to measure actual contact resistances between chain links and measure the polarization level of chain and anode coverage over the mooring chain links	Henry B. Gonzalez Convention Center	Symposia
Thursday 3/10/2022 8:10am - 8:35am	Case History: Lining Water Box Condensers	Frank Rea - An energy company hired a contractor to remove and replace the linings of water box condensers during a maintenance shut down. This case history will give a summary of the scope of work, a review of the specification, a description of the work performed, an accounting of the in-process inspection, and a summary of lessons learned during the project.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:10am - 8:35am	Investigation & Mitigation Of Corroding Unbonded Post-Tension Tendons	Lenard Mancs, David Whitmore - Unbonded post-tension (PT) tendons have been used for many years to reinforce concrete structures. Generally, these structures have performed well except where unbonded PT tendons have suffered from corrosion due to moisture penetration or grease deficiencies. Like other technologies, unbonded PT systems have evolved and improved over the years from “paper-wrap” to “push-through” to “heat sealed” to “extruded” to “fully encapsulated” systems. Consideration should be given to the type of system when selecting the appropriate evaluation and corrosion mitigation methods for these systems. Evaluation of unbonded post-tensioned structures is important to determine the current condition and to determine if corrosion and deterioration is likely. If broken tendons or corrosive conditions are identified, a suitable mitigation strategy should be implemented such that structural integrity can be maintained and the service life of the structure can be extended.	Henry B. Gonzalez Convention Center		Symposia
Thursday 3/10/2022 8:30am - 10am	QP5 Subcommittee		Henry B. Gonzalez Convention Center	Room 225 B	Other

Thursday 3/10/2022 8:35am - 9am	Long-Term Case Studies Of Cathodic Protection Along The Texas Gulf Coast	Stephen Foster, Kyle Myers - Reinforced concrete bridges and other maritime infrastructure are at high risk for corrosion related damage over its service life. These assets are subjected to harsh exposures that will degrade ordinary protective measures for reinforced concrete over time. Sacrificial (galvanic) cathodic protection (CP) systems have been used successfully to protect bridge and other reinforced concrete infrastructure in Texas for approximately 30 years. As these systems age, owners are faced with decisions regarding timing and need to replace existing CP systems. This paper will present case studies from recent testing of sacrificial CP systems from several bridge and infrastructure projects along the Texas gulf coast, with ages ranging from newly constructed to 25 years old. Results from testing indicate many of the CP systems are still offering some level of cathodic protection. Considerations and options for continued monitoring, maintenance and repair, or replacemen	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	How A Single-Coat, Non-Hazardous Epoxy Saves Charlotte Water Money In The Long Run	David Adams , Jan Conant - The McAlpine Creek Wastewater Management Facility (MCWWMF) is the largest wastewater treatment facility operated by Charlotte Water (CLTWater). In 2018, CLTWater began a Reliability and Process Improvements project. The project involved rehabilitation of 16 secondary concrete clarifiers that ranged from 95 to 150 feet in diameter, with the oldest clarifiers being nearly 60 years old. CLTWater considered an epoxy coating. However, they historically ran into issues with failures and delaminations. Thus, they opted to move forward with a pilot study with four different epoxy manufacturers where they analyzed cost, schedule, performance, quality, service life, and safety. Concluding the test, CLTWater determined the single-coat epoxy to provide the best value for their project. The product selected was not the lowest cost option. Yet, the epoxy's single coat application and non-hazardous attributes provided CLTWater seven-month time savings and the greatest	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	Monitoring And Controlling Cathodic Protection Without Using Reference Electrode — Cathodic Producti	Lietai Yang, Xiaodong Sun - The commonly accepted practice for monitoring and controlling cathodic protection (CP) is to measure potentials of the structure with a reference electrode which may require maintenance and has a limited service life. A coupled multielectrode array sensor (CMAS) with only solid components is maintenance free and may last as long as the CP-protected structure. This paper discusses how to use a new parameter from the CMAS for monitoring and controlling CP without using a reference electrode. This parameter has been called CP effectiveness margin (CPEM) and has a value of 0% when the CP starts to be adequate and 100% when the CP starts to be excessive. When used together with the potential-measurement methods, the CPEM from a highly robust CMAS probe may provide an independent and real-time indication for the effectiveness of the CP systems and serve as a complimentary method for CP assessment.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	Influence of dissolved hydrogen on the intergranular oxidation behavior of Ni-base alloys in simulat	Yun Soo Lim, Dong-Jin Kim, Sung Woo Kim, Hong Pyo Kim, Jong Yeon Lee - The oxidation test of Alloys 600 and 690 was conducted in simulated PWR primary water at 325 □ for a period of 3600 hours. The test solution was 1200 ppm B and 2 ppm Li in pure water maintaining a dissolved oxygen content below 5 ppb. The hydrogen contents were varied from 5 to 30 cm3 H2/kg H2O. It was revealed that surface grain boundaries were oxidized in Alloy 600; however, IG oxidation did not occur in Alloy 690 within the range of hydrogen concentrations. The reason for the absence of IG oxidation in Alloy 690 appears to be attributed to the formation of continuous protective Cr2O3 innermost layer just over the grain boundaries beneath the surface. As a results of the formation of Cr2O3 innermost layer, Cr was depleted and Ni was enriched on the surface grain boundaries. All the different oxidation phenomena between Alloys 600 and 690 are believed to be caused mainly by the different Cr concentrations in thes	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	Conditioning Of Steel Surfaces With Various Abrasive Blast Media And Effect On Coating Performance	Andrew Recker - There are various abrasive media available for blasting steel surfaces in preparation for protective coating application. Each of these abrasive materials provide for not only a surface profile, but a different resulting steel surface condition either from direct embedment of particles and/or changing of the corrosion potential of the steel chemistry. This paper will provide an analysis of the steel surface after blasting with different abrasive media including garnet, coal slag, steel slag, and 10X. This analysis includes profile peak density measurements, XPS, polarization resistance, and soluble salt measurements prior to coating application. The scope of the work also includes the use of conditioning or cleaning agents to prepare the steel surface for optimum cleanliness. The coated panels will then be tested with elevated temperature deionized water immersions (NACE TM 0174) and salt fog (ASTM B 117) for comparison. This work will provide insight into the variati	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	The Evaluation Of Corrosion Behavior Of Austenitic Stainless Steels And Ni-Based Alloys In Molten Sa	Qingyang Liu, Richard Barker, Chun Wang, Jiong Qian, Anne Neville, Frederick Pessu - High temperature corrosion of materials in molten salt is of great interest to renewable energy production industry, especially concentrated solar power plants (CSP) where molten salts are used as thermal energy transfer fluid and storage media. The corrosion degradation of metallic components when used with molten salt in CSPs poses significant threat to the continuous safe operation at extremely high temperature (>565□). The evaluation of the corrosion behavior at the metal – molten salt interface and the properties of corrosion products formed are needed to better understand the corrosion mechanisms and clearly explain the corrosion performance of metals used in CSPs. In this study, the corrosion behavior of four types of corrosion resistance alloy; SS321, SS347, IN625 and In825, are investigated in nitrate salt for 7, 14 and 28 days under isothermal and simulated thermal cycling condition. The sa	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	Assessment Of Precorrosion Methods For Inhibitor Testing Under Sour Conditions	Iozsef Attila Palencsar, Rolf Nyborg - Qualification of corrosion inhibitors for field deployment involves performance testing in the laboratory. Especially for sour service, a common set of test methods and associated protocols or guidelines used across the oil and gas industry, chemical companies and laboratories does, however, not exist. Development and testing of robust methodology are at the core of a Joint Industry Project (JIP) carried out at the Institute for Energy Technology (IFE). This contribution presents a selection of findings related to precorrosion, one of the aspects addressed in the JIP. A series of benchmark experiments assessing the performance characteristics of various inhibitor chemistries mitigating corrosion of carbon steel under sweet (CO_2) and sour (CO_2:H_2S 1:1) conditions at 25 °C and 60 °C without any precorrosion raised concerns related to uneven attack and risk for developing undesirable experimental artifacts, e.g. localized corrosion. Subsequent stu	Henry B. Gonzalez Convention Center	Symposia
Thursday 3/10/2022 8:35am - 9am	Corrosion In Dense Slurry And Models Performance	Kofi Freeman Adane - This paper showed results from tests conducted in a slurry flow loop.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	Arc Sprayed Zinc Metalizing For Cathodic Protection Of Reinforced Concrete Structures	David Whitmore, Travis Marman - Arc Sprayed Zinc Metalizing for Cathodic Protection of Reinforced Concrete Structures By David Whitmore Vector Corrosion Technologies Travis Marmon Vector Construction ABSTRACT Reinforced concrete structures can corrode if they are exposed to chlorides or if the pH of the concrete decreases over time. Arc-sprayed zinc coatings are versatile and can be used as part of a cathodic protection system to halt corrosion and extend service life. Arc-sprayed zinc coatings are multi-functional and can be used as part of impressed current cathodic protection systems or they can be used to provide galvanic cathodic protection. This paper describes the development and use of arc-sprayed zinc coatings for cathodic protection of steel in reinforced concrete structures. Development and use of arc-sprayed zinc coatings as part of impressed current cathodic protection systems going back to the 1970’s will be presented. Development and use of arc-spra	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	New Long Service Life Topcoats For Pad-Mounted Transformer Enclosures.	Kurt Wood - This talk will describe recent work to develop 2-component aqueous topcoat formulations, based on PVDF-acrylic hybrid dispersions crosslinked with polyisocyanates, which meet the requirements of the new SSPC Paint 47 standard for highly weatherable fluoropolymer topcoats, and when combined with conventional primer and midcoat technology, also meet the requirements of IEEE standards C57.12.28 and C57.12.29 for pad-mounted transformer enclosures. Enhanced weatherability is primarily conferred by having relatively high levels of fluoropolymer in the coating binder. Chemical resistance is obtained by a combination of high fluoropolymer level plus crosslink density. Barrier properties contributing to corrosion resistance depend on both these compositional factors, as well as on other formulation details.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 8:35am - 9am	Corrosion Behavior Of Stainless Steel Food Processing Equipment In Low Ph Environments	Suresh Divi, Harbinder Pordal - The food industry uses various corrosion-resistant alloys (CRA's) in the form of vessels, tubes, mixers, etc. to process different types of foods. The physicochemical characteristics of processed foods permit various CRA grades depending on the type of food contents and its corrosivity (non-corrosive, mild, medium, and high corrosivity). Due to ease of availability and low cost 304/304L stainless steel (SS) is the most commonly used CRA in the food industry. Wherever there is a need for superior corrosion resistance alloys 316L and 317 are used. If proper heat treatment is not performed on the 304 SS food processing components, when subjected to low pH corrosive environments, the welds and the heat-affected zone (HAZ) show poor corrosion resistance). In this study, the corrosion resistance of 304, 316, 317 stainless steel in a low pH environment typical of certain food processes will be investigated. A series of electrochemical corrosion tests on 30	Henry B. Gonzalez Convention Center		Symposia

Thursday 3/10/2022 9am - 9:25am	Evaluation Of Corrosion Pitting In A 317L Stainless Steel Surface Condenser Tube Bundle	Mel Esmacher, Kumar Kembaiyan, Edward Blessman - Despite more than 15 years of operational reliability, a 317L (UNS S31703) stainless steel steam surface condenser at a power plant in the Northeastern United States was revealed to have a significant waterside pitting corrosion problem. The pitting was identified during Eddy Current testing and verified by removing sample tubes. The severe pitting in the tubes was primarily focused at the seam weld region. Possible causative factors for the pitting attack were identified. Metallography and electrochemical testing confirmed non-optimal corrosion resistance along the original laser seam welds, as compared to the base metal. Modifications to the cooling water chemistry were instigated to reduce the severity of the pitting attack in an effort to extend the service life of the condenser bundle. Re-tubing options with alternative stainless steel alloys are also discussed.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9am - 9:25am	Innovative And Sustainable Corrosion Protection Solutions For Foundation Structures Of Offshore Wind	Frank Prenger, Kathrin Hesnaoui - The steel foundation structures of offshore wind turbines have so far been protected in the underwater area exclusively by cathodic protection. Recent German regulations recommend an additional top coating to reduce the required anode masses. If organic top coatings are used, they lose their barrier protection effect due to damage during transport and installation, defects during service life due to (hydro)abrasion and aging, which raises anode demand. A thermal spray coating in the underwater zone is thus a logical alternative to the organic topcoat system. Improved zinc-based metalized coatings exhibit not only a high degree of cathodic protection on defects, but also a high degree of passive protection and corrosion resistance through the formation of a firmly adhering top-layer with a high mechanical resistance. The result is an integrated, economical and sustainable corrosion protection system that results in considerable savings in resources an	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9am - 9:25am	Corrosion Of UNS S31603 Under Partial Upgrading Of Bitumen Using Thermal Cracking	Xue Han, Yimin Zeng, Kaiyang Li - Oilsands bitumen is partially upgraded to facilitate the pipeline transportation with environmental and economic benefits. In this work, the corrosion performance of a candidate constructional material, UNS S31603, was evaluated under the environments of cyclic thermal cracking of bitumen at 400 °C. Sample coupons exposed to gas phase and liquid phase to simulate the constructional materials for distillation tower and partial upgrader, respectively. Corrosion rates were measured using weight loss method. Advanced microscopy techniques were used to examine the corrosion products, and further identify corrosion modes. Corrosion mechanisms of samples exposed to different environments were explored as well.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9am - 9:25am	In Situ Atomic Force Microscopy Study Of Microstructure Dependent Inhibitor Adsorption Mechanism On	Huiru Wang, Alain Pailleret, Bruce Brown, Srdjan Nesic - Organic surfactant type inhibitors have been widely applied in the oil and gas industry considering their high efficiency at ppm concentrations. The investigation of organic inhibitor adsorption and inhibition mechanisms on carbon steel has been limited by the lack of surface characterization techniques at a molecular level. Atomic force microscopy (AFM) can not only provide localized visual observation, but can also achieve the detection of mechanical properties of an inhibitor film. Previous research has systematically studied the frictional properties of self-assembled surfactant monolayers on mica; however, there has been no such studies on carbon steel. In this study, in situ AFM contact mode friction imaging and in situ AFM tapping mode phase imaging techniques have been applied to investigate the influence of the ferritic-pearlitic microstructure of carbon steel on inhibitor adsorption mechanisms during CO2 corrosion. AF	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9am - 9:25am	Compatibility Of Steels At 450°-650°C In Supercritical CO2 With O2 And H2O Additions	Bruce Pint, Rishi Pillai, James Keiser - Direct-fired supercritical CO2 (sCO2) power cycles are being commercialized to revolutionize fossil energy as a low-emission power source. However, the cycle will increase O2 and H2O in the sCO2 and the implications of these additions have not been fully studied, particularly for lower cost steels that are needed in the lower temperature segments of the plant. Representative 9 and 12%Cr ferritic-martensitic (FM) steels and conventional and advanced austenitic steels were evaluated at 450-650°C to determine the maximum use temperatures in sCO2 with 1%O2 and 0.1%H2O at 300 bar. Compared to research grade (low impurity) sCO2 in indirect-fired cycles, the mass gains and scale thickness were not significantly changed for FM steels: both formed thick duplex Fe-rich scales. For stainless steels, higher mass gains were observed in all cases with increased Fe-rich oxide nodule formation. After 1000h at 650°C, the measured bulk C content was high for al	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9am - 9:25am	Developments In Abrasive Blast Nozzle Technology: Reducing Noise Exposure While Preserving Nozzle Pe	Matthew Sullivan - Relying on cutting edge advancements in jet engine technology, new Blast Ninja abrasive nozzle designs can now reduce noise by up to 17dBA, an approximate 300% reduction in sound intensity, when compared with conventional venturi nozzles of the same bore size. Blast Ninja nozzles accomplish this by reducing the nozzle air exit velocity and sound pressure level, while preserving particle velocity to maintain equal abrasive power. The difference in noise exposure enables operators to be safer, work longer, diminish operator fatigue, and minimize employer liability. Furthermore, whereas NIOSH estimates a $100 per dBA of savings when purchasing quieter products, such improvements in acoustical performance can also translate to employer cost savings. The efficacy of Blast Ninja nozzles were evaluated with Keith Industries (Houston, TX) a leader in providing abrasive blasting and specialty coating services to the petroleum, chemical, and power generation industries.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9am - 9:25am	Cobalt/Chromium Carbide Composite Coatings Applied By Brush Plating For Use As An Alternative To Har	Joshua Thomas, Danijela Milosevic-Popovich - Due to increased concern for both environmental and worker safety from governments around the world, numerous significant industrial chemicals are being phased out of production processes. One example is the use of hexavalent chromium compounds for the electrodeposition of hard chrome. Electrodeposited chrome is typically used for improved hardness, lubricity, wear resistance, and corrosion resistance. This work will support the use of a metal matrix composite composed of cobalt and chromium carbide particles as an alternative for chrome coatings deposited from hexavalent chromium compounds. Metal matrix composite (MMC) coatings consist of two phases co-deposited during plating: a continuous metal phase such as cobalt and small (<100 µm) particles of another chemical species distributed throughout. The physical qualities of the composite (such as hardness) are strongly dependent on the ratio and distribution of the two constituent phases.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9am - 9:25am	Design Of Cathodic Protection System For Duplex Stainless-Steel Pipeline: Protection Criteria And Hy	Ashraf Alaasmi, Timothy Bieri, Ziru Zhang, Katherine Buckingham - Duplex stainless steel (DSS) is selected for wet gas pipeline to minimize OPEX and eliminate maintenance activities for internal corrosion control. DSS, however, requires a combination of coating and cathodic protection (CP) for external corrosion mitigation due to harsh external conditions (e.g., high operating temperature and high chloride level in the soil) in the Middle East. CP design and operation for DSS pipeline faces a major challenge as there is no applicable published industry standard or technical research for protection criteria for DSS. Laboratory testing was performed with soil samples removed from the field to determine whether an applicable CP potential range exists that can provide the required protection and avoid hydrogen embrittlement at the same time. Overall findings of the lab tests in 2 representative soil samples indicated that a CP potential range exists. This range, which is between -600 to	Henry B. Gonzalez Convention Center		Symposia

Thursday 3/10/2022 9am - 9:25am	Assessment And Rehabilitation Of Piping Inside Water And Wastewater Treatment Plants	Manuel Najar - Many pipes within water and wastewater treatment plants that were constructed within the last 50 years are nearing the end of their service lives. Owners have invested in condition assessments to help them make the difficult decision to repair or replace these pipelines. There are many types of condition assessment methods that can be used to determine the existing condition however this presentation will discuss a data-driven approach. Rehabilitation of the pipelines with protective coatings can also be challenging due to limited access and limited construction schedules. The presentation will discuss some important factors to consider when selecting protective coatings based on case histories.	Henry B. Gonzalez Convention Center	Symposia
Thursday 3/10/2022 9am - 9:25am	Metallizing Steel Bridges In New England - It’S Growing!	Jerry Zoller - The use of metallized coating on bridges in New Hampshire years ago was limited to small special strategic steel locations. The metallizing option was severely limited by lack of shop applicators. Rhode Island pioneered duplex metallized bridges, research, and interest. The past decade has seen a rapid growth of industry facility investment for application and Owner selection of the metallizing coating. This paper presents several New Hampshire bridges and signature New England bridges with metallized coating representing the growing popularity of thermal spray coating for steel bridges.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9am - 12pm	Corrosion of Additively Manufactured Materials	Chair: Emerson Nunez Vice Chair: Robert Mason This symposium features technical papers that address the corrosion related issues of additively manufactured (AM) materials, mainly metals. In contrast to conventional processes, additive manufacturing processes and post□processing treatments result in unique microstructures and material surfaces which alter the corrosion performance. Subjects include but are not limited to: process□structure□performance relationships, post□processing treatments and surface finish, corrosion mechanism of AM materials, AM material degradation in corrosive environments, AM materials selection and applications, AM qualification and certification, integrity or risk analysis and assessment, etc.	Henry B. Gonzalez Convention Center	Room 214 C	Symposia

Thursday 3/10/2022 9:10am - 9:35am	Corrosion Characterization And Performance Evaluation Of Co-Cr Alloys By Laser Powder Bed Fusion And	Reece Goldsberry, Krutibas Panda, Brendan Voglewede - Microstructural evolution and defect density of these AM parts are characterized in this study. The role of chemistry in the microstructure has been studied using energy dispersive spectroscopy (EDS) mapping and porosity quantification is studied using computed tomography (CT) scanning. The difference in the wear behaviors of these two families are characterized using low angle dry erosion tests. Comparison of their corrosion performance was performed by exposing them to alkaline brines with high concentration of chlorides typically seen in the drilling environment. The corrosion properties were studied using electrochemical methods such as open circuit potential, linear polarization resistance, and cyclic potentiodynamic polarization along with high temperature immersion testing.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	“Dollars & Cents - You Make The Choice: A Look At Elastomer Polyurethane Versus Epoxy Laminate L	Greg Hansen - The use of protective coatings is to enhance the durability of concrete structures by creating a barrier that will limit the penetration of water, acids, chemicals, solvents, and chlorides that will breakdown industrial or municipal infrastructure. Corrosion in concrete is not just caused by the constituents of wastewater, it can also be caused by the cleaning procedures of water treatment or MBR systems. Lining solution technologies presented included systems comprised of 100% solids epoxies, epoxy laminate alternatives and elastomer polyurethane applications. The purpose of this paper is to provide an understanding of two lining solutions: elastomer polyurethane and epoxy laminate systems. The paper will provide insight into the effects of corrosion on concrete infrastructures, identify the various lining solutions, compare and contrast the application techniques, cost structure, product performance in these environments and highlight project impacts of these solutio	Henry B. Gonzalez Convention Center	Symposia
Thursday 3/10/2022 9:25am - 9:50am	Shop Painting Vs Field Painting Of Steel Bridges The Pros And Cons	Charles Brown - The author looks at the recent trend of applying all three coats of paint in the shop versus painting just the primer in the shop and touching up the primer and applying the other 2 coats in the field. The paper reviews the pros and cons of shop versus field painting and touches on costs, underlying issues of shop versus field painting, quality control and repairs. The paper will also go over a recent job done in the shop and the problems that arose and what corrective action had to be taken in the field on a Maryland State Highway project.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	Cathodic Protection -Based Solutions For Corrosion Prevention Of “Green Aluminum” Alloys	Marco Bandiera, Arianna Pavesi, Bozhena Tsyupa, Andrea Bonfanti, Alessandro Mancini, Massimiliano Bestetti, Federico Bertasi - The manuscript investigates the use of cathodic protection -based strategies (e.g. sacrificial anodes) to prevent corrosion phenomena on two different secondary Aluminum alloys. Voltammetry and zero resistance ammeter (ZRA) -based methods are used to: a) asses the protection capability of Zinc-based sacrificial anodes; and b) experimentally determine the amount of Zinc required in order to protect a certain surface of each investigated secondary Aluminum alloy. As a deeper level of analysis, the manuscript examines the protection capability of sacrificial anodes when coupled with anodized secondary alloys. It is demonstrated that the synergistic effect due to the: a) presence of the oxide layer coating; and b) cathodic behavior of the protected specimens; allows to reduce the consumption rates of the considered sacrificial anode. Taken altogether, the work p	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	Highlighting The Use Of Brush Plating For Plating On Titanium, Nickel Plating, Copper Plating And Me	Joshua Thomas, Danijela Milosevic-Popovich - Selective or brush plating is an application method for electrodeposition which can be used for coating an array of pure metals, alloys, and composite materials. The ‘brush’ in brush plating describes a porous, non-conductive, flexible material which wraps the anode to keep it separated from the part to be plated. The plating solution is applied by rubbing the anode, covered with the brush material and saturated by the plating solution, against the area to be plated. This is done in lieu of dipping the entire part in a large tank of plating solution. Brush plating has seen its most advantageous use in plating smaller areas of larger parts because the amount of masking used can be reduced, and smaller volumes of solution can be utilized compared to traditional tank plating methods. Brush plating is portable and repair plating can be performed in the field, sometimes without even disassembling equipment. Brush plating is currently used for n	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	Effect Of Varying H2S Content On High Temperature Corrosion Of Austenitic Alloys In A Pyrolysis Proc	Manuela Nimmervoll, Gregor Mori, Roland Haubner, Stefan Hönig - Several austenitic high-temperature alloys were tested at laboratory scale under conditions simulating a thermal cracking process of post-consumer plastics. The test gas atmosphere consisted of 3.8 vol% HCl, 1.9 vol% CO2, 0.3 vol% CO, 2.8 vol% H2, bal. N2 and either of 0.02 vol% or 2 vol% H2S. Corrosion tests were performed at 580 °C for 240 h. After the corrosion tests the samples were analyzed by metallography, SEM/EDX and XRD. Additionally, the mass loss was evaluated. Results show that at 0.02 vol% H2S the mass loss decreases with increasing nickel and decreasing iron content of the alloys. At 2 vol% H2S the mass loss decreases with increasing chromium content. In general, the mass loss of the materials rises with increasing H2S content in the gas atmosphere. Degradation models for both test gas atmospheres are presented and the results are critically discussed.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	Can Micelles Be Used To Expedite And Enhance Laboratory Qualification Testing?	Scott Rankin, Andy Osnowski - The formation of corrosion inhibitor micelles in produced water can be used as an indicator of optimal dosage in a system. Prior to field use, tests are conducted in the laboratory on the relevant corrosion inhibitor, ideally in the presence of field hydrocarbon and other production chemicals. This ensures that the chemical and system are suitable and gives confidence that micelles will be detected, if present. During this pre-deployment testing, a corrosion inhibitor concentration series is created to determine the critical micelle concentration (CMC), i.e. the concentration at which micelles form for a given system. Other information is also provided, such as partitioning and potential influence of production chemicals on micelle formation. Lab qualification testing of corrosion inhibitors require significant time, instrumentation and skilled staff. Work has been conducted to determine if micelles can provide a higher throughput for compatibility test	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	How The Right Pot Choice And System Set Up Can Improve Blasting Efficiency Continued	David Barnes - In 2019 we looked at the various adjustable parameters that can and do affect the productivity (yardage), media usage and efficiency of a blasting operation. Air flow, nozzle pressure and nozzle size all contribute to the efficiency and yardage achievable by a blast pot. Pot and valve design will contribute both positively and negatively to these variables but correct set up is imperative for efficient blasting. Improvement in pot and valve designs can lead to huge gains for the blaster and with some simple, logical adjustment and/or upgrades the changes recommended here will help you get the most from your pot. In 2020 further tests were carried out to show that not only can these changes improve our blasting efficiencies but to investigate whether there is a high pressure “sweet spot” where we can optimise the efficiency of our blasting systems. This paper discusses these trials and the benefits that can be achieved.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	Corrosion Fatigue Of CrNi13-4 Martensitic Stainless Steel For Francis Runners In Dependency Of Water	Dagmar Rückle, Geert Schellenberg, Werner Ottens, Benjamin Leibing, Florian von Locquenghien - From an evaluation of a database, containing water quality data of worldwide hydro power projects, different water qualities were defined to perform low-cycle and high-cycle fatigue tests with the influence of a corrosive medium. In Hydro Power stations, acting as power reserve, longer standstill times can occur and the turbine may still be submerged in water. Therefor investigations for idle-time corrosion were performed. To identify corrosion critical chemical elements in different water qualities and to evaluate the corrosion behavior of Francis runner materials electrochemical polarization experiments were performed. For selected water qualities, material test results and SEM analysis will be presented and compared to available data.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	Failure Of In-Service Stainless-Steel Chemical Storage Tanks Fasteners And Gaskets – A Case Study	Tariq Kamshad - This paper demonstrates a case study associated with the improper installation of non stainless steel materials in chemical tanks against design specification, which explicitly called for the use of stainless steel fasteners and gaskets. An operating facility required the substitution of current chemicals with new ones, and as part of the management of change (MOC) process, the cleaning and inspection of the tanks were required. Internal visual inspection (IVI) of the tanks revealed severe corrosion of the tank internal fasteners, including fasteners supporting structural elements of the tank central periphery. Positive Material Identification (PMI) testing was conducted and concluded that chrome-manganese bolt nuts were used during construction stage which does not match with the design recommended material which is stainless steel AISI Type 316, ASTM A 193 GR. B7 and ASTM A 194 GR. 8M. The causal factors for the fasteners corrosion were determined to arise from galv	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:25am - 9:50am	External Stress Corrosion Cracking Of In-Situ Carbon Steel Pipelines	Duane Serate, Matthew Krantz, Yashar Behnamian, Haixia Guo, Victor Itulua, Simon YUEN - This paper summarizes the external stress corrosion cracking investigation of in-situ carbon steel pipelines. A total of xxx indications were found over xxx kilometres of pipelines in an inspection campaign between 2020 and 2021 using eddy current array. These indications range from xxxx length by xxxx depth. Extensive laboratory testing was performed to understand the corrosion mechanism with Cyclic Potentiodynamic Polarization (CPP) and Slow Strain Rate Testing (SSRT) of pipeline steel samples using leachates extracted from mineral wool samples from the field from different pipelines. Mineral wool leachate chemistries were also analyzed. Field Open Circuit Potential (OCP) measurements were also performed on the OD of the pipelines. A screening criteria is developed to determine which pipelines are susceptible to this damage mechanism, with recommendations on the inspection and maintenance strate	Henry B. Gonzalez Convention Center	Symposia
Thursday 3/10/2022 9:25am - 9:50am	Life Cycle Costs For Thermal Spray Zinc Duplex Coatings On Long Lifetime Steel Constructions	Martin Gagne, Ole Knudsen, Knut Ove Dahle - Thermal spray zinc (TSZ) duplex coatings have been shown to be highly durable, as evidenced by more than 50 years of successful use since first specified by the Norwegian Public Roads Administration (NPRA). The paper will summarize field examinations, maintenance costs, coating lifetime expectations and life cycle cost estimates for steel bridges as a function of the environmental corrosivity category (C1-C5), and make comparisons to alternative coatings that are less expensive to apply but that have shorter lifetime expectancy.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 9:35am - 10am	High Strength Austenite For Additive Manufacturing	Andreas Mohr, Horst Hill, Janosch Conrads, Karlheinz Hoeren - Stainless austenitic steels have a wide range of applications in the field of classic mechanical engineering, particularly due to their good formability and very good corrosion properties. An important representative of these grades is the material 1.4404 (316L), which has established itself as a standard steel in Additive Manufacturing. Typical stainless austenites are chemically structured as follows: The corrosion resistance of the material is primarily achieved by the element chromium (Cr). This causes a dense chromium oxide layer on the material surface based on a total chromium content of >12%, which prevents corrosion reactions. This chromium oxide layer is further stabilized by the element molybdenum (Mo). It has to be noted that the increase in corrosion resistance caused by Cr and Mo is only guaranteed if both elements are dissolved in the metal matrix. As a consequence, austenitic stainless steels are usually ch	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10am - 10:25am	Mechanical, Microstructural And Corrosion Characterization Of Low Binder Containing WC-Co Grades Usi	Reece Goldsberry, Krutibas Panda, Paul Prichard, Ed Rusnica, Jerry Dominguez, Zhuging Wang - Although several AM methods have been investigated to additively manufacture cemented carbides, the present study utilized a binderjet process to manufacture two relatively low binder containing WC-Co grades; WC-17%Co and WC-13%Co. The corrosion, and mechanical properties of AM cemented carbides grades were characterized in the present study. Corrosion properties of the AM grades as well as their equivalent grades fabricated using conventional PM route were compared using linear polarization resistance and cyclic potentio-dynamic polarization following methods outlined in ASTM G59 and ASTM G61, respectively, in neutral 3.5% NaCl solutions. Mechanical characterization was performed using fracture toughness testing per ASTM B771 as well as transverse rupture toughness testing per ASTM B406 on these grades. Optical and scanning electron microscopic techniques were further utilized to characteriz	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:10am - 10:35am	Cathodic Protection Monitoring In Water And Wastewater Systems	Jamey Hilleary - Web-based remote monitoring is widely used in the oil and gas pipeline industry in order to ensure corrosion protection systems are functioning reliably. The water and wastewater industry is not subject to the same regulatory mandates governing the oil and gas industry, but is no less a part of the critical infrastructure. As these systems age and fail, the effects go beyond cost and inconvenience into potentially significant public health and safety issues. The water and wastewater industries deal with different challenges than the oil and gas pipeline industry. The budgets available for equipment and personnel for corrosion management are significantly lower. The materials requiring corrosion protection are much more varied, and there are typically less personnel within the organization trained to meet and overcome the challenges of implementing and maintaining effective corrosion prevention systems. This paper shows some case studies of municipal water and wastewa	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:10am - 10:35am	Corrosion Inhibitor Surfactant Optimization: Part 1 - Inhibitor Efficiency Approach	Richard Woollam, Joshua Owen, Yasmin Hayatgheib, Richard Barker - A homologous series of alkyldiemthylbenzylammonium chlorides (BAC) was used as a model for a composite commercial corrosion inhibitor formulation. The homologous series consisted of three BAC with even alkyl chain lengths of 12, 14 and 16 units respectively. The critical micelle concentration (CMC) of each of the components was measured using the lipophilic dye Nile Red. The values of CMC were used as the basis for a 10 - point three component mixture experiment to determine the composition to achieve the ‘optimal’ corrosion inhibitor performance. The three component 10-point design was a simplex□centroid design augmented with three interior points to determine the concentrations used in the mixture experiment. The corrosion inhibitor performance for each mixture was tested in a 1% NaCl solution under approximately 1 bar partial pressure of CO2 at 30 °C. The corrosion rates before and after the injection of the corrosio	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:10am - 10:35am	Metal Dusting Resistance Of Nicrmocu Alloy And Its Weld Overlay Under High Pressure Condition	Bingtao Li, Vinay Deodeshmukh, Mathias Galetz - A new NiCrMoCu alloy has been developed to offer excellent metal dusting resistance by utilizing the effect of copper on inhibiting carbon deposition and graphite formation, and its weld overlay could be a cost efficient solution to provide corrosion protection. The current paper studies metal dusting resistance of the NiCrMoCu alloy and its weld overlay, which was applied by Gas Metal Arc Welding (GMAW) and Laser wire process on N06230 alloy plate, along with a wrought N06025 alloy for comparison. The metal dusting test was conducted in a CO-H2-H2O-CO2 gas with high carbon activity at 620°C and 18bar condition. The samples were periodically removed from the furnace to measure weight change and check metal dusting attack situation. After 790h exposure, the NiCrMoCu alloy and weld overlay showed excellent metal dusting resistance without metal dusting pits, while metal dusting attack was observed on the wrought alloys N06230 and N06025 a	Henry B. Gonzalez Convention Center		Symposia

Thursday 3/10/2022 10:10am - 10:35am	Laser Cleaning For Surface Preparation For Pre-Weld And Pre-Bonding Applications	Tyler O-Neill - As laser cleaning continues to gain popularity as a source for surface prep and coating removal, this study will explore the use of laser ablation to remove contaminant oxidation and other contamination from metallic substrates. While brazing and welding components don’t typically bond well to surfaces that contain oils, dirt, greases, lubricants, or oxides, laser cleaning systems have the ability to target coatings while having a minimal impact to the metallic substrates. This study will demonstrate how using laser cleaning technology can improve the surface free energy of a substrate and promote successful welding and adhesive bonding. While material properties drive the absorption abilities for substrates and coatings to absorb different wavelengths of laser energy, the process of ablation is caused when the laser wavelength is absorbed into the contaminant or oxidation coating. This high energy exchange causes the contaminants to rapidly change from a solid to a g	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:10am - 10:35am	Combining Thermal Spray Zinc And Hot-Dip Galvanizing To Achieve An All Metallic Zinc Coating System	Bernardo Duran - This presentation will discuss methods and strategies for combining thermal spray zinc and hot-dip galvanizing to create an all metallic zinc corrosion protection system. Hot-dip galvanizing is a mature industry and is commonly specified for infrastructure projects, whereas thermal spray zinc and its alloys are gaining traction with many asset owners and DOTs. This has created questions concerning how best to combine both systems for exceptional corrosion resistance and material durability. Topics covered include processing variations, application advantages for new versus rehabilitation projects, how material size affects preferred processing methods, general price differences, maintenance requirements, comparisons to competitive coatings, sample projects, and common specifications. Attendees will leave with an understanding of how best to combine metallic zinc coating systems and a list of non-promotional resources for specifying an all metallic zinc corrosion prot	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:10am - 10:35am	Importance Of Quality Control Of Wear Resistant Overlays In Oil Sands Production Operations.	Satya Kompally, Jeff Liu - Equipment and piping in Oil Sand operations subject to severe impact and abrasion wear while handling dry ore and wet slurry. Wear resistant overlays play very important role in extending the service life of various equipment and piping in Oil Sand production operations. Chromium Carbide and tungsten carbide overlays are widely used to increase the wear resistance of equipment and piping. Bonding with base material, under-bead cracking, overlay chemistry, carbide distribution, dilution, through thickness hardness are main factors in determining the service life of overlays. Qualification testing and production testing are very important in increasing the durability. The service life of overlays depend on quality control process adopted during their production. Some typical field failure cases due to poor-quality overlays will also be discussed.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:10am - 10:35am	Review Of Techniques To Evaluate SCC Susceptibility Of Carbon Steels Used In Construction Of Nuclear	Brandon Rollins, Sandeep Chawla, John Beavers, Joe Gerst, Narasi Sridhar, Jason Page, Crystal Girardot, Shawn Campbell - Stress corrosion cracking (SCC) is a documented threat to the integrity of carbon steel radioactive waste storage tanks. Presently, the slow strain rate (SSR) test is the workhorse test technique used for assessing SCC of carbon steels in nuclear waste simulants. The main advantages of the standard SSR technique are that it is relatively rapid, sensitive in detecting SCC, and inexpensive. SSR test results are typically classified as “SCC” or “No SCC”. Occasionally tests are not easily classified, which results in a third category, “Inconclusive”. Inconclusive results are usually related to variations in ductility parameters compared to the control specimen, or the presence of atypical fracture facets or secondary features on the gage section. Regardless of the cause of the inconclusive result, these tests create uncertainty in assessing susceptibility to SCC. This	Henry B. Gonzalez Convention Center		Symposia
Thursday 3/10/2022 10:30am - 12pm	QP General Subcommittee		Henry B. Gonzalez Convention Center	Room 225 B	Other

Thursday 3/10/2022 10:35am - 11am	The Effects Of Different Blast Abrasives On The Performance Of Liquid-Applied Epoxy Pipeline Coating	Haralampos Tsaprailis, Shan Rao - The significance of surface preparation on the success and lifetime of protective coatings is well-recognized. On this account, blast cleaning is routinely used for achieving the required surface conditions prior to the application of a coating. Despite having been utilized for about 150 years, a literature review revealed that little attention was given to the effects of different blast abrasives on coating performance. It is somehow self-evident and accepted by most professionals that all abrasives would provide similarly optimized surfaces, as long as the right size of abrasive is selected and the proper surface preparation technique is implemented. Thus, more focuses have been placed on characterizing surface roughness and identifying effective profile parameters, etc. This paper presents the results of a comprehensive experiment carried out on two representative liquid-applied epoxy pipeline coatings applied over 15 different surfaces that all	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:35am - 11am	Evaluation Of Pitting Penetration Associated With Steel Exterior Of Hanford Tanks	Kenneth Evans, Sandeep Chawla, Narasi Sridhar, Brandon Rollins, John Beavers, Katie Sherer, Jason Page, Crystal Girardot - Radioactive and chemically hazardous wastes are stored at the Hanford site in underground double-shell tanks (DSTs) constructed of carbon steel. The corrosion management of these tanks has largely focused on the complex waste chemistries that are contained in the primary tank. More recently, attention has been given to the corrosion that has been found on the exterior of the secondary liners of the DSTs. The cause of the external corrosion seems to be related to the intrusion and accumulation of water in the tertiary leak detection systems, which exist under the concrete foundation of the DSTs. The external corrosion has led to significant wall-loss (up to 70%), which has occurred in a localized manner (broad pitting). In addition, site measurements have indicated that the most significant areas of wall-loss are aligned with the slots (drain channels) of the conc	Henry B. Gonzalez Convention Center		Symposia

Thursday 3/10/2022 10:35am - 11am	Proposal Of 18Cr-8Ni Based Austenitic Stainless Steel With Superior Stress Relaxation Cracking Resis	Takahiro Osuki, Yuhei Suzuki, Shinnosuke Kurihara, Toshihide Ono, Masaki Ueyama - It has been known that Stress Relaxation Cracking (SRC) occurred in welded joint or cold deformation area is severe problem for stabilized operation in hydro-treating or hydro-cracking processes in a complex refinery etc. For example, in Paper No.07423 reported in NACE CORROSION 2007, TNO Science and Industry investigated the SRC ranking of heat resistant alloys and the mechanism of SRC within Joint Industrial Programme (JIP). They clarified that the major mechanism is due to the formation of both precipitation hardening along dislocations and precipitation free zone along M23C6 carbide at grain boundary during stress relaxation process within the temperature range between 550□ and 750□. Especially, S34709 or S30409 indicates higher SRC susceptibility compared with S31609, which are required Post Weld Heat Treatment (PWHT) to prevent SRC. Therefore, the customers or fabricators using S34709 or S30409 ha	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:35am - 11am	Corrosion Inhibitor Surfactant Optimization: Part 2 – Adsorption Kinetics Approach	Richard Woollam, Joshua Owen, Yasmin Hayatgheib, Richard Barker - In Part 1 the CMC and corrosion inhibitor efficiency response curve was estimated for the homologous series of alkyldimeththylbenzylammonium chlorides of alkyl chain lengths of 12, 14, and 16 units respectively. In Part 1 the uninhibited and inhibited corrosion rates were used to estimate the corrosion inhibitor efficiency. In Part 2 the transient data between the uninhibited corrosion rate and the inhibited corrosion rate was used to estimate the rate of change of surface coverage. The coverage rate curve was analyzed in terms of mix first and second order adsorption kinetic model in order to derive the adsorption and desorption rate constants, and the order weighting factor between first and second order. As with Part 1 the adsorption rate constants were determined for a 10□point three component simplex mixture experimental design. Cubic response curves were calculated for the adsorption and desorption rate constants	Henry B. Gonzalez Convention Center		Symposia

Thursday 3/10/2022 10:35am - 11am	Investigation On The Localized Corrosion Performance Of Lean Duplex Stainless Steels In Urban Wastew	Audrey Allion, Nicolas Larche, Benoit Emo, Elisabeth Johansson, Dominique Thierry - The present paper deals with the localized corrosion performance of lean duplex (S32101, S32202 and S32304) in solutions simulating pre-treatment unit waters, using electrochemical testing. The localized corrosion was compared with austenitic stainless steels (S30403 and S31603) and with more alloyed duplex grades (S82441 and S32205). Pitting corrosion methods were adapted from standard electrochemical test methods ASTM G150 for evaluating critical pitting temperature (CPT) and ASTM G61 for assessing pitting potential (PP). Environmental parameters, chloride content and pH for both methods and temperature for pitting potential test, were selected to be representative of the different environments that can be encountered in urban wastewater treatment plants. All the results permit to have an overview of corrosion properties according to the environmental parameters and to choose properly the best sta	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:35am - 11am	Severe Pipe Damage In SAGD Steam Distribution Lines	Haixia Guo - In Oil Sands SAGD (Steam Assisted Gravity Drainage) operation steam is injected into underground oil sands deposits to heat the bitumen locked in the sand and allow it to flow well enough to be extracted. Depending on the design of the SAGD facility, the steam distribution system can include hundreds of meters or kilometers long of piping/pipeline conveying steam from the plant. The reliability and integrity of this steam distribution system is critical for SAGD operation. This paper reports severe damage found at the high pressure steam distribution system in a SAGD facility. The morphology, distribution and features of the damage and the associated process conditions are summarized. The potential damage mechanisms and contributing factors are analyzed. A damaged mechanism similar to conventional FAC (Flow Accelerated Corrosion) but under unique process conditions, i.e. un-conventional FAC with high temperature, high pH, low water quality, and reducing conditions, is de	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 10:35am - 11am	Calcareous Deposition On Thermally Sprayed Aluminium Surfaces	Mobin Salasi, Edgar Hornus, Yu LONG, Francisco Vouilloz, Mike King, Kjetil Andersen, Ola Krosness, Roy Johnsen, Mariano Iannuzzi - Previous studies revealed the formation of calcareous deposits on thermally sprayed aluminium (TSA) coated surfaces immersed in natural seawater and connected to a cathodic protection system. Calcareous deposition occurred even though TSA coatings have a lower cathodic overpotential compared with carbon and stainless steels, which should reduce the thermodynamic precipitation driving force. There is at present limited knowledge on the calcareous deposits' formation kinetics on TSA in natural seawater following prolonged exposure at different temperatures. In this study, bare 25Cr super duplex stainless steel (SDSS) and TSA-coated SDSS samples (with and without an epoxy-based sealer) were exposed to natural seawater under impressed current cathodic protection (CP) and open circuit potential (OCP) conditions at different temperatures (i.e., 20, 35, 60 and 8	Henry B. Gonzalez Convention Center		Symposia

Thursday 3/10/2022 10:45am - 11:10am	Investigation Of Corrosion In WAAM Manufactured Materials	AISHWARYA Aishwarya - To develop the commercial applicability of WAAM, there is a crucial need to understand the corrosion aspect of the components in order for industry acceptance. It is well-understood that WAAM process has a complex thermal process, resulting in unique microstructures and material surfaces. Hence, a comprehensive review of the resulting microstructural evolution and corrosion resistance of the printed alloys from the WAAM process has been presented. It was found that the current studies on corrosion resistance are focused on Steel and Nickel-based alloys due to the possibilities of industrial applications. However, the understanding of the corrosion resistance and corrosion testing is still lacking for the mechanisms that the metal alloys are susceptible to. Development of various standardised corrosion testing for the metal alloys is necessary to optimize particular WAAM applications based on requirement.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11am - 11:25am	Upcoming Changes To NSF Drinking Water System Components Program (NSF 600) - No Need To Be Afraid	Steven Roetter - By now, most in the water industry have heard about the new NSF 600 standard that will take effect on Jauary 1, 2023; but there is significant uncertainty among tank owners and specifying engineers as to how this new standard will impact the coating of water tanks in the near term and future. This paper will discuss the differences between NSF 61 and NSF 600, analyze how these changes will impact current technology and legacy tank coatings, and discuss solvent borne coating technologies being developed to comply with the new standard. While this paper will adress the technological impacts of this standard, it will also adress the paractical considerations related to tank owners and specifiers.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11am - 11:25am	Effect Of Hydrophobic Interaction On Corrosion Inhibitor Efficiency	Susumu Hirano, Ayano Yasui, Hirotaka Mizukami, Sei Tatsuya, Toshiyuki Sunaba - The surfactant is well known as an active ingredient of corrosion inhibitors, however, the molecular structure and its dosage of commercial inhibitors are not disclosed for users. The performance of commercial inhibitors was studied treating the whole aspect of inhibitor as a kind of surfactant. The corrosion rate was measured in an autoclave using an electrochemical measurement namely Linear Polarization Resistance (LPR) with an oil flowline condition solution. Firstly the corrosion rate was measured only with a corrosion inhibitor, and a hydrocarbon solvent was added afterwards. The decrease of the corrosion rate was observed after an addition of the solvent. Aromatic and aliphatic solvents with different octanol-water partition coefficients, Kow, were tested in the same manner. The inhibitor efficiency was saturated effectively after the addition of a solvent with high Kow. The compatibility with a specif	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11am - 11:25am	Tank Waste And Ground Water Effects On The Corrosion Susceptibility Of The Secondary Liner Of Hanfor	Sheewa Feng - The primary liner failure event of double-shell Tank 241-AY-102 observed in 2012 resulted in direct contact of tank waste to the inside surface of the secondary liner. The potential also exists for ground water to contact the outside surfaces of all double-shell tank secondary liners. The contact of the secondary liner with tank waste and ground water led to the need to evaluate the corrosion susceptibility in these environments. Work was performed at the 222-S Laboratory to simulate double-shell tank secondary liner steel exposed to refractory wetted with tank waste. In addition, simulation of secondary liner steel exposed to ground water in a tank’s concrete base and leak detection channels was performed. The double-shell tank secondary liner in contact with ground water is much more susceptible to corrosion compared to the same material exposed to tank waste. The alkaline condition and the presence of nitrite as a corrosion inhibitor in the tank waste may have contr	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11am - 11:25am	Simulation Of The Damage Tolerance Of Thermal Spray Aluminium Sacrificial Coating In Artificial Seaw	ADRIANA CASTRO VARGAS, Shiladitya Paul - Numerical simulations were conducted to understand the behaviour of sacrificial aluminium coatings obtained by arc spray with varying areas of damage and its capacity to polarise the steel under a simulated marine environment. The damage tolerance of a selected sacrificial coating of aluminium alloy AA 1050 with 300 µm in thickness was evaluated using 5%, 20%, 50% and 90% exposed steel surfaces configured in a time-dependent model. Arbitrary Langrangian Eulerian (ALE) was used as a moving mesh technique to simulate the consumption of the TSA coating surface. Cathode surface, in this case, steel exposed, is assumed non-deforming in the model. The simulations were compared with experimental measurements of open circuit potential (OCP) and corrosion rate from previous studies from the group, where the electrochemical behaviour of TSA with exposed steel surface was evaluated over different periods of time in artificial seawater. The corrosion rate	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11am - 11:25am	Wear Performance Evaluation Of Chrome Carbide Overlays (Ccos)	Md. Aminul Islam, Jiaren Jiang, Yongsong Xie - Due to their outstanding wear performance, chrome carbide based overlays (CCOs) are widely being used in the oilsands industry for slurry handling equipment. However, volume contraction during cooling of the welded overlay results in the formation of longitudinal cracks in the weld deposit known as ‘cross-checks’. These stress relief cracks are beneficial in the hardfacing as it minimizes the risk of hairline cracks under the deposit, which can result in spalling during service. However, these possess a unique challenge for the erosion-corrosion performance evaluation of CCOs in the lab. Exposed surface cracks in the weld deposit results in significantly higher corrosion rate (i.e. crevice, galvanic corrosion) during testing. NRC’s mining wear and corrosion laboratory has developed a procedure to minimize the effect of localized corrosion during electrochemical testing. Following this new procedure, erosion-corrosion performance of four	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11:10am - 11:35am	Material Capabilities Of Additively Manufactured Alloy UNS N07718 In An H2S-Containing Environment	Wei Chen, Thomas Dobrowolski, Satya Ganti, Tim Haeberle, Aaron Avagliano, Anjani Achanta - The objective of this paper is to critically assess the capabilities of AM 718 of different processing conditions for H2S-service. First, the effects of feedstock, printing, and heat treatment on the mechanical properties and microstructure of AM 718 are evaluated. Second, AM 718 of select processing conditions are tested under slow strain rate tension (SSRT) at the AMPP MR0175/ISO15156 sour service limit of UNS N07718 of 300°F (149°C). Results are compared to wrought 718 of API 6ACRA 120K grade. Detailed characterization of materials and degradation mechanisms will be presented to support the discussion of developing the optimum processing routes of AM 718 for H2S-service.	Henry B. Gonzalez Convention Center	Symposia
Thursday 3/10/2022 11:25am - 11:50am	Primer For The Inspection, Testing, And Analysis Of Electrically Continuous Reinforced Concrete Stru	Samuel Rivera - This paper will present field verified methods for corrosion engineers and technicians to accurately inspect and log structure configuration, field conditions and perform field tests to verify electrical continuity prior to concrete operations (prepour testing). Additional topics will include troubleshooting as it pertains to prepour testing and also if a structure has already been poured (postpour) whether it was previously tested or not. The concluding topic will address the utilization of project documents such as structural and shop drawings to extract relevant rebar information used in the creation of theoretical resistance and when to use either a standard mathematical analysis or SPICE simulation software to develop said theoretical resistance as a computer model.	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11:25am - 11:50am	Residual Analysis Assay For Thiol-Based VCI Quantification In Top-Of-Line Corrosion Environments	Mariana Folena, Joshua Owen, Iain Manfield, Hanan Farhat, Anne Neville, Jose Antonio Gomes, Richard Barker - CO2 Top of line corrosion (TLC) poses a significant problem in oil and gas fields, resulting in both economic losses and health and safety issues. The use of conventional corrosion inhibitors does not typically ensure effective protection against this particular type of corrosion, limiting the working lifetime of carbon steel pipelines. The main chemistry of inhibitors used for such application relies on volatile chemicals that can be transported through the vapour phase to reach the top of the pipeline. Studies have shown that alkanethiol compounds may form self-assembled monolayers in acid environments with good efficiency in mitigating steel corrosion. Recently, long chain size thiols (> C6) have been investigated as potential volatile corrosion inhibitors (VCIs), demonstrating good efficiency. This work seeks to evaluate the efficiency, mechanism and partitioning behaviour	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11:25am - 11:50am	Effective SCC Inspection Of In-Situ Oil Sands Pipelines Using Advanced Eddy Current Array Technology	Michael Sirois, Mathieu Bouchard - This paper summarizes the successful deployment of advanced Eddy Current Array (ECA) probes in the inspection of intergranular stress corrosion cracking (IGSCC) appearing on the external surface of above ground in-Situ pipelines. During an inspection campaign between 2020 and 2021, mainly carried on emulsion and produced gas pipelines, a total of xxx indications were found over xxx kilometres of pipelines. These indications range from xxxx length by xxxx depth. The technology provided the pipeline operator a fast method for scc detection that lead to cost-effective inspection and maintenance planning, while preventing the risk of loss of product containment (lopc).	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11:25am - 11:50am	Suspension-High Velocity Oxy-Fuel Spray Tio2 Coatings And Their Corrosion Behaviour	Garima Mittal, Alex Sabard, Imran Bhamji, Shiladitya Paul - Ceramic coatings are commonly used as barrier coatings to protect the metal surface against corrosion due to possessing better wear, corrosion and heat resistant properties than metals. Titanium dioxide is one of the extensively used ceramic coatings for a broad range of applications including solar cells, self-cleaning, air purification and biomedical applications. Since coating microstructures and properties vary with the deposition method, thermal spray coatings are very promising in terms of corrosion and wear resistance. High-velocity oxy-fuel (HVOF) spray method is a commercially used eco-friendly coating method that provides better control over coating properties. Here, TiO2 coatings were deposited on carbon steel substrate using suspension-HVOF spray. Commercially obtained aqueous suspension of TiO2 nanoparticles was used as a feedstock material. The phase analysis of deposited coating material was done using XRD, an	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11:35am - 12pm	Performance Of Additively Manufactured Alloy 718 In Sour Service	Liu Cao, Christopher Taylor - Precipitation hardenable nickel alloys are commonly used in oil and gas production equipment where materials must provide both outstanding mechanical strength and corrosion resistance. Additive manufacturing (AM) provides a new approach to the design and manufacture of components from metal powder and provides some unique advantages over traditional manufacturing. However, components produced by AM are not currently acceptable per NACE MR0175/ISO15156 since no AM alloys have been balloted and approved for inclusion. There are uncertainties and knowledge gaps around the performance of AM material in sour service. AM Alloy 718 (UNS N07718) test material was manufactured by laser powder bed fusion (LPBF) with final heat treatment per API 6ACRA 150K designation by three suppliers. After benchmarking the basic mechanical properties in air, the AM Alloy 718 test material was evaluated by slow strain rate (SSR) testing, four point bent (4-PB) testing and proof	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 11:50am - 12:15pm	Development Of Methodologies For Continuous And Batch Inhibitor Film Persistency Investigation In Th	Mengqiu Pan, Kasra Shayar Bahadori, Maryam Eslami, Bruce Brown, Marc Singer, David Young - Organic corrosion inhibitors (CI) are widely used in the oil and gas industry to mitigate corrosion in pipeline transmission systems. Upstream, there are two distinct internal corrosion mitigation methods using inhibitors: continuous injection and batch inhibition. Each treatment mode has its own challenges, requiring specific knowledge; for example, interrupted continuous injection or irregularity in batch inhibitor application frequency requires knowledge of inhibitor film persistency. The performance of applied corrosion inhibitors is typically evaluated in laboratory conditions, prior to field application. This study is focused on development of methodologies to investigate inhibitor film persistency using inhibitor model compounds, possessing only one molecular type, in both continuous and batch inhibition. For persistency studies relating to continuous treatment, experiments were divided	Henry B. Gonzalez Convention Center	Symposia

Thursday 3/10/2022 1pm - 1:25pm	Development Of Multilayer Coating Systems For Self-Healing Protection And Corrosion Mitigation In Th	Adamantini Loukodimou, David Weston, Shiladitya Paul, Dimitrios Statharas - This work investigates the formation of microcapsules loaded with corrosion inhibitor, which is acting as a self-healing system. After their formation, they are mixed in a waterborne paint (low in volatile organic compounds (VOCs) content) in different amounts and are applied on metallic substrates (carbon steel). Based on the literature Zn/Al coatings provide good corrosion protection for metallic substrates, acting as a sacrificial layer, hence their usage offers an additional protection. In the three-layer system of metallic coupon, Zn/Al coating and enriched paint, deliberated scratches will be introduced, to estimate the self-healing efficiency of it. Also, Electrochemical Impedance Spectroscopy (EIS) tests are performed for the evaluation of the anti-corrosion performance of the protective coating. This ongoing research demonstrates the efficacy of these agents and shows potential for future real-world	Henry B. Gonzalez Convention Center		Symposia
Thursday 3/10/2022 1pm - 5pm	- Oil & Gas Production Materials and Test Methods Information Exchange Session		Henry B. Gonzalez Convention Center	Room 214 D	Technical

Thursday 3/10/2022 1:25pm - 1:50pm	Coatings To Regulate Scaling In Geothermal Applications	Shiladitya Paul, Alex Sabard, Briony Holmes - This paper explores the possibility of using thermal spray and brush applied coatings of inorganic and organic nature (respectively) to engineer the substrate surfaces and modify the scaling behaviour in simulated geothermal environments. The coatings were pre-selected based on the performance data in literature, ease of application, availability and cost. The philosophy was to select coating types that facilitate and/or retard the formation of surface scales. Carbon steel substrates with different coatings were prepared and the water contact angle measurements were carried out. These measurements provided an indication of possible hydrophobicity or hydrophilicity of the coatings, and allowed further down-selection in conjunction with coating adhesion data. The down-selected coatings were tested in simulated scale-forming conditions for at least 168h followed by detailed post-test characterisation (photography, light and electron microsco	Henry B. Gonzalez Convention Center		Symposia