2019 IPEIA Technical Program - Abstracts at a Glance

January 14, 2019 - subject to change

Item	Presentation Name	Abstrac	Name of	Company
2019_AB001	**Root Cause Analysis Made Simple – Driving Bottom Line Improvements by Preventing One Failure at a Time**	Many maintenance & reliability staff are so busy fixing problems that they never get the chance to prevent them. In a reactive work environment, there is simply no time to spare. Root Cause Analysis (RCA) gives us an easy to implement approach to preventing failures that integrates with our current troubleshooting efforts and drives bottom line business improvement. We can make our workplaces safer by reducing the number of unexpected failures while improving our business performance through increasing our facility's throughput and reducing the money spent on repairs – straight to the bottom line.	Lubell, Susan	Steppe Consulting Inc.
2019_AB003	**Standardization of NDE: How to ensure the correct NDE method and correct location is inspected every time.**	With the ever evolving landscape of Company and Industry Standard updates, asset acquisitions, and talent natural attrition; how does one ensure the long-term repeatability of NDE inspections of pressure equipment? One of the cornerstone principles (especially in measuring Long Term Corrosion Rate) is to repeat the same inspection method on the same physical location of the pressure equipment. Particularly with conventional NDE (RT and UT) of pressure piping, there is a strong foundation in HOW to perform the NDE (ie. calibration standards, NDE technician certifications, etc), but how does one ensure the repeatability of WHAT is inspected (ie. specific location of UT grid scan, size and orientation of UT scans, angle of RT image, etc.) in the long term periods of 5, 10, or 15 years? This presentation outlines a number of key principles to help guide pressure piping NDE standardization and a case study deep-dive into how it has been implemented in the past.	Brown, Jeremy	Vision Integrity Engineering Ltd.
2019_AB004	**Assessing performance of a corrosion control program & incorporating data analytics**	To optimize Asset Integrity Management (AIM) programs both the inspection and corrosion control programs should be interactive and proactive. This will help companies to move away from high OPEX costs and reactive programs with high volumes of unnecessary inspection (searching for corroded equipment); towards really understanding and managing their process conditions and how this impacts the likelihood and severity of internal damage mechanisms. By gathering and assessing data collected from various sources and understanding the actual corrosion properties of the process both through data trending and visualization, the effectiveness of the corrosion control program can be evaluated with recommendations to further improve it. This presentation will cover a case study that looks at the corrosion profile of a production process train on an upstream facility. It will walk through both the review process, visualization of results through an overview of the facility (via PFDs) and also includes an economic assessment looking at the associated costs for maintaining or improving a corrosion control program against losses caused for downtime repairing equipment.	Davidson, Jamie	Lloyd's Register Energy Americas, Inc.
2019_AB005	**Plant Wide CCD/IOW Implementation Process**	API 970/584 (Corrosion Control Documents/Integrity Operating Windows) are becoming a valuable resource in a Refinery Mechanical Integrity Program. The ability to usefully identify Unit Corrosion Loops and document the expected Damage Mechanisms is critical for Risk Based Inspections. When overlaid with susceptibility to both normal and process upsets conditions, this becomes a benchmark for turnaround planning improvements in plant reliability programs. This paper will summarize a Plant wide approach toward this process. One will be an orderly progression for a single Plant conducting RBI on most of the operating units and moving to CCD/IOW as part of a robust Mechanical Integrity program.	Nugent, Michael	Irving Oil, Ltd. and Equity Engineering Group
2019_AB006	**Fitness-for-Service Case Studies in HTHA Equipment**	Improvements in Non-Destructive Examination (NDE) and Fitness-for-Service (FFS) have been developed in the area of High Temperature Hydrogen Attack (HTHA). The NDE advances have greatly increased the accuracy of and confidence in HTHA detection and sizing and have therefore allowed FFS evaluations of equipment that were not technically feasible just a few years ago. This paper will deal with case studies involving inspection planning using flaw and detection tolerance, remaining life dependent on inspection intervals, Minimum Pressurization Temperature (MPT) considerations, Post Weld Heat Treatment (PWHT) considerations in pressure vessel repairs of aged HTHA equipment and other operational concerns for Pressure Vessel equipment via API 579.	Prueter, Phillip	Equity Engineering Group
2019_AB007	**Ammonia Fleet Wide HTHA Risk Assessment by Latest Methodologies**	Understanding the risk of assets with regard to High Temperature Hydrogen Attack (HTHA) has been a challenge for individual sites as well as major international Owner-Users. In this paper, a corporation wide assessment at 10 different production sites on four different continents will be presented. This assessment utilized the most recent HTHA damage progression modeling technology in order to create a methodology to risk rank. The outcome of the study was used by the client to supplement their internal criteria that was prior used for an independent assessment. The outcome of the project allowed the owner/user to better prioritize future actions such as replacement and inspection. A high-level overview of this process will be discussed.	Nugent, Michael	Yara International
2019_AB009	**Buried Ultrasonic Corrosion Monitoring Sensors for Midstream Asset Integrity**	In response to new PHMSA and DOT regulations around continuous internal corrosion pipeline monitoring, many operators are using both wired and wireless ultrasonic sensors for both buried and above ground assets between regularly scheduled in-line inspections (ILI). The ease of deployment coupled with the durability and flexibility of the different sensor platforms is allowing single point, multi-point, or area monitoring of critical asset locations. Sensor are being deployed predominately for two different scenarios: • New Construction: For areas which have been identified as low spots or potential troublesome locations during pipeline plotting. • Asset Integrity Monitoring: For areas which have been identified by smart pigs or ILI. If a section has leaked or is in need of fix, sleeve, or repair, sensors are installed in the area where the asset failed previously. For pitting or 'low spots' which have been identified by the mass screening, sensors are placed on the areas which are marked to monitor the anomaly. This allows the asset owner to keep regularly scheduled ILIs as they are monitoring these low spots between inspections. In either case, these sensors are able to provide critical data around episodic or gradual ware of the asset due to microbiologically induced corrosion, chemical inhibitor effectiveness, and frequency of required cleaning. This paper will cover the sensor technology, deployment, and case studies around how the technology has helped owner/operators better protect their critical midstream assets.	Strachan, Steve	Sensor Networks, Inc.

2019_AB012	**The Importanced of Post Welding Pickling for Duplext Stainless Steel**	Petrochemical industry is expanding on using duplex stainless steel for exchangers, piping, vessels and other applications. However, there are variations between the different petrochemical manufacturers' specifications when it comes to purchasing, fabrications, welding, etc. Since some specifications lacked critical details, failures occasionally occur. An example will be presented of a duplex stainless-steel (DSS) piping spool, with 168.3 mm (NPS 6) nominal outer diameter was failed through wall circumferential linear opening at the 6 o'clock orientation. The failure was located adjacent to the weld joining the straight pipe (DSS) section to the flange (DSS). Upon failure analysis, band of heat discoloration (heat tinting), was noted next to the weld joining the flange and the straight pipe section. It appeared that post welding treatment such as picking was not performed hence a chromium-rich scale, which is typically not very protective, impaired the corrosion resistance of duplex stainless-steel welds. Therefore, it is important to pay special attention to stainless steel welding procedures and influence the weld procedure details that the manufacturers might be offering.	Samson-Ovia, Richard	NOVA Chemicals
2019_AB013	**Mobilization of the Asset Integrity Program**	Traditional field inspections and testing have been paper based. Technological advances now are contributing to the quality and efficiency of the field MI program. This presentation will discuss how advances in inspection and testing data gathering and reporting is leading to better quality and efficiency. The mobile devices allow almost real time engineering analysis and field data gathering. This presentation will also discuss how data analysis is contributing to more predictive MI programs. Currently huge amount of data can be collected and predictive analytics can be utilized for better life assessments of critical equipment. Mobile field technology is contributing to both data gathering and data analysis to increase program efficiencies and minimize wasted time and resources.	Davis, Russ	Mistras Group
2019_AB014	**Revising API RP577, Welding Processes, Inspection, and Metallurgy**	Notes taken while working with the Task Group updating RP 577 (Welding Processes, Inspection, and Metallurgy). There has been some significant discussion related to the purpose of this practice, and the new edition will reflect the clarifications. Distinction between RP 577 and the related RP 582 (Welding Guidelines for the Chemical, Oil, and Gas Industries) will be included during the 3rd edition development.	Yoakam, Josh	HollyFrontier Corporation
2019_AB018	**Resources for Fixed Equipment Mechanical Integrity - Why Do We Need So Many? Past vs. Present**	This presentation will indicate why operating sites need more resources (human and monetary) to provide fixed equipment mechanical integrity (FEMI) today versus 30+ years ago. I will cover most of the major FEMI changes in the oil, chemical and gas industry in the last 30+ years that strain our budgets and staffing levels, including: how our codes/standards have changed; how our business environment has changed; how our record-keeping and data analysis has changed; how our process conditions have changed; how our inspection planning efforts have changed; how our NDE tools/techniques have changed; how the public attitude toward our business has changed. All of these issues and more have impacted the needs for resources that need to be employed to protect and preserve FEMI in order to minimize the chances for loss of primary containment (LOPC). I will indicate what we need to do to minimize even further, minor leaks that were thought to be acceptable 30+ years ago. We now have to focus beyond just the prevention of major process safety events from fixed equipment. I will address why this is necessary and how the industry is responding.	Reynolds, John	Intertek AIM
2019_AB021	**Tank tales: Cases of Failures and Damage of Storage Tanks**	Tanks are ubiquitous and essential in our industrial societies. We use them to store hydrocarbons, industrial goods such as sulphuric acid, agricultural products, and many other products including our waste. When they fail, the consequences are dire due to the large volumes of products they store, and their potential explosive and toxic nature. Some tank failures are well known even to the public (the distilling tank with molasses which failed in 1919, the Bhopal tragedy in 1984, the sulfuric acid storage tank failures in 2001). For tanks to perform properly, design, service knowledge and a great deal of know-how are needed. The damage and failures discussed in this presentation underline that a great deal of know-how is needed for tanks operate reliably. Specifically, the cases presented illustrate considerations of the shell to-roof welds, the fabrication of new tanks and their testing, welding and testing drain nozzles in large steel tanks, repairs once tanks have been in service, installation of fiber reinforced plastic tanks, tank floor process side pitting, and tank floor cracks. They highlight key factors on the performance of tanks important for personnel in charge of equipment reliability.	Benz, Ana	IRISNDT Corp.
2019_AB026	**Asset Integrity Optimization in the Oil Sands through Risk Based Inspection - Case Study**	Risk Based Inspection is a unique approach and mindset to asset integrity management with the potential to unlock financial returns without compromising safety. Using proven industry best practices, it has the ability to prioritize integrity resources into areas where they will be most effective. Once implemented, the RBI program produces a dynamic sight of the facility's health and provides an efficient schedule to prevent repetitive and unnecessary inspections. This case study focuses on a successful implementation project, including the initial benefits of a Risk Based Inspection program, the importance of continuous improvement through evergreening, and how it can become a multidisciplinary overhaul for operators.	Del Nero, Victor	Lloyd's Register
2019_AB027	**Going Beyond Typical Failure Analyses**	The ultimate goals after completion of failure investigations are the prevention of future incidents, injuries, fatalities, and clean-up costs. Additional goals include the minimization of production interruptions, unavailability of the asset, regulator penalties, stressful work under a regulator's timeline and potential pressure from media and the public. Root cause failure analysis methods can be used to complement failure investigations by addressing culture, normalization of warning signs, operation outside design limits, production pressures, training and competence and many other potentially preventive actions. Two examples of the application of root cause failure analysis will be presented to demonstrate preventive value for equipment owners.	Gareau, Frank	Skystone International LP
2019_AB029	**Application of LIDAR for Improved Piping Integrity Assessments**	High energy piping in power generation are subject to movement during thermal transients and abnormal operation. Determining the immediate and long term negative effects of abnormal and transient operations on high energy piping can be difficult. Data is currently limited to pipe hanger measurements, physical assessment of the piping, and visual examination of structures near pipe that have been damaged because of abnormal piping movements. The consequence of failure for high energy piping can be severe and the effect of unexpected or unknown displacements cannot be quantified when estimating remaining life.	Rosinski, Stan	Electric Power Research Institute

2019_AB030	**Dynamic RBI – addressing non-linear behavior and data uncertainty**	Current risk-based inspection (RBI) assessment practices, whether quantitative, semi-quantitative or qualitative, have one issue in common: they are static and do not address data uncertainty. We assume that corrosion rates are linear and that the probability of failure is constant, while not addressing data variability. In reality, we are presented with a snapshot of equipment and piping conditions that do not accurately reflect changing failure dynamics, inconsistent inspection quality and varying levels of maintenance efficiency. To address these shortcomings, Wood's integrity specialists propose moving from a static to a dynamic RBI assessment approach based on Monte Carlo simulation techniques, which use computational algorithms with repeated random sampling to achieve more-realistic risk assessments. This presentation will demonstrate how the current RBI requirements and principles embodied in standards such as API 580 and API 581 can be met while also addressing data uncertainty, non-linear degradation and variable maintenance and inspection effectiveness.	Hall, Steve	Wood
2019_AB032	**Performance-Based Assessment of an Incinerator Stack Using Field Measurements**	ASME STS-1 provides guidelines for the design, fabrication, and erection of steel stacks, however there are no specific guidelines for the assessment of guyed steel stacks already in service. Furthermore, existing literature regarding the proper re-tensioning of guy wires is scarce or nonexistent. This procedure is particularly important for stacks that experience significant thermal growth. This effect is further exacerbated by directional wind cooling effects. This presentation summarizes the effect of guy wire spacing, position, tension pattern, and operating and shutdown tension settings on the structural response of a guyed steel stack. Field tension measurements and laser sans are used to refine a finite element model of the stack. A performance-based methodology for lateral deflection is proposed to guide fitness-for-service assessments and mitigation implementation.	Farrow, Kenny	Stress Engineering Services Canada
2019_AB035	**ASME Section VIII 2019 Code Update - What do you do when the Code doesn't have applicable rules?**	This presentation will highlight the upcoming changes to ASME Section VIII, focusing on Division 1 and Division 2. The primary focus in this presentation will be on Section VIII, Division 1 and Article U-2(g). This is the paragraph that explains what to do when there are no applicable rules in Section VIII, Division 1.	Seipp, Trevor	Becht Engineering Canada, Ltd.
2019_AB037	**Damage Control - Managing the Damage Caused by Power Plant Cycling**	Cycling operations can be very damaging to power generation equipment. The challenge for owners of plants required to operate in this way is to fully understand the effects on plant and component life expectancy, and the actual costs, of the cycling operating profiles. The majority of the financial impacts caused by operating baseload designed plants in flexible modes is limited to several damage mechanisms impacting the material integrity of critical components. The severity of the impact of these mechanisms can be partially mitigated through improved plant operation and process controls, however, it is impossible to avoid the reduced life expectancy of critical components caused by the cycling operation. This presentation discusses the critical damage mechanisms caused as a result of cycling operation and suggests methods for mitigating the impact of those damages.	Hamblin, Pamela	Thielsch Engineering Inc.
2019_AB041	**The Effects of Buttering on In-service Welding**	Buttering is intended to minimize the quench hardening effects inherent in welding on pressure equipment that is in service. The effectiveness of these buttering techniques is examined. Comparisons are made between in-service weldments that utilize buttering techniques and those that don't. Methods of simulating in-service conditions are also discussed.	Dull, Morgan	Red Flame Industries
2019_AB042	**Rising Up From The Ashes - Assessing and Repairing Pressure Equipment After A Fire**	In July of 2007, Outlet Header #2 on the F-901 Steam Hydrogen Reformer at Nutrien's Redwater Nitrogen Operations catastrophically failed causing a release of process (hydrogen) gas. The process gas ignited by way of an external ignition source causing a fire. The reformer and surrounding equipment (upstream & downstream) were extensively damaged. This paper will go through, in detail, the pressure equipment damage mapping strategies, the damage assessment and repair strategies used during the repair exercise. This paper will also discuss the RCFA findings developed as part of the investigation and the improvement strategies identified and implemented to ensure no incident re-occurrence.	Dul, Robert C	Nutrien
2019_AB043	**Sweet to Sour Service Assessments for Fixed Process Equipment**	Operators can sometimes be faced with changing process operating conditions that result in their pressure equipment being exposed to sour service as defined by NACE MR0175/ISO 15156 (NACE/ISO) when the design did not anticipate such conditions. In other cases, an operator may acquire sour production fields and associated equipment where records of verification are lacking. In each case the operator has a duty to understand the risk of stress corrosion cracking and other H2S related damage mechanisms to ensure that the equipment is safe to operate. This presentation discusses the type of sour service damage mechanisms that are common, susceptible materials, and inspection and verification methods and other steps that can be used in conjunction with a risk-based assessment approach to ensure that equipment is safe to operate.	Foley, Daryl	Group 10 Engineering Ltd.
2019_AB044	**Avoiding Pitfalls Associated With Vacuum Rings In High - Temperature Vessels**	A stainless-steel vessel was designed to ASME Section VIII, Division 1. The vessel was designed to operate in two regimes: 1. Under vacuum/external pressure at a shell temperature of up to 370^{0}C, so vacuum/stiffening rings were installed. 2. Under internal pressure at a shell temperature of up to 600^{0}C. Due to high operation temperature, the vessel was wrapped in thermal insulation and cladding. Thermal insulation is not always part of the ASME vessel design. However, it appeared that the presence of stiffening rings and the varying thickness of the thermal insulation may have resulted in unacceptably high stress and potential failure in the shell. An API 579/ASME FFS-1 fitness-for service assessment was performed. It included a set of finite element analysis (FEA) calculations to establish temperature distributions in the vacuum rings and stress of the vessel shell near the stiffening rings. Potential solutions were explored such as the minimum thickness of thermal insulation that would not result in unacceptably high stresses.	Tatarov, Alex	Skystone International LP & Keyera-Alberta Envirofuels

2019_AB048	**CASE STUDY: TESTING WALL LOSS DUE TO FLOW ACCELERATED CORROSION**	Pipe wall loss due to Flow Accelerated Corrosion (FAC) is currently recognized as a serious safety concern for many industries as a result of fatal accidents. Codes such as the API 579-1/ASME FFS-1 and ASME B31.1 have long recognized that pipe wall loss due to Flow Accelerated Corrosion (FAC) is a serious safety and reliability issue that should be monitored at the very least. This includes Parts 4 and 5 of API 579-1 and the mandatory Chapter VII on the Operations and Maintenance of covered piping systems (CPS) published in the ASME B31.1 Power Piping Code. The degradation mechanism of FAC must be part of a Fitness-for-Service (FFS) program. This paper details one utility's experience in setting up an FAC program on its boiler feed water pump discharge piping. It includes brief descriptions of the program including initial testing of select locations. The results of this testing are discussed including the results and recommendations.	Kimball, Lange	Stress Engineering Services Inc.
2019_AB050	**Code Compliance Strategies when Converting a Large Utility to 100% Natural Gas Firing**	The Alberta government mandated that coal-fired power generation should be eliminated by 2030 while shifting this generation towards renewables and natural gas fired power generation. According to Alberta Energy, approximately 41 percent of Alberta's installed electricity generation capacity is from coal (nearly 5,700 MW) which may cease generation by 2030. Converting coal fired generators to 100% natural gas appears to be an attractive solution but understanding the conceptual approach while being compliant with ABSA and CSA regulations can be challenging based on most of the recent gas conversion project occurring in the USA which follow ASME B31.1 and NFPA regulations.	Lemmons, Marc	Sargent and Lundy
2019_AB052	**Early Stage Creep detection in High Energy Piping**	HIGH ENERGY PIPING CREEP DETECTION AND UT CAPABILITIES High Energy Piping is a critical component of any industrial power plant. Understanding the failure mechanisms and current inspection capabilities is critical for any plant engineer, maintenance planner, or component manager. Creep fatigue and creep redistributed stress analysis is central to understanding potential in service failures or unplanned outage overruns. Metallurgical understanding of this phenomenon can help the application of the proper NDT method employed by the industrial plants which have high energy piping. High-energy piping (HEP) presents particular challenges for risk management because of its structural complexity, combined with the difficulty of inspection. New technology specifically proprietary matrix focused phased array (MPA) is a new non-destructive ultrasonic field inspection system designed specifically for analyzing the integrity of high-energy piping and identifying high temperature creep, fatigue, creep-fatigue, thermal shock, ratcheting and flow accelerated corrosion. New technology allows for 100% coverage of the expected creep initiation zone as the scan is performed along the entire weld axis versus a typical conventional coverage of less than 8%. - Increases the confidence and accuracy of HEP remaining life assessment - Allows for data collection and evaluation via rapid scanning at speeds of conventional LPA with the detection level of APA and the additional advantage of inspecting virtually 100% of the weld length - Detects aligned cavitation and creep micro-cracking in P11, P22 and other low alloy carbon steels - Combines the best aspects of both Linear and Annular Phased Array (LPA & APA) - Achieves 2D focusing with a 128 element matrix probe - Detects down as low as 40% to 70% expended life, almost twice as early as other methods - Linear Phased Array & TOFD only detects creep damage at ~85% expended life - MPA Detects aligned cavitation and heavily clustered isolated cavitation's - EPRI qualified procedure and technology for creep detection.	Preston, Ron	Team Industrial Services, Inc
2019_AB057	**Waveform Controlled Gas Metal Arc Welding for Weld Metal Overlay**	Advances in welding power source technology have resulted in the ability to increase control of the Gas Metal Arc Welding (GMAW) process, resulting in improved productivity and quality. Some welding characteristics that were previously controlled by the welder or welding operator are now controlled in real-time by the power source. Waveform controlled welding allows modification of the voltage and/or current wave shape to control characteristics such as droplet shape, penetration, wetting, bead shape and/or transfer mode(s). Waveform controlled pulsed-spray GMAW-P has several benefits when applied to weld metal buildup and corrosion resistant overlay applications. These benefits include reduced lack-of-fusion defects, reduced weld dilution for better chemistry, reduced spatter, thinner overlay, and better overall surface appearance. Several case studies will be provided including pressure vessel wall thickness restoration for repair of corrosion under insulation (CUI), and clad restoration.	Barborak, Darren	AZZ Specialty Welding
2019_AB059	**Lessons Learned in Piping Troubleshooting and Design**	Piping is typically not given the type of attention that pressure vessels are afforded. Consequently many times in industry loss of containment or impacts to onstream reliability are related to issues in the piping circuits and their respective components. This presentation is a walk through 8 case histories looking at failure mitigation and remediation. It is focused on practical solutions by limiting impacts to production. Furthermore, the reason for why some of these failures occur and what can be done to prevent them in design is explored.	Becht V, Charles	Becht Engineering Inc.
2019_AB061	**Acoustic Emission On-Stream Monitoring of HTHA Cracks in a Pressure Vessel**	Acoustic Emission has been an effect tool for on stream monitoring of various assets. It can provide an indication of when crack initiation/growth occurs in the component being monitored. Being an instantaneous detection technique, it can be correlated with process parameters to identify which process parameter(s) may be driving the crack growth. In this presentation an example of this will be provided. A vessel with existing HTHA cracks was instrumented with AE sensors. The system collected AE data as well as temperature and pressure information. When AE from the area of the cracking was detected these parameters were reviewed and correlated with crack activity. It was shown which was driving the cracking.	Ternowchek, Sam	Mistras Group

2019_AB064	**Valve Manufacturing: Inconsistencies between Common Practices and Code Requirements**	This presentation reviews common practices in manufacturing of forged valves and discusses how some of these practices may not be compliant with the requirements of ASTM material standards. For instance, many smaller forged valves with integral flanges are commonly machined from bar stock or open-die round forgings. The presentation compares this practice with the requirements of ASTM specifications for forged components such as ASTM A350. The potential impact of this non-compliance on the valve operation and integrity is additionally discussed. A number of recommendations are made to address the issue.	Abari, Ali	IRISNDT
2019_AB066	**Stack Life Extension through FFS and Rope Access Industrial Services**	Through strategic application of inspection, API 579 methodologies, detailed structural analysis, and rope access industrial trades services stack life extension costs can be significantly reduced. We will present a case study on a recent project outlining the details and strategies deployed, as well as a brief discussion on emerging technologies that can be deployed that can provide critical information for planning.	Seymour, Andrew	Acuren Group Inc.
2019_AB068	**Inspection Management Programs and Piping Circuit Implementation: When the Real Work Begins**	Many piping integrity managers develop piping circuits to assist with managing piping systems. However, implementing piping systems into an asset management inspection program is often a step that is underestimated. Creating the correct database relationships between: piping circuits, piping segments, piping components, and piping corrosion monitoring locations and corresponding measurement data is a complicated, but critical, step to ensure piping circuits can actually be leveraged effectively. To implement piping circuits into a program effectively requires asking questions such as: • What are piping circuits? • How are piping circuits developed? • What do we want piping circuits to do? • How is my inspection program database built? • How will piping circuits be reported on and maintained over time? • Is this going to be a sustainable process? Answering these questions is critical to developing an implementation strategy. In the process, some integrity managers realize they may require specialized assistance with database structures, hierarchies, relationships, query tools, reporting, scripts, etc. Often the depth of skill required may warrant a reporting analyst and a database developer. Although some inspection management programs may offer default structures that can support piping circuits, often the default structure provided is generic and may require a creative implementation to function as desired. There is no unified methodology for developing piping circuits, so often a generic database solution may not work exactly as intended. This presentation is designed to discuss some of the steps required to develop a more successful piping circuit implementation process for inspection programs that may assist with creating a functional and sustainable piping integrity program.	Weisgerber, David	AVH Engineering
2019_AB070	**Case Study-Failure Analysis of a Pressure Vessel under Cyclic Regime using a Fracture Mechanics Approach**	A fracture mechanics approach was used to evaluate a pressure vessel which runs in cyclic service. This case study focuses on a failure analysis process from the diagnostic phase to repair and recommendations for future service as per API 579-1/ASME FFS-1 Fitness-for-Service Standard. The fracture mechanics approach was used instead a traditional fatigue analysis because of its robust theoretical basis. In addition, the fracture mechanics approach takes into account actual/future operating conditions and inspection results, providing in a powerful assessment tool. Cracks on a pressure vessel, working as part of a hydraulic reservoir system, were observed during a normal inspection. 3D Laser scanning technology was used during the inspection phase to verify geometrical issues. Finite element analysis (FEA) was performed in order to determine actual fatigue life of the pressure vessel based on its operational history. Finally a new inspection interval, extent of the inspection and additional recommendations were defined using a fracture mechanics approach.	Perez, Jorge	RAE Engineering and Inspection Ltd.
2019_AB079	**On Stream Assessment Of Tank Floor To Shell Weld Using Advanced NDE**	This is a case study of an on stream assessment of a floor to shell weld that was performed on a large diameter storage tank in which there were concerns of excessive edge settlement. This assessment was completed by the development of both a specific advanced NDE technique as well as the development of specific NDE equipment for the application. The case study covers the following: 1) Storage tank inspection history and challenges. 2) Advanced NDE procedure and equipment development. 3) Field application of advanced NDE technique and other inspection methods. 4) Inspection findings and recommendations.	Bannatyne, Scott	Canadian Engineering & Inspection Ltd.
2019_AB080	**Managing IOW's Through Integrity Analytics**	An effective IOW program can provide less downtime, optimized inspection costs, and a more assured asset lifecycle. Many refining, gas processing, and petrochemical plants have already identified the need to define IOW's, but are still unsure how to extract the most value from them. In order to achieve the benefits associated with IOWs, they must be implemented and managed appropriately. In this presentation, we will enable you to implement and manage IOWs with confidence through a concise and practical approach.	Garcia, Phil	PinnacleART
2019_AB087	**HTHA Damage Detection and Characterization using ToFD, PAUT and TFM/FMC**	For the past 4 years, over 100 samples of ex-service High Temperature Hydrogen Attack have been examined using ToFD, PAUT and TFM/FMC techniques. Many of these have been used as a training class for close to 100 NDE Technicians worldwide. These examinations have been validated with the use of laboratory metallographic examinations. This paper will provide a overview of strengths and pitfalls of the various modalities and show actual images of characterized damages.	Armitt, Timothy	Lavender NDT International

2019_AB088	**Advanced Ultrasonic Corrosion mapping comparison through time**	Corrosion is a natural phenomenon bringing back refined metal to an unprocessed state, this damage mechanism happen on most metal and in all industry. NACE lately approximated the global corrosion cost impact on our society at 2.5 trillion of USA dollar. This number is expected to grow within the incoming year because of ageing infrastructure. Ultrasonic has always been a good technique for corrosion evaluation. In the last decade, Phased Array Ultrasonic Testing (PAUT) has become one of the most common approaches to achieve such assessment. Lately, ultrasonic image processing technique such has Total Focusing Methode (TFM) has started to appear on the market, bringing a significative improvement of resolution and spatial coverage. But concretely, what is the advantage of processing such technique over corrosion? This paper is going to present one of the advantages of using the Total Focusing Method for corrosion comparison over time. Keyword: Ultrasound Testing (UT), Phased Array Ultrasonic Testing (PA), Total Focusing Method (TFM), linear scan, accuracy, Pulse-Echo Technique, amplitude analysis, non-amplitude technique, corrosion, precision.	Roux, Phillipe	Sonatest
2019_AB092	**The Value of Lean in Asset Integrity Management**	Achieving high levels of Asset Integrity Management program effectiveness, while continually driving sustainable efficiency gains, presents a complex challenge for organizations throughout the Oil & Gas industry. Long term success of improvement efforts depends on the support of key stakeholders that expect tangible value addition to the program. Without a structured method in place for identifying waste and implementing improvements, verifying efficiency gains and justifying further investment is difficult. Lean principles focus on providing a simple, yet systematic, approach to streamlining and sustaining process performance without sacrificing program effectiveness. This presentation will explore common challenges and pitfalls that organizations experience when attempting to increase program performance and will demonstrate how Lean techniques drive realized cost savings, more effective processes, and increased confidence in the program.	Saathoff, Joe	PinnacleART
2019_AB093	**Grade 91 and Grade 22 High Energy Piping Fitness-for-Service Issues**	Fitness-for-service (FFS) evaluations were performed for several high energy piping systems that had Grade 91 piping and Grade 22 piping materials. Many issues were identified in the multiple facets of these FFS evaluations. The hot and cold piping system walkdowns revealed multiple anomalies indicating that the piping systems were not behaving as intended in the original designs, including broken springs, hydrostatic test pins that had not been removed, a broken spring hanger yoke, topped-out supports, bottomed-out supports, and missing supports. In some cases, the pipe at the location of the spring supports had no significant cold-to-hot displacements. Some piping systems did not behave as originally intended and did not satisfy the requirements in ASME B31.1-2016 para. V-7.6. The significant displacement variations from the intended design displacements were evaluated to assess the integrity of each of the piping systems. In some cases, unintended high stresses were identified at relatively low stress locations in the as-designed piping stress analyses. Piping stress analyses of the field as-found conditions have revealed that main steam and hot reheat piping systems have a few girth welds of relatively low stress. In one case, an SA-335 Gr 91 to SA-335 Gr P22 girth weld dissimilar metal weld (DMW) was subject to low axial stresses. A creep life fraction evaluation was performed, considering conservative parent metal creep rupture data, weldment performance degradation, redistributed creep stresses, and multiaxial stresses in the DMW. Due to the low stresses, the creep life fraction analysis of this particular DMW girth weld estimated more than 50 years of remaining creep rupture life.	Cohn, Marvin	Intertek
2019_AB094	**“Staying Sharp” The Importance of Continuing Education**	This 50 minute presentation will focus on how boiler and pressure vessel inspectors can stay up to date on the latest code requirements. We will provide detailed information on where inspectors can find and utilize technical information with respect to maintaining integrity for themselves and the equipment they inspect.	Amato, Joel & Creaser, Eben	Minnesota Department of Labor and Industry
2019_AB095	**Overview of the Fernie Arena Ammonia Incident**	This presentation will provide an overview of the Fernie Memorial Arena that occurred in the province of B.C. on October 17, 2017. The presentation will describe the ammonia refrigeration system, the events leading up to the release and a technical discussion of the incident itself.	Tony Scholl	BC Regulator Presentation