

Abstract No. 4000

Title: SCIENCE AND TECHNOLOGY APPLIED TO CORROSION PREVENTION AND CONTROL

Author: Captain John Kamp, Office of Naval Research

Presenter: Captain John Kamp, Office of Naval Research

ABSTRACT: NOT AVAILABLE

Abstract No. 4001

Title: CORROSION; ICE CONTROL & REMOVAL

Author: Mr. William Ricks, METSS Corp and Mr. Mike Jago, Orison Corp

Presenter: Mr. Shawn McGlothlin, Orison Corp

ABSTRACT: Utilizing corrosive salts for snow & ice control have resulted in costly environmental impacts as well as corrosion issues. The USAF and Army have spent the last several years pursuing non-glycol deicing technology with the goal of reducing the environmental impact and corrosion issues. Metss Labs has been committed to producing a family of deicing technologies that are effective, environmentally sound, non-toxic, and non-corrosive. IceClear Plus is the latest in non-glycol, winter technology that employs a new advanced corrosion inhibitor. Derived from corn, the nation's most abundant renewable resource, IceClear Plus is ideal for de-icing applications such as in virtually any situation. Utilized for both deicing and prevention, IceClear Plus prevents ice from bonding to surfaces to make snow and ice removal quick and easy!.

Abstract No. 4002

Title: NAVAL SURFACE WARFARE CENTER LOUISVILLE UPDATE

Author: Mr. Russell Bentley

Presenter: Mr. Russell Bentley

ABSTRACT: NOT AVAILABLE

Abstract No. 4003

Title: NAVAL SURFACE WARFARE CENTER CARDEROCK DIVISION

Author: Mr. Regis Conrad

Presenter: Mr. Regis Conrad

ABSTRACT: NOT AVAILABLE

Abstract No. 4004

Title: **CONTROLLING RUST AND CORROSION USING FLUID THIN FILM COATING TECHNOLOGIES**

Author: Mr. Jim Van Gilder, Corrosion Technologies Corporation

Presenter: Mr. Jim Van Gilder, Corrosion Technologies Corporation

ABSTRACT: For years, industry has concentrated on preventing rust and corrosion of separating surfaces to be protected from the atmosphere using barrier coatings. Barrier coatings can prevent such abuse from occurring for a time but, inevitably, protection is compromised and damage results. Using FTFC technology, rust/corrosion can be prevented or interrupted even after it has already progressed, minimizing resulting repair costs. These products can effectively interrupt the process, without the usual removal of oxidation, prior to application, saving labor and downtime. Multiple uses, other than corrosion control, will be covered

Also, a surface treatment using a polymer-forming coating will be presented that prevents exhaust deposits and other contaminants from adhering to various surfaces, including paint, glass, plexiglass, eisenglass and gel coats.

Abstract No. 4005

Title: **DoD CORROSION UPDATE**

Author: Mr. Daniel Dunmire

Presenter: Mr. Daniel Dunmire

ABSTRACT: NOT AVAILABLE

Abstract No. 4006

Title: **SURFACE MINERALIZATION AS AN ALTERNATIVE TO CADMIUM PLATING AND HEXAVALENT CHROMATE FOR CORROSION PROTECTION**

Author: Mr. David Donohue, Mr. George Simpson, Integrated Systems Analysts; Ms. Nancy Heimann, Elisha Technologies

Presenter: Mr. David Donohue, Integrated Systems Analysts

ABSTRACT: The Elisha Mineral Coat (EMC™) engineered surface is a patented, mineral-based product that is produced in an environmentally benign process that forms a thin metal silicate surface fully involving the substrate metal. This new surface can be used in coating systems that function as preferred alternatives to stainless steel, cadmium/chromium, or cadmium plating in fastener applications. The surface mineralization is an effective component of coating systems both on zinc plate and zinc nickel plating. This mineralizing technology is also available in gel and lubricant form for use in protection of deck machinery systems.

The surface mineralization technology offers an effective replacement for undesirable heavy metals such as chromium (e.g., hexavalent chromate), cadmium and lead-based technology currently available to provide corrosion protection to fasteners without escalating maintenance costs. This corrosion protection system is not a coating in the conventional understanding of the word. Rather, the mineralization process is a conversion at the molecular level of the naturally occurring surface compounds of oxides, hydroxides, and carbonates to a silicate. The mineral is chemically bonded to the metal substrate. Hence the resulting mineralized surface is not a coating that can be lifted or undermined as a mechanically bonded coat of paint may be.

Surface mineralization has been undergoing testing by a major automotive manufacturer for use on fasteners as a replacement for hexavalent chromate. The results have demonstrated a significant increase in corrosion resistance of components protected by the mineral product. Significant performance findings including data from test protocols such as ASTM B117, GM9540P and the Ford Arizona Proving Ground will be detailed in the final paper. In October 2003, Elisha successfully completed a major cyclic testing effort at 180 cycles of various surface mineralized fasteners in comparison with cadmium and cadmium plus chromium plated ones using the GM9540P protocol. This new system outperformed all other coatings at the 180-cycle point in this test.

This surface mineralization technology is currently being used by the U.S. Navy in the corrosion protection upgrade of all weather deck steel watertight door dogging mechanisms, as a corrosion inhibitor for shipboard anchor chain detachable links, and for corrosion protection of aircraft carrier aircraft elevator wire ropes and slewing arm boat davit wire ropes. The gel form of the product is currently being used in bridges, in chemical-processing plants, and is a strategic weapon in industrial maintenance. Field data show the gel to be five times more effective as a barrier coating than high performance industrial paint in U.S. Gulf Coast refinery applications.

This paper will explain the surface mineralization technology, review its current uses, and show test results for applicability as an environmentally benign alternative to cadmium plated and hexavalent chromate treated fasteners.

Abstract No. 4007

Title: A NOVAL VOC-FREE AND CHROMATE-FREE AND HP-FREE PRIMER SYSTEM FOR STEEL AND ALUMINUM SUBSTRATES

Author: Mr. Max Sorenson and Mr. Matt Stacy, ECOSIL LLC

Presenter: Mr. William van Ooij, University of Cincinnati

ABSTRACT: A novel primer system for use on various metals is introduced and discussed. It consists of mixtures of organofunctional silanes, water-dispersed resins and nanoparticles. The systems can be sprayed or brushed onto steel, galvanized steel or aluminum alloys. The coatings are of 10-15 μm thickness and are very flexible. They do not require a conversion coating on the metal substrate. A salt spray resistance of 1000 hrs is routinely obtained, with or without topcoat. The generic term for this type of primer is superprimer. The primer provides excellent adhesion to the substrate and outstanding corrosion protection as a result of the low water permeability rate. Defect-healing capabilities such as shown by chromate conversion coatings in combination with chromate pigments are provided by the superprimer as well. Water-soluble inhibitors are used which have been converted to slow-release pigments by a special surface treatment. Some successful applications of this new system and its mechanism of corrosion protection are discussed.

Abstract No. 4008

Title: AQUEOUS YET WATERLESS CLEANING AND CORROSION CONTROL

Author: Mr. Max Friedheim, PDQ Precision Inc.

Presenter: Mr. Max Friedheim, PDQ Precision Inc.

ABSTRACT: It's only water, yet when utilized with the Mini-Max Cleaner to create instantaneous superheated high-pressure steam vapor, you have the cleanest, safest, most cost effective parts cleaning systems available today.

When coupled with the Mini-Max Waste Management System for the contaminant entrapment the total efficiency of the unit is unparalleled.

What we do not have speaks volumes: No solvents or solvent alternatives: No wastewater stream as the steam vapor evaporates and the removed contaminants are all that remains.

The Mini-Max Cleaning and Waste Management systems provide the user community complete safety to the user as well as the environment. The Mini-Max Cleaner is the proud winner of the South Coast Air Quality Management Districts Clean Air Award for Technology in the 1997-1998 year.

These portable, electric, steam vapor cleaners are currently in use world wide by the U.S Armed Forces for areas of cleaning as diversified as from electronics to weapons, from ground equipment to ships at sea.

Many of our fortune 500 companies are current users as well as a number of our National Laboratories. The smaller companies are well represented also in fields as diversified as electronics manufactures to auto repair facilities; from Hospitals and surgeries to bowling alleys. Wherever the Mini-Max Cleaner goes, there are smiles.

Abstract No. 4009

Title: AIR FORCE CORROSION PROGRAM

Author: Ms. Kimberly Andrews, Robins Air Force

Presenter: Ms. Kimberly Andrews, Robins Air Force

ABSTRACT: The Air Force Corrosion Prevention and Control Office (AFCPCO) manages the Air Force's corrosion program, and is the Air Force's single focal point for all corrosion guidance and policy. Our customers are Air Force field units, command-level corrosion managers, depots, and system program managers. We are also the Air Force's representative to the rest of the corrosion community, including other services and industry. This briefing describes recent Air Force corrosion issues, the actions we are taking to address them, and new technologies we are investigating to improve the Air Force corrosion program. Topics include recently qualified materials, process improvements, technical data updates, and results of site survey.

Abstract No. 4010

Title: MORPHOLOGICAL EXAMINATION OF MIC AND PITTING ATTACKS OF UNS NO400 IN ARABIAN GULF SEAWATER AND SALT SOLUTIONS

Author: Mr. A. Al-Hashem, W.Riad and V. Gouda, Petroleum Research & Studies Center, Kuwait Institute for Scientific Research

Presenter: Mr. A. Al-Hashem, Petroleum Research & Studies Center, Kuwait Institute for Scientific Research

ABSTRACT: Alloy UNS NO400 (Monel 400) has been used extensively in marine engineering applications in petroleum and petrochemical industries in the Arabian (Persian) Gulf region. Localized MIC and pitting corrosion due to SRB and chloride have an effect on the performance of this alloy. In fact, several tube coolers failed within a few months of service in refineries utilizing Gulf seawater as a coolant. Therefore, detailed failure and laboratory investigations were conducted to determine the factors that led to the premature failures of UNS NO400 in natural Gulf seawater and 3.5% NaCl solutions. Scanning Electron Microscope (SEM) and Energy Dispersive Spectrometer (EDS) were used to study the morphology of attack on the surfaces of failed UNS NO400 tubes and commercially available sheets and rods used in the as-

received condition. For the laboratory investigation, anodic polarization was applied to study the effect of potential and exposure time on the morphology of pitting attack for this alloy. Results of the failure investigation indicated that all coolers suffered from severe MIC as well as pitting attack. The laboratory results determined that polarization at low current density favours micropitting, while polarization at high current density favours anodic dissolution and pits with large diameters.

Abstract No. 4011

Title: STRESS CORROSION CRACKING OF NICKEL BASE ALLOYS AND 316 STAINLESS STEEL UNDER SUPERCRITICAL WATER ENVIRONMENT

Author: Mr. Ryutaro Fujisawa, JCII

Presenter: Mr. Ryutaro Fujisawa, JCII

ABSTRACT: Supercritical water(SCW) process is an attractive method for decomposition of hazardous organic wastes and for modification of low-quality hydrocarbon resources. However, the corrosion of a reactor and a heat exchanger is known as the major difficulty to put the SCW processes into industrial applications. It is important to select suitable structural materials, which are compatible with SCW environments, to ensure long term integrity of the reactor components.

The objectives of this study are to evaluate the susceptibility of Ni base alloys and SUS316 stainless steel to stress corrosion cracking in SCW under reducing atmosphere and to understand the corrosion mechanisms. Susceptibility of the alloys to SCC was evaluated by slow strain rate technique (SSRT). Three kinds of Ni base alloys, Alloy 625, Alloy C-276 and Ni-45Cr-1Mo (MC alloy) and a Type 316 stainless steel were used in this study. Experiments were carried out to investigate the influences of environmental variables such as temperature, anion, pH and the hydrogen partial pressure. Hydrogen partial pressure was changed with the mass of additional HCOOH. Applied pressure was 25 MPa and testing temperature covered from 350 up to 550 . SCC did not occur in the high-purity water at 400 /25MPa. With 0.001mol/L HCl or 0.01 mol/L NaOH, cracking occurred in Type 316 stainless steel and Alloy C-276 at 400 /25MPa. With 0.01mol/L HCl or NaOH, cracking occurred on Alloy 625 at 400 /25MPa. Cracking susceptibility of Ni base alloys decreased with increasing Cr content of alloys in SCW either in the HCl or NaOH environments.

Abstract No. 4012

Title: NAVY SBIR EFFORTS FOR DEVELOPING HIGH POWER DIODE LASERS FOR SURFACE PREPARATION AND SURFACE ENHANCEMENT FOR AIRCRAFT AND SHIP PRESERVATION

Author: Mr. Frederick A. Lancaster, Pres/CEO LANCORP ASI

Presenter: Mr. Frederick A. Lancaster, Pres/CEO LANCORP ASI

ABSTRACT: The purpose of this paper is to show the capabilities developed out of two Navy (NAVAIR and ONR) Small Business Innovative Research Programs for the application of high power semi-conductor diode lasers (HPDL's) for surface preparation and surface enhancement for both aircraft and ship preservation. The paper will show specific examples of coatings removal of powdercoats, epoxy and polyurethane coatings, and other coating systems from various pieces of naval hardware. Specific examples of the use of HPDL's for surface preparation of steel, aluminum, composite and fiberglass surfaces as found on Navy aircraft and on ships will be shown, as well as the related material performance results. The application of HPDL's for precise surface enhancement of steel by laser hardening of steels will be also presented. The processes and equipment, both portable and fixed will be described, as well as

application to Navy uses and requirements both in new construction of ships as well as in the maintenance of active ships and aircraft. The environmental, economic, energy efficiency and performance advantages of HPD Laser technology for preservation will also be highlighted.

Abstract No. 4013

Title: HOLIDAY DETECTION USING INFRARED THERMOGRAPHY

Author: Mr. Omar M., Hassan M., Saito K., Mechanical Engineering Department, University of Kentucky.

Presenter: Mr. Omar M., Mechanical Engineering Department, University of Kentucky.

ABSTRACT: The holidays are considered to be the points that will initiate corrosion on painted steel structures, so holidays detection is one of the best preventive measures for corrosion control. The infrared thermography has been successfully applied for the detection of corroded painted surfaces in different structures ranging from fuel reservoirs to the inspection of steel bridges. In this paper the holiday detection using infrared thermography technique will be addressed and the advantages of this application will be illustrated. Results from experimental work conducted on different types of anti-corrosive coats are shown. An analytical thermal model for the prediction of latent corrosion is presented. Some processing schemes to filter out the non-useful facial features such as dirt and tape markings will be used.

Abstract No. 4014

Title: RAPID, COST-EFFECTIVE REPAIR TECHNOLOGIES – TRANSFERRING TECHNOLOGY FROM SKY TO SEA.

Author: Dr. Keith Legg, Rowan Technology Group; Mr. John Sauer, Sauer Engineering

Presenter: Dr. Keith Legg, Rowan Technology Group

ABSTRACT: Over the past few years aerospace manufacturers and aircraft repair depots have been adopting new OEM and repair technologies for corrosion and wear protection, whose performance far surpasses today's chromium and cadmium electroplates. The result is faster turnaround to improve readiness, better performance, less maintenance, and lower cost. At the same time these modern coating technologies, such as HVOF thermal spray, electrospark alloying, high strength stainless steel and Al plating, are eliminating some of our worst environmental and worker safety problems.

Given the difficulty and high cost of removal and repair for many shipboard items it would seem that these newer technologies ought to provide even greater advantages of cost, cleanliness and turnaround in ships than they do in aircraft. In fact some of these technologies can be used for in-place repair of local damage and corrosion, eliminating the delays and costs of removing large items, shipping and reinstalling. Despite this, adoption of these technologies for ships and submarines has been very limited, perhaps largely because the information has not moved beyond the aircraft industry.

In order to quantify the cost impact of these new technologies, we have developed a cost analysis tool that incorporates the full costs of developing and implementing the technology, and takes into account the benefits that can be derived from on-site repair, improved performance, reduced maintenance, faster turnaround, and reduced service failures.

We will discuss the DoD experience with some of these technologies, suggest possible shipboard applications where they might prove beneficial, and provide an idea of potential cost savings.

Discussion, criticism and feedback are encouraged.

Abstract No. 4015

Title: TITANIUM IN SALT WATER SERVICE

Author: Mr. John Mountford, Jr., Tico Titanium, Inc.

Presenter: Mr. John Mountford, Jr., Tico Titanium, Inc.

ABSTRACT: Corrosion caused by salt water is death for many materials, which demand high maintenance and costs in time and replacement – only to be left with the same conditions for repetitions of the same cycle. Titanium “fixes” these problems in many areas of application since it is immune to salt water corrosion and can last indefinitely in service. Not only does this reduce or eliminate maintenance concerns and costs, it also eliminates the need for repetitive replacement, giving it a short payback period and low life-cycle costs.

This presentation will be a brief overview of the Commercially Pure (CP) grade(s), their applications in salt-water service and comparisons with other materials. Titanium’s lightweight advantage along with its corrosion immunity allows additional weight savings by designing in reduced component sizes that further justify up-front costs and show significant life-of-the-ship cost savings. It is fast becoming the material of choice for many shipboard applications with the potential to change from repair and/or replace to working toward minimal maintenance / replacement-free service.

Abstract No. 4016

Title: PROGRESS IN REDUCING THE COST OF CORROSION

Author: Dr. Neil Thomas, NACE International – The Corrosion Society

Presenter: Dr. Neil Thomas, NACE International – The Corrosion Society

ABSTRACT: This presentation will update the progress that has been made in helping to reduce the \$276 billion annual cost of cession in the United States, including the \$20 billion estimated as the total cost of corrosion within the U.S. Department of Defense.

Corrosion of military equipment and facilities is an ongoing problem in all branches of the military and is potentially the principal cost driver in lifecycle costs. Corrosion has a major impact on troop readiness, performance, and safety – and must be addressed. Since the publication of “Corrosion Costs and Prevention Strategies in the United States,” NACE International – The Corrosion Society has made several advances in implementing the recommendations of the study. Hear about the NACE initiatives in raising awareness about corrosion issues, new education efforts, standards development, and especially the collaboration with the Department of Defense in its directive to reduce the impact on corrosion on military equipment and infrastructure.

Abstract No. 4017

Title: DEVELOPMENT OF THE DATA PACKAGE FOR THE INCLUSION OF CAST 2205 DUPLEX STAINLESS STEEL IN ASTM A923.

Author: Mr. Malcolm Blair, Steel Founders; Society of America

Presenter: Mr. Malcolm Blair, Steel Founders; Society of America

ABSTRACT: Duplex stainless steels are used in numerous applications in the US Navy. These applications include hydraulic accumulators, seal rings on missile launching tubes and in ancillary equipment such as pumps and valves. The processing of duplex stainless steels is not without its' problems. Composition control is necessary to achieve the mechanical

properties and heat treatment is a critical part of the process in ensuring a satisfactory microstructure. Intermetallic phases have a detrimental effect on the mechanical properties and corrosion resistance of duplex stainless steels. Three heats of cast material were examined in detail to determine the ability of the tests in ASTM A923¹ to discriminate material which had been inadequately heat treated. More than 20 additional heats of cast material were studied to determine if they would pass the prescribed tests. The result of this work will allow purchasers to specify the use of A923 to ensure correct heat treatment of cast products.

Abstract No. 4018

Title: BACKPACK CLOSED LOOP BLASTING SYSTEM: A NAVSEA PROJECT

Author: Mr. Andrew Seelinger and Mr. Rob Pressier, Naval Sea Systems Command, and Ms. Heather Parks, Mr. Delmar Doyle, National Surface Treatment Center

Presenter: Ms. Heather Parks, National Surface Treatment Center

ABSTRACT: The US Navy uses hand and power tool surface preparation methods (SSPC SP-3 & SP-11) to prepare substrates for paint application. Tools such as needle guns, disc grinders and disc sanders are used for this secondary surface preparation. The quality of surface preparation provided by these tools is often inadequate and production shortfalls are numerous. These methods provide a reduced level of surface cleaning, often leaving contamination and compromising the lift expectancy of the coating. In addition, they provide no true profile to the surface, which can lead to inadequate adhesion of the primer. Traditional hand power tools are very time consuming, labor intensive and produce large amounts of dust.

NAVSEA is currently seeking alternative solutions to better prepare surfaces prior to touchup and repair painting. With that goal in mind NAVSEA has tasked the National Surface Treatment Center to manage development of a portable, closed loop blasting system that utilizes Sponge-Jet blast media. A prototype system has been developed which provides many advantages over current power tools methods. The Sponge-Jet blasting system is intended for use as a SP-11 remote area surface-profiling tool. Prototype features include the ability to remove corrosion products, clean the surface, produce a suitable profile, contain blast media and provide a smooth transition (feathering) without cracking or damaging the surrounding paint. The unit is currently in the shipboard testing and evaluation phase. Details of these tests will be presented in the paper.

Abstract No. 4019

Title: US COAST GUARD CORROSION CONTROL INITIATIVE

Author: LTJG Andy Go Shorn, Office of Naval Engineering, USCG HQ Washington, DC

Presenter: LTJG Andy Go Shorn, Office of Naval Engineering, USCG HQ Washington, DC

ABSTRACT: NOT AVAILABLE

Abstract No. 4020

Title: US ARMY SMART COATINGS MATERIAL PROGRAM

Author: Mr. James L Zunino III, U.S. Army Corrosion Office

Presenter: Mr. James L Zunino III, U.S. Army Corrosion Office

ABSTRACT: The goal of the U.S. Army Smart Coatings™ Materiel Program is to create the next generation of coatings for Army materiel that will have unique properties such as self-healing, corrosion resistant, and coloring attributes. A partnership between the Army Corrosion Office at

Picatinny, NJ along with researchers at the New Jersey Institute of Technology (NJIT), NJ, Wake University, NC and Clemson University, SC will develop the next generation of smart coatings™ materiel via novel technologies such as nanotechnology, MEMs, metamaterial, flexible electronics, etc.

The coatings applied to weapon systems today are "dumb" in the sense that once applied they perform their function without the ability to self-correct because of changing circumstances or without the ability to tell the user of potential anomalies such as corrosion or adhesion problems. Their application and removal is also labor intensive and potentially hazardous to the people working with them. Most of these coatings need to be "touched-up" by hand and hide substrate damage from the user of the product. In a 2002 NACE report to the Department of Transportation Federal Highway Administration it was estimated that the total cost for DOD corrosion related problems is \$20 billion per year, \$4 billion of which is related to painting/de-painting operations.

The main objective of the activities under the Program is to conduct research designed to lead to the development of coatings incorporating properties such as self healing, selective removal, corrosion resistance, sensing, ability to modify coatings' physical properties, and alerting logistics staff when tanks or weaponry require more extensive repair. The resulting smart coating™ materiel will ultimately aid the Army and DOD in 1) Decreasing life-cycle costs; 2) Increasing readiness by reducing equipment down time; 3) Reducing the maintenance burden being placed on diminishing active and reserve work force resources; 4) Reducing the potential hazards associated with painting/de-painting operations. This briefing will provide to the audience an overview of the Smart Coatings™ Materiel Program and discuss progress thus far.

Abstract No. 4021

Title: PACIFIC RIM CORROSION RESEARCH PROGRAM (PRCRP)

Author: Mr. Robert Zanowicz, US Army RDECOM - ARDEC

Presenter: Mr. Robert Zanowicz, US Army RDECOM - ARDEC

ABSTRACT: The Army, operating in the vast area of the Pacific Theater of Operations that includes but is not limited to the Hawaiian Islands, Alaska, Australia and Korea is plagued by endless corrosion problems. Both in dollars and in materiel readiness, costs are significant and efforts are underway to eliminate or greatly reduce these costs. PRCRP is an effort between Industry, the U.S. Army and the University of Hawaii – Manoa to meet these challenges. The Hawaiian Islands provide an ideal site for the PRCRP for two reasons: First, Hawaii due to its varied topography contains numerous microclimates such as rainforest, desert, alpine, marine and volcanic that is a natural laboratory for climactic research for conditions found throughout the PTO. Secondly, the large military presence of all the services in Hawaii allow for ample input to research and perspective in solving real world DOD corrosion problems. Research will be conducted in the corrosion laboratories at UHM to study corrosion effects on metal-matrix composites, ceramic film coatings, organic-matrix composites and Micro Electromechanical Systems (MEMS). PRCRP will also identify corrosion mechanisms, methods of corrosion protection, inhibition and the development of corrosion test protocols relevant to the PTO. This presentation will consist of an update and a progress report on the PRCRP and some of the key findings of the last year.

Abstract No. 4022

Title: EXPANSION JOINT AND NOSING REPAIRS MADE EASILY

Author: Mr. Howard Kotler, Belzona Inc.

Presenter: Mr. Howard Kotler, Belzona Inc.

ABSTRACT: At each and every military establishment there are 1000's of square feet of concrete. Each slab is separated by expansion joints at their nosings. Over time, these nosings erode or are damaged, as is the adjoining expansion joint. This presentation will discuss facilitating these repairs with chemically compatible polymers with outstanding adhesion properties.

Abstract No. 4023

Title: CASE STUDIES OF COST SAVINGS AND RELATED BENEFITS OF VAPOR CORROSION INHIBITORS TO REPLACE LEGACY PACKAGING METHODS IN MILITARY APPLICATIONS

Author: Dr. James Henderson, Northern Technologies International Corporation

Presenter: Dr. James Henderson, Northern Technologies International Corporation

ABSTRACT: Three cost studies are presented that supported decisions by commercial manufacturers to change to Zerust® Vapor Corrosion Inhibitor (VCI) packaging from traditional methods: oil coatings, and desiccant in barrier packaging. These legacy methods are still common in military applications where these cost models may be useful references. The studies show cost reductions of 35% to over 50% for cases of long-term storage and ocean shipment of mechanical, electrical and electronic equipment. Two of the studies supported decisions to replace oil corrosion prevention coatings on inter-plant ocean shipments of "Completely Knocked Down" (CKD) ferrous vehicle engine components. These two cases represent the broad trend that drove rapid company conversions in methods for worldwide shipments from "wet" (oiled) to "dry" parts and subassemblies protected with VCI packaging. The third cost analysis supported a specification decision to ship container loads of electronic control cabinets and other electromechanical modules for a turnkey factory. Packaging used VCI film combined with VCI vapor capsules rather than desiccants placed in three-layer barrier packaging (MIL-B-131H Type 1 Class 1). Other critical decision factors included improved corrosion protection, preventative maintenance cost improvement, improved readiness, quality and reliability, improved environmental impact, enhanced workplace health and safety.

Abstract No. 4024

Title: COATINGS – A \$108 BILLION OPPORTUNITY

Author: Mr. Larry Christie, NACE International – The Corrosion Society

Presenter: Mr. Larry Christie, NACE International – The Corrosion Society

ABSTRACT: During 2002, NACE International released a breakthrough study "Corrosion Costs and Prevention Strategies in the United States". This study was commissioned by the Federal Highway Administration with research conducted by CC Technologies.

The study concluded that the total cost of corrosion in the United States was a staggering \$276 Billion or equivalent to 3.1% of the Gross Domestic Product. The Study also concluded that Coatings and Coatings Technology was the highest preventive measure used.

This presentation reviews the facts and figures of the study. and how this relates to our work environment focusing on the Navy, and other government entities. As Corrosion is considered a natural phenomenon, the presentation also addresses comparisons with other natural phenomena and discusses the differences in cost comparisons.

The presentation concludes with details on how NACE is implementing strategies based upon the study for the Coatings Industry.

Abstract No. 4025

Title: ENVIRONMENTALLY SUSTAINABLE BUSINESS IN AEROSPACE THROUGH INNOVATIVE TECHNOLOGY

Author: Mr. David Palermo, Pantheon Chemical

Presenter: Mr. David Palermo, Pantheon Chemical

ABSTRACT: Moving forward into the business climate of the future, it will no longer be possible to remove and indefinitely distribute natural resources such as oil, coal and minerals. Additionally, the continued spread of man made materials and synthetic chemicals needs to be mitigated. Business operations contribute significantly to the addition and removal of substances in the environment, and as individuals, we have a social responsibility to help slow and eventually eliminate this erosion of nature. Pantheon Chemical understands these environmental challenges and has a well documented and successful history in overcoming those challenges, bringing breakthrough chemical systems that outperform the standard hazardous processes

Abstract No. 4026

Title: ROBOTIC WATER TANK INSPECTION AND CORROSION ASSESSMENT

Author: Mr. Theodore Lund, President Extech, LLC

Presenter: Mr. Theodore Lund, President Extech, LLC

ABSTRACT: The presentation will address the evolution of underwater robotic methods for inspection and corrosion assessment of potable and firewater storage tanks.

Water storage facilities are receiving increasing attention with regard to maintenance and structural integrity. Federal and State Regulators are demanding more testing within the reservoirs and procedures to ensure that tanks are sound and properly maintained.

Removing reservoirs from service for routine inspection is a major issue for utilities, industries and military facilities. Neglect of reservoir service can have substantial impacts on water quality and long-term structural integrity.

This presentation will describe innovative robotic methods that have been developed allowing tank owners to inspect their tanks while full and on-line. Underwater robotic methods eliminate the need for downtime, minimize lost water and require no confined space entry.

These methods have already been used on the North Slope of Alaska, on military bases and most prominently for major public water utilities.

The presentation will educate attendees on the types of equipment available, proper methods and special techniques for underwater metal assessment, ultrasonic testing and leak testing.

The talk will compare the economics technical merits of other methods of inspection such as dry inspection and diving. It is hoped that utility operators will develop a new understanding of their options and how to more easily meet drinking water and NFPA tank inspection requirements.

Abstract No. 4027

Title: RISK ASSESSEMENT AND ECONOMIC CONSIDERATIONS WHEN COATING BALLAST TANKS

Author: Mr. Kenneth Tator, KTA-Tator, Inc.

Presenter: Mr. Kenneth Tator, KTA-Tator, Inc.

ABSTRACT: This paper will discuss the types of corrosion in ballast tanks, and areas within ballast tanks most susceptible to corrosion. An overview of the requirements regarding surveys and certification inspections will be outlined, and a coatings risk assessment methodology will be presented. Some of the causes of coating failure will be discussed, along with means to extend the life of shipboard coatings. Finally, a brief estimation of costs of coating ships and ballast tanks in new construction, and during maintenance and repair will be presented.

Abstract No. 4028

Title: RESOURCES FOR PRESERVATION OF NAVY SHIPS

Author: Dr. Richard W. Drisko, SSPC: The Society for Protective Coatings

Presenter: Dr. Richard W. Drisko, SSPC: The Society for Protective Coatings

ABSTRACT: This presentation describes the various SSPC (Society for Protective Coatings) Resources currently used in the presentation of U.S. Navy ships. Among the resources described in some detail are: training and certification programs offered by SSPC that are being required by the USN in order for contractors and craftspersons to do preservation work on USN Vessels undergoing coatings repair. Also discussed are selected SSPC consensus standards commonly referenced in preservation work.

Abstract No. 4029

Title: TECHNOLOGY TRANSFER AND MECHANISMS FOR DOING BUSINESS WITH THE FEDERAL GOVERNMENT

Author: Dr. J. Scott Deiter, Director, Tech Transfer, NSWC, IHDIV

Presenter: Dr. J. Scott Deiter, Director, Tech Transfer, NSWC, IHDIV

ABSTRACT: Everyday, hundreds of federally funded laboratories apply their research and development expertise for the advancement of science. More than 700 laboratories and research centers, representing almost all federal departments and agencies, conduct approximately \$70 billions in research and development annually. Their science has the capacity to enrich our lives by making them safer, more convenient, and more fulfilling. From medicine to transportation to communication, these research facilities investigate everything that is known and extract knowledge from the previously unknown.

It is essential that the innovation occurring behind federal laboratory doors be transferred from the theoretical to the practical. To capitalize on the nation's investment in federal research, the expertise and socioeconomic well-being in the global marketplace as well as ensuring security and prominence.

There are several formal transfer mechanisms available to a state or local government, an industrial organization (including a corporation, partnership, limited partnership, or industrial organization), a public or private foundation, a nonprofit organization (including university), or other person(s) to enhance or promote technological or industrial innovation for a commercial or public purpose. These mechanism include Work for Private Party Agreements, Cooperative Research and Development Agreements, Patents and Licensing, and Partnership Intermediary Agreements. A description of these technology transfer mechanisms, including success stories, will be included in the presentation.

Abstract No. 4030

Title: PLANNING, BUILDING, AND OPERATING THE DOD CORROSION EXCHANGE COMMUNITY OF PRACTICE

Author: Mr. Thomas Key, Senior Systems Analyst and Mr. Kevin Throckmorton, Systems Analyst

Presenter: Mr. Thomas Key, Senior Systems Analyst

ABSTRACT: The objective of this paper is to provide a roadmap for planning, building, and operating the DoD Corrosion Exchange community of practice. This community of practice, built upon the DoD Corrosion Exchange e-portal located at www.DoDCorrosionExchange.org, consists of individuals and organizations in the corrosion prevention and control (CPC) community (DoD/Government, academia, and industry) who have an interest in corrosion—particularly as it relates to DoD weapon systems, equipment, related commercial assets, and infrastructure. The Exchange provides a cost free forum for communication and cutting edge collaboration and information sharing tools combined with a content-rich environment for technical information exchange among all sectors of the CPC community from basic research through application. Using the community of practice concept combined with these tools, the Exchange allows members to freely collaborate and share ideas, data, information, and knowledge in an open forum or secured environment tailored to their specific needs across the CPC community. Although the most important aspect of any community of practice is its people, there are many factors that contribute to the success or failure of the endeavor. This paper explains those factors and provides a step-by-step approach used to successfully launch and operate the DoD Corrosion Exchange community of practice.

Abstract No. 4031

Title: PREDICTABILITY OF CORROSION PROCESS - UPDATE

Author: Ms. Nancey J. Maegerlein, Naval Surface Warfare Center, (Crane Division)

Presenter: Ms. Nancey Maegerlein, Naval Surface Warfare Center, (Crane Division)

ABSTRACT: In the evaluation of the corrosion sensor, there are several avenues of validation and applications that must be pursued. If heat is truly heat, then the use of these sensors can be unlimited. The information that will be presented in our paper includes the analysis of the quality of the sensor in new applications, in addition to the sensitivity of the sensor based on location. One new application is high frequency vibration: The Detrimental Chemical Interaction between Materials during High Frequency Vibration is shown in a vibration experiment using a peltier sensor that measures microcalorimetric heat. The experiment consists of vibration of steel and aluminum cantilever beams with a peltier sensor mounted at the bending area. Using the peltier sensor to characterize the heat produced at the various frequencies, the detrimental interactions can be measured and quantified.

Can we measure when the protective coating is gone? Another test will provide information on the total heat produced (and rate of production) when a sacrificial coating is used up.

The last application is location for monitoring: We hope to have the data completed on another test – the optimum position of the sensor on a carbon steel drum for sensitivity. In other words, how close to the corrosion does the sensor have to be placed to register.

Abstract No. 4032

Title: U.S. ARMY CORROSION PROGRAM OFFICE

Author: Mr. Don Skelton

Presenter: Mr. Don Skelton

ABSTRACT: NOT AVAILABLE

Abstract No. 4033

Title: USAF SPACE COMMAND EASTERN RANGE METALIZATION PROGRAM

Author: Mr. Ken Marshall,

Presenter: Mr. Ken Marshall,

ABSTRACT: The corrosion control and protection of Air Force Launch Test Range System assets is a never-ending Battle. Most sites are located in close proximity to the ocean and harsh marine environments. Protection of these systems is a costly endeavor. Estimates for labor, material, and other direct expenditures due to corrosion has been projected at approximately 35% of the total maintenance budget.

One of the most important considerations for the maintenance of range instrumentation is the scheduling of system downtime. Launch and operational requirements mandate narrow windows of opportunity in which to conduct corrosion control activities. Primary consideration must be given to system and surface preparation. This preparation is critical to insure that the affected system can be readily returned to full mission capable (FMC) status and that specified coatings can be properly applied. High performance coating systems requires substrates to be abrasive blasted. This process introduces a significant amount of risk to sensitive electronic and mechanical equipment, especially bearing surfaces. Previous methods of corrosion control relied on conventional three part coating systems consisting of a zinc rich, organic or inorganic primer, an epoxy mid-coat and a polyurethane topcoat. Typical average life expectancy for these coating systems was approximately five years. During subsequent corrosion control operations the system was again placed at risk.

In order to mitigate risk to the system, minimize downtime, and reduce costs, an alternative method of corrosion control has been incorporated on Air Force Ranges. That alternative is the thermal spray or metallization process.

Abstract No. 4034

Title: U.S. MARINE CORPS CORROSION UPDATE

Author: Mr. Andrew Sheetz

Presenter: Mr. Andrew Sheetz

ABSTRACT: U.S. Marine Corps combat systems and logistic equipment is exposed to seawater splash and spray and marine atmosphere during deployment. The Marine Expeditionary Forces (MEFs) are based near and on various ocean coasts (Okinawa, Hawaii, California, North Carolina) where most equipment is stored outside. As a result, corrosion of USMC gear occurs at a higher rate than for any other service with similar equipment.

The combination of the effects of the shortcomings of vehicle design and construction with the corrosive operating environments with reduced or deferred maintenance due to lower manning levels and environmental restrictions has created a heavy Total Ownership Cost burden and has begun to impact upon the readiness of the Marine Corps.

The specific objective of the Marine Corps Vehicle TOCR effort is to develop corrosion control, monitoring and prevention technologies for USMC procurement and maintenance programs

which will result in longer and more cost-effective performance life for transportation systems. To be presented as a part of the Marine Corps Vehicle Program are the Advanced Coatings and Longer-Life Components Task and the Corrosion / Durability Road Test Task.

Abstract No. 4035

Title: COMNAVSURFPAC CORROSION CONTROL INITIATIVE

Author: Mr. Stuart Morgan

Presenter: Mr. Stuart Morgan

ABSTRACT: NOT AVAILABLE

Abstract No. 4036

NOT AVAILABLE

Abstract No. 4037

Title: WATERBORNE TANK AND VOID PRESERVATION UPDATE

Author: Mr. Larry Bowden, CNAL NORFOLK, VA

Presenter: Mr. Larry Bowden, CNAL NORFOLK, VA

ABSTRACT: Update of current and ongoing Waterborne Preservation Initiative by Commander Naval Air Force Atlantic Fleet. The carrier dry-docking cycle has recently been increased to a twelve-year period, eliminating four dry dockings over the ship's service life. Fewer docking cycles reduce tank and void preservation opportunities. A critical aspect of achieving the twelve-year dry-docking is the ability to repair and preserve tanks and voids while ships are waterborne rather than waiting for a depot or industrial availability. Abrasive blasting is the approved method of surface preparation for tanks and voids. Considering the substantial number of tanks that require preservation on an ongoing basis, there is a pressing need to develop an alternative method to control corrosion and possible loss of service in these critical areas. To achieve the twelve-year docking period, an efficient and economical pier-side preservation process must be developed that will not interfere with operational requirements of the ship or present undue hazards or hardship to the ships crew. COMNAVAIRLANT has conducted two-test and evaluation projects utilizing Ultra-High pressure water jet blasting as an alternative to abrasive blasting for coating removal. The results of these UHP preservation efforts have been promising thus far, but concerns regarding the level of flash rust following UHP water jet blasting have been raised. The development of a quantitative measurement technique and a device to measure the extent of surface rust following UHP blasting eliminates many of the concerns surrounding the quality control issues associated with UHP blasting of tanks and voids. . COMNAVAIRLANT considers the UHP water jetting process to be the least intrusive process to the crew for tank and void preservation during pier-side availabilities while the ship is waterborne.

Abstract No. 4038

Title: EVALUATION OF CONDUCTING POLYMER COATING TECHNOLOGIES

Author: Mr. Lawrence Gintert, Mr. Skip LefLeur, Concurrent Technologies Corporation; Mr. Don Skelton, U.S. Army Industrial Ecology Center

Presenter: Mr. Skip LefLeur, Concurrent Technologies Corporation

ABSTRACT: Inherently Conductive Polymers (ICPs) combined with Mil specification primers/top coats create high performance coatings systems that can provide corrosion protection to U.S.

Army ground vehicles in highly corrosion environments. Ten ICP based coating systems and eight Mil specification coating systems, serving as controls, were applied to 1018 steel test panels and subjected to two laboratory accelerated tests; a 120 cycle SAE J2334 and a 2000 hour ASTM B117. The scribed test procedure for both the scribed and unscribed portions of the panels. ICP coatings have been primarily designed to protect aluminum surfaces, and were not expected to compete very well with traditional U.S. Army coatings on steel. Eight of the ten ICP based coatings and seven of the eight control coatings had average ratings in the SAE J2334 and the B117 tests of greater than 6.0. These results, while greatly exceeding expectations, are some of the first of their kind and are very promising for the current study of ICPs on aluminum as well as future studies on other substrates.

ICPs are a relatively new technology and have yet to attain a strong grip in the corrosion market. While it is likely that the costs for these products will be reduced as the demand increases, the inherent multi-functionality of the ICPs could justify the higher costs. ICPs can be used antennae "painted" directly onto a vehicle or weapon system, as alternatives to obstructive, dangling, conventional metal antennae. ICPs are also being investigated as possible displays for cell phones, solid-state lighting, hard-coats for optical devices and shielding from electromagnetic pulses on weapons such as missiles. This multi-functionality is a great incentive for taking a closer look at these fascinating new coatings.

This paper discusses the research and testing conducted on ICP coating systems under the U.S. Army Corrosion Measurement and Control Program.

Abstract No. 4039

Title: CORROSION OF MILITARY HYDRAULIC EQUIPMENT

Author: Mr. Robert Mason, Mr. Martin Konrad, and Joshua Semich, Concurrent Technologies Corporation And Mr. Don Skelton, U.S. Army Industrial Ecology Center

Presenter: Mr. Robert Mason, Concurrent Technologies Corporation

ABSTRACT: Military organizations employ a sizeable fleet of hydraulic-based vehicles and systems in routine operations. Hydraulic systems are critical to the operability of tactical forklifts, air defense artillery systems, cranes, armored vehicles, and aircraft. Since hydraulics are essential to the functionality of these assets, the corrosion of these systems is a considerable issue. In some weapons systems, the hydraulics are so critical that corrosion of the hydraulic components can completely deadline the asset. Commercial off the shelf technologies (coatings, materials, etc.) are available that can reduce hydraulic corrosion and thusly reduce the total ownership costs and maintenance burden on affected assets. This paper discusses the initial work conducted under the U.S. Army Corrosion Measurement and Control program to identify the most critical hydraulic corrosion problems and investigate corrosion mitigation technologies to address them.

Abstract No. 4040

Title: EVALUATION OF COMMERCIAL RUST CONVERTERS AS A TOOL FOR CORROSION CONTROL

Author: Ms. Leanne Petry and Ms. Diane Buhrmaster, University of Dayton Research Institute; and Ms. Donna Ballard and Ms. Lauren Wallace, United States Air Force

Presenter: Ms. Leanne Petry, University of Dayton Research Institute

ABSTRACT: Temperature, humidity, and environmental contaminants can attack unprotected steel. Rust converters turn non-protective iron oxide rust into passivating and protective films on

steel surfaces. For quite some time, the United States Air Force (USAF) and the Air Force Space Command (AFSPC) have been trying to incorporate the use of commercial rust converters as a viable tool for corrosion control. In this study, the corrosion resistance of tannic acid and phosphoric acid controls as well as commercial rust converters in the untopcoated and topcoated conditions are being investigated. The intended use is as an interim coating on military ground vehicles, support equipment, communication towers, and space launch complex areas where adequate surface preparation or mechanical removal techniques are limited. Additionally, an attempt will be made to develop test methodology for the selected use of rust converters. Salt fog and cyclic weathering exposure tests were performed on untopcoated and topcoated rust converter systems without artificial defect sites. Surface characterization was performed to discern if any materials compatibility issues exist with either the substrates or coatings, if there are any adhesion problems when applied per manufacturers recommendations, or if their use can be isolated to otherwise untopcoated surfaces. Commercial off-the-shelf products were also examined for critical similarities or differences including ease of application, barrier properties, chemical properties, and mechanical properties. Result will be discussed.

Abstract No. 4041

Title: ONR – NAVAL MATERIALS SCIENCE AND TECHNOLOGY FOR CORROSION CONTROL

Author: Dr. David Shifler, Naval Surface Warfare Center, Carderock Division

Presenter: Dr. David Shifler, Naval Surface Warfare Center, Carderock Division

ABSTRACT: The presentation will outline the research thrust areas in corrosion control and the types of programs supported by ONR. The presentation will also discuss how ONR programs are initiated to meet thrust areas.

Abstract No. 4042

NOT AVAILABLE

Abstract No. 4043

NOT AVAILABLE

Abstract No. 4044

Title: INTRODUCTION TO FEDERAL TECHNOLOGY TRANSFER

Author: Mr. Edward Linsenmeyer

Presenter: Mr. Edward Linsenmeyer

ABSTRACT: NOT AVAILABLE

Abstract No. 4045

Title: PORTABLE CONTAINMENT/PROTECTIVE Enclosures For the US Navy

Author: Mr. Travis Baillie and Mr. Chuck Hansen, Weatherport HWP LLC.

Presenter: Mr. Travis Baillie and Mr. Chuck Hansen, Weatherport HWP LLC.

ABSTRACT: WeatherPort Corporation's presentation will consist of an overview of containment and protective enclosures used on various Navy projects, including most recent work on new gun mount and missile launcher enclosures. These enclosures are fabric-tension type shelters which

employ a vinyl fabric tensioned over a galvanized steel or aluminum framework. The enclosures are available in a wide variety of sizes, shapes, and with custom openings for ventilation, doors, windows, special penetrations, etc. The framework and cover are designed for slip-fit construction and are very quickly set up or taken down. They are crane-liftable when fully assembled. When up, they provide excellent working conditions, practically air-tight sealing, and very good performance under adverse weather and high wind conditions. WeatherPort currently manufactures units specifically designed for use on a variety of Navy ship's.

Abstract No. 4046

Title: COME HELL OR HIGH WATER – THE ART OF COATING UNDERWATER AND IN THE WET

Author: Mr. Tim Davidson, Alocit Group

Presenter: Mr. Tim Davidson, Alocit Group

ABSTRACT: This presentation will discuss application techniques for underwater coatings. The application process and equipment required, along with methods, types of equipment, and minimum requirements for surface preparation will be covered. Differences in the application of coatings in wet areas and splash zones will be addressed. Case histories will be discussed.

Abstract No. 4047

Title: EROSION / CORROSION PROTECTION OF MAIN SEAM CONDENSERS FOR OCEAN GOING VESSELS

Author: Mr. Jon Hanlon and Mr. Wes Langeland, Duromar, Inc. and Mr. Richard Kreislmaier, Plastacor - International

Presenter: Mr. Jon Hanlon, Duromar, Inc.

ABSTRACT: Corrosion, erosion, and mechanical stress have all been major problems associated with the integrity of main steam condensers on ocean going vessels. Tubesheets, tube-to-tubesheet joints, waterboxes, heads, and auxiliary piping are all subject to these type of problems. A number of potential solutions have been tried including metallurgical reengineering, cathodic protection, mechanical rework, inhibitors and coatings. Difficulties have occurred with all of these solutions. The advantages of using the plastacor system, first developed in Germany in 1963, as a long term solution to these problems is discussed.

Abstract No. 4048

NOT AVAILABLE

Abstract No. 4049

Title: ASPECTS OF VOLATILE CORROSION INHIBITORS

Author: Dr. Sunil Dhoot

Presenter: Dr. Sunil Dhoot

ABSTRACT: Recent studies on the cost of corrosion have reemphasized the need to protect existing military assets from the corrosive effects of the atmosphere and thereby extend their life cycle. Volatile corrosion inhibitors (VCIs)^{1,2} have been identified as a class of materials to assist in this task of protecting metallic materials that are exposed to the corrosive environment³.

VCI chemicals are an effective method of protecting metals parts, in that they are able to reach inaccessible crevices and gaps in the metallic arrangement. The VCI chemicals can be delivered to the metal via many methods such as VCI impregnated papers, films, powders, liquids etc.

In this presentation, we discuss some aspects of VCIs. We will compare VCIs to other temporary protectives, discuss some typical VCIs that have been used historically and talk about different methods of delivering VCIs. We also touch upon testing methods, discuss packaging guidelines and provide some application case histories where VCIs have been used successfully.

Abstract No. 4050

Title: TBA – CORROSION INHIBITORS

Author: Mr. Lou Lawrence, VSE Corporation; Mr. Bill Balcom, Carwell Products; Mr. Rudy Nessel, Interface Inc.; Mr. Jim Henderson, Northern Technologies International Corp (NTIC).

Presenter: Mr. Lou Lawrence, VSE Corporation; Mr. Bill Balcom, Carwell Products; Mr. Rudy Nessel, Interface Inc.; Mr. Jim Henderson, Northern Technologies International Corp (NTIC).

ABSTRACT: VSE Corporation, Carwell Products, NTIC and Tabet Manufacturing comprise the Delta Alliance. This session provides an overview of our collective capabilities to assess and implement programs of comprehensive analysis and proven corrosion solutions problems throughout the logistics stream. We augment *your* current programs to reduce total ownership costs, maximize operational readiness and extend system life cycles. Our Integrated Product Team (IPT) approach identifies customer- unique requirements, documents risks and provides: tailored assessments; on-site & mobile service capabilities; certified application technicians & training and refurbishment of unique components and subsystems. Our typical ROI is \$4.00 for every \$1.00 spent!

Carwell Products Inc. provides proprietary Corrosion Prevention Compounds (CPCs) and related services applied to DoD systems during use, pre-deployment staging, short/long term storage, shipping and other severe conditions. Approvals include MIL-C-81309E Amendment # 3, compliance with NIST standards, and EPA/OSHA compliance. Carwell T-32, is the **only** product that can be applied directly over CARC without having to prepare the substrate metal.

NTIC provides customized corrosion management and services under the well-known brand name Zerust® ... including vapor corrosion inhibiting packaging, materials and technical support. Our successful history includes worldwide support for all major automotive and engine manufacturer's supply chains. WE support metal finishing, aerospace, military and electronics applications in the harshest of environments.

The Delta Alliance ... providing customer unique product service and support! We are where you are! Talk to us today

Abstract No. 4051

Title: THE ECONOMICS AND SAFETY OF USING SALT-AWAY ON EQUIPMENT LOCATED IN MARINE AND OTHER HIGH SALT EXPOSURE ENVIRONMENTS.

Author: Ms. Lenora Meister, Salt-Away Products

Presenter: Ms. Lenora Meister, Salt-Away Products

ABSTRACT: Presentation identifies economic features of using Salt-Away as a salt removing maintenance product. Several examples of chloride/Salt Away solution immersion testing using

mil spec metals are included, showing the safety and lack of significant deleterious effects on the metals. Salt removal surface analysis test methods and results showing the effectiveness of the product's salt removing capabilities are also reported

Abstract No. 4052

Title: COMPUTER-CONTROLLED ROBOTIC SYSTEM FOR SURFACE PREPARATION, COATING APPLICATION AND MEASUREMENT

Author: Mr. David Tolliver, Visions East, Inc.

Presenter: Mr. David Tolliver, Visions East, Inc.

ABSTRACT: This presentation will examine the current methods used for the surface preparation and painting of a large surfaces (such as a ship's hull, flight deck or large storage tanks) and contrast it with the advantages of automation through the use of computer-controlled robotic equipment.

The evolution of marine coatings, equipment and techniques will be discussed. Through the use of automation in the surface preparation and coating process, shipyard productivity can be advanced. Material and labor costs can be reduced, worker safety is improved, impact to the environment over current methods can be minimized and quality results become repeatable and predictable.

Abstract No. 4053

Title: SURFACE PREPARATION MONDAY AFTERNOON

Author: Mr. John Tanner

Presenter: Mr. John Tanner

ABSTRACT: NOT AVAILABLE

Abstract No. 4054

Title: ABRASIVE BLASTING – NOW “ROCKET SCIENCE”

Author: Mr. Michael Merritt, Sponge-Jet Inc.

Presenter: Mr. Michael Merritt, Sponge-Jet Inc.

ABSTRACT: The recent application of advanced rocket nozzle and certain gas dynamics principles are leading to dramatic production improvements, which may triple current productivity levels of abrasive blasting. This presentation will outline improvements in both traditional abrasive blasting nozzle design and a new method of Multiple Stage Particle Acceleration (MuSPA). New systems based on these technologies will be demonstrated in a separate outdoor venue on Tuesday, July 13, 2004.

Abstract No. 4055

Title: SPONGE-JET EQUIPMENT DEMONSTRATION

Author: Mr. Michael Merritt, Sponge-Jet Inc.

Presenter: Mr. Michael Merritt, Sponge-Jet Inc.

ABSTRACT: EQUIPMENT DEMONSTRATION

Abstract No. 4056

Title: SALT FOG RESULTS USING A CONJUGATED POLYMER AS A PRETREATMENT WITH NON-CHROME PRIMERS

Author: Ms. Nichole Anderson, Chemical Engineer Chemistry and Materials Division

Presenter: Ms. Nichole Anderson, Chemical Engineer Chemistry and Materials Division

ABSTRACT: Corrosion testing of a conjugated polymer (BAM-PPV) developed by NAVAIR, China Lake has been ongoing for the last few years and has previously yielded encouraging results. In 2004, a neutral salt fog test was completed using BAM-PPV as a pretreatment with Navy approved non-chrome primers. Other commercially available non-chrome pretreatments were also included in the test with the same non-chrome primers. The exposure results of the pretreatments alone as well as in coating systems will be presented. In addition, future test plans for FY04 will also be discussed.

Abstract No. 4057

Title: AN ENGINEERING/CONSTRUCTOR PROSPECTIVE ON SHIP TANK PRESERVATION USING WATERJETTING

Author: Mr. James Gillard, Corppo Companies, Inc.

Presenter: Mr. James A. Ellor, Corppo Companies, Inc.

ABSTRACT: Waterjetting of ship tanks is continuing to receive additional attention in U.S. markets for both commercial and military applications. Waterjetting appears to offer potential advantages in the speed of coating removal. Yet at the same time, the practice continues to raise questions about the appropriate engineering specifications for the process, especially the acceptability of painting over residual surface rusting or discoloration following waterjetting. The paper discusses some lessons learned and results from laboratory tests and from field use of waterjetting equipment for surface preparation prior to painting of ship tanks.

Abstract No. 4058

Title: US NAVY CORROSION CONTROL INITIATIVES

Author: Mr. Andy Seelinger

Presenter: Mr. Andy Seelinger

ABSTRACT: NOT AVAILABLE

Abstract No. 4059

Title: TESTING METHODOLOGIES, ACCEPTANCE CRITERIA AND A CRITICAL EVALUATION OF HYDROCHLORIC AND PHOSPHORIC ACID BASED CHEMICALS FOR DESCALING OF SEAWATER PIPING MATERIALS

Author: Mr. Edward Lemieux and Mr. Keith Lucas, Center for Corrosion Science & Engineering; and Ms. Theresa Wolejsza, Geo-Centers, Inc.

Presenter: Mr. Edward Lemieux, Center for Corrosion Science & Engineering

ABSTRACT: Use of copper-nickels alloys in seawater-cooled heat exchangers is common due to the inherent properties of these alloys, namely, a relatively low corrosion rate, anti-fouling properties and erosion corrosion resistance relative to other alloys. The corrosion behavior of these alloys is strongly dependant on the formation of a "protective film" on the underlying metal.

In addition, alloying of copper with nickel increases these alloys tendencies towards passivity as compared to pure copper and has beneficial effects on their erosion-corrosion resistance. Erosion-corrosion is also improved by addition of iron and manganese. The ability to form a protective film in seawater is influenced by various parameters which include:

- Alloy-related properties (microstructure, chemical composition)
- Seawater properties (oxygen and contaminant content)
- Physical conditions (design, temperature, flow velocity)

The main causes of failure of cupro-nickel alloy components in seawater are usually attributed to either erosion-corrosion at extreme velocities or pitting phenomena. It is well established that these failures are generally due to detrimental seawater conditions, such as the presence of sulphides, or poor designs resulting in flow velocities too high and highly turbulent conditions. Periodic cleanings are necessary on seawater cooling systems, due to the gradual formation of scaling and macro-fouling during operation. Several chemicals and procedures can be used to remove these deposits and growths, the most common products being hydrochloric, citric or sulfamic acids. Hydro-lancing and mechanical cleaning are currently in use but have major drawbacks in costs and labor hours. In addition, most of these methods raise some safety and environmental issues.

Currently, two commercial water scale solvents have been identified that claim to be safe, environmentally friendly, inexpensive and exhibit no detrimental effects on the materials. However, demonstrations have noted an appreciable metal loss during cleanings. As a result of these demonstrations, the Naval Research Laboratory in Key West, FL (NRLKW) has conducted research to determine the characteristics of both hydrochloric acid and phosphoric acid based cleaning compounds which are commercially available. The objectives of this work reported in the current document were to identify the effect of cleanings on the corrosion behavior of 70/30 Cu/Ni, on the existing protective oxide film and evaluate the subsequent reformation of 70/30 Cu/Ni in seawater after cleaning with descalant. A compilation of these results is given in the current document. Additionally, the methods for evaluation of descaling chemicals and the acceptance criteria are presented

Abstract No. 4060

Title: OPTIMIZING THE UV SENSITIVE PIGMENT IN PAINT FORMULATION FOR HOLIDAY DETECTION

Author: Mr. Belal Gharaibeh, University of Kentucky

Presenter: Mr. Belal Gharaibeh, University of Kentucky

ABSTRACT: NOT AVAILABLE

Abstract No. 4061

Title: CORROSION PROTECTION

Author: Mr. Warren Brand, UV Corrosion Control

Presenter: Mr. Warren Brand, UV Corrosion Control

ABSTRACT: NOT AVAILABLE

Abstract No. 4062

Title: THE OFFICE OF NAVAL RESEARCH'S COMMERCIAL TECHNOLOGY CENTER

Author: Ms. Lynn Torres

Presenter: Ms. Lynn Torres

ABSTRACT: NOT AVAILABLE

Abstract No. 4063

Title: INNOVATIVE X-RAY TECHNOLOGY

Author: Dr. Don Sackett

Presenter: Dr. Don Sackett

ABSTRACT: NOT AVAILABLE

Abstract No. 4064

Title: PLURAL COMPONENT SPRAY EQUIPMENT EVERYTHING YOU NEED TO KNOW

Author: Mr. John Pardi, Gusmer Corporation

Presenter: Mr. John Pardi, Gusmer Corporation

ABSTRACT: The intentions of this presentation are to introduce the end user, specifier, engineer and owners to the proper equipment necessary for spraying plural component fast set material through Plural Component spray equipment. This program will discuss the different types of proportioning pumps, spray guns and auxiliary equipment presently available from the different equipment manufacturers. It will attempt to explain the benefits and disadvantages of each type based on the intended application. In an addition this presentation will discuss the importance of choosing the proper equipment for the application in order to accomplish the desired physical properties of the materials and profits.

Abstract No. 4065

Title: CORROSION PREVENTION USING AV-DEC POLYURETHANE SEALANTS

Author: Mr. Dave Schmidt, Av-DEC

Presenter: Mr. Dave Schmidt, Av-DEC

ABSTRACT: Av-DEC, (Aviation Devices & Electronic Components) based in Fort Worth Texas, is a innovative company with a customer driven product mix solving a wide variety of corrosion related problems. Av-Dec is having great success in both the Military and Commercial aviation market and is ready to develop products for the military sea going fleets.

Proven areas of application:

- Mounting interface surfaces
- Connector sealing
- Structures interface sealing
- Wire harnesses
- Connector sealing assemblies

Av-DEC has been providing answers to the major airlines in corrosion prone areas including wire harnesses for years. Current products include: HiTak Polyurethane Gaskets (conductive and non-conductive), HiTak Polyurethane Tape (structural sealing), HiTak Polyurethane StretchSeal

(connector sealing), wire harness sealing boots and both SelfLeveling and Thixoflex injectable sealants. All of our products are non-hazardous. Av-DEC is an innovative company with innovative solutions for corrosion prevention. Bring us your biggest problems and allow us to develop a solution.

Abstract No. 4066

Title: UNDERSTANDING & SOLVING COMMON MOLD & FUNGUS, CORROSION & DECAY PROBLEMS – HIGHLIGHTING THE “FUNGUS AMONG US”

Author: Mr. Lawrence W. Cerenzie, FSC Coatings

Presenter: Mr. Lawrence W. Cerenzie, FSC Coatings

ABSTRACT: This timely presentation will focus on mold, mildew & fungus topics given the impact today on commercial, military, industrial and residential facilities and mobile craft. To solve the situation is first understand why it is happening and what can be done to prevent it. A haunting question is Why is Mold Happening Now? We will discuss why – the answer will surprise you. We will discuss health & non-health effects and who says these “growiies” are a problem. We will also discuss viewpoints. Prevention technologies do not work from the environmental, cost and health viewpoints. Prevention will be a big topic by centering on daily maintenance including cleaning techniques and high performance coatings solutions. In other word. **“Prevention By Design”Be.**

We will also do a quick review of the various coating development and use programs that we have currently undertaking with the various military branches. This will include the breakthrough Cammy Top IR Spectra Topcats used by the Marine Corps and other corrosion prevention systems such as the Zero-Rust and Lox-Rust technologies.

Abstract No. 4067

Title: CERAMKOTE 54®

Author: Mr. Barry Miller

Presenter: Mr. Barry Miller

ABSTRACT: This presentation will discuss CeRamKote 54®, a highly abrasion resistant ceramic loaded epoxy coating, which is currently being used on many Navy projects in either tests or approved applications. Recent applications which include bow areas of LCU's, anti-skid and non anti-skid deck areas, remote submarine program components, bow thrusters, rudder leading edges and propeller shrouds will also be covered. In addition, data on another tough application involved coating cast cable clam shell devices for protecting undersea cables routed through surf on coral reefs in Kauai, Hawaii for the Pacific missile test range will be provided. Questions receive from field units requesting information about the use of CeRamKote 54® on specific projects indicate a need for a current update. This presentation will provide the latest information concerning the known approvals/tests granted for the use of our products.

Abstract No. 4068

Title: ADVANCEMENTS IN THERMAL SPRAY TECHNOLOGY

Author: NOT AVAILABLE

Presenter: NOT AVAILABLE

ABSTRACT: NOT AVAILABLE

Abstract No. 4069

Title: COATINGS

Author: Mr. Dannie Vickers

Presenter: Mr. Dannie Vickers

ABSTRACT: NOT AVAILABLE

Abstract No. 4070

Title: PRECISION ICEBLAST CORPORATION

Author: Mr. Keith Boye, Precision Iceblast Corporation

Presenter: Mr. Keith Boye, Precision Iceblast Corporation

ABSTRACT: Precision Iceblast Corporation offers a nationwide contracting service to provide for your CO₂ blasting needs. Our company is one of the oldest iceblast contracting companies in the country and we are equipped with the most aggressive system. Iceblasting has revolutionized the way companies are currently cleaning or preparing a surface for recoating. For over eleven years, Precision Iceblast has done extensive cleaning in almost every industry (food, paper, automotive, tape, printing, nuclear, restoration, marine, manufacturing, etc.).

CO₂ blasting provides environmentally safe industrial cleaning, stripping and decontaminating. A high velocity stream of CO₂ pellets (dry ice) is used to clean or strip a substrate. The CO₂ pellet undergoes a process called sublimation (molecule moves from the solid phase to the gas phase, thereby skipping the liquid phase). Upon impact, the CO₂ is vaporized and simply returns back to its natural state in the atmosphere. The end result is a cleaned surface with no mess other than the contaminant that was removed.

Iceblasting is also the safest way to clean a surface because the process is completely non-abrasive. Therefore, materials such as steel, concrete, plastic, glass, or rubber can be cleaned without causing any damage to the material. In addition, cleaning can occur around electrical components and bearings because iceblasting is completely dry. The new technology of CO₂ cleaning is the modern alternative to chemical cleaning, sandblasting, waterblasting, steam cleaning, manual scrubbing and scraping, and is the most effective and efficient method of cleaning available today
