

Abstract No. 3000

Title: ABSTRACT OF INSTITUTIONALIZING OVERARCHING DOD CORROSION PREVENTION CONTROL AND MITIGATION

Author: Mr. Daniel Dunmire, Corrosion Policy & Oversight, Office of the Secretary of Defense

Presenter: Mr. Daniel Dunmire, Corrosion Policy & Oversight, Office of the Secretary of Defense

ABSTRACT: On December 2, 2002, the President signed the Bob Stump National Defense Authorization Act for Fiscal Year 2003, Pub. L. No. 107-314, which enacted 10 U.S.C. 2228. Section 2228 requires the Secretary of Defense to designate an official or organization to be responsible for the prevention and mitigation of corrosion of military equipment and infrastructure, develop a long-term strategy for corrosion prevention and mitigation, and submitting an interim report.

Two of the three tenets of the law have been met: (1) designation of the Principal Deputy Under Secretary of Defense as the DoD corrosion official and naming a director of corrosion prevention control and mitigation, and (2) submitting an interim report to congress which addresses the Department's long range corrosion prevention control and mitigation plan.

The presentation will address the third tenet, that is what we expect to present to congress in the December final report, and activities accomplished to date

Abstract No. 3001

Title: SURFACE MINERALIZATION AS AN ALTERNATIVE TO CADMIUM PLATING AND CHROMATE TREATMENT

Author: RADM (Ret). David P. Donohue and Capt (Ret). George T. Simpson, Integrated Systems Analysts, Inc.

Presenter: RADM (Ret) David Donahue, Integrated Systems Analysts, Inc.

ABSTRACT: The Elisha Mineral Coat (EMC™) engineered surface is a patented, mineral-based product that forms a thin metal silicate surface fully involving the substrate metal. This product can be used in a three-part system (i.e., first lightly zinc plating the steel substrate, then electrochemically converting that zinc plated mild steel substrate into a zinc silicate and then top coating that mineral with a one part heat cured epoxy paint) that will function as a technically preferred and lower cost alternative to stainless steel in fasteners for marine applications. This mineralizing technology, also available in gel and lubricant form, as a one-part system, is a central and essential key to the success of the Navy's watertight door dogging mechanism increased operating life.

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 to aircraft carrier aircraft elevator 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.

Elisha's surface mineralization technology offers a superior performing 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. The surface mineralization 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 coat of paint may be.

The Elisha® EMC™ process has been undergoing testing by a major automotive manufacturer for use on fasteners as a replacement for hexavalent chromate. The Navy is now conducting testing of Elisha® EMC™ treated fasteners as an alternative to cadmium plated ones. 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.

Abstract No. 3002

Title: REMOVAL & PREVENTION: WHICH FIRST?

Author: Mr. Mike Jago and Mr. Shawn McGlothlin, Orison Marketing, L.L.C.

Presenter: Mr. Mike Jago, Orison Marketing, L.L.C.

ABSTRACT: The chicken & egg question applies to the 2004 corrosion push. Orison Marketing, L.L.C. has a Pollution Prevention answer either way.

The US Navy has been testing two new products E-Z Safe Solutions EVAPO-RUST & M 400. EVAPO-RUST has proven itself as a safe, easy to use, and hard working iron oxide (rust) remover. The Norfolk Naval Laboratories has certified the claims of the manufacturer, which include: pH: 6.1, Non-Hazardous, Non-Toxic, Not a skin irritant, Not an eye irritant, Non-Corrosive, Non-Flammable, No VOC's, and No HAP's.

M 400 is undergoing testing as a marine corrosion inhibitor. M-400 is a sister product to AR 500 (Mil C 81309-E) and CP-90. CP-90 has undergone 5 years of Army testing, and is now an integral part the ground vehicle corrosion prevention. Testing in Hawaii has proven the product simple, safe, and highly effective in aggressive environments. Other DoD elements have shown interest in benchmarking this research and taking it straight to the field.

EVAPO-RUST has successfully transferred from laboratory curiosity to retail, industrial and military success. Rust (and other oxides of iron) is safely dealt with, disposal is not a problem, acids are replaced, and worker safety is greatly enhanced. The introduction and

application of these successful products will go a long way toward helping the DoD achieve success in the 2004 corrosion prevention initiative. The question of removal and prevention is simplified with the introduction of these P2 technologies. EVAPO-RUST removes iron oxide, & M400, CP-90, AR 500 all prevent or stop it.

Abstract No. 3003

Title: DEGRADATION OF MATERIALS BY FUNGUS

Author: Mr. Maroof Quurashi, Naval Surface Warfare Center (NSWC) Crane, IN

Presenter: Mr. Maroof Quurashi, NSWC Crane, IN

ABSTRACT: Crane Division Naval Surface Warfare Center (NSWC Crane) performs fungus testing on a variety of materials that may harbor fungus attack susceptibility. The samples are tested in accordance with the MIL-STD-810F, IPC-TM-650 and ASTM –G-21 Standards. The procedure includes preparations of test media, viability of inoculum control, control items, inoculation of test and control item, test incubation of test items or introduction to the environmental chambers and final evaluations

The purpose of these tests is to assess the extent to which the material will support fungus growth (resistance of materials to fungi), species and how this growth affects the performance and/or service use/life of the item. Fungus can eat materials as nutrition including polymers, wood, some metals, electronic circuits board assemblies, wires, leather, paper (cellulose) and all of the petroleum products.

Fungus lives on materials/components that supply nutrition under the right biological and environmental conditions namely high humidity. High moisture enables the fungi to absorb the nutrients. A warm temperature also accelerated the fungi growth. The presence of inorganic salts will provide optimum conditions for accelerated growth.

Fungus may cause electronic failures due to electrical shorts. Since microbial deterioration is a function of temperature and humidity and it is a condition of hot and humid tropics; it is considered important to check for fungus susceptibility in items or equipments used under those kind of climatic conditions. It should also meet the acceptance criteria for health, safety, performance and EPA regulations.

A commercial material (plastic or rubber) can be attacked by fungi due to the presence of non-polymer species such as plastizers, pigments (organic and inorganic), antioxidants, fillers, reinforcements and other additives. Dust particles in the air can also serve as food for fungus growth. If a fungus-inert plastic surface should become contaminated with extraneous matter, such as grease, dust, etc., fungus could thrive.

When reengineering or redesign takes place, the replacement items need to be evaluated for potential fungus growth. A major concern to the DOD community is effective storage in the field environment for materials comprising such item and assembled combinations. These are the questions we need to answer via Fungus testing for the Commercial Off The Shelf (COTS) items supplied to DOD by private vendors. COTS items must also be Fungus tested. This paper will provide information on the results of some of these fungus tests.

Abstract No. 3004

Title: CORROSION PERFORMANCE AND MARINE FOULING OF ENGINEERING ALLOYS IN ARABIAN GULF SEAWATER

Author: Dr. J.Carew and Dr. A.Al-Hashem, Petroleum Research and Studies Center, Kuwait Institute for Scientific Research

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

ABSTRACT: Marine fouling of the surfaces of UNS S31600, UNS N08028, UNS N-8825, UNS N06030, UNS N0400 and UNS C71500, have been identified along the shores of the Arabian/Persian Gulf in Kuwait. The corrosion rate of the alloys was also determined as a function of immersion time by the weight loss method. The exposure period covered both the summer and winter seasons at which the average seawater temperature was 35°C and 22°C respectively. With the exception of the UNS C71500, all the other alloys were heavily fouled with greenish, brownish, and reddish type of algae and different sizes of barnacles. The limiting factor for performance in seawater has been shown to be crevice corrosion, but UNS N08028, UNS N08825 and UNS N06030 were unaffected by localized corrosion for a period of 24 months. Removal of the biofilm from the surfaces of the above alloys indicated the initiation of microbial corrosion.

Abstract No. 3005

Title: A QUICK CURE SINGLE COAT SYSTEM FOR BALLAST & FUEL TANKS

Author: Mr. Mark Schultz and Mr. Eric J. Bosanac, Sherwin-Williams

Presenter: Mr. Mark Schultz, Sherwin-Williams

ABSTRACT: Recent developments in coatings technology will greatly reduce labor costs and time necessary to coat fuel and ballast tanks. New high build, edge retentive, low VOC epoxy coatings allow access to the tanks in only several hours with a cure to immersion service time of 24 hours. Also, the one coat application will significantly lower labor related costs and expedite return to service. Application on a US Navy vessel will be discussed in conjunction with several shipyard demos. Lastly, QC concerns will be addressed with a further discussion of black light additives in the coating.

Abstract No. 3006

Title: THERMAL EFFUSIVITY AS A NON-DESTRUCTIVE METHOD TO CHARACTERIZE THIN FILMS

Author: Mr. Mark F. Fleszar, Benet Labs/Watervliet Arsenal

Presenter: Mr. Mark F. Fleszar, Benet Labs/Watervliet Arsenal

ABSTRACT: The Thermal Conductivity Probe (TC Probe) offers a potential non-destructive method for looking at changes in a 3 to 5 mil polymer coating. The Mathis

Instrument's TC Probe is based on a modified hot wire technique. The probe operates under constant current conditions. The temperature of the heating element is monitored during sample testing and changes in the temperature at the interface between the probe and sample surface, over the testing time, are continually measured. Since the coatings are thin, the potential for heat transfer into the substrate are possible. Care must be taken to assure that the analysis time is set to eliminate or at least minimize thermal penetration. The effusivity is a function of the density, heat capacity and thermal conductivity. As a polymer coating degrades as a result of environmental exposure, structural changes in the polymer occur. Chain scission reduces molecular weight and shorter polymer chains become more mobile. Resulting changes in the polymer density and thermal conductivity can be observed using the TC Probe.

Abstract No. 3007

Title: CORROSION TEST RESULTS USING A CONDUCTIVE POLYMER AS A REPLACEMENT FOR A CHROMATE CONVERSION COATING

Author: Ms. Nicole Anderson and Ms. Cindy Webber, Naval Air Warfare Center, China Lake

Presenter: Ms. Nicole Anderson, Naval Air Warfare Center, China Lake

ABSTRACT: Recent corrosion testing done at NAVAIR, China Lake using a conductive polymer as a replacement for chromate conversion coating MIL-C-5541 has produced very good results. An ongoing comparison of a standard paint system and a system utilizing a conductive polymer as a corrosion inhibitor shows similar performance in salt fog tests in excess of 2500 hours. The standard coating system of MIL-C-5541, MIL-PRF-23377, and MIL-PRF-85285 is being used as a control. The test coating system is similar with the exception that the MIL-C-5541 chrome conversion coating has been replaced with the conductive polymer BAMPPV, {poly [bis (2,5-(N,N,N',N'-tetra alkyl)amine)-1,4-phenylene vinylene]}. FY03 efforts will focus on the use of BAMPPV in conjunction with a non-chrome primer and standard topcoats to produce a completely chrome-free paint system. Additionally, new formulations are being explored in an effort to incorporate the BAMPPV into a primer to not only eliminate chrome but also to provide a complete paint system with just two coatings.

Abstract No. 3008

Title: METALLIZING FOR EXTENDED CORROSION PROTECTION IN MILITARY APPLICATIONS

Authors: Dr. Doug Neale, NCI Information Systems

Presenter: Dr. Doug Neale, NCI Information Systems

ABSTRACT: The concept and practice of metal wire arc spray technology ("metallizing") for "lifetime" corrosion prevention and control is described with respect to field and depot level military applications, including technical data, cost data

(application, life-cycle, ROI) and supporting specifications. Successful field applications for metallizing include launch towers, tracking dishes, water towers, maintenance stands, bridges and dams. Depot applications include vehicle frames, trailer/loader decks and structure, fire bottles and disassembled communications towers. The process has also been automated at four production sites for corrosion protection of general-purpose bomb casings (new and renovation). Metallizing is recognized worldwide as a robust, versatile and extremely effective technology for corrosion protection of structural steel substrates.

Abstract No. 3009

Title: NEW METHODS TO COMBAT UNDER-INSULATION CORROSION

Author: Mr. Howard Kotler, Belzona Inc.

Presenter: Mr. Howard Kotler, Belzona Inc.

ABSTRACT: Over the course of the last several years, many advancements have been made to fight the devastating effects of corrosion on the insides of hot pipes and vessels. Although good, this leaves the problem of under-insulation corrosion. This can be in a couple of forms, i.e., SCC-stress corrosion cracking and ESCC-external stress corrosion cracking. In many cases, it can be attributed toward chloride cells from water that is trapped below the insulation. Now we need to find a way to fight this problem and/or prevent it in the first place, using heat activated polymers requiring minimal surface preparation. The following presentation will provide an overview of this new polymer.

Abstract No. 3010

Title: POWER TOOL CLEANING / SURFACE PREPARATION

Author: Mr. Rocky Venitittelli, Desco Manufacturing

Presenter: Mr. Rocky Venitittelli, Desco Manufacturing

ABSTRACT: This presentation will explain how successful surface preparation can be accomplished utilizing power tools and equipment.

The introduction will include the use of specialized power tools to removal and containment of hazardous material, maximizing the performance of power tools, types of power tools, field performance of power tools use in the military and industry and documentation available. General surface preparation and hazardous material abatement will be discussed.

Abstract No. 3011

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.

Abstract No. 3012

Title: DEMONSTRATION OF ZERUST® MATERIALS; EFFECTIVE LOW COST CORROSION PROTECTION FOR CRITICAL ON-BOARD MECHANICAL, ELECTROMECHANICAL AND ELECTRONIC SYSTEMS

Author: Dr. Jim Henderson and Mr. Don Kubik Northern Technologies International Corporation (NTIC)

Presenter: Dr. Jim Henderson Northern Technologies International Corporation (NTIC)

ABSTRACT: Several applications of Zerust® corrosion inhibiting materials (general category VCI and VpCI) are illustrated by successful tests and initial deployments with the U.S. Navy and U.S. Coast Guard. These examples and others are used to show benefits that transfer to a variety of similar applications to protect U.S. Navy equipment when corrosion protection must be continuously effective for several years under similar extreme conditions: electro-mechanical, controls, communications and lighting systems on ships and boats, aids to navigation and other buoys, and other maritime equipment. Key demonstrated benefits include reduced down time and unscheduled maintenance caused by unchecked hidden corrosion of components like connectors, switches and wiring terminations. Mention is made of key measures of efficacy of these materials, of safety in use and environmental benefits from their use, and comparison to short life and less effective legacy methods that remain largely the benchmarks and standard practices: desiccants and semi-permeable seals, greases and some CPC spray coatings. Zerust® corrosion prevention materials and services have been developed, made and sold for over

20 years by Northern Technologies International Corporation, a public company with subsidiary and affiliate operations in 26 countries and customers in over 40 countries.

Abstract No. 3013

Title: PORTABLE CONTAINMENT/PROTECTIVE ENCLOSURES FOR THE US NAVY

Author: Mr. Travis Baillie and Mr. Chuck Hansen WeatherPort Corporation

Presenter: Mr. Travis Baillie, WeatherPort Corporation

ABSTRACT: WeatherPort Corporations 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-lift able when fully assembled. When up, they provide excellent working conditions, practically airtight 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 ships.

Abstract No. 3014

Title: SCALING ANALYSIS OF UV INDUCED PAINT DEGRADATION USING ATOMIC FORCE MICROSCOPY

Author: Mr. Mark Johnson and Mr. Paul Cote AMSTA-AR-CCB-TA

Presenter: Mr. Mark Johnson AMSTA-AR-CCB-TA

ABSTRACT: Changes in the intrinsic structure of paint surfaces resulting from extended UV exposure can significantly alter the appearance of the paint due to a breakdown in the resin that binds the pigments and flattening agents. In this study, the coating structure of 2 military paint formulations was analyzed to establish correlations between the spatial and dynamic scaling properties of the coatings and UV exposure time. Atomic force microscopy was employed to map surface structures over a range of scales from 20 nm to 10 nm. The roughness of the polyurethane surface was characterized in terms of scaling exponents using detrended fluctuation analysis to identify long range, power law relations and correct for inhomogeneities in the surface structure. The time-dependence of the roughening process was also determined and correlated with changes in gloss. The techniques developed in this study provide a new, systematic means to quantify physical properties changes that are responsible for appearance changes in paints. The scaling parameters provide fresh insight into the mechanisms of UV degradation and a useful metric for comparing the performance of different paint formulations.

Abstract No. 3015

Title: U.S. ARMY CORROSION WEBSITE DEVELOPMENT

Author: Mr. Lawrence A. Gintert and Ms. Kristy L. Anderson, Concurrent Technologies Corporation

Presenter: Mr. Lawrence A. Gintert, Concurrent Technologies Corporation

ABSTRACT: As the U.S. Department of Defense (DoD) addresses the problem of corrosion and its effects on military readiness, new technologies are being introduced that need to be relayed to maintenance technicians and design engineers. To perpetuate this relay of corrosion-related information, a dedicated website portal is being developed. The website portal will permit access by the public as well as restricted access via password. The website will feature links to training on a variety of topics related to U.S. Army corrosion issues, information on upcoming corrosion-related conferences, reports based on research to be used in future design and applications, search and query capabilities of data gathered, and an economic model that can be used to calculate potential cost savings associated with corrosion mitigation technologies. Concurrent Technologies Corporation (CTC) is developing the corrosion website under the sponsorship of the U.S. Army as part of the U.S. Army Corrosion Measurement and Control (CM&C) Program. This paper presents the requirements and rationale for the U.S. Army corrosion website portal, the layout and architecture of the entire website, and a detailed description of each website section.

Abstract No. 3016

Title: A NEW VOC FREE, CORROSION PROTECTION REACTIVE BARRIER PACKAGING MATERIAL

Author: Dr. Keith W. Donaldson Engineered Materials, Inc. (EMI)

Presenter: Dr. Keith W. Donaldson Engineered Materials, Inc. (EMI)

ABSTRACT: A new active barrier material for electrostatic discharge (ESD) and corrosion protection has been developed. These new materials are reactive polymers (trade name Static Intercept®). They consist of a blend of polymer resins (e.g. polyethylene, polypropylene, styrene) co-valently bonded with stable solid-state additives, with no addition of any volatile components, so the material is VOC free. The resulting materials provide permanent ESD protection with an unparalleled ability to neutralize corrosive gases for extended time. The plastic acts as an active barrier, reacting with and permanently neutralizing corrosive or reactive gases. Other characteristics include: non-outgasing, humidity independent and clean room compatible. Extensive testing by various organizations, including DuPont, The US Army (Picatinny Arsenal and Tobyhanna) and others have verified that the material outperforms mil PRF-131 J foil packaging for corrosion protection. Testing has also shown Intercept to be compatible with all fuel and propellant systems, with the exception of Lead Azide.

The same material provides protection from corrosion, oxidation and degradation by atmospheric H₂S, COS, Nitrous Groups, Ozone and HCl for both non-ferrous and ferrous

metals. The material provides a robust corrosion prevention solution, working effectively whether it is hot or cold, dry or wet. Applications stretch from connectors, metal cabinets and high end electronics, to outdoor shrink wrapping of military equipment for ship board transport, as well as Naval ships and military jets. Intercept is fully recyclable and re-usable. The presentation will cover testing, case studies and applications.

Abstract No. 3019

Title: NAVAL SURFACE WARFARE CENTER PORT HUENEME
DETACHMENT LOUISVILLE CORROSION CONTROL UPDATE

Author: Mr. Dave Whittle, Naval Surface Warfare Center, Port Hueneme Detachment
Louisville (NSWCL)

Presenter: Mr. Dave Whittle, NSWCL

ABSTRACT: Update of current and ongoing corrosion control projects at NSWC PHD . The MK 75 Gun Program has provided a listing of corrosion control for the past year. The Decoy Launching is providing a list of material that has been incorporated into their systems from past Corrosion Control Conferences. Also, providing information of the shipboard testing, of a low temperature powder coating

Abstract No. 3020

Title: OVERVIEW OF CURRENT CORROSION ABATEMENT AND
CONTROL TECHNOLOGIES

Author: Mr. Regis K. Conrad and Mr. Richard A. Hayes, Naval Surface Warfare
Center, Carderock Division

Presenter: Mr. Richard A. Hayes, NSWC Carderock Division

ABSTRACT: The NSWC Carderock Division is responsible for research, development, test and evaluation, fleet support, and in-service engineering for surface and undersea vehicles and associated hull mechanical and electrical systems and propulsors. Another integral part of its mission is logistics R&D and support to the Maritime Administration and maritime industry. The Carderock Division is a major technical component of the Naval Sea Systems Command. It is also recognized as the principal Navy resource, national focal point and international leader in surface and undersea vehicle science, ship systems and related maritime technology. The Division serves as a source of innovative technology for other national priorities, such as environment, energy and transportation.

The Marine Corrosion Branch, Code 613, consisting of the environmentally assisted cracking and fatigue labs, high temperature lab, and electrochemistry and aqueous corrosion labs capable of conducting corrosion research, testing and evaluation of Navy sea borne materials exposed in ambient or high temperature (simulated gas turbine) marine environments. Both materials and coatings evaluations provide input into design guidance, specifications, and manuals. Customers include USN, USMC, USCG, the maritime industry, and other private sector companies. Ongoing research efforts and their applications will be presented and discussed.

Abstract No. 3023

Title: THE SURFACE FORCE PERSPECTIVE

Authors: Mr. Earl (Bucky) Glenn, Commander Naval Surface Force, U.S. Atlantic Fleet (COMNAVSURFLANT)

Presenter: Mr. Earl Glenn, COMNAVSURFLANT

ABSTRACT: The Surface Force Perspective is a fleet overview on the evolution of Engineering for Reduced Maintenance (ERM) and the integration of new technologies into fleet maintenance strategies to reduce life cycle costs and improve system readiness on naval ships.

Emphasis is on the importance of sustaining a partnering relationship with the NAVSEA technical directorate and industry in addressing manpower intensive problems in the fleet and high cost drivers facing the maintenance community.

Abstract No. 3024

Title: COMNAVSURFPAC MAINTENANCE AND ENGINEERING

Author: CDR Scott Mattingly, Commander Naval Surface U.S. Pacific fleet (COMNAVSURPAC) N43

Presenter: CDR Scott Mattingly, COMNAVSURPAC N43

ABSTRACT: This presentation provides an overview of COMNAVSURFPAC Maintenance and Engineering's efforts to improve Fleet maintenance.

The discussion will describe the major functions of COMNAVSURFPAC's Naval Engineering office and will include maintenance strategies, type desk office, quality assurance program, departing from specifications, support liaison with NAVSEA and SPARWAR, and the budget.

Abstract No. 3026

Title: ENVELOP FLEXIBLE CORROSION PREVENTATIVE COVER

Author: Mr. Tom Nelson, Foldy Pac Protective Systems

Presenter: Mr. Tom Nelson, Foldy Pac Protective Systems

ABSTRACT: Corrosion continues to be one of the most costly problems for the Navy and other branches of the US military. Envelop Protective Covers, developed under Navy SBIR funding, are a patented corrosion preventative covering system that has been proven to mitigate corrosion significantly on Naval topside equipment. Testing has shown that Envelop, when compared to the traditional coverings used by the Navy, (1) reduces corrosion by as much as 95%, (2) lasts as much as four times longer, and (3) represents a significant Return on Investment. Both ship validation and laboratory-scale test results will be presented along with example Envelop applications that will assist the Navy and US military in significantly reducing equipment maintenance, refurbishment,

and replacement burdens. It will be shown that Envelop has applications not only in the military, but also for many industrial and commercial applications where corrosion problems have been vexing.

Abstract No. 3027

Title: STATE OF NAVSEA COATING SYSTEMS

Author: Mr. Andrew Seelinger, Naval Sea Systems Command (NAVSEA) 05M1

Presenter: Mr. Andrew Seelinger, NAVSEA 05M1

ABSTRACT: This presentation will provide an overview of the direction that the US Navy is taking for coatings technology.

Reliability and extended performance of coatings, faster paint schedules, compliance with environmental laws / regulations for air and water quality, establishment of standards and specifications common to World NAVIES, and NATO will be discussed

Abstract No. 3028

Title: COMMERCIAL TECHNOLOGY TRANSITION OFFICER (CTTO) – RAPID TECHNOLOGY TRANSITION

Author: Ms. Susan Bales Office of Naval Research (ONR)

Presenter: Ms. Susan Bales ONR

ABSTRACT: ONR's CTTO searches all sectors of the global economy—the government, industry, academia, foreign firms and laboratories, and so on—for technologies likely to be of interest to the Navy and Marine Corps. We then work with both the naval acquisition community and companies to move technologies between the naval services and commercial markets. We find technological solutions to problems facing the war fighter, and we get those solutions into the hands of Sailors and Marines as soon as possible—we aim to deliver in three years or less.

The CTTO is also exploring new approaches, especially relationships with the venture capital community, to leverage naval investment in nascent enterprises that show extraordinary potential payoff. Our responsibilities include: Promoting the rapid insertion of technology from any source by matching program needs and business strategy with technology opportunities; Providing objective, independent, system-oriented technology assessments; Advising on matching the Navy's business and technology insertion strategies; Evaluating potentially disruptive technologies and alerting leadership to their prospects; Developing policies and tools to improve Navy utilization of technology.

Since 1999 we have completed 20 agreements to transition 17 technologies to the Navy and Marine Corps. Advanced warheads, enhanced navigational systems, and new fiber optic networking capabilities are just a few of the technologies we have reviewed and for which we have secured rapid transition to the Department of the Navy. In many cases the CTTO proved to be the only route the technology could find into the program it now benefits.

Abstract No. 3029

Title: U.S. AIR FORCE CORROSION PROGRAM OFFICE

Author: Major Daniel Bullock, US Air Force Program Office

Presenter: Ms. Kimberly Andrews, US Air Force Program Office

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 issues 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 will include recently qualified materials, process improvements, technical data updates, results of site surveys, and customer needs

Abstract No. 3030

Title: ARMY CORROSION PREVENTION AND CONTROL OVERVIEW

Author: Mr. Don Skelton, U.S. Army TACOM-ARDEC, Industrial Ecology Center

Presenter: Mr. Don Skelton, U.S. Army TACOM-ARDEC, Industrial Ecology Center

ABSTRACT: Mr. Skelton of the IEC at TACOM-ARDEC will present an overview of the Army's Corrosion Measurement and Control Program with emphasis on current Research and Development activities. These include initiatives in coating systems, advanced materials, modeling and simulation, NDT technology, Joint Test Protocol development and web based training and information exchange.

Abstract No. 3031

Title: INTEGRATED CORROSION RESEARCH AND ENGINEERING FOR THE U.S. MARINE CORPS

Author: Mr. Rich Hayes, Naval Surface Warfare Center, Carderock Division (NSWCCD)

Presenter: Mr. Rich Hayes, NSWCCD.

ABSTRACT: The NSWCCD is the Navy's principal laboratory for corrosion research, development, testing, evaluation, and engineering support for hull, mechanical, and electrical systems. In this capacity, they bring extensive experience, expertise, and capabilities to the resolution of corrosion problems in severe marine environments and have been addressing corrosion problems for the U.S. Marine Corps for approximately 10 years. NSWCCD is currently conducting a fully integrated corrosion research and prevention program that includes:

- Long-term research sponsored by the Office of Naval Research with Fleet transition of new corrosion prevention products and processes in the 5-10 year timeframe;
- Corrosion prevention and control efforts sponsored by the Chief Engineer, Marine Corps Systems Command. This is a multi-faceted program that addresses near-term problems and solution development;

Direct support to acquisition programs. These efforts are aimed at preventing corrosion problems in the design stage and resolving corrosion issues during system prototype evaluations.

Abstract No. 3032

Title: U.S. COAST GUARD

Author: Mr. Mark Dust, US Coast Guard Logistic Center (USCG LC)

Presenter: Mr. Mark Dust, USCG LC

ABSTRACT: This presentation will provide an update of the US Coast Guards preservation and control program.

The discussion will include the accomplishments of the US Coast Guard Coatings and Coatings Tiger Team, coatings and color manual, impact of deep water, corrosion maintenance procedure cards, topside coatings prototype, anti fouling prototype, slip resistant sheet material and other initiatives and issues.

Abstract No. 3033

Title: AMERICAN SOCIETY OF NAVAL ENGINEERS: PRESENTATION: A RISK MANAGEMENT MODEL FOR THE APPLICATION OF CLASSIFICATION TO NAVAL VESSELS

Author: Capt. (Ret) Glenn Ashe, American Society of Naval Engineers (ASNE)

Presenter: Capt. (Ret) Glenn Ashe, ASNE

ABSTRACT: The U.S. Navy and the American Bureau of Shipping have joined in a strategic partnership to apply the process of classification to the acquisition of naval vessels. The foundation for this effort is the joint creation of a set of established criteria against which a vessel's acceptability as measured against those criteria can be judged. This effort is currently underway for non-nuclear surface naval vessels. Because of the unique mission requirements of such vessels and the multiplicity of roles that the Government plays in the process, it has been necessary to carefully examine the procedures which govern the application of this process in order to clearly define how ABS and its Government partners function in their individual roles. This presentation will outline the overall process, briefly discuss the various programs to which it is being applied and will present the tenets under which ABS and the Government have agreed to function in order to ensure that vessel certification is comprehensive and technical authority remains with the Navy.

Abstract No. 3034

Title: SOUTHEAST REGIONAL MAINTENANCE CENTER

Author: CDR Mark Solberg, Southeast Regional Maintenance Center (SERMC)

Presenter: CDR Mark Solberg, SERMC

ABSTRACT: This presentation will provide an overview of the Designing Model Corrosion Control Facilities for Southeastern Regional Maintenance Center (SERMC) through the Navy Environmental Leadership Program (NELP) & P2 Regional Support Group Naval Station Mayport

The discussion will include background information pertaining to NELP, which was chartered in 1993 by Chief of Naval Operations. The function and visions of the two major installations: Naval Station Mayport and the Navy Region Southwest (NAS North Island) will be explained.

The NELP Mayport Funding/Partnerships will be identified along with the planning data, equipment requirement and total facility costs. Benefits and cost savings will be provided.

Abstract No. 3035

Title: NASA: STAINLESS STEEL UNITIZED IN AEROSPACE DESIGN

Author: Mr. Joe Curran, NASA Kennedy Space Center

Presenter: Mr. Joe Curran, NASA Kennedy Space Center

ABSTRACT: This report presents information on the results of an extended atmospheric exposure test of 11 corrosion-resistant alloys intended to replace the 300 series stainless steel (SS) alloys used in the aerospace launch environment at the Kennedy Space Center (KSC). The alloys included in the study were AL6XN, 254 SMO, C-2000, AL29-4C, C-276, 2507, 2205, 625, 317L, 316L, and 304L. Respectively, these alloys are super-austenitic, austenitic, Ni-Cr-Mo, super-ferritic, Ni-Mo-Cr-Fe-W, duplex, duplex, austenitic Ni-base, two Mo-bearing austenitic, and low-carbon austenitic.

Currently, 300 series SS tubing is used in supply lines that service the launch pads at KSC. This material is susceptible to pitting corrosion that causes cracking and rupture of both high-pressure gas and fluid systems. The implementation of a new tubing alloy will increase the service lifetime of the tubing, improve safety, diminish maintenance costs, and reduce downtime losses.

The test matrix consists of four separate conditions that could be experienced at the launch facilities. They are categorized as follows: normal seacoast unsheltered, normal seacoast sheltered, acid environment unsheltered, and acid environment sheltered. The results are presented in terms of the different materials resistance to corrosion, and the

types of corrosion exhibited. Furthermore, workability issues such as welding and bending are assessed and tabulated. Metallography and Scanning Electron Microscopy (SEM) were performed on the failed tubing to determine the extent of the environmentally induced corrosion damage.

AL6XN was chosen as the alloy to replace the existing 300 series SS at the NASA/KSC launch pads.

Abstract No. 3036

Title: THE COST OF CORROSION

Author: Mr. George Hays, NACE – International – The Corrosion Society

Presenter: Mr. George Hays, NACE - International

ABSTRACT: This presentation provides an overview of NACE International – The Corrosion Society. The vision of NACE International is to be recognized as a world-class corrosion society by contributing significantly to the enhancement of global corrosion efforts, and its mission is to reduce the impact of corrosion throughout the world and it's mission NACE.

A study of the cost of corrosion within the United States will be discussed. . This study involved an industry sector analysis of 26 sectors in 5 categories. The five categories are infrastructure, utilities, transportation, production & manufacturing and government.

Details of the Congressional mandate which requested the Department of Defense (DoD) to develop and implement a long-term strategy to reduce corrosion and the effects of corrosion on military equipment and infrastructure and NACE and DoD collaboration will be discussed.

Abstract No. 3037

Title: DELTA ALLIANCE FOR YOUR CORROSION CONTROL REQUIREMENTS

Authors: Mr. Lou Lawrence, VSE Corporation

Presenter: Mr. Lou Lawrence, VSE Corporation

ABSTRACT: There is an estimated \$300B per year economic impact in the US as a direct result of corrosion and corrosion related effects. Of that it is estimated that approximately \$10B yearly is directly related to the Armed Forces and their equipment and systems. In short, it is a problem of critical proportions and growing as newer systems and equipment enter the inventory.

In response to the increased demand for corrosion control, Carwell Products Inc. of Buffalo, NY developed an entirely new series of highly effective applications. The

products, developed 18 years ago are a Trade Secret and have undergone continuous improvements over the years. Production is tightly controlled, products thoroughly inspected and continuous R&D improves both the product and application techniques. Significant testing has been accomplished by both the U.S. Army and Navy resulting in formal approvals for application, including MIL-C-81309E Amendment # 3. The products meet NIST standards and uses only EPA/OSHA compliant Corrosion Prevention Compounds (CPCs). Carwell T-32 is the *only* product that can be applied directly over Chemical Agent Resistant Coating without having to prepare the substrate metal. Tests show increases in corrosion-related mean-time-between-failure (MTBF) by 90% and the typical Return On Investment is \$4.00 for every \$1.00 spent.

Carwell Products, VSE Corporation and Tabet Manufacturing comprise the Delta Alliance. It was formed to provide comprehensive analysis of corrosion problems and provide a program of proven solutions including remanufacturing and repair. Our approach augments your current corrosion prevention programs and processes, has proven to reduce total ownership costs, increase operational readiness and extends service life. We employ an Integrated Product Team (IPT) approach to identify customer-unique requirements, assess requirements versus risks and develop a tailored program approach for attacking corrosion problems. We provide certified application technicians and can train and certify *your* personnel.

The Alliance provides total product, service and support with both on-site & mobile service capabilities we are where you are!

Abstract No. 3038

Title: USE OF ACCELERATED CORROSION TESTING TO EVALUATE MILITARY SYSTEMS AND EQUIPMENT – AN OVERVIEW

Author: Mr. John Repp, P.E. Corpro Companies, Inc, Mr. Andrew Sheetz US Navy NSWC-Cd, Mr. Carl Handsy US Army TACOM, Mr. Bill Mullis Aberdeen Test Center

Presenter: Mr. Brad Shaw, P.E. Corpro Companies, Inc

ABSTRACT: Throughout the military there has been an increasing trend towards using existing and new equipment and systems for durations greater than their original design life, in many cases this life has been extended to 20 years or more. Based on current trends in the life cycle of military systems, it is highly probably that even this target will be extended (and in some cases, such as aircraft, it has). To increase the life of this equipment more robust materials and supplemental corrosion prevention and control (CPC) measures are being used. Although every effort is made to use state-of-the-art materials, there is no guarantee that they will prove effective. Many factors can greatly influence and possibly even reduce the overall effectiveness of these additional protection measures. Accelerated corrosion testing is the best tool available to specifiers, designers, researchers and evaluators alike to determine the potential influence of these factors and the long-term performance of their systems.

Accelerated corrosion testing can mean many different things to different people. The most common view is that of the cabinet or chamber tests run in corrosion laboratories. However, such test can take on many forms depending on the materials and environments of exposure. For example, different tests are used to simulate atmospheric exposures, whereas immersion service requires an alternative test. In general these tests are designed to simulate, reproduce or represent a specific environment for comparison of materials when being considered for equipment and systems. Many factors influence the correct selection, execution and interpretation of these tests. This paper will discuss these factors in brief, focusing on several types of accelerated testing, highlighting some of the benefits and limits to their use and providing suggestions on how to gain the most information from the data developed by these tools.

Abstract No. 3039

Title: THE ECONOMICS & SAFETY OF USING A ENVIRONMENTALLY ACCEPTABLE CHLORIDE REMOVING WASH FOR CORROSION CONTROL ON EQUIPMENT LOCATED IN MARINE & OTHER HIGH SALT EXPOSURE ENVIRONMENTS

Author and Presenter: Ms. Lenora Meister, Salt-Away Products, LLC

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 using the same and other metals are also reported.

Formula information and application features describe the product. Examples of current successful applications are included, as well as a partial list of major commercial customers.

Abstract No. 3040

Title: PREDICTABILITY OF THE CORROSIVE PROCESS

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

Presenter: Ms. Nancey Maegerlein, NSWC Crane Division

ABSTRACT: This presentation focuses on the predictive surveillance technology that has been used in the weapon components systems at the Explosive Sciences Branch (ESB) of NSWC Crane Division. The technology is based on measuring the heat flow or thermal properties using micro calorimeters.

The basic principle of operation is microcalorimetry of corrosive reactions. The effective measurement of corrosion requires a tool, which can detect the heat generated from corrosive reactions generated over long periods of time.

The corrosion is an electrolytic process that releases energy that cannot be controlled or predicted unless it can be effectively measured. The Explosive Sciences Branch Code 4052 (ESB) performs procedures of heat flow microcalorimetry where the energy can be effectively measured as heat.

The paper talks about the traditional method and compares it with the new method. This procedure is innovative. It applies the discovered equation of noble prizewinner scientist Dr. Svante Arrhenius.

The technology originally was applied by the pharmaceutical industry to predict the shelf life expiration date, now it is applied in the aging studies, functional testing, and service life of weapon component systems.

Abstract No. 3041

Title: PROPOSED ENVIRONMENTAL SYMPOSIUM TOPIC,
METALLIZATION

Author: Mr. Jim Trammel, USAF Space Command DET. 8 CWP

Presenter: Mr. Jim Trammel, USAF Space Command DET. 8 CWP

ABSTRACT: The metallizing process is used for corrosion control purposes on the spacelift range tracking assets on both the Eastern and Western ranges. It is also used on the space launch facilities at Vandenberg AFB and on the ICBM facilities at FE Warren AFB, WY. Because of the harsh environments that our facilities operate in, the standard three-coat paint system seldom lasts longer the three years before corrosion becomes a problem again. Metallizing Systems are designed and developed to accurately apply a sacrificial coating of zinc, aluminum, or an 85/15 compound on a metal substrate such as steel that precludes the formation of corrosion. The system uses a low energy, high disposition arc spray system that utilizes 3 phase 230/460 volts and dry compressed air at 65 cfm @ 100 psi. Other options were studied however; none came up with the life span of a metalized coating. As stated before, the standard three-coat paint system lasts approx. three years. The compound of 85/15 has a life of 20 years while the zinc or aluminum coating lasts 40 years with no corrosion. Since the metalizing process utilizes no volatile chemicals, (VOCs), it is environmentally friendly; therefore, totally eliminating the hazardous waste stream and the associated costs

Abstract No. 3042

Title: TRANSPORT ANALYSIS OF PIT PROPAGATION IN AL AND AL
ALLOYS IN THE PRESENCE OF CHLORIDE IONS

Authors: Dr. Charles L. Arvin and Mr. Albert E. Miller University of Notre Dame.

Presenter: Dr. Charles L. Arvin University of Notre Dame

ABSTRACT: Many peculiarities occur during pit propagation in Al and Al alloys. Some of these include 1) the formation of a chloride salt at the base of a propagating pit, 2) the indeterminate growth of one pit through a material while others stop, 3) an abrupt change in the open circuit potential after some period of incubation, 4) the enhancement

of pitting in the presence of certain species such as Cu from the alloy material, 5) the transport of inhibiting agents only to the location of active localized dissolution, and 6) the inhibition of pitting corrosion through reduction of species such as Cr(VI) and subsequent precipitation even though its concentration is ca. 10^{-7} gmol / L. A mass transport analysis that considered diffusion, migration and solubility factors along with a development of a one-dimensional model was able to explain and predict all of the aforementioned peculiarities. Through this understanding, a list of mass transport and chemical properties required for future pitting inhibitors and for future alloy constituents was developed.

Abstract No. 3043

Title: DEVELOPMENT OF AN ENVIRONMENTAL CORROSIVITY SENSOR

Authors: Ms. Andres M. Cardenas-Valencia, Mr. Scott Samson, Dr. Eric T. Steimle

Presenter: Dr. Eric T. Steimle

ABSTRACT: Continuous methods for monitoring corrosion are particularly challenging. This talk will focus on the development of an inexpensive, customizable technology involving optical signal variation due to changes in a coated wave-guide. This technology will be incorporated into a portable, self-contained, indirect corrosion monitoring system, which is amenable to attachment to or placed in the vicinity of a target structure (aircraft, bridge, sensitive electronics, transported or stored equipment) for the purpose of quantifying the cumulative corrosivity of the environment that has been experienced. This will allow the necessary feedback for enhancing preventative maintenance and procedures and allow early identification of potential problems. Miniaturization of spectrometers and electronic advances enables the development of real portable sensors that can be used for continuous monitoring that are rapid, noninvasive, cost effective, and capable of remote interrogation.

A first-principles based methodology is described in which light signals are quantitatively related to the degree of corrosion in the waveguide. This approach has been validated by comparing the algorithmic predictions with carefully conducted laboratory experiments. This sensing approach has been designed to be self-calibrating, which provides for the possibility of continuous monitoring for predetermined amounts of time. The measurement methodology that is described, allows for a versatile sensor that can be easily configured for diverse applications to monitor different degrees of environmental corrosiveness.

A preliminary discussion on the further miniaturization of this approach by using novel, micro-fabrication techniques is introduced here. This work demonstrates the potential for the inexpensive, mass production of a versatile and portable corrosion sensor that provides consistent measurements through continuous, unattended monitoring

Abstract No. 3044

Title: DEVELOPMENT OF VOLATILE CORROSION INHIBITORS IN EMITTERS

Author: Dr. Sunil Dhoot, Daubert VCI, Inc.

Presenter: Dr. Sunil Dhoot, Daubert VCI, Inc.

ABSTRACT: Volatile corrosion inhibitors (VCIs)^{1,2} are currently used for protecting metallic materials that are exposed to the corrosive environment³. VCI chemicals are an effective method of protecting metals parts, in that no cleanup or further rework of the parts is needed after the parts are removed from the VCI packaging. The VCI chemicals can be delivered to the metal via many methods such as VCI impregnated papers, films etc. A common requirement is the presence of an enclosed environment. VCI papers and films create a protective environment by encasing the metal part during transportation and storage.

In applications such as electrical boxes, control boxes, and data storage systems, the internal critical parts need protection against corrosion. These parts are already enclosed in a box. A VCI emitter⁴ is then a convenient method to deliver the VCI.

In this report, VCI's in emitters have been developed and studied. Building on a basis of chemistries that have worked well for industry over decades, VCI formulations were developed for the emitter. Accelerated corrosion studies (temperature and humidity cycling) showed excellent protection for a large variety of metals in presence of VCIs. Experiments were also performed to select a tape suitable for adherence of the emitter to a broad choice of substrates. Finally, some application case histories where the VCI emitter has been used successfully to provide corrosion protection are presented.

Abstract No. 3045

Title: THE BASICS OF PROTECTIVE COATINGS

Author: Mr. Dannie Vickers, Vickers Industrial Coatings

Presenter: Mr. Dannie Vickers, Vickers Industrial Coatings

ABSTRACT: Successfully selecting and applying protective coatings requires an understanding of coating basics.

This discussion will include a brief history of coating formulation development and application procedures.

Further discussion will center on the basic "parts" of a protective coating and the relationship between coating formulation, mechanisms of protection, surface preparation, adhesion and curing mechanisms.

Abstract No. 3046

Title: ENVIRONMENTAL EVALUATION OF CADMIUM COATING FOR USE IN A MARINE ENVIRONMENT

Authors: Mr. Regis Conrad, Naval Surface Warfare Center, Carderock Division

Presenter: Mr. Regis Conrad, NSWC Carderock Division

ABSTRACT: This presentation will discuss alternative plating systems to cadmium plating and the reason why there is a search for alternative coating systems. The benefits of using cadmium plating, along with the personnel health risks and environmental problems will be explained. Alternative coating systems will be identified to include specific testing performed on the test samples, test results. An open discussion will conclude the presentation.

Abstract No. 3047

Title: CERAMKOTE 54®

Authors: Mr. Barry Miller, Freecom

Presenter: Mr. Barry Miller, Freecom

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 received 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. 3048

Title: A CORROSION COATINGS TOOL BOX

Author: Mr. Tim Davidson, Alocit Corporation

Presenter: Mr. Tim Davidson, Alocit Corporation

ABSTRACT: Innovative and affective coating solutions for corrosion and other coating problems in the real world

In a perfect world, coating problems can be solved quite easily, by design, choice of materials and proper maintenance. On planet Earth, however, Murphy's Law dictates that we are faced every day with the rusting results of compromise and failure. But there is no need to despair – solutions are at hand for a wide range of surface protection issues, using a simple and versatile toolbox principle to keep aging infrastructure in working condition.

When the going gets tough ...

DAMP & CONDENSATION

Coating in a wet environment need not be a problem. Concrete and steel surfaces subject to spray, condensation and run-off can be successfully coated - and no need to wait for those water-jetted surfaces to dry.

Case studies: Single Buoy Mooring, Water jetting test comparison

OILY/CONTAMINATED SURFACES

Wherever equipment is used or serviced, oil and other contamination may become a safety or aesthetic issue. Complete cleaning may not be possible, but applying a fresh coating to the area can make it good as new.

Case studies: Gornergrat Tunnel, PCB encapsulation

BOLTED SYSTEMS

Constant attention to flanges, valves and pipework can be addressed with a simple barrier coating

Case study: Offshore platform

LONG & SHORT-TERM EQUIPMENT STORAGE

Take the headache out of protecting your assets, making sure they are there when you need them – and that they will still work!

Case study: Western Australia

MARINE ENVIRONMENTS

Deal with MIC, failing concrete, rusting piles and accelerated corrosion of all kinds

Case studies: MIC, USS Detroit

WET/GREEN CONCRETE

No need to delay, waiting for solutions to moisture in concrete, whether it is from the environment or because it's newly laid.

Case study: Singapore MRT

INNOVATIVE SOLUTIONS - CONCLUSION

Flexible products bring new possibilities, whether it is replacing tiles in the Holland Tunnel, protecting bearings in dusty and corrosive environments or allowing more eco-friendly surface preparation techniques

Abstract No. 3049

Title: SURFACE PREPARTAIION: ASSURING A SUCCESSFUL JOB BY REALIZING THE LIMINTATIONS!

Author: Mr. John Tanner, UHP Projects

Presenter: Mr. John Tanner, UHP Projects

ABSTRACT: An overview of the currently utilized methods of surface preparation with an emphasis on fine tuning the specification and optimizing the shipyard period.

Abstract No. 3050

Title: COMPOSITE ABRASIVES AS AN ALTERNATIVE TO HAND TOOL SURFACE PREPARATION

Author: Mr. Bill McLaughlin, Sponge-Jet, Inc

Presenter: Mr. Bill McLaughlin, Sponge-Jet, Inc

ABSTRACT: This presentation illustrates recent Military and Marine developments using low dust, reusable composite abrasives. Reports from the field compare hand tooling to composite abrasive blasting as they relate to accelerating blasting and painting operations, reducing total project costs, while improving the quality of the prepared surface.

Abstract No. 3052

Title: PACIFIC RIM CORROSION RESEARCH PROGRAM (PRCRP)

Author: Dr. Robert Zanowicz, US Army Industrial Ecology Center

Presenter: Dr. Robert Zanowicz, US Army Industrial Ecology Center

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 Industrial Ecology Center, Army Tank-Automotive RD&E Center and the University of Hawaii – Manoa to meet these challenges. The Hawaiian Islands provide a natural laboratory for climactic research for conditions found throughout the PTO and data generated in research will be correlated with corrosion of samples in these various microclimates such as rainforest, desert, alpine, marine and volcanic. In addition, 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.

Abstract No. 3053

Title: ROADMAP FOR COATINGS APPROVAL

Author: Dr. Forrest Houlette, National Surface Treatment (NST) Center

Presenter: Dr. Forrest Houlette, NST Center

ABSTRACT: Last year, NST Center released a roadmap for getting a coating approved for Navy use. This roadmap appears as an annotated flowchart at www.nstcenter.com, and it also appears as a downloadable PDF file on the web site. This tool has been one of our most popular pages, because it captures knowledge that was spread widely among a few individuals, no one of which had the full picture. The roadmap brought the various bits of the explanation of how to get a product approved together into a single place for the first time.

This year NST Center is working on an extension of the roadmap. Once you have identified the military spec under which you must qualify a product, you have to organize a testing regime based on multiple testing standards provided in at least three different locations. We are extending the roadmap to guide users through the testing process. We will tell you what tests you need to pass for the spec in question, what documents govern their design, and what organizations control the testing standards you must meet. Like the original roadmap, we are gathering thinly spread knowledge and concentrating it in a single place for efficient use, a trademark of the NST Center web site.

Abstract No. 3054

Title: SMALL BUSINESS INNOVATIVE RESEARCH

Author: Mr. John Williams, Office of Naval Research (ONR) Small Business Innovative Research (SBIR) Program

Presenter: Mr. John Williams, ONR, SBIR Program

ABSTRACT: This presentation will describe the research opportunities reserved for small business that are available through the Small Business Innovative Research (SBIR) Program and the Small Business Technology Transfer (STTR) Program.

Descriptions of both the SBIR and STTR programs along with the critical differences of each program will be provided. The application process and eligibility requirements will be discussed.

The top 10 reasons for seeking SBIR / STTR funding opportunities will be identified. For additional information go to: www.dodesbir.net

Abstract No. 3055

Title: COMPUTER SECURITY FOR BUSINESS

Author: Mr. William Thompson, McConnell Technology and Training Center (MTTC).

Presenter: Mr. William Thompson, MTTC.

ABSTRACT: Learning Objectives Overview of environment and potential threats for businesses and networks. This presentation reviews assessments of those threats and potential damage. As well as, response options, risk mitigation, and disaster recovery. Additional resources are available to businesses. Outcome Attendees will gain a heightened awareness of computer security in today's commercial environment and actions that can be taken to secure their information systems. Summary this presentation will focus on the steps businesses can take to protect themselves, their clients, and customers from computer security threats, both internal and external. parameters will be presented in light of field trial results.

Abstract No. 3056

Title: MODERN CLEAN COATINGS FOR WEAPONS SYSTEMS

Author: Dr. Keith Legg, Rowan Technology Group

Presenter: Dr. Keith Legg, Rowan Technology Group

ABSTRACT: modern coatings are increasingly replacing older coatings such as hard chrome and cadmium electroplates that not only are environmentally acceptable but also have better performance. This talk discusses several of these alternatives. Among these are several alternatives being developed and validated by the ESTCP-funded Hard Chrome Alternatives Team (HCAT):

- ◆ HVOF thermal spray to replace hard chrome, now being put into production at several NADEPs and ALCs
- ◆ Electrospark Deposition for build-up and repair of small areas.

Other technologies are also discussed, including the development of a new high strength stainless steel under SERDP funding by QuesTek Innovations, and a new cost analysis methodology called C-MAT, developed by Rowan Technology Group.

We conclude that successful implementation of new technologies requires

- ◆ Satisfactory technical options
 - ◆ Solid up-front evaluation of those options
 - ◆ A good reason for the user to make the change (which is seldom an environmental reason)
 - ◆ A strong technical team to develop, validate, and implement the alternative
 - ◆ Solid, independent technical data
 - ◆ Material and process specifications.
-

Abstract No. 3057

Title: CORROSION PROTECTION OF NAVAL SHIPS USING VAPOR PHASE CORROSION INHIBITORS

Author: Ms. Anna Vigneti, Cortec Corporation

Presenter: Ms. Anna Vigneti, Cortec Corporation

ABSTRACT: This paper is a review of the successful use of environmentally friendly vapor phase corrosion inhibitor (VpCI) systems for the protection of naval ships during operations. Discussion of biodegradability, aquatic toxicity, and marine life study will also be a component of this paper. An actual case history will be presented depicting use of VpCI systems for a naval ship.

Abstract No. 3059

Title: ADVANCED THERMOPLASTICS FOR CORROSION PROTECTION

Authors: Mr. Rich Iazzetti, KCC Corrosion Control

Presenter: Mr. Rich Iazzetti, KCC Corrosion Control

ABSTRACT: Abstract: This presentation will describe in detail Advanced Thermoplastic coating technology for corrosion protection.

This discussion will include the benefits of thermoplastic technology; characteristics of thermoplastics, product application process, surface preparation of the substrate, application equipment, tests conducted and test results.

Abstract No. 3061

Title: CORROSION RESISTANCE OF NANOSCALE THERMAL SPRAY COATINGS IN MARINE ENVIRONMENTS

Author: Mr. Denise A. Aylor and Mr. Regis K. Conrad Naval Surface Warfare Center Carderock Division

Presenter: Mr. Regis K. Conrad Naval Surface Warfare Center Carderock Division

ABSTRACT: General corrosion, cavitations, and erosion testing was conducted on nanoscale tungsten carbide-cobalt (WC-Co) and alumina-titania ($\text{Al}_2\text{O}_3\text{-TiO}_2$) thermal spray coatings deposited on Alloy 400, 316L stainless, and carbon steel substrates. A variety of sealers for these coatings were also evaluated to assess their general marine corrosion behavior. Test results will be presented, along with a metallographic evaluation of the coatings after the corrosion testing.

Abstract No. 3062

Title: CHEMICAL REMOVAL OF POLYSULFIDE DURING OVERHAUL

Author: Mr. Pierce Newman, Eldorado Chemical Company

Presenter: Mr. Pierce Newman, Eldorado Chemical Company

ABSTRACT: Several non-regulated, non-hazardous aerospace materials qualified to Air Force TO 1-1-8 are discussed as means of accelerating the often-laborious process of removing MIL-S-81733 polysulfide during gun and antenna overhaul. These materials use a digestive approach to removing the coating and are non-embrittling. One material, currently qualified to NavAir TT-R-2918 and evaluated at Portsmouth Naval Station, has the additional capability of readily removing polyurethane topcoats.

Additionally, two methods used in aerospace manufacturing and fuel tank repair are discussed as having potential merit for reducing labor during overhaul procedures. Extremely thick coatings are readily removed using the first method, while the second significantly accelerates removal of partially and completely cured polysulfide from small pieces, such as The presentation concludes with a brief discussion of ongoing process improvements and future work in the development of bond release agents for removing surface polysulfide and improved residual corrosion protection on steel fasteners.

Abstract No. 3065

Title: POLYSULFIDE AND RTV REMOVAL

Author: Mr. Len MacLaughlin, Aerospace / Elixair

Presenter: Mr. Len MacLaughlin, Aerospace / Elixair

ABSTRACT: AeroSafe will introduce the Elixair family of chemical products used for the removal of Polysulfide and RTV sealants and adhesives. We will discuss how this alternative to mechanical stripping can speed up the process of sealant and adhesive removal without damaging the substrate. The Elixair family of chemical products are being widely used in the aviation industry today and have demonstrated how safe and effective they are on a wide range and types of sealants and adhesives. They have saved time and money in this process. In addition, the use of the water based cleaning solvent has eliminated and reduced the amount of hazardous cleaning products and surface preparations used in work place. The reduction of solvents such as MEK and others has been well documented throughout the industry. Major testing laboratory reports confirm low to no VOC and no toxicity of the cleaning agent. All of these products will be demonstrated at this years RUST conference.

Abstract No. 3066

Title: WATERBORNE TANK AND VOIDS

Author: Mr. Larry Bowden, Commander Naval Air Force Atlantic (CNAL) N430E

Presenter: Mr. Larry Bowden, CNAL

ABSTRACT: This presentation will identify the problems involved in maintaining tanks and voids in naval vessels. It will provide an overview of a plan to accomplish waterborne tank preservation and explain the corrosion risks involved. A general overview of the condition of the tanks and voids, along with inspection procedures, coatings testing, and the COMNAVAIRLANT waterborne – UHP tracking Matrix will be discussed.

Abstract No. 3067

Title: AV-DEC OVERVIEW

Author: Mr. Dave Schmidt, Av-Dec

Presenter: Mr. Dave Schmidt, Av-Dec

ABSTRACT: This presentation will provide an overview of AV-Dec Corporation. Av-Dec is highly focused on corrosion prevention in the Aerospace Community currently solving corrosion related problems with Non-hazardous Urethane based products. Av-Dec is currently working with branches of the Military and Commercial Airlines. The three specific areas of focus for corrosion prevention are aircraft to antenna mating surfaces, aircraft structural areas, & wire harnesses & interconnects. The presenter will explain and give examples of five ways to prevent corrosion through the use of their products. These include the use of conductive antenna gaskets, hi-tek tape, connector wraps, injectable sealant (self-leveling green, & thixo-flex orange), & wire harness design and repair. Proven applications, and test results will be discussed. The advantages of polyurethanes as compared to existing sealants will be explained.

Abstract No. 3068

Title: LPH-17 UPDATE

Author: Mr. Allen Parks, NSW Crane Division

Presenter: Mr. Allen Parks, NSW Crane Division

ABSTRACT: The LPD-17 Ship Wide Area Network (SWAN), and Ship's Control & Steering (SCS) fungus and Salt Fog Qualification Support involved:

- a. evaluating two Contractor's proposed test methods for compliance with specifications;
- b. research and utilization of scientific categorization references;
- c. review of all SWAN and SCS materials;
- d. review list reduction based on component duplication;
- e. mutual agreement on fungus and salt fog ranking scales;
- f. reviewing contractors' final reports.

Abstract No. 3069

Title: GLOBAL FINISHING SOLUTIONS

Author: Ms. Kate Kubernach, KMR Consulting

Presenter: Ms. Kate Kubernach, KMR Consulting

ABSTRACT: This presentation will provide an overview of Global Finishing Solutions (GFS) Corporation and the services that the company has to offer customers. Three new programs to fit facilities owners needs will be discussed. These programs are: Maintenance contracts, Retrofit/upgrades, & lease with option to buy. This presentation will include maintenance contract section, which offers regular maintenance to all paint booths regardless of age, and discuss why not having a monthly maintenance program increases the failure of the equipment. Global Finishing has maintenance contracts to cover entire facilities. An emergency response team for unexpected breakdowns and all work is done during shop downtime.

Within Retrofit/upgrades section GFS is able to bring older paint booths to current EPA standards. These upgrades include climate controls, auto-balancing of airflow, new filtration systems. The cost of upgrading/retrofitting may be lower then replacement and it extends the lifetime of the original investment. We have the ability to convert waterfall booths to dry booths. Within the lease Option Program you are able to pay a monthly cost and your booth is provided immediately. In conclusion we provide answers to you facility problems.
