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Feature

## One of DoD's Smartest Corrosion Programs is Driven by the Marine Team

### *Popular with Marines, the Maintenance Program is Worth Emulating*

*By Cynthia Greenwood*

Although it is the Defense Department's smallest armed force—at about 234,000 active duty and reserve troops—the U.S. Marine Corps is larger than the entire British Army. To experts who preserve the ground equipment used by Marine forces, fighting corrosion can be uniquely challenging.

While it is true that Marines operate vehicles and weapon systems similar to the Army, they practice amphibious warfare in much harsher saltwater environments. Indeed, the Marine Corps' four major bases are located on the ocean in North Carolina, California, Hawaii, and Japan.

Before experts began carrying out a Congressional mandate to establish new corrosion prevention policies throughout DoD, the Marine Corps began ramping up an under-funded corrosion prevention program that began more than 20 years ago.

In December 2002, Richard Kelly, the Marine Corps Deputy Commandant, circulated a memo that ordered officials to establish an effective corrosion prevention program for all tactical ground equipment. His aim—to reduce maintenance requirements and costs through "the development of corrosion prevention and control products, materials, technologies, and processes."

Kelly's memo said the Marine Corps was experiencing a decrease in readiness because equipment was deteriorating, a situation he said was "affecting the safety of our Marines."

### ***The Beginning—Assessing Equipment and Maintenance Needs***

In 2004 the Marine Corps benefited from Congressional funding that allowed officials to raise its corrosion prevention program to a new level. That same year, the Marine Corps' Corrosion Prevention and Control (CPAC) Program Office developed a corrosion category code rating system of "one" through "five." The rating system was designed to identify the level of repair required to return an asset to category 1 "operational ready status" with no corrosion. After the rating system was put in place, the CPAC program manager used contracted services to conduct an assessment of all Marine Corps ground combat and support equipment. The assessment provided a base line of the condition and corrosion severity of every tactical vehicle and generator not being used in the southwest Asia theatre of operations.



*Pictured is a row of MTVRs (Medium Tactical Vehicle Replacements) at Marine Corps Base Camp Pendleton, north of San Diego, California. The MTVR and other ground vehicles used by Marines are better preserved under the Marine Corps' highly structured corrosion prevention program. Photo courtesy of the Marine Corps CPAC (Corrosion Prevention and Control) office.*



*A corrosion service team member applies corrosion prevention compounds to the interior of an amphibious assault vehicle (AAV). Photo courtesy of the Marine Corps CPAC Office.*

Marine Corps tactical equipment includes Mine Resistant Ambush Protected (MRAP) vehicles—armored trucks resistant to mines and ambush; Logistics Vehicle Systems (LVSs) used primarily by combat service support motor transport units to haul supplies in large quantities from beachheads, ports, railheads or airfields to combat service support areas; HMMWVs (pronounced like "HUMVEES")—the all-terrain 2 1/2-ton cargo and troop carriers; and Medium Tactical Vehicle Replacements (MTVRs)—seven-ton, six-wheel, all-terrain vehicles.

During this original assessment, all category "five" equipment was considered unsafe and removed from service. From that point on, the severity and extent of corrosion repair under the Corrosion Prevention and Control (CPAC) Office is based on this rating system. In turn, the system helps the office decide if the equipment needs maintenance and repairs at the organizational or unit level; the intermediate level; or the depot level. The assessment developed further into a Corrosion Prevention and Control

Program Management Tool used to track the status of each asset throughout the life cycle.

"By assessing corrosion in this manner, we got a handle on the problem," explained Matthew Koch, who has served as the program manager for corrosion prevention and control at the Marine Corps System Command since 2006. Bernard Friend, a retired Marine Corps Master Gunnery Sergeant, has recently joined the CPAC program as the Operations and Maintenance manager overseeing all support tasking related to the corrosion service teams and Mobile Corrosion Abatement.

### ***A Cohesive Corrosion Program***

The Marine Corps' Corrosion Prevention and Control program is far-reaching and multi-faceted. At each base and reserve unit, it combines a comprehensive maintenance program, a system using highly trained contract labor and quality-assurance protocols with tight local monitoring; controlled, sheltered humidity protection for its artillery, tanks, and armored vehicles; and the use of protective covers for everything from Amphibious Assault Vehicles (AAVs) to generators and water tanks. Moreover, through a program of testing and research, engineers work with manufacturers and the DoD acquisition community to help design in improvements.

"Through our program, we have not only slowed the rate of corrosion for the Marine Corps ground equipment, we've also reduced the mechanics' time during required maintenance," said Chris Wesenberg, the field service representative (FSR) who provides corrosion program office support to II Marine Expeditionary Force (MEF) at Camp Lejeune Marine Corps Base in North Carolina. Wesenberg and his counterparts at other Marine Corps installations serve as the eyes and ears of the CPAC Program Office, overseeing equipment and Corrosion Service Teams performing corrosion repair and preventative maintenance.

Field Service Representatives at other Marine Corps installations have similar oversight and authority over maintenance and corrosion prevention. Lee Nadara serves as the FSR at Marine Corps Base Kaneohe Bay on Oahu, Hawaii. As FSR, Robert Hanke manages equipment maintenance at Marine Corps Base Camp Pendleton, California, and the Air Ground Combat Center at Twentynine Palms, California. Andrew Elliott is the FSR overseeing equipment maintenance for Marine forces on Okinawa, Japan. Colton Bickers, an FSR based in New Orleans, Louisiana, manages equipment for the Marine Forces Reserve centers across the United States. The service teams at Camp Pendleton and Twentynine Palms share responsibility for corrosion prevention at the Marine Corps Air Station at Yuma, Arizona.



*A corrosion service team member applies corrosion prevention compounds to a logistics vehicle system (LVS) at Marine Corps Base Camp Lejeune on the North Carolina coast. Marines use the LVS, nicknamed the "Dragon Wagon," to haul supplies from beachheads, ports, and airfields to combat service locations. Photo courtesy of the Marine Corps CPAC Office.*

## **Roots of Success—Corrosion Service Teams**

A key part of the Marine Corps' success was put in place in 2005 after the assessment when contractor teams were brought in to do all organizational-level corrosion-related maintenance for each base's organizational units. These corrosion service teams are mobile, roving from unit to unit mitigating and preventing rust all year long. When stationed at a given unit, their job is to touch each piece of gear and apply CPC (corrosion prevention and control) compounds, touch-up painting, and anything else needed to return the piece to a pristine "category one" state. Each time an item is touched a new assessment is recorded, updating the information being reported in the Program Management Tool. This data is used to nominate candidates into higher-level repair facilities and identify future requirements.

All the CPAC program asks of the Marine units is to provide clean equipment to the corrosion service teams, and while the latter are working, they are not allowed to operate the vehicles. "By having qualified contract labor in place, we make sure everything gets done," Koch explained. "The three biggest things that corrosion service teams have provided include an avoidance of higher replacement costs, savings on time during maintenance, and an increased equipment life span," he said.

The corrosion service teams are invaluable to the Marine Corps because they take the corrosion prevention burden off the war fighter. "In order for our corrosion prevention program to become long-term, it needed to be as non-intrusive on the Marine units as possible," Wesenberg said. The best proof of the success of these teams comes from the regiments themselves, who now have the time to focus on training operations and mechanical repairs of their vehicles.



*An LVS passes through one of two automated wash racks installed in 2005 at Marine Corps Base Kaneohe Bay on Oahu, Hawaii. Photo courtesy of the Marine Corps CPAC Office.*

Each corrosion service team has a quality assurance (QA) representative and an FSR. "The FSR oversees everything that is done, while the QA oversees that it's being done in accordance with the Marine Corps technical manuals," Koch said. "For example, the QA makes sure we're getting complete coverage with our touch-up coatings according to the technical manuals." The CPAC program office has identified 15,000 assets currently in the inventory of the II Marine Expeditionary Force (II MEF) that will be serviced repeatedly over the service life of the equipment. This asset collection encompasses equipment at Camp Lejeune, Cherry Point Air Station, and New River Air Station, Wesenberg said.

### **Protecting Assets Through Dehumidified Storage and Protective Covers**

The Marine Corps is committed to protecting as much equipment as possible through its controlled humidity protection program. Sheltering equipment at a relative humidity below 50 percent eliminates rust, mildew, mold, and moisture.

In 2005 the CPAC Office began building dehumidification shelters on all of its bases. The majority of the building has occurred at Camp Lejeune, Cherry Point, and New River Air Station—comprising II MEF—because the operating forces there saw the advantage of having them and provided the required resources. Today, II MEF has more than 100,000 square feet of dehumidified storage. "Our goal is to add 250,000 to 300,000 more square feet over the next two to three years," Wesenberg said. In particular, Camp Lejeune has 12 dehumidification structures owned by the 10th Marine Regiment whose sole purpose is to house its Lightweight 155 Howitzer. "This regiment's biggest expense is its guns, so the shelters are vital," Wesenberg said.

The 2nd Tank Battalion benefits from a different type of dehumidification provided by three T-shelters. This unit owns about 54 M1A1 Abrams tanks in which dehumidified air is piped through hoses into the body of the tank, providing a dehumidified environment for optics and electronics that need protection. Instead of dehumidifying the tank exterior, the optics and electronics get the benefit of dehumidification using T-shelters, and the tank itself becomes the dehumidified envelope. Both types of dehumidification shelters are invaluable to the artillery regiments who own the guns, as well as the tank battalions whose tanks can fail if exposed to excessive moisture.

To practice effective maintenance, the CPAC office authorizes Marines to use a variety of protective covers to shelter trailers while not in use. "The units use the covers as they see fit," Wesenberg said. At Camp Lejeune's 8th Engineering Support Battalion, a fleet of 26 trailers sport special purpose-built covers that include drain holes, access panels for lift hooks, and Velcro or zippered flaps for data plates. These covers protect the trailers from rain, sun, and moisture. Throughout Camp Lejeune about 2,500 different types of covers are used to protect generators, trailers, water tanks, and water bulls, which are trailer-mounted water tanks. These same practices are used across the Marine Corps to protect equipment from harsh environments.

### ***Improving Platforms and CPC Technology Through Better Engineering***

Besides deployed civilians who do routine maintenance to support Marines, the CPAC office employs engineers who aim to improve the quality of new equipment. A key goal of the office is to assist in the engineering of new equipment so that corrosion is mitigated as much as possible, Wesenberg explained.

"We have engineers working with each one of our platforms—the MRAPs, the LVSRs, the HMMWVs, MTVRs, generators, and trailers, everything the Marine Corps has in its motor pool," Koch said. "Our engineers and service technicians work with the acquisition engineers to improve the language in new platform contracts, influence the testing of prototypes, and to work with the original equipment manufacturers to correct any deficiencies in the equipment."

"We're getting more involved with the DoD Corrosion Policy and Oversight Office to make sure our technicians and acquisition engineers are certified to make good calls in determining the long service life of our equipment," said Koch.

Koch and other corrosion experts have also begun working with NACE International and the DoD Corrosion Policy and Oversight Office to assess the certification requirements of each corrosion service team member to ensure that everyone is properly trained. "Being the premier organization for corrosion prevention, NACE plans to evaluate their own training courses to see what needs to be developed for the Marine Corps. Then they will work with us to implement a plan."



*This MTVR truck has recently been returned to a Category 1 "pristine" condition after being processed through the corrosion repair facility at Camp Lejeune. Photo courtesy of the Marine Corps CPAC Office.*