

USMC Environmental and Corrosion Control Issues

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USMC ENVIRONMENTAL AND CORROSION CONTROL PERSPECTIVES – THE REDUCTION OF CR⁶⁺

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CPAC Program



- The CPAC program is the manager for corrosion control issue within the Marine Corps
- CPAC provides support to the Marine to reduce the burden cause by corrosion through
 - Applied RDT&E to evaluate new technologies
 - Acquisition support on new systems
 - Organizational maintenance activities

CPAC Program



- CPAC is the voice of the Marines
- Annually hold a 3-day Working Group for Active Duty Marines
 - Display accomplishments
 - Voice concerns
 - Communicate policy
 - Identify opportunities and priorities
- Field Service Representatives (FSRs) at all major installations and for reserve units

Leading Issues for the USMC

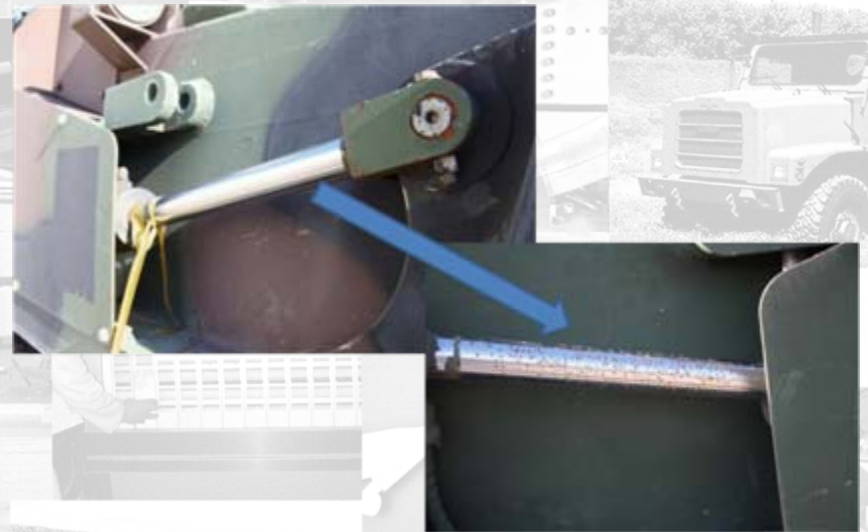


- Hydraulic cylinders
- Fasteners
- Environmentally friendly pre-treatments
- More durable primers

Hydraulic Cylinders



- Coating performance and quality leading issue
- Classical pitting corrosion of porous platings
- “Crap shoot” how plating will perform
- Corrosion causes damage to seals and failure of hydraulic system



Two similar aged M9 ACE vehicles, one with intact chrome plating, one with heavily pitted cylinder rod.

Hydraulic Cylinders



- CPAC has looked into alternative coatings and processes
- Potential environmental benefits
- Some possible performance benefits
- Larger issue appears to be quality and consistency
 - How do we eliminate variations in process?
 - What are the right ways to evaluate and ensure quality?
 - The real savings may be from improving overall performance.

Fasteners



Black oxide steel fastener in MRAP floorboards
~20 min per fastener to remove

- Same issues, different service
 - Prevalence of cadmium
 - Use of hexavalent chromium
 - Potential incompatibilities with alternatives
 - Use of non-corrosion resistant hardware in harsh environments

Fasteners



- Fully support DoD Cr⁶⁺ policy memo
- Endorse the use on non-chrome and trivalent-chrome alternatives
- Favor non-cadmium hardware
- Concern with logistics and supply chain of many alternatives

Pre-treatments



- Repainting is a large part of the Marine Corp's corrosion control strategy
- Established Corrosion Repair Facilities (CRFs)
 - Each major installation (4 centers)
 - Mobile CRFs for reserve units and overflow capacity
- Annually repainting 5,000-7,000 vehicles
- Spot touch-up operations on fielded systems

Pre-treatments



- Current operations is not to use pre-treatments
- Facilities not permitted / allowed to use Cr^{6+} containing products
- Perform abrasive blasting where possible
- Mechanical sanding also used
- Pre-treatments desired to enhance performance of primers / promote adhesion

Smooth grinder / sanded surface prior to painting

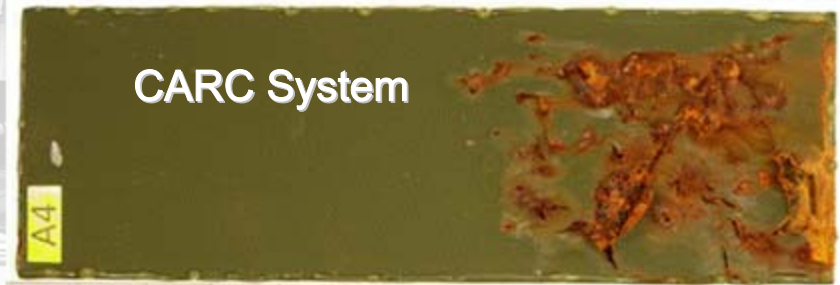


Primers

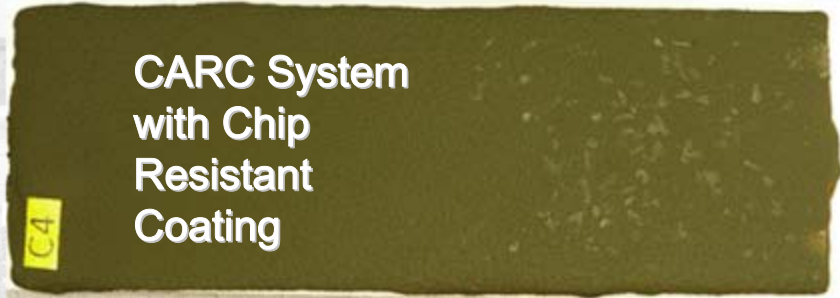


- CARC primers are thin, don't withstand abrasion / impact and only provide barrier protection
- Have enhanced our systems with supplemental materials
 - Zinc-rich coatings
 - Chip resistant coatings
- Proven to be effective with the CARC system
- Exploring other applications and materials

CARC System



CARC System
with Chip
Resistant
Coating



USMC User Perspective



- What is the user's perspective?
- They want a system that works
 - Low cost of ownership
 - Low maintenance burden
 - Minimizes exposure risk
 - Is available to perform the mission at hand
- CPAC's focus is to provide the system that works
- We work on the details and specifics and provide the Marine a vehicle ready to go

