Sustaining the Force

The evolution of the Marine Corps Corrosion Prevention and Control Program

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"Sound corrosion prevention and control (CPC) planning reduces life cycle costs, improves maintainability, and availability."[1]

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Corrosion Service Team technicians perform enhanced surface preparation and touch repairs on a water sixcon container at a supported unit's location. The CPAC Program employs intermediate-level corrosion repairs using enhanced capabilities. *(CPAC Team Files.)*

The Marine Corps has long embraced the disciplined optimization of limited resources as a defining characteristic of its operational culture. Strategic planning, efficient allocation, creativity to maximize output, minimization of waste, prioritization of effort, and the leveraging of existing assets are not simply management principles but enduring elements of how Marines operate in every environment. Clear communication and disciplined execution ensure that the right tasks are accomplished by the right people, using the right tools, even under conditions of uncertainty and constraint. In keeping with this mindset, the Marine Corps Corrosion Prevention and Control (CPAC) Program has evolved into a critical sustainment capability focused on mitigating one of the most persistent and costly threats to readiness: corrosion.

Corrosion is often described as a silent but pervasive readiness degrader. It weakens structural integrity, reduces system reliability, increases maintenance workload, and shortens the service life of tactical equipment. For a force that routinely operates in maritime, jungle, desert, and expeditionary environments, corrosion presents a constant and unavoidable challenge. Over the past two decades, the CPAC program has transformed from a largely reactive and decentralized collection of local efforts into a proactive, enterprise-level capability. This evolution has improved equipment availability, reduced total ownership cost, and directly supported the Commandant's vision for integrated logistics across a globally distributed network of bases, stations, and forward-operating locations.

Corrosion prevention and control is now firmly established as a Marine Corps-wide priority, reinforced by *Marine Corps Order (MCO) 4790.18*.[2] This order directed the creation of a coordinated CPAC program designed to integrate corrosion considerations across the entire life cycle of equipment. This integration spans acquisition, sustainment, research, development, test, and evaluation (RDT&E), continuous program management, and the execution of both preventive and corrective corrosion control actions. By embedding corrosion planning early in the development of a warfighting capability and sustaining it throughout a system's life, the Marine Corps reduces the likelihood of costly, late-stage repairs and premature asset replacement.

During this same period, the DOD mandated the adoption of Condition-Based Maintenance Plus (CBM+).[3] The CBM+ represents a fundamental shift away from traditional time-based maintenance schedules toward a data-driven approach in which maintenance actions are performed only when indicators show they are truly required. The goal of CBM+ is to reduce unnecessary maintenance, optimize sustainment costs, and improve operational availability. Together, *MCO 4790.18* and the CBM+ mandate laid the foundation for a standardized, data-informed decision framework that enables enterprise-wide corrosion mitigation based on actual equipment condition rather than assumptions or calendar-driven periodicity.

Before the adoption of the overarching policies, corrosion prevention efforts across the Marine Corps were largely decentralized. Individual Marine Forces and units managed corrosion based on local priorities, available resources, and varying levels of technical expertise. While this approach allowed flexibility, it also resulted in inconsistent standards, uneven execution, duplicative efforts, and challenges in resourcing and long-term planning. The lack of enterprise visibility limited the Corps' ability to identify systemic corrosion issues and address them efficiently.

Transitioning to a centralized CPAC approach required trust and buy-in from the operating forces. Units needed confidence that an enterprise-level program would remain responsive to local operational needs while delivering greater efficiency and effectiveness across the fleet. Over time, this confidence was earned. Centralization has increased consistency and predictability across all supported locations and strengthened standardization of corrosion servicing practices. Just as importantly, it has significantly improved planning, programming, budgeting, and execution of financial resources. The enterprise CPAC model enables the Marine Corps to address corrosion holistically, focusing on root causes rather than repeatedly treating symptoms.

The CPAC mission is built on four mutually reinforcing pillars: equipment assessments, RDT&E, prevention, and repair. Among these, equipment assessments form the foundation for all other activities. Through systematic inspections and evaluations, CPAC personnel establish or validate corrosion category codes (CCCs) for Marine Corps equipment. These standardized codes provide an objective measure of corrosion severity and risk, enabling program leadership and sustainment planners to make informed decisions regarding maintenance prioritization, resource allocation, and long-term sustainment strategies.

Accurate CCC data ensures corrosion mitigation efforts are aligned with the actual equipment condition. This approach prevents over-maintenance of serviceable equipment while ensuring at-risk equipment receives timely attention. Research, development, test, and evaluation efforts build on assessment data to identify improved materials, coatings, and processes that can prevent or slow corrosion. Prevention activities emphasize early intervention through proper washing, preservation, coatings, and environmental controls. When prevention is insufficient, repair capabilities ensure corrosion damage is corrected at the lowest appropriate maintenance level before it escalates into costly depot-level repair or replacement.

"We don't need more assessments, we don't need more analysis, we don't need more study ... we need decisive action and solutions to mitigate the challenges of contested logistics environments in order to ensure our ability to fight and win."[4]

A significant capability improvement occurred in May 2020 with the introduction of the Enhanced Corrosion Service Team (E-CST) initiative. This effort aligned CPAC execution directly with Marine Corps CBM+ policy by authorizing maintenance actions based on condition evidence rather than defaulting to higher-level repairs. Under the E-CST model, CSTs were granted authority to perform limited corrosion repairs on CCC 3 and 4 equipment within their capability.

Previously, equipment exhibiting corrosion beyond minor levels was routinely routed to corrosion repair facilities (CRFs), regardless of whether the damage could be addressed at the unit level. Under E-CST, CSTs use specialized hand tools, materials, and approved technical procedures to conduct repairs on the lot in unit motor pools. This shift empowered CPAC personnel to leverage assessment data and technical expertise to execute timely, targeted repairs where the equipment resides.

The results have been substantial. Field-level repairs dramatically reduce repair cycle time, labor hours, and overall cost while increasing equipment availability. Importantly, the E-CST initiative was never intended to replace CRFs. Corrosion repair facilities remain essential for performing in-depth corrosion repair, extensive surface preparation, and recoating for equipment with severe damage that exceeds field-level capability. Instead, E-CST serves as a force multiplier, addressing corrosion early and preventing minor issues from escalating into depot-level problems.

Since implementation, CPAC performance metrics have demonstrated measurable benefits. From May 2020 through December 2025, the E-CST model generated cost avoidance exceeding $23 million compared to performing the same repairs at CRFs. Average repair cycle times dropped from more than 16 days to fewer than four, while labor hours per repair were reduced by over 40 hours. Thousands of shop days and tens of thousands of labor hours were preserved, directly translating to improved readiness and reduced sustainment burden.

E-CST Achievements		Financial & Readiness Impact
Repair Days Saved: 27,876		**Cost Avoidance:** $23.77M
Shop Days Saved: 102,204		**Readiness Impact:** Increased Availability
Labor Hours Saved: 94,030		

Figure 1. Key operational impact of E-CST. *(Figure provided by authors.)*

Key Takeaways Include

- E-CST repairs are significantly faster, cheaper, and require far fewer labor hours than CRF repairs.
- CRF repairs are still necessary for equipment with extensive corrosion.
- Corrosion avoidance measures yield the greatest strategic benefit by preventing repairs altogether, saving tens of thousands of labor hours and over $23M in costs while improving readiness.

Beyond cost savings, the operational impact has been equally significant. Equipment repaired at the field level experiences minimal downtime and is returned to service rapidly. In contrast, CRF repairs often require extended transportation, scheduling delays, and prolonged periods of non-availability. By performing maintenance at the lowest capable level, CPAC maximizes the operational utility of Marine Corps equipment.

Today, the CPAC program supports units at major Marine Corps installations, reserve sites across the United States, and remote locations including Darwin, Australia; Koror, Palau; and the Philippines. Mobile CPAC teams conduct on-site corrosion assessments, servicing, and repair in austere environments, allowing units to retain equipment locally and avoid the transportation costs and operational disruption associated with shipping assets to corrosion repair facilities.

A CST technician employs a mobile blast recovery system—an example of the enhanced capabilities researched and utilized by the CPAC Team—to perform condition-based corrosion repairs. *(CPAC Team Files.)*

As *Force Design* initiatives continue to mature, the CPAC team is postured to expand its support to emerging requirements, including those associated with Blount Island Command and operations throughout the Indo-Pacific theater. Leveraging mobile and E-CST capabilities enables the Marine Corps to meet corrosion prevention and repair needs without the time and expense associated with constructing new corrosion repair facilities—projects that can take years to plan and execute.

In an era defined by constrained resources, distributed operations, and evolving threats, continuous process improvement is essential. The Marine Corps CPAC program demonstrates how targeted reform, empowered field teams, and data-informed decision-making can strengthen operational readiness while reducing total ownership cost. The E-CST model provides a flexible, scalable sustainment solution aligned with *Force Design* and the realities of expeditionary operations. Through proactive prevention, early intervention, and efficient repair, CPAC ensures the Marine Corps remains resilient, ready, and postured for the future fight.

Notes

1. Defense Acquisition University, "Corrosion Prevention and Control (CPC) Overview," n.d.

2. Department of the Navy, *Marine Corps Order 4790.18: Corrosion Prevention and Control*, n.d.

3. Department of Defense, *Condition-Based Maintenance Plus (CBM+) Guidebook*, n.d.

4. Patrick Kelleher, remarks at the Department of War Maintenance Symposium, 2025.