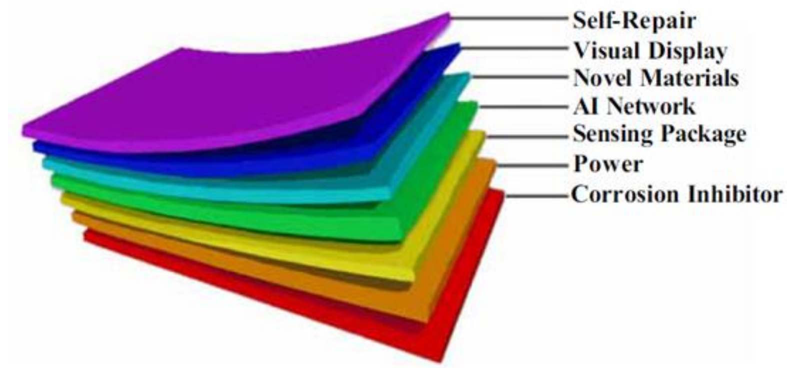
Corrosion Inhibitor Use
U.S. Army, USAF and NAVAIR

Army Regulation 750–59 [1] specifically cites corrosion inhibitors in Chapter 3, Implementation. If the operator is capable of washing and painting, the application of approved corrosion-inhibiting compounds should be included in the maintenance and storage regimen. Furthermore, "field-level personnel are encouraged as a minimum measure to prevent the effects of corrosion."

The U.S. Army Smart Coatings™ Materiel Program [2] conducted research into the development of smart coatings using, but not limited to, flexible electronics, nanotechnologies, meta-materials, and micro-electromechanical systems. Such advanced coating systems would be both multilayered and modular with functionalities including embedded corrosion inhibitors as shown.



Potential Smart Coatings™ System Structure (PATENT PENDING U.S. Army & NJIT)

A 2005 report to Congress prepared by the Under Secretary of Defense (Acquisition, Technology and Logistics) [3] cited the use of non-hazardous corrosion inhibitors to control corrosion, scale, and microbiological growth in boilers and cooling towers at both Fort Carson and Fort Rucker. The cited benefits are that they maintain systems at optimum treatment levels, reduce failure and downtime, improve safety, minimize worker contact with treatment chemicals, and ensure heating and cooling for mission-critical equipment and training.

A 1987 Naval Air Development Center report by Agarwala [4] took a holistic approach in his corrosion inhibitor investigation and the role they played in crack growth rates and stress intensity factors for steels and aluminums resulting from corrosion fatigue.

The Naval Air Warfare Center Aircraft Division has developed a performance specification [5] which includes the use of corrosion inhibiting lubricants to "prevent the formation of non-conductive surface oxides which interfere with electrical continuity." This was approved for use by all departments and agencies of the Department of Defense.

Black et al. [6] cited a serendipitous discovery, employing corrosion inhibitors in fuel handling systems increases jet fuel's lubricity. It is now a requirement that corrosion inhibitors be employed as a lubricity enhancer for all military JP-4 and JP-5 jet fuels. By 2013, this included JP-8 (NATO F-34) and NATO F-35 jet fuels [7]. The USAF conducted significant research on jet fuel additives, including corrosion inhibitors and icing inhibitors, to determine their effect on fuel thermal stability, filterability, and lubricity. Martel et al. conducted such research at Wright-Patterson Air Force Base [8].

References

[1] Army Regulation 750–59, Corrosion Prevention and Control for Army Materiel, Maintenance of Supplies and Equipment, Headquarters Department of the Army, Washington, DC, 19 March 2014

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[3] Office of the Secretary of Defense, Report to Congress Department of Defense Status Update on Efforts to Reduce Corrosion and the Effects of Corrosion on the Military Equipment and Infrastructure of the Department of Defense, May 2005

[4] Agarwala, V, S., Multipurpose Corrosion Inhibitors for Aerospace Materials in Naval Environments, Air Vehicle and Crew Systems Technology Department, Naval Air Development Center, Warminster, Pennsylvania 18974-5000, June 4, 1987, Report No. NADC-87034-60

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[7] MIL-DTL-83133H with Amendment 2, 24 December 2013; Detail Specification Turbine Fuel, Aviation, Kerosene Type, JP-8, (NATO F-34), NATO F35, and JP-8+100 (NATO F-37)

[8] Martel, C. R., Bradley, R. P., McCoy, J. R., Petrarca, J., Aircraft Turbine Engine Fuel Corrosion Inhibitors And Their Effects On Fuel Properties, Air Force Aero Propulsion Laboratory, Wright-Patterson Air Force Base, Ohio, July 1974, Report AFAPL-TR-74-20

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