

Tesla Sparks

33 Years Avionics' Repair

Bench Technician, Heavy Check, Line Maintenance

March 14, 2018

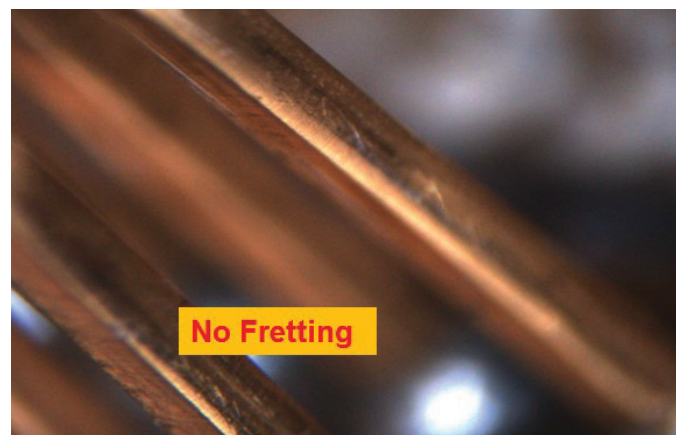
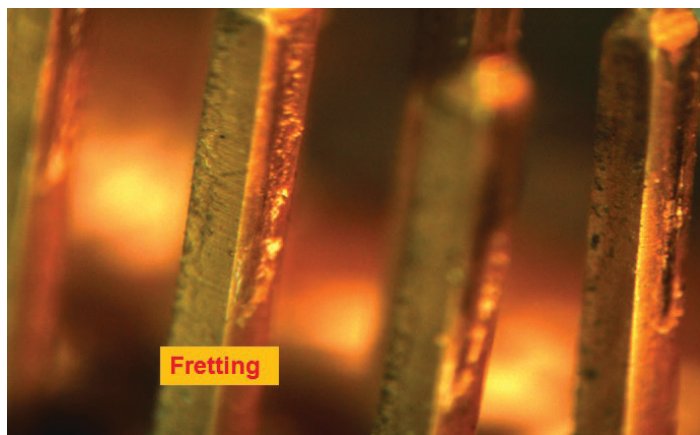
Aviation's Unusual Circumstances - Electrical Connector Corrosion

DeoxIT® removes corrosion, prevents corrosion and lubricates.

No other product like this:

Understanding the Value of the DeoxIT®

Based on industry experience, claims have been made that DeoxIT® has shown an immediate benefit after use. To understand the value of DeoxIT®, you need to understand the aging failure modes and the process of how corrosion is formed. Aviation has unusual circumstances for how corrosion is formed. If you don't understand the failure mode, you won't be able to ensure the problem was addressed or why corrosion keeps coming back. If you understand the failure modes you will understand why computers after they get re-racked they work for a while then fail again in a few weeks or months. The dissimilar metal corrosion was known to the ancients, but recent studies reveal even MIL-SPEC G-45204 hard gold contacts corrode. Electrical connector corrosion is observed in all terrestrial environments even with very low humidity. The significant technical challenges and the high costs directly related to corrosion provide strong incentives for maintenance, to develop a firm grasp on the fundamental basis of corrosion removal and prevention.





Audio/Video



Computers



Automotive



Communications



Marine



Electrical



Energy



Photography



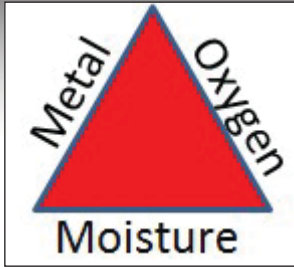
Security



Medical



Avionics

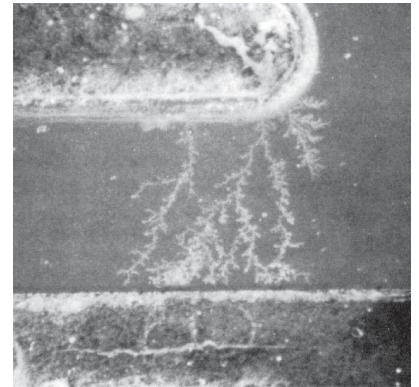


Fundamentals of Corrosion

This is what is needed for corrosion to grow. Corrosion triangle 1 - Metal, 2 - An oxidizer (Oxygen In the air), 3 - Moisture or some other chemical. Dissimilar metals create a current to grow the corrosion. Corrosion products have a greater volume than the base metal. This greater volume is what pushes the electrical connector pins apart causing intermittent electrical signals. At the microscopic level the contacts are not smooth with full area contact. Current flows mostly between the peaks. The oxide or salt corrosion products become like the ore from which the metal was made. To mitigate contact corrosion, one of the corrosion pillars would need to be eliminated.

Moisture forms a conductive circuit in pores through which electrons pass between the dissimilar metals causing corrosion. Generally, electroplated or hot dipped coatings that are completely free of pores and other discontinuities are not commercially feasible. Contact cleaners do not remove corrosion. They only remove, grease, oil and dirt. Most aircraft maintenance manuals say to use alcohol and a brush to clean connectors, but alcohol does not remove corrosion. Pits eventually form at coating flaws, and the coating is penetrated. Pits where corrosion starts are so small you need 20X power to see them.

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Aviation's Unusual Circumstances

This is why aircraft electrical connector corrosion is worse than other industries. When aircraft are on the ground at sea level on a standard day 14.7 psi of air pressure surrounds the aircraft. At altitude, air pressure surrounding aircraft is around 5 psi. As the aircraft climbs and descends air pressure moves in and out of the electrical connectors. This cycling of air pressure forces moisture into the connectors. As the aircraft descends there is a differential pressure of 9 psi. This is why electrical connectors corrode more rapidly than other industries. As the aircraft descends in altitude through rain and moist air, the differential pressure forces this moist air into the connectors and pins. The moisture coming into the connectors has a tendency to stay and not move out of the connector as easily as it comes in. This phenomenon was readily apparent when we installed a rubber boot on a flap transmitter connector on a 757. The boot filled up with water and made the connector even worse than before we put the boot on. This is what happens on the outside of the aircraft. On the inside of the aircraft it does the same but at a little less pressure differential around 6 psi.

The other unusual circumstance is vibration. All aircraft the longer they are in service, the more the computers, LRUs and connectors experience fretting corrosion and damage to the pins. You cannot see fretting with the naked eye, but fretting damage is easily seen under a microscope. If re-racking a computer fixes the problem, this is a sign you have a fretting problem. Fretting damage is rarely addressed because of the high cost of changing the connectors. This is one area that DeoxIT® excels in. DeoxIT® dramatically improves low tension connections and prevents Fretting. If DeoxIT® was installed on the connectors on the computers from the OEM, it would eliminate the fretting damage altogether. Hewlett Packard Enterprise, after an extensive qualification of DeoxIT®, was able to conclude that the D-series product dramatically improved performance of interconnects on their servers. In the implementation phase of DeoxIT® and with over two years of deployment, the reliability of servers treated with DeoxIT® have as much as a 50% improvement in customer reliability and in warranty cost



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associated with those servers. Avionic shops have seen intermittent test bench problems that without DeoxIT®, there would be no inexpensive fix. This is another major advantage with DeoxIT® it provides a cost effective fix for repair of intermittent systems that is so low there is no need for cost analysis. For example, proposed cleaning the connectors on all toilets on a A330 aircraft. With a fleet size of 32 aircraft the cost would be \$40 per aircraft, equals \$1280 for the fleet.

This cost analysis would be similar to any other fleet of aircraft or any other aircraft system. Spoilers ,Flaps, Cargo Loading, Nose Steering Bypass, Brake Temp Indication, Tire Pressure Indication, Toilet Systems, Engine Vibration. These are just a few of the intermittent systems that have no hard failed components. These systems are the ones that would benefit the most from DeoxIT®, also the most gain in general for the smallest amount of capital invested. That last statement is probably the most single valuable point for using DeoxIT®. It is used all over the world and it's manufactured in San Diego, California, by CAIG Labs.

DeoxIT® has been on the market for 60+ Years.

: Reasons for evaluating the need for electrical contact cleaners and lubricants

: Improvements in aviation industry have high cost for implementation

: More often than not implementation cost out weights improvement

: This is not the case for the use of DeoxIT, also improves many different ATA's

Data shows the use of DeoxIT® is possibly the most valuable reliability project for any company that has computers, electrical and electronic equipment. When comparing the cost of reliability projects against the use of DeoxIT® as the solution, it becomes self-evident of the huge cost benefits that can easily be experienced. When NASA and Defense Contractors needed extreme reliability, DeoxIT® was the answer.

END. *Tesla Sparks*



BELL LAB'S CPC



F-16 System Program Office



■ THE RELIABILITY OF EVERY U.S. WEAPON SYSTEM THAT USES ELECTRONIC PARTS MAY BE INCREASED BY USING THIS CORROSION INHIBITING LUBE IN THEIR CONNECTOR SETS



■ MANY OTHER USES FOR THIS CPC COULD BE BENEFICIAL
■ COST IS SHOWN AS PRIMARY BENEFIT BUT EFFECTIVENESS & SAFETY FOR OUR TROOPS IS EVEN MORE IMPORTANT



CAIG Laboratories, Inc.

12200 Thatcher Court, Poway, CA 92064 U.S.A.

P: 858/486-8388 | E: info@caig.com

WEB: www.caig.com | www.deoxit.com



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