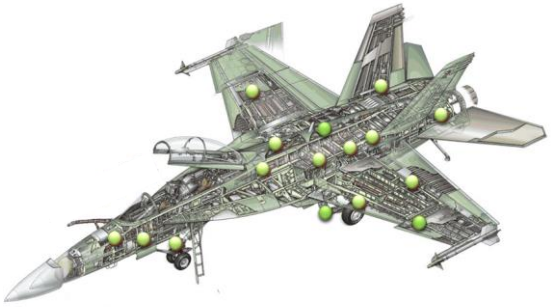
Corrosion Djinn™ Ver 2.2

Galvanic Corrosion Prediction and Assessment

Corrosion Djinn™ is Corrdesa's award-winning, easy-to-use engineering tool for rapid evaluation of the risk and magnitude of galvanic corrosion between dissimilar materials. Scientifically based on a qualified materials database, it instantly provides the galvanic corrosion current generated between dissimilar material couple. This shows the engineer immediately whether a particular combination is bad, and if so, what alternatives would perform better.

The Old Way – Galvanic Potential

We are all familiar with the standard galvanic series tables we find in books and in military standards such as MIL-STD-889B. These tables and standards are always based on the galvanic potential difference, ΔE, between two materials. Unfortunately, galvanic corrosion rate does not depend on potential differences – it depends on the kinetics of chemical reactions on both materials. As a result galvanic tables often give completely the wrong answer. All of the tables say that one of the worst galvanic couples is Al vs Ti – much worse than Al vs stainless steel, so corroded fastener holes in airframes are often repaired with stainless bushings. In reality, however, stainless steel corrodes aluminum far faster than Ti does, even though the Al/Ti ΔE is larger. The result is visible every time we tear down an aircraft wing.



The New Way – Galvanic Current

Recognizing these problems, NAVAIR, the DoD office in charge of Naval Aircraft, is working on updating MIL-STD-889B to change the method of assessing corrosion risk from *galvanic potential* to *galvanic current*. Corrosion Djinn™ is the only simple tool on the market that works with this new approach to give the real corrosion risk, while still being compatible with old approach. Developed under funding from the ONR Sea-Based Aviation Program, Corrosion Djinn™ calculates the galvanic current between any two materials based on their polarization curves, providing a rapid estimate of corrosion rate and risk. It is ideal for rapid evaluation of corrosion risk at any interface, or determining the corrosion severity at all the risk locations throughout an entire aircraft.

Contact: Dr. Alan Rose, 770-328-1346, arose@corrdesa.com

Using Corrosion Djinn™

Corrosion Djinn™ is easy-to-use software designed for the M&P Engineer and anyone who needs a quick answer to questions such as "Which materials and coatings can I use together?" "How will trivalent chrome passivation, compare to hexavalent?" "Will ZnNi be as good as Cd?" "How do these 12 options compare – which should I choose?"

Anyone can learn to use it in 5 minutes, and each calculation takes a few seconds.

The Science behind Corrosion Djinn™

Corrosion Djinn™ is based on the established principle that at equilibrium between a noble material (cathode) and a sacrificial material (anode) the corrosion current is determined by the crossing point of the their polarization curves. While this is idealized it works very well for most practical purposes, such as bushings, fasteners, butt and faying surfaces.

Award-Winning Software

Corrosion Djinn™ received a **2017 Materials Performance Corrosion Innovation of the Year Award** recognizing its contribution to reducing corrosion.

Planned additions

The current Version 2.0 embodies all the basic principles of correct current-based galvanic prediction. Over the coming year the following capabilities will be added:

- Corrosion rate in µm/year
- Galvanic Severity Index (galvanic/self corrosion ratio)
- Effect of area ratios
- Corrosion rates for common geometries (bushings, joints, faying surfaces, insulation).

The Data behind Corrosion Djinn™

Good software is worthless if it is based on bad data. The old galvanic tables consist mostly of half century old measurements of galvanic potential from generic alloys. Corrosion Djinn™ depends for its accuracy on a new, curated database of electrochemical data, all taken in a consistent manner. These curves include many aerospace alloys and coatings, and new materials such as carbon fiber composites, ZnNi electroplate, and new treatments such as trivalent passivated aluminum and coatings. In response to user requests we are constantly adding new materials, coatings and treatments.

How to purchase Corrosion Djinn™

The standard version is available on-line at http://corrosiondjinn.com/. For details see http://www.corrdesa.com/technology/corrosion-djinn/ Contact arose@corrdesa.com or klegg@corrdesa.com for sales and technical information.

A local version will be released shortly using a local version of the database with periodic database updates as new materials are added. This version will permit the use of local, proprietary or restricted data.

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