

Enterprise Solution for Corrosion Resistant Design Corrosion Djinn® Version 3.4

Annual corrosion costs 2%-6% of global GDP. Material choices are made by designers but less than 5% of them actually have specialist materials & processes (M&P) knowledge and 1% of engineers actually have expert knowledge of corrosion.

It has been reported that 30%-40% of corrosion costs are avoidable with better design. Corrosion Djinn® our easy-to-use application enables Enterprises to significantly claw back these high corrosion costs by placing materials and corrosion knowledge directly into the hands of the designers at the point where and when it is needed.

Djinn® v3.4 enables designers to quickly assess galvanic corrosion risk and choose appropriate material and coating alternatives to eliminate or mitigate corrosion in compliance with MIL-STD-889D.

Corrosion Risk Analysis

Traditional approaches to assessing galvanic corrosion risk are typically based on the galvanic potential difference, ΔE , between two materials. However, potential difference is not a true indicator of kinetics and can result in widely incorrect and particularly dangerous choices for some material combinations. MIL-STD-889D is a recently revised military standard (Jul 2021) that defines the compatibility requirements for conductive materials. This particular revision represents a major paradigm shift in galvanic corrosion theory. The corrosion current, rather than the potential difference, between two dissimilar materials will be used to determine galvanic compatibility. This new methodology is based on the mixed potential theory of electrochemistry and is also being adopted by

other institutions and organizations. The revision also outlines the procedures required to generate electrochemical data to for new materials, coatings, and surface treatments.

Corrosion Djinn® is a unique software tool that addresses these issues by providing an enterprise accessible, easy to use, computerized method for determining the galvanic corrosion rate between material couples, supported by a consistent database of modern, accurate, polarization curves. All of this data has been acquired following the measurement protocol defined in the appendix of MIL-STD-889D. Indeed, the Djinn® Platform also incorporates the actual MIL-STD-889D Data, providing a more accurate insight into the corrosion rate between a wide range of modern materials, coatings and treatments and the consequent risks associated with using them.

Using Corrosion Djinn®

Corrosion Djinn® is simply accessed via a web browser with a subscription (SaaS – Software as a Service) enabling instant deployment across your enterprise, providing consistent information to all your designers and materials engineers.

The easy-to-use interface is designed for anyone who needs a quick answer to questions such as “Which materials and coatings can I use together?” “How will trivalent chrome passivation compare with hexavalent?” “Will ZnNi be as good as Cd?” “How do these 2 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 well-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 their polarization curves. While this is idealized it works very well for most practical purposes, such as bushings, fasteners, butt and faying surfaces.

The Data behind Corrosion Djinn®

Data quality is key - typical *galvanic tables* consist mostly of half century old measurements of galvanic potential from generic alloys. Djinn® accesses 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, new coatings such as ZnNi electroplate, and new treatments such as trivalent passivated aluminum. In response to user requests we are constantly adding new materials, coatings and treatments.

Djinn Enterprise Implementations

Djinn® can be implemented in a number of ways depending on your IT needs. Our default *Shared Cloud* instance can be set up very quickly, where named users are provided access credentials to www.CorrosionDjinn.com. Alternatively if you need to be able to add and manage your own materials and coatings we can stand up a *Private Cloud Instance* where named users can access Djinn® via their own cloud resource.

Alternatively Djinn® can be *self-hosted* on your own IT network.

Data Acquisition Services

Corrdesa has the physical resources and expertise to deliver engineering services to measure the necessary

polarization data on any additional materials or coatings.

How to purchase Corrosion Djinn®

Corrosion Djinn® is available on an annual license basis.

Contact arose@corrdesa.com for sales and technical information. For further details see <http://www.corrdesa.com/technology/corrosion-djinn/>

