Radiation Hardened Motors

Frequently Asked Questions

How do you know the motors will survive radiation?

Motors were provided to Oak Ridge National Labs as part of a test program. Motors were subjected to Gamma Radiation where total accumulated dose exceeded the amounts specified in our catalogs. The results of this program are listed in the Lab Notes section of the web site.

How much radiation can Empire Magnetics' RH products withstand?

Empire Magnetics' radiation hardened motors are rated for 2×10^8 rads t.a.d. (gamma radiation). On a custom basis Empire Magnetics supplied motors for Oak Ridge National Labs that withstood as much as 1×10^9 rads t.a.d. (gamma radiation) without any degradation in performance.

How does Radiation affect products?

High energy radiation breaks down long chain molecules typical in organic materials. Such things as insulation, glue, varnish, PC cards, lacing cords, slot liners, lubrications, plastics and more decay more rapidly than normal as the result of radiation exposure. This decay shortens the useful life of the products.

Can I get radiation hardened cables?

Yes, but production of specialty wire requires minimum production quantities. Since demand for radiation hardened wire is infrequent, it is not economically feasible for Empire Magnetics, Inc. to stock these wire and cable for all of the products. Therefore to obtain radiation hardened wire and cable, you may be required to purchase a minimum of 1000 feet.

Why do I need a special radiation resistant gearbox?

Even with the use of NRRG grease, the plastic retainers in the ball bearings may be susceptible to radiation. In addition, the seals and the gaskets are frequently soluble in the NRRG grease.

What kind of motor do I need for gamma radiation exposure?

The effects of gamma radiation on motor insulation is similar to that of high temperature, and the combination of high temperature and radiation will shorten the material life significantly. To extend material life, oversize the motor, use a lower current and reduce the operating temperature.

Do you have a motor that can withstand neutron radiation?

Yes, even though neutron radiation damage is much more difficult to quantify than gamma

radiation. The insulation materials that are best against the attack of gamma are also the best ones to withstand neutron effects, however life predictions are another matter all together.

Where can I get more information?

See Radiation Hardened information in the Technical Articles section on the home page.

Where can I find a materials library that gives me all the information I need to design Radiation Hardened systems?

Much of this information has been generated at significant expense by private companies for their profit. More has been generated as part of classified weapons development programs. As such this information is difficult to obtain. National Labs are able to provide some resources.

What RH products can you offer in addition to motors?

We can provide resolvers, gearboxes, brakes, connectors, cables, subassemblies, complete mechanical designs and mechanical systems.

Satisfied customers for RH products?

Oak Ridge National Labs, Argonne National Labs, Savannah River Labs., G.E. Nuclear Fuels, Bettis Labs, Brookhaven National Labs, Stanford Linear Accelerator, Lawrence Livermore National Lab, Toshiba, Kobe Steel, Mitsubishi Heavy Industries, Japanese PNC and JERI agencies.