



CASE STUDY



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Surface Enhancements Eliminate ESD Damage During Operation of State-of- the-Art I.C. Handlers

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When San Jose California's Exatron engineered their latest generation of integrated circuit (I.C.) handling equipment, protection from damage due to electro-static discharge (ESD) was a top priority. So they turned to a company known for pioneering high-tech protective coatings for NASA - General Magnaplate Corporation.

At their Ventura, California Materials Technology Center - one of four such coating facilities in North America - Magnaplate applied two of its multi-step surface enhancement coatings. The coatings - NEDOX® and MAGNAPLATE HCR® - improved the ESD resistance and performance of key Exatron handler components such as precision trackwork, main plates, extrusions, input & output mechanisms, rails and slides. All these metal surfaces are subjected to potentially severe friction from the constant action of plastic and ceramic I.C.s being run through testing cycles.

ESD Damage and Wear are Avoidable Risks

Experience has shown that, unless protected, friction between I.C.s and the handlers'

aluminum tracks and rails can introduce serious risks of "blown devices" even during initial runs. In addition, wire "flash" still attached to device leads can scratch and mar aluminum surfaces. NEDOX® and MAGNAPLATE HCR® surface enhancement coatings - processes pioneered for NASA - now prevent those problems.

The NEDOX process starts with the electrodeposition of nickel on the aluminum surface after it has been properly cleaned and prepared. This deposit contains countless micro-pores which are enlarged in a series of proprietary treatments. The surface is sealed with a controlled infusion of sub-micron size particles of selected polymeric materials, and then subjected to a Magnaplate-developed treatment which insures thorough cross-linking integration of the particles and the top layer.

Unlike conventional protective coatings for aluminum, the Magnaplate-applied polymer infusion results in a previously unattainable combination of wear resistance, lubricity, and electrical conductivity. Even extremely thin deposits of the NEDOX coating act as a static barrier, preventing static build-up and the resultant ESD.



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In the HCR surface enhancement process, aluminum in the substrate surface is converted to aluminum oxide. The H₂O of the newly formed ceramic surface is then replaced with Magnaplate's inert polymeric materials that provide a self-lubricating surface. In the process, the aluminum crystals expand and form porous anchor crystals that remain hygroscopic for a short period of time. Colloidal bi-metallics are then introduced, under controlled conditions of properly balanced suspension, time and temperature, to permanently interlock with the newly formed crystals.

The result of these multi-step surface enhancements is harder-than-steel, permanently lubricated plastic/ceramic coated trackwork protected from both wear and static build-up.

As Exatron likes to point out to their prospective customers, ESD safeguards are designed into their testing equipment, not simply created as an afterthought. The result, they stress, is handlers that meet or exceed all known ESD standards.

Low-Cost, Easy-to-Use Test Equipment

In business since 1974, Exatron fills the electronic industry's need for low-cost, easy-to-use, reliable handling and test equipment, offering complete automated systems including a wide variety of through-hole and SMD handlers, integrated temperature chambers, dedicated open/short lead bond and high performance logic testers, laser markers and labelers.

Space Age Coatings Come Down to Earth

Founded in 1952, General Magnaplate's technologically advanced surface enhancement coatings were used to solve NASA's corrosion, abrasion and lubrication problems in the harsh environment of outer space. Today, the company's processes not only enhance vital components of all U.S. space vehicles, but also are used to boost the performance of equipment in all kinds of "down to earth" industrial operations throughout the world.



Early field trials of predecessors to Exatron's newest Model 5000 handlers - designed and engineered to meet heavy-duty production handling requirements - uncovered a problem that needed quick correction: 6061T6 aluminum trackwork on the company's pioneering handlers was subjected to potentially damaging ESD (Electro-Static Discharge) caused by the constant movement of plastic and ceramic leaded integrated circuits sliding down the 6061T6 aluminum



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trackwork. The solution (now used on all of Exatron's most advanced equipment) was to coat the trackwork with General Magnaplate's high-tech, multi-step surface active coatings called NEDOX® and MAGNAPLATE HCR®. The coating technologies - applied to all the silver metallic (aluminum) surfaces shown in this photo - create conductive surfaces that lasts longer, perform better, and inhibit generation of ESD.