



## CASE STUDY



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# Ultra-Thin, Ultra-Hard, Surface Enhancement Applied On International Space Station's Quick Disconnect Couplings Eliminates Wear, Leaks, and Contamination

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In the harsh vacuum and low temperatures of outer space, the valves on quick disconnect couplings (QDCs) on the International Space Station (ISS) must operate with total reliability. Even UPS or FEDEX haven't found a way to make an overnight delivery of a replacement part to outer space. That's why the QDCs must be extraordinarily smooth, hard, and durable to alleviate the possibility

of damage to the sealing surface during transportation or simply when opening or closing valves at temperatures as low as -160°F (-107°C).

During the extremely long period of exposure to the harsh condition in space, any damage to the coupling's valves - even minute surface scratches - can result in unacceptable levels of system fluid leakage. Such gradual leakage of system fluids would contaminate the ISS external facilities and/or its internal habitat. It would also result in depletion of valuable resources which could be replenished only at great expense by additional space shuttle flights. Extreme system cleanliness, therefore, is vital, and contamination represents a constant, serious danger. Surface hardness, durability, and extended reliability are of utmost importance for the QDCs installed both inside and outside the ISS.



*Quick Disconnect Couplings (QDC) on the International Space Station (ISS) manufactured by the Parker Stratoflex Unit of Parker Hannifin Corporation are treated with a NEDOX synergistic coating to prevent surface scratches which could lead to leakage of system fluids.*

The design engineers at the Parker Stratoflex Unit of Parker Hannifin Corporation achieved that hardness, durability, and smoothness by specifying that the surface of the ISS QDCs



be treated with NEDOX®, a proprietary surface enhancement coating technology applied by its developer, General Magnaplate Corporation. NEDOX provided an extremely thin film coating that permanently dry-lubricates the surface to a coefficient of friction (COF) as low as 0.06 while providing a hardness of up to Rc68. Not only did NEDOX perform better than other coatings that were tried, but its cost was considerably less than any other product.

Stratoflex's valve components for ISS QD couplings are manufactured from high strength Inconel or stainless steel. These components are polished, scrupulously cleaned, carefully packed, and sent to General Magnaplate's facility where the NEDOX coating is applied. Magnaplate's stringent QA inspection methods assure that the customer's exacting specification requirements are met.