



Cleaning a Stainless Steel Device for Rulon Bearing Bonding

This customer was experiencing premature failure of their device due to an inadequately bonded fluoropolymer bearing fitted inside a stainless steel device. The solution involved the cleaning of the stainless-steel component and in-place bonding of a plasma-treated Rulon® bearing.

The solution involved:

- Removing all gross contamination (machining oils, etc.) from the stainless-steel device via water/detergent washing followed with a plasma-cleaning procedure to remove all trace contaminants left over from the gross-cleaning step.
- Plasma-treating the Rulon bearing to clean and functionalize the material to better receive a structural epoxy.

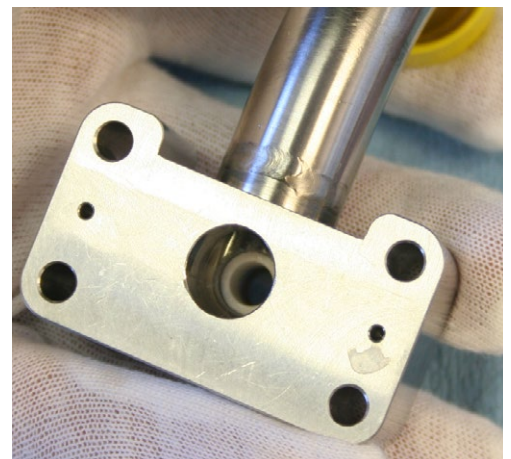
[Rulon](#) is an engineered tetrafluoroethylene polymer mixed with other materials, polymeric or inorganic. Because a portion of the Rulon material is a fluorocarbon polymer, it is difficult to achieve good lap shear bond strength without some sort of surface treatment.

Sodium naphthalene ammonia [Tetra etch™] dips or liquid etching of fluorocarbons are an effective way to enhance the adhesion of fluorocarbon polymers; however, this highly caustic and toxic method is dangerous and can be difficult to control. Moreover, the resulting surface of a dipped surface is discolored to brown or black and often deforms the material — changing the dimensional integrity of the finished part.

[Plasma surface modification](#) is as effective as this dip method yet it is environmentally friendly, safe, controllable and repeatable without discoloration or deformation of the material.

Plasma is a quasi-neutral cloud of ion, electrons, and radicals. The diffuse cloud is capable of altering the polymer chemistry on the surface of materials, providing wettable or adherent surfaces on materials that are otherwise inert. The [Rulon bearings](#) used in this application were subjected to a specific gas mixture to induce an adherent surface for a structural epoxy resulting in a bond strength equal to that achieved by sodium etching — without causing discoloration or part deformity.

Download our [technical white paper](#) to read more case studies about plasma cleaning.



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