

Photons meet Plasma – Adding Value to your Al, Mg and Ti Components

PEO, plasma-electrolytical oxidation, remains as an unknown or at least niche surface technology, giving lightweight metals a hard and robust protection shell. Expiring an increasing interest in the research society in the last decade, it is supposed to be a promising candidate for increasing lightweight potential but being not ready for wide industrial applications by being too expensive or applicable only on small parts or series. In this talk we will refute these reservations by unveil high demand applications of our clients, who apply our surface technology on their components under different harsh conditions. The CERANOD® surfaces can withstand high loading by vibrations giving lightweight alloys like Aluminum or Magnesium a high corrosion and wear protection. Here, one of our automotive clients is using our surface technology on highly loaded components in the power train for a long period and now ordered the second generation of the lager-volume production providing components for the world's biggest OEMs. This illustrates that the PEO process is neither too expensive when hitting the demands nor a niche technology for very particular fields. In a further application case Magnesium component modified by our ceramic-like atomic bonded surface found their way in a large production series last year after being tested world-wide for several years in an innovative ICE application.



Figure 1: possible high-loaded Aluminum component

We will show application possibilities and different fields of our surface modification used industrial in tribological, corrosive and high temperature applications, whereas for instance maintenance-free power units could be realized.

Being convinced that facing the incessantly growing demands on sustainability, efficiency and endurance, which are made on components in automotive, aerospace and machinery applications, is only possible by intelligent lightweight, including multi-material mix, accompanied by the right solutions for the surfaces, we enhance our technologies. Most recently, we found that especially in the case of

Aluminum casting alloys an adopted PEO process leads to positive tribological behavior in combination with novel low-viscosity oils. The utilization of Direct interference laser structuring and hybridizing with a solid lubricating polymer manifold the positive effect. A 1000-h tribological test just being finished before this submission proves a very promising solution with low friction and almost no wear after a long period.

In this talk we will report on our tribological and corrosion test results within our laboratory accompanied by SEM and EDS findings for different CERANOD® surface solutions. These findings we will compare and correlate with some different application cases of our clients, who utilize our solutions on their end products to enable the usage of lightweight metals under harsh tribological, vibrating and /or corrosive environments, and, thus, saving a lot of energy and resources.