Corrosion protection from the plasma nozzle

When ZF TRW Automotive in Gelsenkirchen decided ten years ago to coat a safety-relevant aluminum component with atmospheric pressure plasma to improve corrosion protection, it was a world first. Today ZF TRW pretreats over one million parts a year with the environmentally friendly plasma jet technology from Steinhagen in Westphalia.

Prior to this, low pressures were the only option, but since the mid-2000s, it has been possible to produce and deposit function-alized plasma nanocoatings under atmospheric pressure. Whether for corrosion protection or adhesion promotion, as a release agent, anti-adhesion or barrier coating, the PlasmaPlus plasma polymerization jointly developed and patented by Plasmatreat GmbH from Steinhagen (Westphalia) and the Fraunhofer IFAM in Bremen enables users to apply functional coatings to their material surfaces without a vacuum chamber.

The process is based on the Opensair-Plasma technology developed by Plasmatreat in 1995 and now used in virtually all sectors of industry throughout the world. The jet technology cleans surfaces to a microfine level and activates them with the aim of significantly improving their wettability and adhesive characteristics in preparation for downstream processes such as bonding, painting or printing. With in-line and robotic capabilities, the jet systems are designed for use on continuous, fully automated production processes (Fig. 1).

A precursor in the form of an organosilicon compound is added to the plasma generated in the nozzle to produce the plasma coating. Due to high-energy excitation within the plasma, this compound is fragmented and deposited on the surface in the form of a thorough integration into the process chain.

Provided that the quality requirements for new developments are fully specified from the start, they can be implemented using well-established technical solutions in accordance with the corresponding influencing parameters. However, it is significantly more difficult if customer requirements change at a later stage of the project.