Press Release

Steinhagen, Germany, November 18th, 2025

In-line oxidation reduction with plasma: greater reliability and yield in power module manufacturing

Demand is growing rapidly for high-performance electronics for automotive, industrial, and data center applications. At the same time, manufacturers are under increasing pressure to deliver more compact, powerful, and reliable modules. The REDOX tool offers an innovative solution to key challenges in power module manufacturing by combining Openair-Plasma pretreatment and inline oxide reduction.

Plasma technology is the key to stable connections
Power modules are among the most critical and demanding components in modern electronics. Problems such as insufficient adhesion, voids in solder joints, delamination, and thermal inefficiency impair not only performance, but also the service life of the modules.

Plasmatreat's Openair-Plasma pretreatment provides clean, dry, and precisely controllable surface activation. With the addition of REDOX technology, oxide layers are removed inline without the use of chemicals. The result is contamination-free, highly active surfaces that enable significantly better wetting and adhesion of solder, bonding, and casting materials.

More power, less waste
Combining these technologies significantly improves connection quality and thermal performance. Manufacturers report production yields up to 40% higher and measurable reductions in field failures caused by solder joint wear or delamination. These improvements make plasma a key enabler for developing the next generation of power electronics.

Technical Benefits of Plasma Pretreatment and REDOX-Tool Integration

Microfine cleaning and oxide reduction: Removes organic residues and metal oxides to improve adhesion.

Surface activation: Increases surface energy for reliable adhesion of wire bonds, die attach, and encapsulation materials.

Flux-free processing: Minimizes chemical additives, reduces the risk of contamination, and simplifies processes.

Inline integration: Compatible with automated production lines for real-time process control and reproducible results.

Optimized thermal interfaces: Improved thermal conductivity, reduced hot spots, and increased current-carrying capacity.

Applications:
This approach is particularly effective for:

- Cleaning and activation of lead frames, wire bonding, encapsulation, and coating in module assembly.
- High-current inverters, onboard chargers, and industrial power modules with high thermal and mechanical stress.
- Semiconductor manufacturers and Tier 1 suppliers who want to increase throughput, process stability, and reliability of their products.

Plasmatreat: Partner to Power Electronics
As the world's leading supplier of atmospheric plasma surface treatment technologies, Plasmatreat has supported the electronics industry for decades in developing durable, high-performance systems. Leading manufacturers in semiconductor and power electronics production rely on Plasmatreat to maximize connection reliability, minimize contamination, and streamline processes—from prototypes to large-scale production.

More information: www.plasmatreat.com

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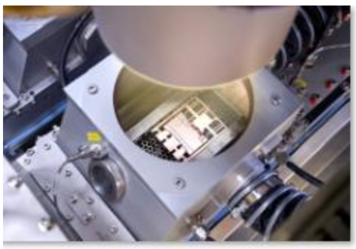
Pictures and captions:



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Plasmatreat REDOX-Tool for removing metal oxides for improving solder wetting and bond integrity. (Copyright: Plasmatreat GmbH)

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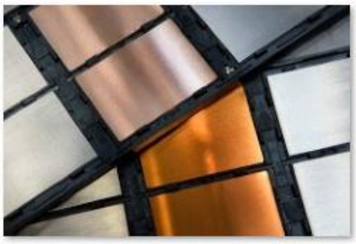

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Left: oxide-free metal after oxide reduction. Right: Metal with an oxide layer before oxide reduction. (Copyright Plasmatreat GmbH.)