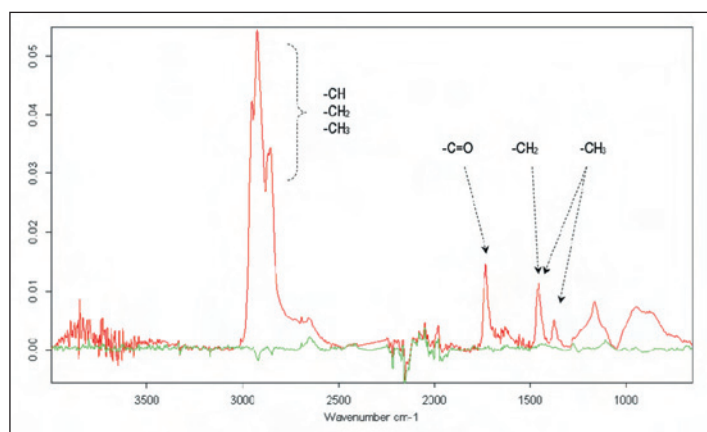


# Electronic Manufacturing Applications

## Improved surface adhesion for micro-electronic devices & PCB's using Openair®-Plasma Systems

Plasma etching for improved adhesion has long been a part of the electronics industry. Prior to the introduction of Openair®-Plasma Technology, it could only be sustained in a low pressure chamber. Low pressure translates into slow, expensive and disruptive to production flows. These restrictions made traditional plasma etching solutions non-viable for PCB and semi-conductor packaging applications.

**Plasmatreat** Openair®-Plasma Systems overcome these hurdles. While still applicable to semi-conductor manufacturing, they have the advantages of working in open atmosphere, using air as a process gas, and being placed in-line with existing processes. The Openair®-Plasma System is voltage free and therefore will not harm ESD sensitive devices.

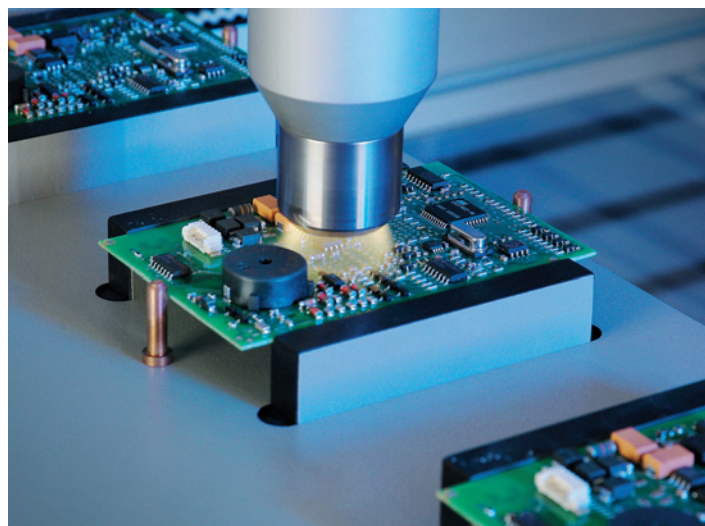


*Openair®-Plasma cleaning of aluminum surfaces contaminated with hydrocarbons measured by infrared spectroscopy (attenuated total reflection ATR). Red spectrum: oil contaminated surface, green spectrum: plasma cleaned surface.*

## Features

The process is unique as it is:

- Directly in line: conveyor belt as well as robotic application is possible.
- High speed: up to 100 m/min achieved in electronic applications.
- Voltage free: < 1V residual voltage means it can be applied to ESD sensitive components.
- Cost effective: relatively low initial investment, very low running costs.
- Flexible: applicable to flat surfaces as well as complex 3D shapes
- Environmentally friendly: only uses air (or other gases), no solvents, no ozone emissions.
- Reliable: process conforms to QS 9000 requirements.
- Easy to install: requires only electricity and compressed air.

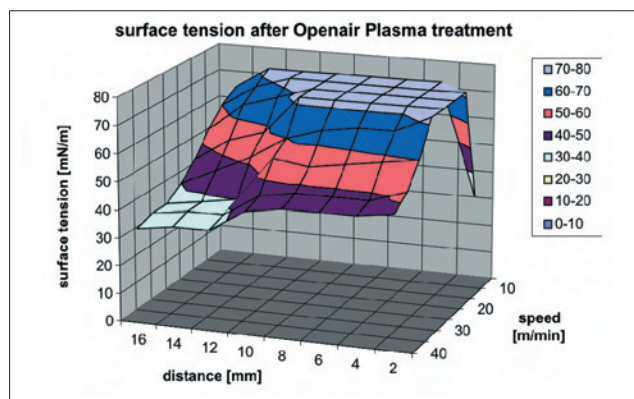


*Micro cleaning and surface activation of fully populated PCB before conformal coating. Openair®-Plasma surface preparation leads to increased yields and lower costs.*

## The Openair®-Plasma process

- Eliminates all organic and silicone based contaminants.
- Activates the surface by introducing oxygen in form of hydroxyl and ketonic groups into non-polar surfaces. The result is high surface energy (figure 3) and in most cases, full wettability (above 72 dynes).
- Perfect for wirebonding, soldering, conformal coating and under filling encapsulation.
- Effectively removes electro-statically attracted dust.
- Replaces VOC-based cleaning processes.

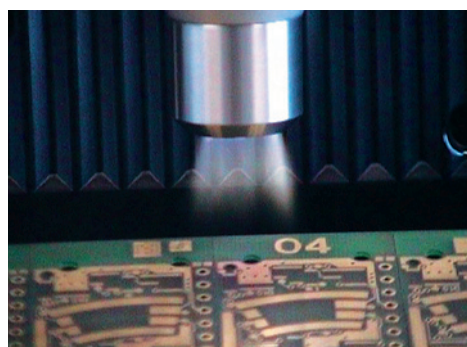
Easy to use: large process window. Head clearance & speed only process parameters.



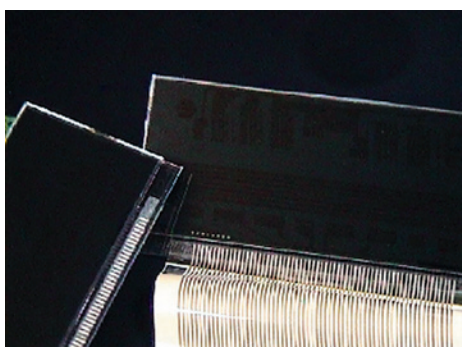
Surface energy of a non-polar polymer after plasma surface preparation is dependent on treatment parameters. The surface tension reaches 72 dynes in a broad process window.

## Some Applications

- Preparing specialized PCB or semi-conductor package surfaces for heatsink attach (increased adhesion, significant for conductive epoxies)
- Flip-chip die attach. (aids solder wet-ability and flow of underfill material)
- Semi-conductor package surface preparation for greatly improved printing
- Cleaning of leadframes before molding for increased adhesion (reduce pop corning)
- Increased performance and reduced cost of conformal coating.



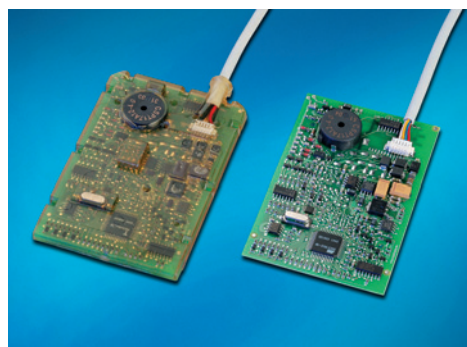
Preparation of PC-board before application of solder resist.



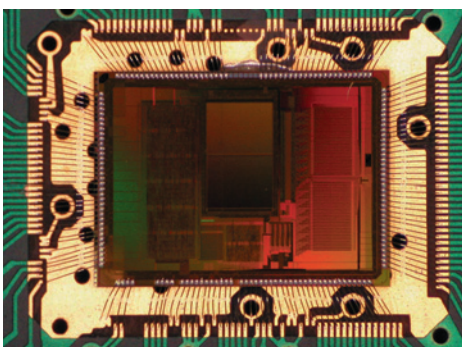
Liquid crystal display with contact film (right), and after the film has been forcibly removed (left) – shows the high quality bond.



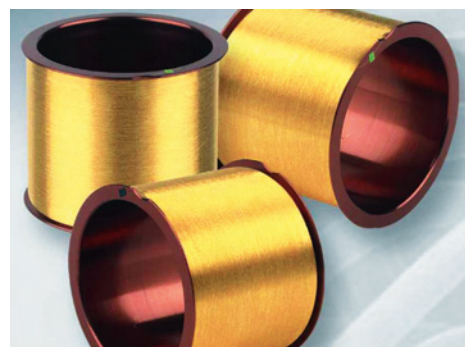
DVD Surface treatment for an improved layer adhesion



Activation of electronic devices before injection moulding



Openair®-Plasma avoid a wet chemical treatment of circuit boards before bonding



Desoxidation of bond wires, a huge process innovation