

Effect of a plasma treatment

A plasma made from atmospheric air is highly oxidative. Layers of adsorbed molecules (e.g. oil and on metallic surfaces water) are removed. Plastics are oxidised at the surface („cold“ combustion). The treatment increases the wettability by increasing the surface energy and increases the adhesion for inks and glues.

No side effects

In general, the substrates are treated only for 1/100 up to 1/10 seconds. Also very thin films are modified only at the surface. No pin holes are created. Mechanical, optical and electric properties are not changed. Only warm air containing ozone is produced as a by-product.

Pay attention to the stability of the pretreatment!

Surface energy may decrease after treatment. For instance for PP in the first week after the treatment by 3 mN/m and in the first half year of storage by another 3 mN/m. Sometimes it makes sense to treat as high as possible before a storage. However, due to many possibilities of contamination, storage should be avoided.

**Each application needs its own specific solution.
We bring any type of electrical discharge
to the application.**

Pretreatment stations

Design of an AP-plasma/corona station:

- 1.) Treatment tool including guidance of substrates and treating electrode; both adapted to type of substrate, material, production speed and aim of treatment.
- 2.) Adapted power supply for control and electric supply (typical values: voltage 12 - 15 kV, frequency 20-50 kHz, power 100 W up to 50 kW).
- 3.) Blower to remove the ozone (optionally via an ozone absorber) and to cool the electrode, if necessary.

No contact to high tension

Contacts to parts on high tension are not possible, if the station is used as directed. An unattended contact to the medium frequency high tension is unpleasant, but due to the frequency range primarily not dangerous.

Low wear and maintenance

The stations are designed for a 3-shift permanent use, optionally also for heavily stressed industrial environments.

EX-proof stations are possible

The discharge is a source of ignition. An EX-proof design is possible on demand.

Electromagnetical tolerability and security are guaranteed

The stations are provided with the CE-sign.

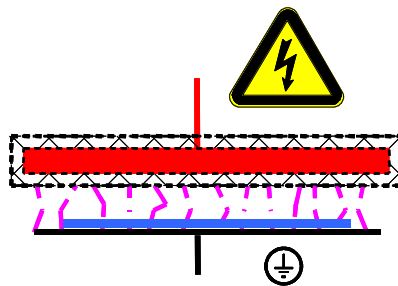
What means plasma?

„PLASMA“ is a gas, which contains a big amount of electrical charges. In contrast to normal gases, it is conductive – although it appears electrically neutral to the outside. Ionisation of gas molecules (for noble gases: gas atoms) produces the charges. Positive ions are produced by separation of negative electrons from the molecules and atoms. Besides electrons, ions and „normal“ gas molecules, a plasma consists also of neutral molecule fragments (radicals), which are chemically high reactive due to their unstable structure. This reactivity is used in many technical processes: for instance, as a pretreatment before printing and gluing by oxidation of the surface of the substrate. Plasmas produced under ambient conditions using air as working gas and electrical discharges for excitation are used for this application.

Plasma parameter:

- production: thermal/flame or electrically
- chemical composition of the working gas: air, argon ...
- intensity of excitation; determines concentration (electron density) and energy content (electron temperature)
- pressure: ~mbar (LP), 1 bar (AP), >1 bar (HP)

Direct treatment

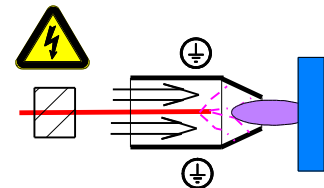


The substrate to be treated must be introduced „directly“ into the discharge gap at the „classical“, direct corona-treatment. The treatment electrode, which guides the web and lays electrically on ground, forms together with the treatment electrode on high potential a 1,5 up to 2,0 mm wide gap. A special electric control of the electrode, which reduces the energy content of the micro discharges and prevents the formations of hot, thermal arcs makes gaps up to approx. 10 mm possible.

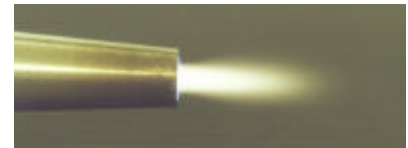


„discharge thunder storm“
between the electrodes

Indirect treatment



Common for the different methods of the indirect pretreatment is that the discharge burns between two electrodes and gets directed toward substrate surface by a flow of air, for instance. Current filaments are blown out at our **Korona-GUN^a**; but not at our **Plasma-BLASTER** as shown below.



Electrode-less like an
„aurora borealis“

CORONA = PLASMA??

A current conducting plasma exists inside the current filament of a corona discharge. Another, secondary plasma exists besides the current filaments. An AD-plasma is free of current filaments. It is potential free: „plasma to touch“.

with current filaments = corona
without current filaments = plasma