

PlasmaAir PA1

atmospheric plasma system



activate and clean surfaces for

- gluing
- bonding
- soldering . . .

Introduction:

Atmospheric pressure plasma systems are of high industrial interest because they provide an access to plasma applications without the need of expensive vacuum technology. **PlasmaAir PA1** is a novel and unique atmospheric plasma source, which is mobile and easy to handle. It produces a high efficient plasma with a variety of process gases.

This device is a plasma system which rapidly activates and cleans different kinds of surfaces. If you want to join and coat products, particularly different materials, plasma treatment is very helpful and in several cases necessary.

PA1 was especially developed for strong adhesion between smooth and temperature-sensitive substrates like plastics.

Benefits:

- **economic:** good price performance ratio
- **compact:** small system with small supply unit
- **flexible:** light in weight and good transportable
- **easy handling:** position head and press button
- **safety:** $T \ll 100^{\circ}\text{C}$ on surface for sensitive materials

Description:

dimension supply unit: $w=190$, $h=160$, $d=280$ mm

dimension plasma head: $\text{Ø}=30$, $l=130$ mm

plasma source: microwave 2,45 GHz, 24V DC, 30W

process gas: air, other gases (O_2 , He, Ar, ..)are possible

The design of PA1 makes operation simple:

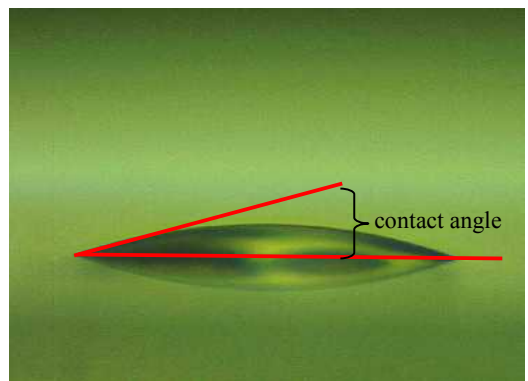
- (1) take the head of PA1 in one hand,
- (2) press button of supply unit to switch plasma on,
- (3) move this head in a small distance over the surface
- (4) the surface is activated / cleaned by the plasma
- (5) now print or glue etc. and the process is finished



Pic. 1: PlasmaAir PA1



Pic. 2: Head of PA1 compare with coin



Pic. 3: Dot of glue with contact angle [°]

Applications

applicable before fabrication process of:

- gluing
- casting
- coating
- printing
- bonding
- painting
- foaming
- soldering
- siliconizing

potential surfaces:

- metals
- ceramics
- silicones
- duroplasts
- elastomers
- thermoplasts

possible fields of applications:

- packaging industry
- plastics technology
- medical technology
- automotive industry
- electronics manufacturing
- research and development

Result of plasma cleaning:

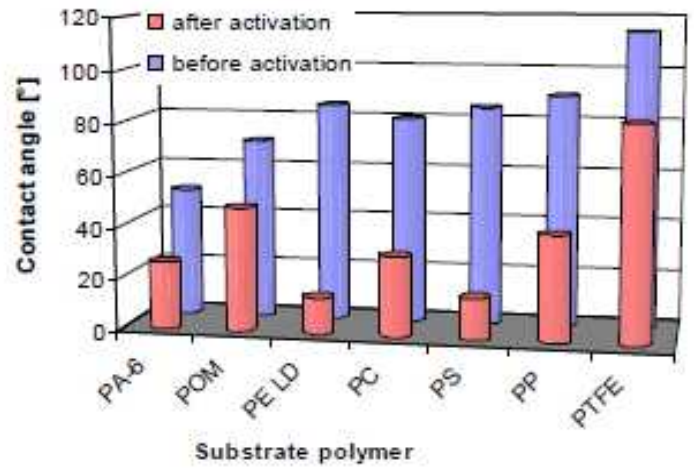
The result of the plasma process is to activate the surface. The marker of a high surface activation is the contact angle (see Pic. 3).

There is a correlation between surface activation, contact angle and the following adhesion process: If the surface activation is good the contact angle is smaller and the adhesion is better.

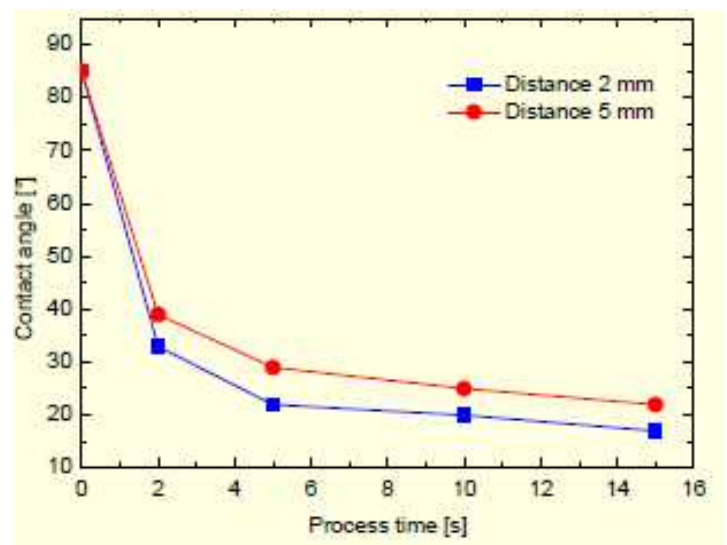
We can say: The smaller the contact angle all the better is the adhesion process (see Pic. 4). With a contact angle $\leq 30^\circ$ we become very good adhesions results.

In Pic. 5 we see the dependence between the contact angle and Process time with two several distances of PA1-Head to the surface. With a 2 mm distance we become after 2s a contact angle approx 30° .

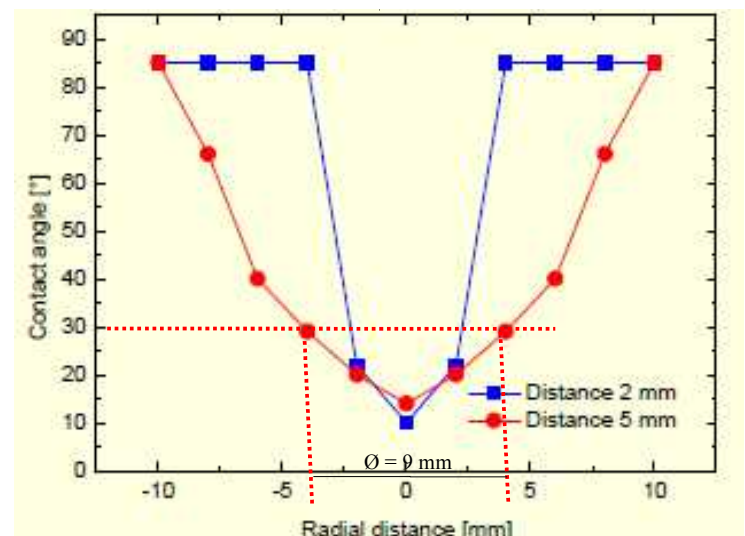
In Pic. 6 we see the dependence between the contact angle and radial of hole in PA1-Head. With a hole of approx 9 mm we become contact angle of 30° .



Pic. 4: Comparison of different polymers of PA1 (Headdistance = 2 mm; 1,5 l/min; 15 s)



Pic. 5: Variation of process time and gas of PA1 (PS, Headdistance = 2 / 5 mm; 1,5 l/min)



Pic. 6: Dependence of size of treatment area on distance of PA1 (PS, Headdistance = 2 / 5 mm; 1,5 l/min O₂; 10s)

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