

# Plasma Activation of EPDM/TPE Frames

Openair®-Plasma replaces mechanical brushes or primer coating, new trend in extrusion and fitting.

Nowadays, almost 100 % of the insulation of automobile doors consists of EPDM mixtures. Such doors have to fit very well, reduce noise, be attractive visually and to the touch as well as cheap to produce. In addition, the insulation must not freeze to the car body in winter. In order to meet these requirements,

state-of-the-art coatings in the form of flock or slide lacquer must be applied. The adhesion of such systems on the highly non-polar elastomers presents a challenge which was solved in the past by rotating wire brushes, a process that was in itself quite unsafe.

## Openair®-Plasma technique

has quickly conquered the problem by a process, which, due to its simplicity and reproducibility, is now widespread in industry. By means of Plasma pretreatment during extrusion, plastics and elastomers are prepared for subsequent coating, flocculation, application of tapes or 2K extrusion. Often the adhesion of the materials is only possible after surface modification is completed. Coating quality is sustainably improved.



Illustration 1  
Automobile door frame

### Essential process advantages with Openair®-Plasma:

- High process speed – up to 40 m/min, depending on the plasma tool, with a high standard of safety.
- Complete surface pretreatment with a highly homogenous plasma stream and rotating plasma jets.
- Large process window – important with groove geometries; surface and groove floors as well as thin lips are treated evenly.
- Pretreatment without corona effect; the frame does not come into contact with any high voltages.

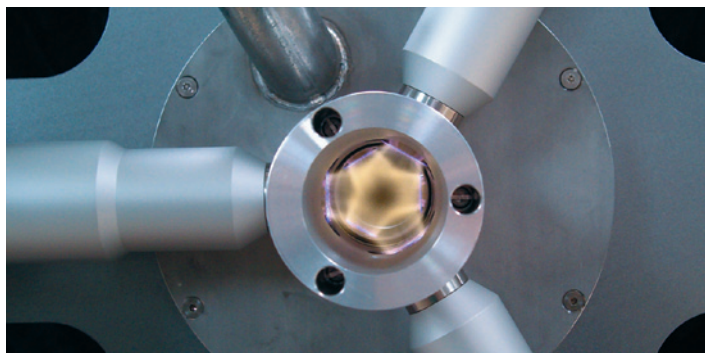


Illustration 2  
Plasma facility 8PFW10  
for frame extrusion

### Application to extrusion:

#### C-shaped plasma station:

- For a maximum of 12 PFW10/RD1004 plasma sources.
- Fast and exactly reproducible jet adjustment through a 0° to 270° arc .
- Centred adjustment range: +/-10 mm each per jet.
- User-friendly compact C-shape design, easy to clean and with open handling of the jet.
- Individually controlled jets; throughput regulation.
- 100 % plasma monitoring by means of integrated spectral evaluation.



#### Plasma tunnel:

- cross-sections up to 30mm are available for small and medium-sized frames,
- gives all-round even treatment due to centrally arranged RD1004 rotation jets,
- higher intensity with plasma filled central chamber,
- highly flexible; obviating the need for jet position adjustment.

## Use in packaging:

Besides pretreatment in extrusion, plasma treatment is being increasingly employed in packaging. In this application, handling of the rotating plasma jets can be done manually or alternatively by industrial robot. The combination of flock/lacquer coating and pretreatment in one handling system is an obvious advantage.

In packaging, the essential advantages of plasma treatment are that it is dust-free and that it provides a much faster pretreatment of frame section with high and even adhesion.



*Illustration 3  
Frame pretreatment by means  
of a rotating plasma jet*



*Illustration 4  
Pretreatment filling up a crack by means of a jet.*

## What is Plasmatreat? How does it affect the surface?

A controlled electric discharge is triggered inside the plasma jets. By means of targeted airflow the reactive components of the arc are separated and transferred outside the jets. The high voltage required for generation remains inside the jets.

When the emerging reactive and ionised air impacts on the treatment surface it causes both chemical as well as physical changes. The surface is cleaned of contamination with hydrocarbons such as fats and extrusion agents and, depending on the material, its molecular chain structure is changed. Frequently, free radicals in the form of hydroxyl and carboxyl groups are produced which facilitate the bonding of different coatings suitable for this purpose. The applied coats can be thinner with the same effect and do not need any aggressive agents for adhesion.

## One step ahead ...

**Openair®-Plasma treatment paves the way for water-based coating systems. The stringent test requirements of the automotive industry can be attained only by very efficient pretreatment at the highest possible level. Plasmatreat has more than 7 years' experience in treating EPDM frames from a wide range of differing installed systems.**

**We will be happy to answer your questions!**