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## The success of atmospheric surface treatment

Efficient, economical and eco-responsible, this technology is being adopted exponentially, and now, no industrial sector can do without it.



### What is plasma ?

Unlike solids, liquids or gases, which are present in their natural state, **the plasma state** can only be reached from a gas subjected to an energy input. It is often referred to as the **‘fourth state of matter’**.

Plasma is created by placing 2 electrodes in a gas and maintaining an electrical voltage between them to produce a discharge. This generates an ionised environment, containing numerous highly reactive species such as ions and excited or metastable molecules.

**It is the properties of these reactive species that are exploited in surface treatment. By reacting with surfaces, they give them new properties.**

## Why is atmospheric plasma used for surface treatment?

When a plasma jet is projected onto a surface, a chemical reaction takes place instantaneously, giving the treated material new properties. This reaction only occurs on the extreme surface of the material and its effect is generally limited in time.

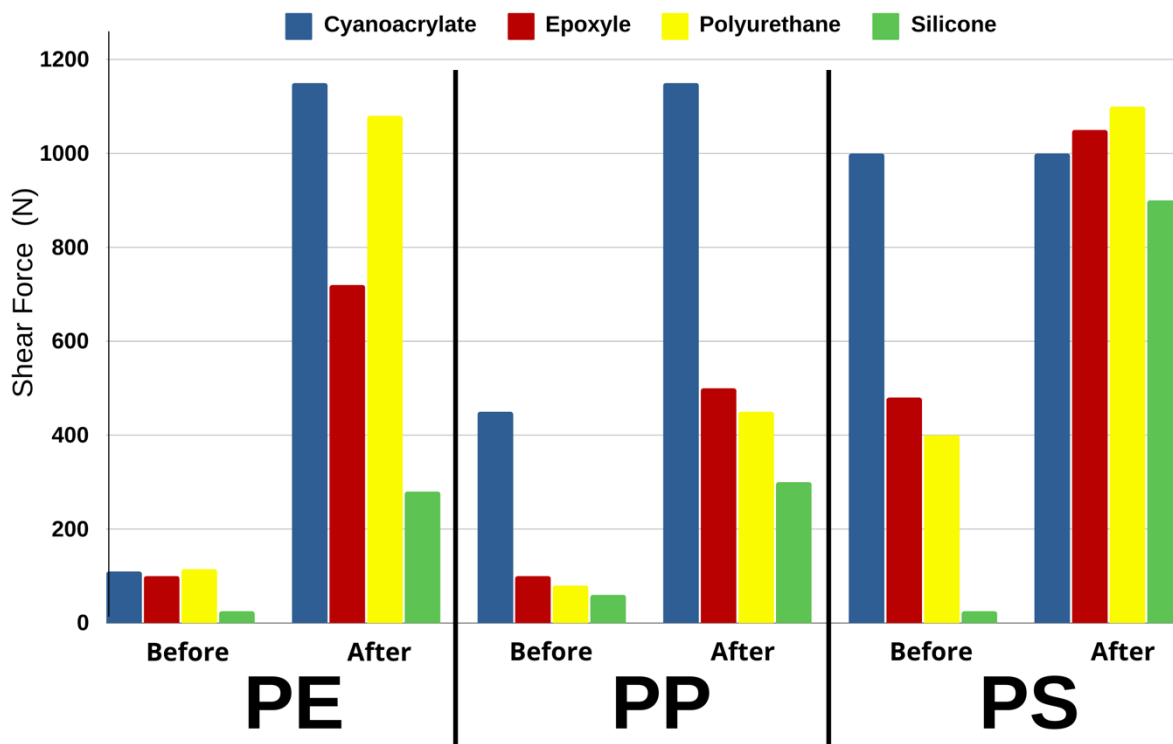
**This means that for a short period of time (from a few hours to a few days), the material treated in this way will have different physical properties that will change its wettability.**



*Increased wettability with plasma treatment on the right-hand side of the part.*

**This modification of surface properties will improve the adhesion of assemblies. As a result, bonding will be more effective and the application of coatings, paints and inks will be more resistant on treated surfaces.**

The main advantage of plasma treatment is that it does not use solvents. It therefore replaces polluting chemical treatments. It can also be a good alternative to flaming.



*Bond strength test before and after plasma treatment on different materials and with different adhesives*

ACXYS TECHNOLOGIES was founded in 2000 by an industrial R&D specialist. Relying on patented technology, the company focused solely on the development and industrialisation of atmospheric pressure plasma surface equipment and the development of processes for different materials. By collaborating with major players in industry and research in many countries, the company has built up a strong expertise that enables it to respond to a wide range of surface treatment issues.

### What are the industrial applications of plasma surface treatment?

The 3 main uses of atmospheric plasma for surface treatment today are :

- **Surface activation :**

By increasing the surface energy of materials, plasma activation enables bonding, painting and printing operations.

It is particularly used on plastics (PP, PE, EPDM, etc.) or minerals such as metals or glass and is widely used in the automotive and packaging industries.

- **Cleaning of finishes :**

Plasma can be used to remove contamination from surfaces, resulting in perfectly clean surfaces. It is increasingly used in precision industries such as watchmaking and electronics.

- **Thin layer deposition :**

By injecting a precursor during the plasma discharge, a thin layer can be deposited on the treated material. The precursor, an organosilane for example, makes it possible to apply a layer of SiO<sub>x</sub> to slow down corrosion on metals, modify the adhesion quality of a surface or offer optical properties. This CVD deposition technique is commonly used in microelectronics.

Operating at atmospheric pressure, atmospheric plasma surface treatment technology has rapidly become the standard for surface treatments in industry because it can be easily integrated into robotised production lines, making it more economical to replace treatments that are less environmentally friendly or more dangerous to use.

**To find out more about atmospheric plasma :** <https://www.acxys.com/fr/procede-plasma/>

### The latest innovations

Surface treatment equipment operating with nozzles producing plasma jets is now commonplace in the industry, often offering a wide range of nozzles (rotary nozzles, deposition nozzles, inclined nozzles, etc.) to cover a wide range of needs.

Thanks to their technical and scientific skills, ACXYS TECHNOLOGIES has added 2 new applications to its range of equipment:

- **The treatment of composites** using a material lightening process (CPA: Composites Plasma Ablation) in partnership with the Irish company PLASMA BOUND. This patented technology is proving extremely popular in the automotive and aerospace industries.
- **Powder processing** using totally innovative equipment that can functionalise powders before they are used in 3D printing. The Luxembourg company AM4AM is already using this industrially to process aluminium powders for the aerospace industry.

Thanks to customer-driven R&D, atmospheric pressure plasma surface treatment systems will continue to revolutionise the industry in the years to come.