

Steinhagen, March 18, 2021

Plasma Instead of Chemicals – Using Openair-Plasma to reduce VOC Emissions.

Volatile organic compounds (VOC) occur when solvents and solvent-containing products are used, and they are harmful to the environment. Nevertheless, manufacturing in many industries still involves pre-treating surfaces with primers, bonding agents or other chemicals that release VOCs. With its Openair-Plasma process, Plasmamatreat GmbH offers an environmentally friendly alternative.

In addition to being environmentally harmful, high VOC concentrations also have health effects for those using the substances. There are therefore various political efforts to drive forward a reduction in VOC emissions, for example the Paris Agreement for the period 2020 – 2050, with 195 countries committing to reduce CO₂ emissions. Another example is the Chinese government's introduction, beginning in 2017, of new environmental protection rules, which in 2018 and 2019 led to new requirements for controlling VOC emissions. The goal was to reduce VOC emissions by 10% by the end of 2020. This especially affects the chemical industry, the packaging and printing industry as well as industrial sectors like electronics manufacturing or mechanical and plant engineering, and even the automotive industry. Because of this development, European and North American companies are also interested in VOC reduction solutions if they manufacture in China.

The goal is to reduce VOC emissions when using paints and varnishes in the automotive industry and in electronics manufacturing. The required bonding strength depends on surface energy and surface polarity. Often, unipolar materials with low wettability are used. In the past, solvent-based bonding agents were the only agents of choice with which to treat surfaces, for example to ensure that paint adhered properly. Frequently, however, more than 80% of the VOC-emitting substances used are found in the bonding agent. Pretreating surfaces with Openair-Plasma, on the other hand, achieves clean, highly-active surfaces with high wettability even with water. The use of solvents is therefore no longer necessary. The entire plasma process is dry and wastewater-free, meaning it is a more environmentally friendly process than the previous approach of using solvents and similar products.

“We see a trend of more and more companies choosing water-based coatings or coating materials with a high solid content to meet the requirements of the new VOC regulations. However, these do not bond as easily and therefore require a higher surface energy to ensure good wettability and bonding that is stable over the long

term. Plasma treatment can significantly increase this surface energy,” says Calvin Chen, general manager of Plasmamatreat Shanghai.

Plasma technology is based on a simple physical principle: addition of energy causes the states of matter to change; solids become liquids and liquids become gases. If additional energy is added to the gas, it ionizes and becomes plasma, the fourth state of matter. If the plasma, with its high energy level, then comes into contact with the material, the surface characteristics, such as polarity, change. This effect also has a significant effect on different adhesive processes. Whether these involve structural adhesive bonds in cars, seals in electronics or rapid, bubble-free wet labeling with high initial stability, these manufacturing processes are possible entirely without liquid chemical waste, thanks to Openair-Plasma and modern, solvent-free adhesives.

New regulations from the Chinese government stipulate that adhesives or cleaning agents containing solvents with a VOC content of greater than 10% may only be used in closed spaces. Furthermore, the fumes must be collected and treated and disposed of separately. This creates added work and manufacturing costs for companies. That is why hot-melt processes or radiation-cured, biodegradable adhesives, for example, will play an important role in the future. “We see a great opportunity here for our VOC-free PT-Bond plasma technology,” says Chen. The PT-Bond process uses Openair-Plasma technology to achieve strong bonding and adhesion of glass, metal, ceramics and plastics that remains stable over the long term, which is a particular challenge for the manufacturing industry. Surface modification using Openair-Plasma pretreatment, for example, creates higher bond strengths on the surfaces to be bonded.

Another industrial process with high VOC emissions is printing, especially on metals, as occurs in equipment and plant engineering, as well as printing on flexible packaging. To reduce VOCs, the plan is to use UV-curable inks, or water-based inks, in the future. “UV printing on metal needs plasma technology to ensure good bonding without the use of solvents. The same applies for UV printing on plastic,” explains Chen.

However, decreasing VOC emissions is important outside of China too. In December of 2016, the EU issued new regulations to significantly reduce air pollution. Volatile organic substances (VOCs) are also affected by these rules, which declare that air pollution is a global problem and note that demand for low-emission products and manufacturing processes will rise markedly. “Reducing VOC emissions concerns all countries, and industrial companies will look for new solutions in this area in order to meet the politically and socially stipulated objective. Our Openair-Plasma technology is an alternative, environmentally friendly and sustainable solution that helps achieve these goals,” explains Christian Buske, CEO at Plasmamatreat.

About Plasmamatreat

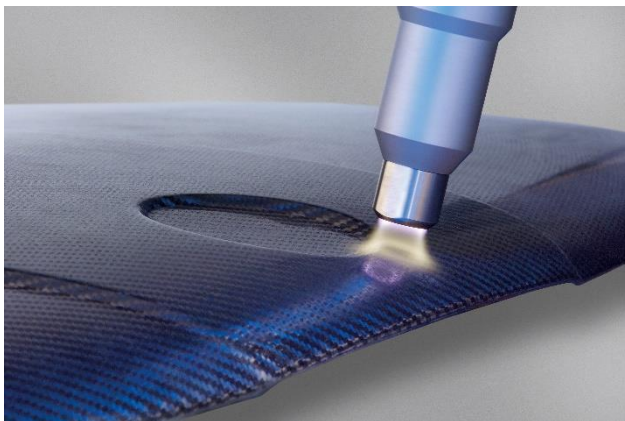
Plasmamatreat is an international leader in the development and manufacture of atmospheric plasma systems for the pretreatment of substrate surfaces. Whether plastic, metal, glass or paper - the industrial use of plasma technology modifies the properties of the surface in favor of the process requirements.

Openair-Plasma® technology is used in automated and continuous manufacturing processes in almost every industrial sector. Examples include the automotive, electronics, transportation, packaging, consumer goods and textile industry, but the technology, cost and environmental advantages of the plasma technology are used in medical technology and in the renewable energy sector as well.

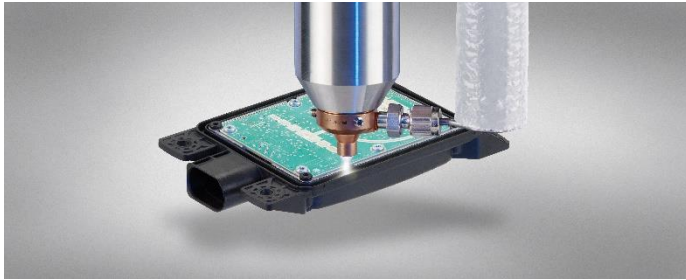
The Plasmamatreat Group has technology centers in Germany, USA, Canada, China, and Japan. With its worldwide sales and service network, the company is represented in more than 30 countries by subsidiaries and sales partners.

For more information, please visit: www.plasmamatreat.com

Image captions:



Openair-Plasma can be used in the automotive industry to optimize pretreatment processes, e.g. before painting, so that no VOC emissions are generated.



Surface pretreatment with plasma has significant effects on various processes, e.g. sealing in electronics. Thanks to Openair-Plasma and modern, solvent-free adhesives, these manufacturing processes are possible completely without wet-chemical waste.



CO₂-free_Icon:

Traditional processes for surface pretreatment can be replaced by Openair-Plasma. Surfaces can be pretreated in a more environmentally friendly and CO₂-free way with Plasmatreat's plasma systems.

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