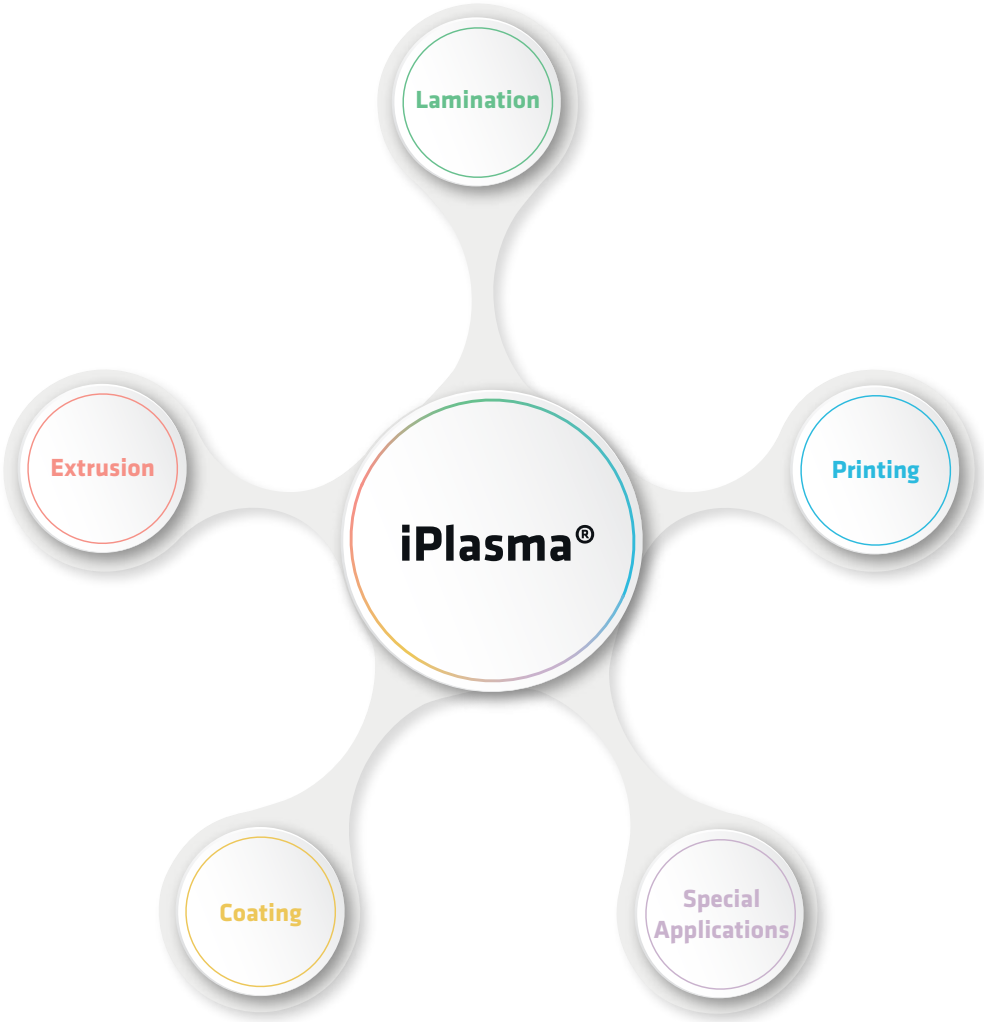
iPLASMA

VETAPHONE
Corona & Plasma

iPlasma

APPLICATIONS



Corona is still the most used and cost efficient solution for increasing surface adhesion and promoting wetting. It is used on more than 95% of all the material converted in the packaging industry today, making Corona the right solution.

Corona is a Dielectric Barrier Discharge (DBD) in air, the electric discharge being controlled by a dielectric barrier, which is in the form of streamers distributed over the surface.

The objective of polymer treatment is to increase the surface energy and therefore the wettability and adhesion for laminating, printing, and other converting processes.

The last 5% of applications have special needs. Even today, some of these are impossible to meet, or are solved in an expensive way that often involves one or more harmful components. These can contaminate the production area for the operators, and are also harmful to the environment.

However, there is a more advanced technology available - iPlasma®. Created in a controlled atmosphere, adding small quantities of dopant gas for grafting and dopant it offers different functionality, and a whole range of surface abilities.

iPlasma® is more homogeneous and 'softer' than Corona. It has lower heat impact on the surface, which enables versatile controlled and tuneable surface chemistry to be achieved. As a result, it can be considered as a gas primer that efficiently replaces both the use of Corona treatment and liquid primer.

Since the introduction of our industrial Atmospheric Plasma Systems in 2010, Vetaphone has supplied more than 60 units.

Vetaphone supplies a complete solution that can be integrated with any type of roll to roll machine. The direct benefits of this 'all-in-one' eco-efficient plasma process are: reduction of costs; lower energy consumption; and a reduced impact on the environment.

iPlasma

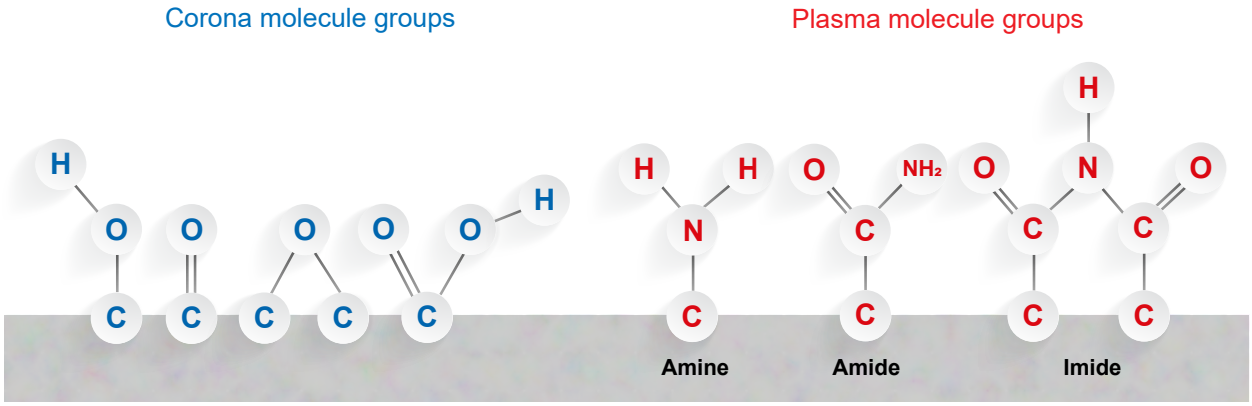
TECHNOLOGY

iPlasma Technology is based on what is called Grafting, and it shares some similarities with Corona treatment, as it is a Dielectric Barrier Discharge created in the gap between the electrode and the roller. In this gap, the molecule structure on the surface of the material breaks and forms new molecules, depending on the composition of the atmosphere present in the gap.

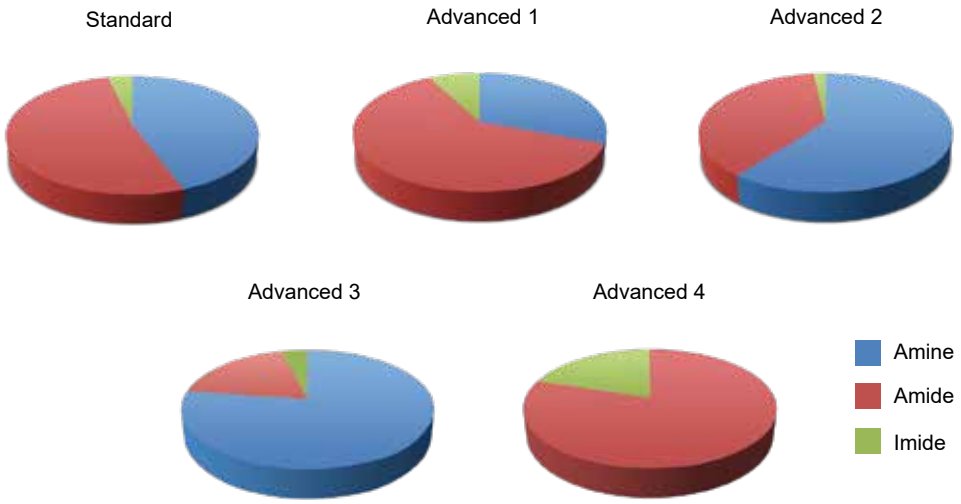
Corona treatment uses the air that is already present (ambient air), and is interesting for many materials from a chemical point of view because of the oxygen based groups (blue groups in the figure below). Where Corona uses the un-controlled atmosphere that is all around us, Grafting uses a 100% controlled nitrogen based atmosphere, which creates nitrogen based groups on the surface (red groups in the figure below).

iPlasma Grafting works with a nitrogen based atmosphere that can be mixed with other gases, known as dopants, to create other groups, or tune the quantity of the desired Amine, Amide and Imide groups. For example, higher quantities of Amine groups can be created by adding different dopants, and thereby reducing the Amide and Imide groups.

This makes it is possible to tune the chemistry on the surface, not only to achieve good adhesion, thanks to high dyne levels, but also to create chemical bonds to inks and adhesives that requires this environment. The figure below, illustrates how each of the Nitrogen molecule groups are created, depending on the composition of the nitrogen based atmosphere.

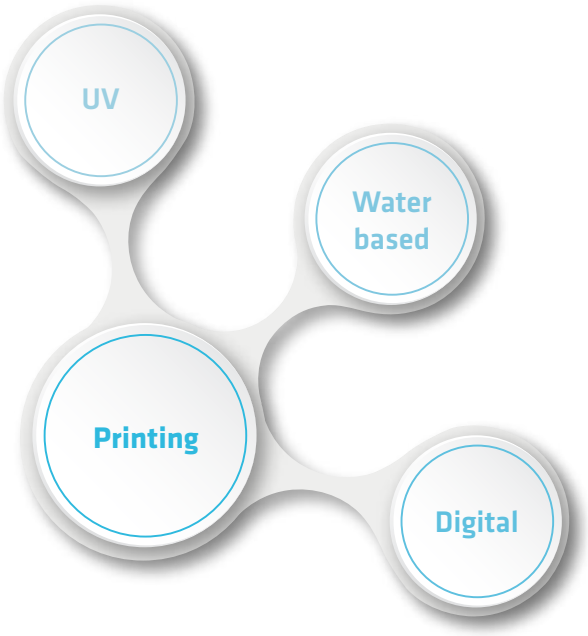


What makes iPlasma Grafting so unique, is its highly controlled and monitored atmosphere. Unlike older technologies, which have been on the market since the 1990s, iPlasma technology is fully controlled and can be used in large-scale production systems as well as lab sized equipment. We can tune the chemistry in any direction required, and some of the different and proven recipes are shown below.



iPlasma for

PRINTING



iPlasma for all Machine Types:	Speed Range	Width Range	Sides to Treat
Flexo (i.e. Comexi, W&H, Bobst Bielefeld, Soma, Uteco)	300 - 600 m/min 1000 - 2000 ft/min	600 - 1600 mm 23 - 63 in	Single and Double Sided
Rotogravure (i.e. W&H, Bobst Rotomec, Uteco, KYMC)	300 - 600 m/min 1000 - 2000 ft/min	600 -1600 mm 23 - 63 in	Single and Double Sided
Narrow Web (i.e. Nilpeter, MPS, Mark Andy, Bobst Florence, Omet)	100 - 300 m/min 330 - 1000 ft/min	600 - 1600 mm 23 - 63 in	Single and Double Sided
Digital (i.e. HP Indigo, OCÉ, Xerox, Screen, Seiko Epson)	20 - 100 m/min 65 - 330 ft/min	200 - 860 mm 7 - 34 in	Single and Double Sided
Special (i.e. Tresu, Goss, Comexi)	1 - 800 m/min 1 - 2625 ft/min	200 - 2600 mm 7 - 103 in	Single and Double Sided

iPLASMA for UV and Water Based Printing

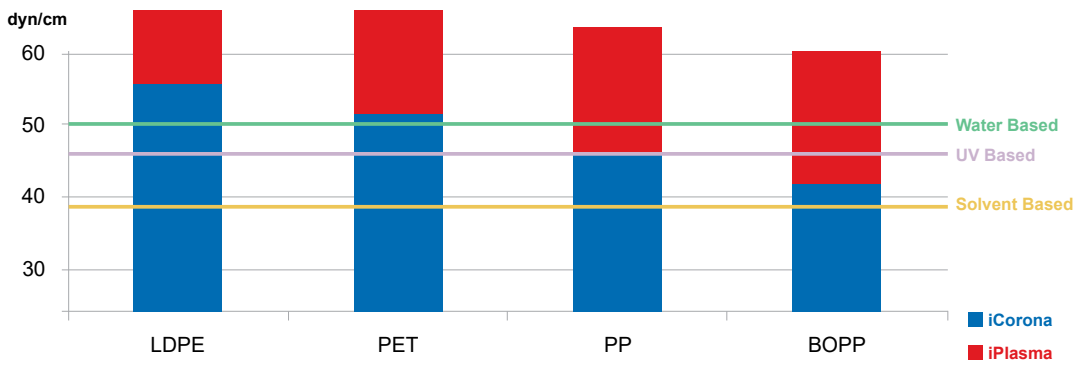
Where solvent based printing typically needs 38 or 40 dyn/cm, the surface tension requirement for UV and water based printing is typically higher, between 44 and 50 dyn/cm.

For some materials, Corona treatment can reach these targeted dyne levels, and in those cases Corona is still the most cost efficient solution. However, some materials are more difficult to treat, and cannot be successfully use Corona to reach the requisite dyne level.

Previously, the solution had been to use chemicals: either by priming the material, or changing the ink chemistry so it could adhere to the material. This is both expensive, and in most cases harmful to both the environment and the machine operators using the liquid solvent primers.

iPlasma solves these problems by changing the molecules on the surface to nitrogen-based instead of oxygen-based. The result is higher dyne levels and extremely good adhesion. Polypropylene substrates are typical of difficult to treat materials, as shown on the graph, but 60 dyn/cm can be achieved on raw untreated BOPP, a widely-used product that cannot be printed with water and UV based inks, if purchased without primer.

iPlasma is the most cost effective solution for both UV and water based printing. Tuning the exact chemistry to the specific application completely removes the need for primer, and removes problems associated with changing the components of the ink, such as the ink drying on the printing plate.



iPLASMA for Digital Printing

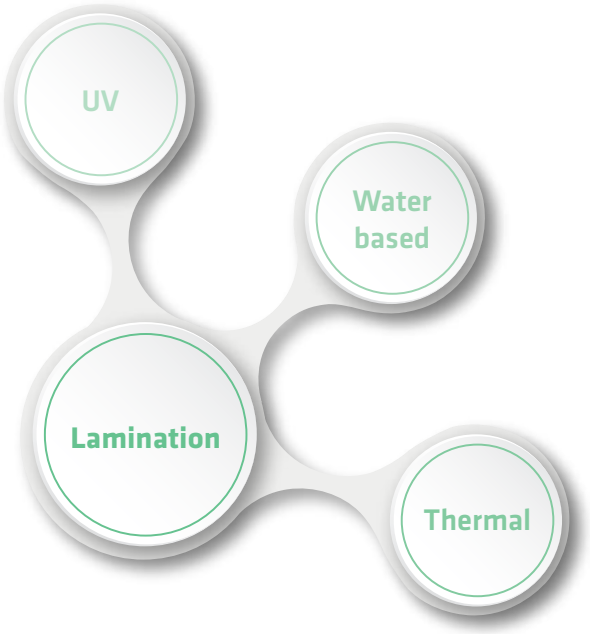
Corona is ideal for applications where oxygen-based molecule groups on the surface increase the adhesion. But the ink used for digital printing needs a chemical connection to the surface that requires different chemistry.

Today, most digital technologies require the substrate to be coated with a primer prior to printing. This is done either by buying pre-primed substrates, or, with some of the digital presses having an inline priming unit prior to the print unit.

iPlasma can replace some of these primers by creating a similar chemical composition on the surface. This works like a gas-primer, making iPlasma far more cost effective, and removing the environmentally harmful liquid primer from the production floor. The result, is a lower production cost, and an improved working environment for the operators.

iPlasma for

LAMINATION



iPlasma for all Lamination Machine Types:	Speed Range	Width Range	Sides to Treat
Lamination (i.e. Comexi, Nordmeccanica, Soma, Webcontrol)	300 - 500 m/min 330 - 1650 ft/min	600 - 1600 mm 24 - 63 in	Single and Double Sided

iPLASMA for UV and Water Based Lamination

UV

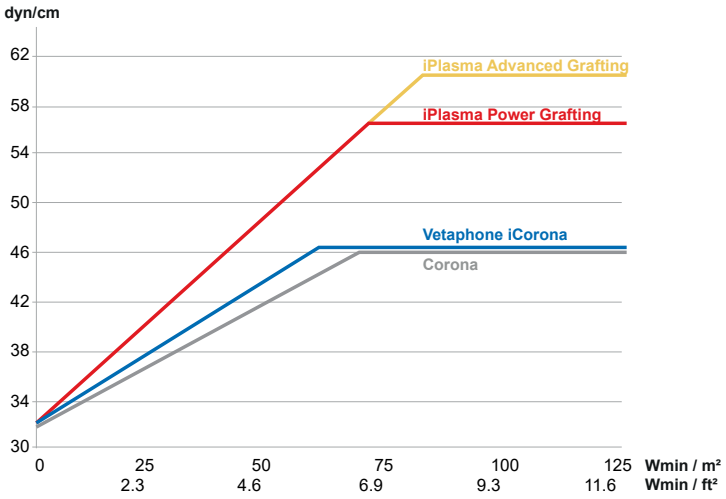
Solvent based adhesives have been commonly used in lamination for many years. In the search for alternatives, certain challenges have arisen. Where solvent based lamination typically needs lower surface energy, and benefits from the Oxygen-based chemistry, UV and water-based lamination have different demands, because they need a higher surface tension, and a different surface chemistry.

The solution has always been chemical: either by priming the material, or changing the chemistry in the adhesive so it could adhere to the material. This is expensive, and in most cases harmful to the environment and the machine operators using these solvent adhesives.

Water based

iPlasma solves these problems by changing the molecules on the surface to Nitrogen-based instead of Oxygen-based. The result is a higher dyne level and extremely good adhesion. Polypropylene substrates are typical of what are considered difficult materials to treat. But, as shown on the graph, 60 dyn/cm can be achieved on raw untreated BOPP, a widely-used product that cannot be laminated with water or UV based adhesives, if purchased without primer.

iPlasma is the most cost effective solution for UV and water-based lamination. Tuning the exact chemistry to the specific application completely removes the need for primer, and therefore removes the issues of films losing transparency, or becoming mid-coloured because of the primer.



iPLASMA for Thermal Lamination

Thermal

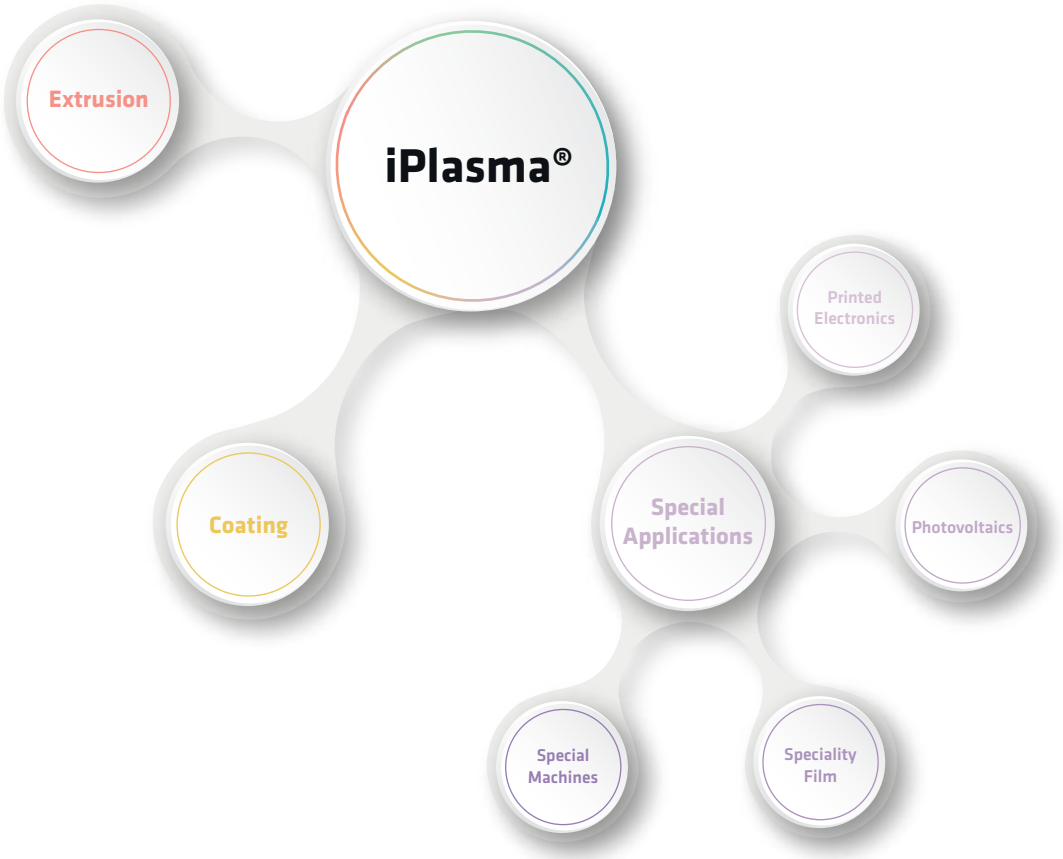
Thermal lamination is widely used with a variety of materials. Previously, the majority of applications were with paper or board, so the need for surface adhesion had less of a focus.

Today, a wide variety of special printed products using all types of print technologies, Flexo, Offset and Digital, mean that products have a large printed area. These include thick layers of ink, intense colours, and paper with a high moisture content. To laminate successfully on these printed products requires surface treatment. In many cases, Corona treatment is sufficient, but where high ink coverage combines with materials that are difficult to treat, iPlasma can be the right solution.

iPlasma treats both the film and the printed areas to very high dyne levels (72+ dyn/cm) and create specifically tuned chemistry that matches the adhesives used in the thermal lamination process.

iPlasma

APPLICATIONS



iPLASMA for Printed Electronics

The special inks used, combined with the need for adhesion to specific materials for printed electronics, requires surface properties that can be obtained only with Nitrogen-based surface chemistry.

iPlasma creates the necessary surface chemistry that meets the adhesion requirements of the special inks and materials. Where iPlasma excels, is its industrially proven low running cost, which enables the lowest price per square metre.

iPLASMA for Photovoltaics

Solar panels need the print material to be transparent so the photovoltaics can work at maximum efficiency. But, using a primer significantly lowers this transparency.

iPlasma removes the need for the primer, and enables direct printing on the material.

iPLASMA for Speciality Film

Pioneering technology is not limited to the applications that are already on the market. iPlasma can be the solution for future uses of speciality films. There is no need to be limited by the chemical means of solving adhesion problems that are offered by the ink and adhesive manufacturers. If a special ink or adhesive is needed, it is likely that a more standard and cheaper alternative, if paired iPlasma can offer a cheaper and better product.

iPlasma has already created new products that were impossible to produce using conventional solutions.

iPLASMA for Special Machines

iPlasma can be mounted on any type of machine that can accommodate a Corona treater. It is not limited to lab sized machines, as is often believed.

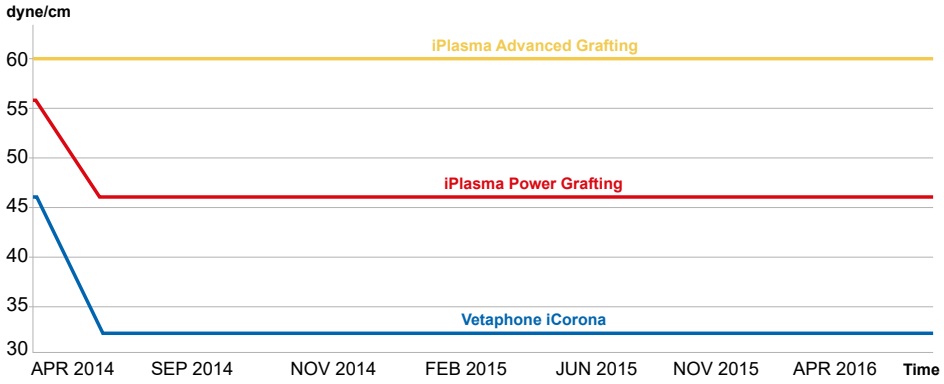
iPlasma equipment comes in all shapes and sizes, from narrow web printing lines to slitter rewinders, catering for both online and offline processes. This allows one iPlasma installation to feed several offline machines running at high speed.

iPLASMA for Extrusion

Extended shelf-life for substrates has long been demanded in the converting industry. Typically, it is recommended that materials are processed within six months of purchase. But this creates additional expense because of the the logistic demands of internal handling, and the risk of having to scrap a large volume of substrate.

Corona is the preferred method of preparing freshly extruded plastic film for converting. However, regardless of how high the treatment dosage [W·min/m2] applied to the material, it always deteriorates over time. The amount of deterioration depends on several factors, including material type and the additives in contains, and can be measured from minutes, to weeks, or even months.

iPlasma overcomes this problem, because materials can be treated to a high and lasting dyne level that is guaranteed for 12, 18, or 24 months.



iPlasma for all Extrusion Machine Types:	Speed Range	Width Range
Brown Film (i.e. Reifenhäuser, W&H, Macci, Davis Standard)	20 - 150 m/min 65 - 500 ft/min	500 - 3000 mm 20 - 118 in
Cast (i.e. Reifenhäuser, W&H, SML, Davis Standard)	50 - 500 m/min 165 - 1650 ft/min	2000 - 6000 mm 78 - 236 in
Stratch (BOPP) (i.e. Brückner)	225 - 600 m/min 750 - 2000 ft/min	4000 - 10 400 mm 157 - 410 in

iPLASMA for Coating

'Coating' is a generic term used for many different types of coatings and primers and for several different types of applications. These include coating the material in preparation for other converting processes, or coating as the final finish, after other converting processes have been completed. All coatings share common drawbacks: they are expensive to apply and require an intensive drying process. These create high production costs, and the long web path through the machine results in a large amount of waste at every job change.

iPlasma offers alternative solutions to each of these. It can work as a gas primer, to prepare the surface for subsequent converting processes, or make the actual coatings on its own - or any variation these. The benefits of IPlasma include thinner coatings, a thinner final product, excellent wettability, gas-priming of all polymer materials, lower running costs, and instant drying of the coating, which results in less waste.

iPlasma for all Coating Machine Types:	Speed Range	Width Range
Coating Lines (i.e. Kroenert)	300 - 1000 m/min 1000 - 3300 ft/min	600 - 1600 mm 23 - 63 in
Narrow Web Post Converting Lines (i.e. AB Graphics, Grafisk Maskinfabrik)	100 - 300 m/min 330 - 1000 ft/min	250 - 860 mm 9 - 34 in

iPlasma

EQUIPMENT

Oxygen measurement

To ensure the controlled atmosphere in the iPlasma processes, our Oxygen measurement devices are of the highest quality in the industry. This means they are able to measure the strict demands for PPM level.

Electrode System

Special designed Quick Change electrode cartridges secure a unique uniform dispatch of gases even at a ultra-low gas consumption. The Quick Change iPlasma systems are constructed with optimum parallel discharge points, with perfect alignment, and can be supplied with metal electrodes or ceramic electrodes.

Mixed Gas

Proof of Concept

Before deciding to invest in an iPlasma system, proof of the concept is the first step to ensure the best result. For this purpose, we have a test facility which contains two completely new installed test lines for iPlasma surface treatment.

The equipment is capable of running production speeds up to 300 m/min with a working width of 1200 mm. The expert team of qualified engineers have advanced tools for analysis and control of surfaces like contact angle, surface energy measurements, specific O_2 and H_2O permeation tests, and tests for adhesion and release.

Furthermore we have a close partnership for advanced surface analyses (ATR-FTIR, AFM, XPS, Tof-SIMS, etc.)

We have years of experience in test treatments and achieving excellent results based on our customers' needs. The process can be done with or without an NDA, depending on customer's wishes. Please contact your local representative or the Vetaphone sales team to order a complete test.

Gas Mixer Control

The important gas mixing flow control is controlled and tested specifically in order to secure the exact properties on the film. Interfacing the generator system enables complete production control.

Touch Control Panel

Our user friendly 10” LCD Touch control panel provides a graphical overview of the entire iPlasma system. The intuitive display offers a large variety of automatic intelligent controls such as Substrate Matching, Gas Mixer Control, Production Log, Proportional Control, Maintenance Schedules and Digital Documentation.

Verified Materials

The lists below are the materials, where we have already tested and verified that the different iPlasma Technologies work. If your material is not in the list, it is still very likely that it can be treated successfully with iPlasma.

iPlasma Grafting has been successfully performed on the following materials: PET, PP, BOPP, PE, PA, PVC, PVDC, Printed Polymers, Fluorinated Polymers (PVF, PVDF, ECTFE, ETFE, FEP and PTFE).

Satisfied Customers

WORLD WIDE

“We have been really satisfied with the entire project. There was no hesitation signing an NDA, so we could get the project started. It was nice to finally work with a company that listened to our needs and made a solution for us.

The quick change system enables us to run with two different types of iPlasma and at the same time normal Corona. The low consumption of gas is without a doubt the lowest we have been offered in the entire industry.

The iPlasma solution has helped with our company’s Green Profile. We have now replaced an environmental unfriendly process with iPlasma. Not only are we saving a lot of money on our running costs, but even better, we have reduced our impact on the environment.”

Explains Christopher Lloyd, NDA signed company.

Read other customer statements on our website.