

FLAME

CORONA
& PLASMA

Which Surface Treating Technology is Best for my Application?

Corona, Plasma or Flame? Surface treating in the converting industry is used to improve the adhesion of engineered films and foils that would otherwise be unreceptive to bonding with inks, coatings, and adhesives. As the only industry supplier who manufactures corona, plasma and flame treatment technologies, Enercon Industries Corporation offers unique insights on how these technologies compare.



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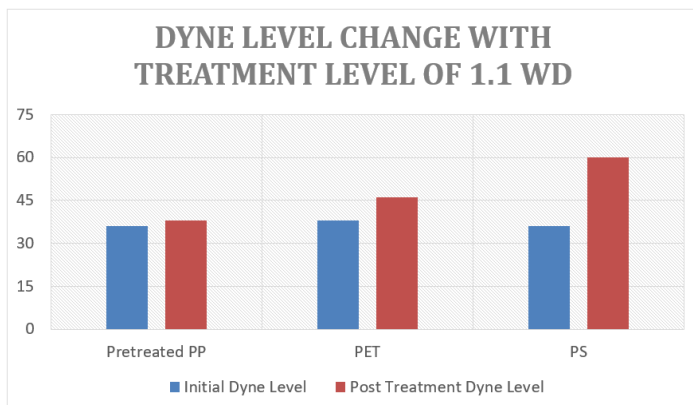
Enercon's VP of Application Engineering, Tom Gilbertson, cites Enercon's pioneering innovation in each of these areas for pushing the capabilities of each technology from a performance, efficiency and economic standpoint. "What we've found over decades of engineering equipment is that understanding the application and converter's objectives will lead you to the right technology. And it's important to note that within a technology category, such as corona or plasma, there are many design considerations which can make or break an application."

"The key is defining the application properly so all components designed into the system add value. This is how Enercon partners with customers to minimize our customers' total cost of ownership," says Enercon's VP Engineering Mario Leonardelli.

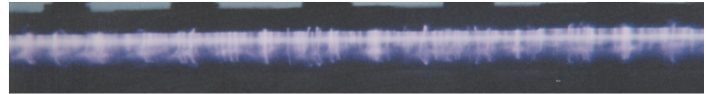
Corona Treaters

Corona treating is the most common technology used by converters and for good reason. It offers the most economical form of treatment and is effective on almost all types of substrates. In fact, the general rule of thumb is: If corona can get the job done, you should use it.

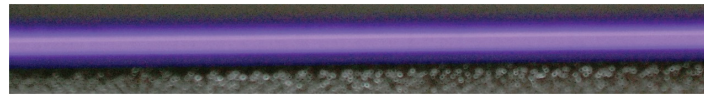
The amount of corona treating needed, often measured in watt density, is dependent on several application variables including material, additives, film width, area of film to be treated, line speed and the goal of treatment. Inherently, materials respond differently to the same level of treatment (Table 1). So, a treater manufacturer's experience becomes very important in specifying the right solution for the application.



What converters should recognize is that corona treaters and the corona they produce is not created equal. If you look at corona generated by a metal electrode and silicone covered ground roll, you will see a very filamentary discharge (Image 1). For many applications, this is perfectly fine and does not produce a functional difference, but for some it will. The filaments in the discharge can damage some films and produce inconsistent treatment. It should be noted that metal electrodes cannot be used when treating metallized film and foils.



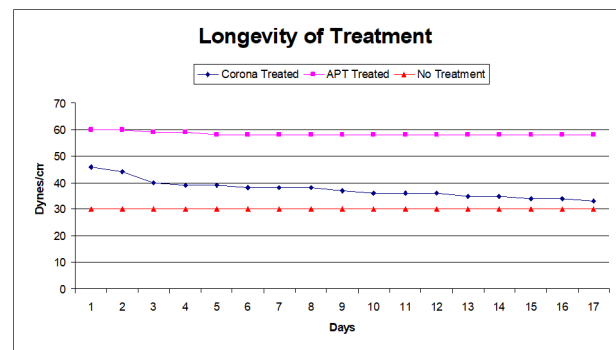
A ceramic electrode produces a less filamentary discharge. Enercon has pioneered the development of High Definition corona, which optimizes the corona discharge with high-powered ceramic electrodes and a special ground roll covering. As you can see (Image 2,) the corona produced by this design is uniform. This technology is recognized for its ability to consistently treat at high levels while minimizing chances of pinholing, film wrinkling and backside treatment.



Plasma Treaters

For materials that are unresponsive to corona treating, atmospheric plasma treating is often considered. Like corona, plasma is the electrical ionization of a gas. However, it is produced at much lower voltage levels and temperatures. Plasma treaters create a glow discharge with a smooth, undifferentiated cloud of ionized gas and no visible electrical filaments.

Plasma treating provides high and long lasting treatment levels by ionizing gases to impart functionality on surfaces. Plasma treaters are used for applications where other treatment methods are incapable of producing the desired results. In Table 2, you can see how plasma treatment outperforms corona



treatment on a polymeric film in terms of higher and longer lasting treatment levels.

These systems carry a higher initial cost than corona treaters due to their unique electrode designs and advanced gas control capabilities. They are also more expensive to operate with consumable costs of the gases used to create the plasma.

As a pioneering innovator of plasma technology, Enercon has earned patents for its groundbreaking designs and are responsible for bringing the most advanced atmospheric plasma designs on the market today. The company’s engineers are noted for breaking barriers for atmospheric plasma treating line speed and minimizing gas consumption for economical operation.

Flame Surface Treaters

Flame surface treaters are the least commonly used on converting lines, but nonetheless are very useful for certain high speed applications. They are used on many paperboard applications and can also be effective at treating aluminum. Enercon’s intense flame chemistry burns off fibers on paperboard prior to extrusion coating applications. For certain grades of aluminum, flame can be used to remove oils from the substrate. For these applications, it’s critical to specify the right ground roll diameter and treatment levels to minimize any wrinkling. Key to repeatability with flame treatment is ensuring your supplier offers an advanced combustion control design and high velocity drilled port burner.

How to Know Which Tech is Best Before Investing in Your Next Treater

If you are working with a new material or application, the best way to put your application to the test is to run a laboratory trial. In Enercon’s lab, converters have access to each type of surface treating technology for an unbiased comparison of results which can support their decision to invest in the technology and equipment design that will optimize their results.

If you need assistance in this area, please contact Enercon Industries. Learn more at www.enerconind.com/web-treating.

Overview of Technology Applications

APPLICATION	TECHNOLOGY
Converting	<ul style="list-style-type: none"> • Corona is used with ceramic electrodes & bare or universal rolls • Flame is used for high speed foil converting and metallization • Extrusion coating and laminating rely on ozone generation, flame, corona or a combination of all three • Plasma is used for difficult-to-treat and engineered material applications
Extruding	<ul style="list-style-type: none"> • Corona is used for most standard width applications along with covered rolls for either fixed width or segmented electrodes for lane treating • For high speed or ultra-wide BOPP, PET, OPP, PE and co-extruded film applications flame, corona or a combination of both treatments are generally used • Plasma is used for difficult-to-treat and esoteric applications
Paperboard/PE coated paperboard	<ul style="list-style-type: none"> • Flame is used to raise surface energy and burn off unwanted fibers
Difficult-to-treat (and surface functionalization)	<ul style="list-style-type: none"> • Plasma is used for engineered films, papers, foams, nonwovens, wovens, fibers, metals & powders. In addition to being able to raise the surface energy, this technology also functionalizes surfaces.