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# Contents

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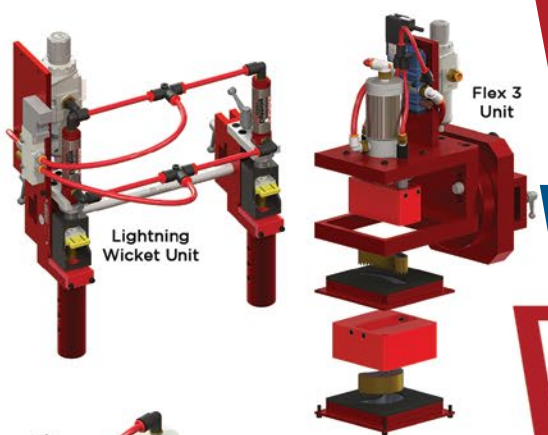


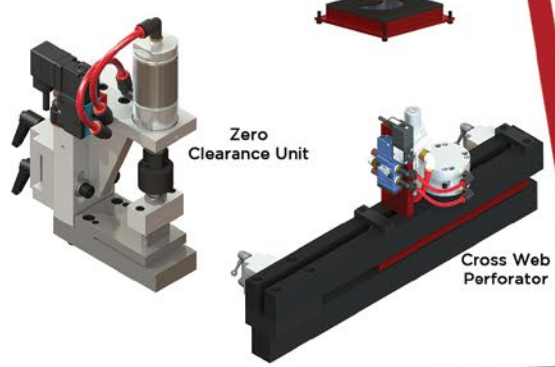


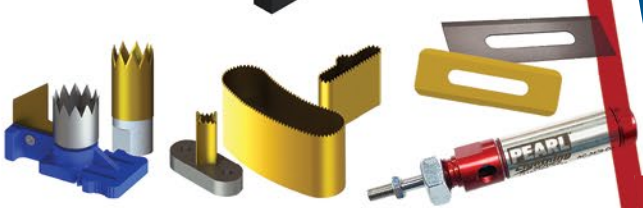


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STATIC SOLUTIONS ROUNDTABLE

# A Collaborative PFFC Q&A

## *The Evolution of Static Control Technologies*

Hosted by Kelly Robinson

PFFC *is most fortunate to have representatives from three leading static control companies share their thoughts and perspectives:*

- *Terrance Clark, Sales Manager, TAKK Industries*
- *Catesha Early, Application Engineer, Simco-Ion*
- *Matt Fyffe, VP/General Manager, Meech International*

*Powered static neutralizers have been available at least since 1904 when William Chapman patented a "Method of Removing Static Electricity from Papers, Yarn, & c" (US Patent 777,598, 12/13/1904). Since then, static control technology has evolved greatly and highly effective dissipaters are now commercially available. Static control technologies continue to evolve to meet customer demands and new technical challenges. Following are our expert's thoughts and perspectives.*

**Over the last few years, have you noticed any changes in the needs or demands for static control? If so, what are the trends?**

**Clark:** There have been significant changes in the needs and demands for static electricity controls. These changes can be attributed to various factors, such as the use of evolving machinery technologies, use of advanced substrates, composites, thin films and an increasing awareness of the risks associated with static electricity.

Businesses in converting, printing, packaging industries are looking for static control technologies that can be easily and economically integrated into their existing machinery while ensuring effective, reliable static control no matter the substrate, static level, distance from or speed of the process.

Further, there are also growing concerns over workplace safety including increased awareness of the hazards associated with static electricity, including fires, explosions, personal injury or discomfort from static shocks.

Several leading-edge static control solutions with "Adaptive Intelligence" for long-range and high-speed static control have been recently introduced. This technology offers the converting industry exceptional static elimination capabilities by sensing the level of static charge and, in turn, providing the appropriate level of static elimination power to neutralize the troublesome static charge.

The demand for static control solutions continues to be driven by the challenges businesses face from the detrimental impacts of

Terrance Clark, Sales Manager, TAKK Industries

Catesha Early, Application Engineer, Simco-Ion


Matt Fyffe, VP/General Manager, Meech International

uncontrolled static electricity in terms of safety issues, product waste and stopped or slowed production resulting in loss of profit.

**Fyffe:** The most important trend in static control lately is the desire to remove human error and interaction from their static control solutions. They just want to "plug it and leave it."

a) **Feedback Controls** — Customers like that newer technologies allow users to monitor, control and adjust performance of the static control devices via a full closed loop system.
b) **PLC Integration** — These systems are designed to harness Industry 4.0 to provide optimal ionization. This is achieved by the use of real time monitoring, data logging, and automatic adjustments through the PLC.
c) **Maintenance** — Newer ionizing bars let operators or maintenance personnel know when bars need to be cleaned, removing the need to have them on a regular Preventative Maintenance which saves time and money.

**To deal with the production challenges associated with new sustainable products, static control systems continue to evolve, allowing for more precise charge control as well as an expansion of intelligence and communication.**

**Early:** A long-term trend has been the change in attitude about operator shocks and production problems caused by static. Today, it's very rare to find any size company that tolerates operator shocks or known production problems associated with high static charges. Once it became possible to know how well a static control device was working, the predicative element, which can then warn operators of high charges associated with operator shocks, brush discharges and line slowdowns became very important to meet customer safety and quality objectives. Thus, we have seen the demand for intelligent, consistent and reliable static control devices has steadily increased.

**Looking ahead for the next few years, what static control changes or demands do you anticipate?**

**Fyffe:** I fully expect static control devices will continue to move further away from old AC Ionizing Systems using an external high voltage power supply. The newer Pulsed DC systems have integrated power supplies and run on 24v. In most cases they are much more powerful, reliable and cost effective.

**Early:** I expect the shift to sustainability by converters will produce products with new static control challenges. I expect demand for the longer-lived active static devices to increase, and demand for passive eliminators, which are usually destined for the landfill after a few months service, to decline. Additionally, to deal with the production challenges associated with new sustainable products, static control systems continue to evolve, allowing for more precise charge control as well as an expansion of intelligence and communication capabilities.

**In your experience, do your customers usually identify a "point**

**person" to handle static control issues? Do you think that this is an effective strategy?**

**Fyffe:** Having a "point person" is always a good idea. However, it is not really a common practice as there are multiple people in the facility that deal with the static control issues in question. They often work in different departments and have their own issues that they oversee.

However, I have seen a trend towards some of the larger multi-location facilities designating a person or team to create static control "Best Practices" throughout all the facilities. These teams already have experience in static control but then take a concentrated "deep dive" into the process and possible solutions. They are very methodical in their approach and very analytical in the solution and final analysis. They will then roll out the same proven solution across all the facilities.

**Do you suggest that customers conduct annual "Static Awareness Training?" If so, what topics do you recommend that they cover?**

**Early:** Safety of plant personnel is a top priority so effective operation of the static neutralizing system is key. This is typically conducted by the manufacturer of static control equipment. A few of the topics covered in our awareness training include:

a) Provide an overview of static electricity and how it is generated;
b) Cover various strategies to mitigate static; and,
c) Define best practices for choosing strategic positions for active neutralizers.

**I have seen a trend towards some of the larger multi-location facilities designating a person or team to create static control "Best Practices" throughout all the facilities.**

**Do you suggest ways for customers to track static performance in their operations? If so, in general, what instruments and procedures do you recommend?**

**Clark:** Yes, the use of a handheld static field meter is a valuable tool that can be used to detect static electricity in paper, film and foil converting operations. These meters, also known as electrostatic field meters, measure the electrostatic charge on a material or surface. For example, the electrostatic fieldmeters will read positive and negative charges.

In paper, film and foil converting operations, handheld field meters can be useful in identifying areas where static charges are causing issues such as defects in the final product or difficulty in handling the material. By using a handheld field meter, operators can quickly detect and quantify static charges, allowing them to make informed decisions on how to control or eliminate them.

In addition to determining location of the static controls, a handheld static meter can help determine the performance of static controls once they are installed or determine whether a particular piece of static control equipment is not working well or has failed and needs to be replaced.

Overall, handheld field meters are a useful tool for detecting static electricity in paper, film and foil converting operations. When used correctly, they can help operators identify problem areas and take appropriate action to prevent static charges from causing issues.

**Fyffe:** As mentioned, the newer technologies offer full closed loop performance. Sensors will read the residual charge on the web following an ionizing bar. The system will then automatically adjust the output of the ionizing bar to neutralize that charge.

This can then be taken a bit further by allowing the customer to output results via data logging. Logs can be passed on to a customer to prove the product was static-free at production time or used for internal controls. These systems are also PLC compatible.

**Early:** There are a few instruments used to perform static checks to verify the neutralizing

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system is performing effectively. These include an electrostatic fieldmeter, electrostatic voltmeter and fixed field mounted sensor. Both the handheld fieldmeter and fixed field mounted sensor detect and measure the electric field. This electrostatic field measurement is then converted to a voltage and displayed.

Use of permanently mounted sensors provides a live picture as to the charges present on the target and the effectiveness of the neutralizing system 24/7. With advancements in smart manufacturing, data is a key component to minimize downtime. This data can be fed back to a PLC which offers additional flexibility for data management. Alarms based on user-defined thresholds can trigger changes in manufacturing processes or a line shutdown if an issue is detected which could impact safety of personnel, quality of product, etc.

*In summary, our experts see recent trends in static control driven by:*

- *Workplace safety;*
- *Increasing awareness of static risks;*
- *Reliable performance; and,*
- *Ease of use with integrated performance monitoring.*

*Tracking static performance is highly recommended and commonplace. We expect to see more static control devices interfaced with machine control systems in the next few years.*

*Once again, we thank our panelist for sharing their wisdom and insights.* ■

## FOR FURTHER INFORMATION

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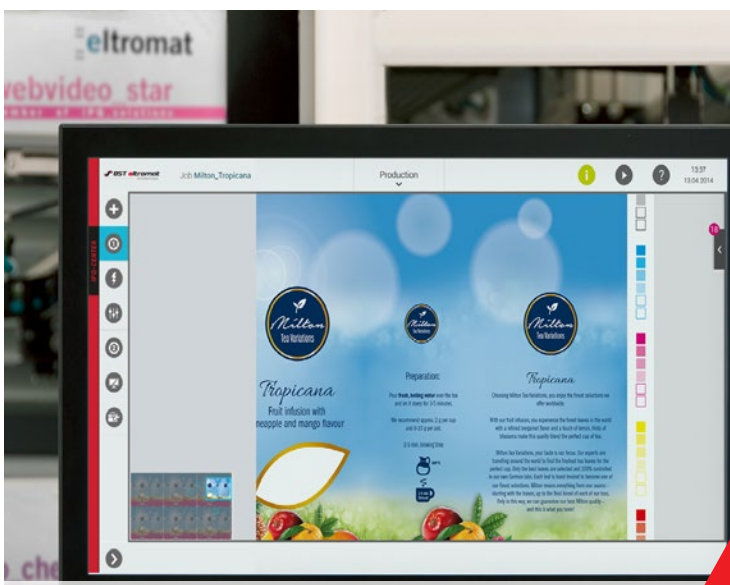


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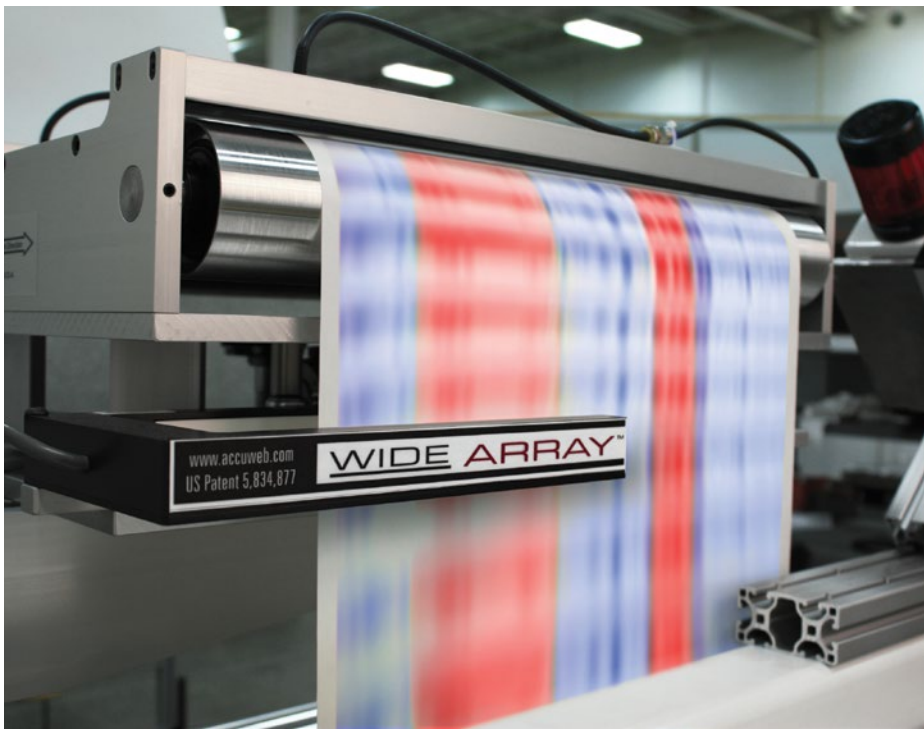


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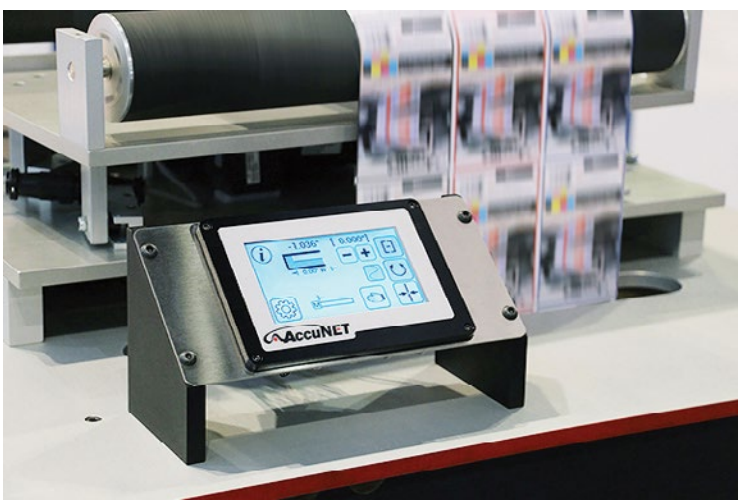


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# Improve Quality by Corona Treating Films Prior to Converting

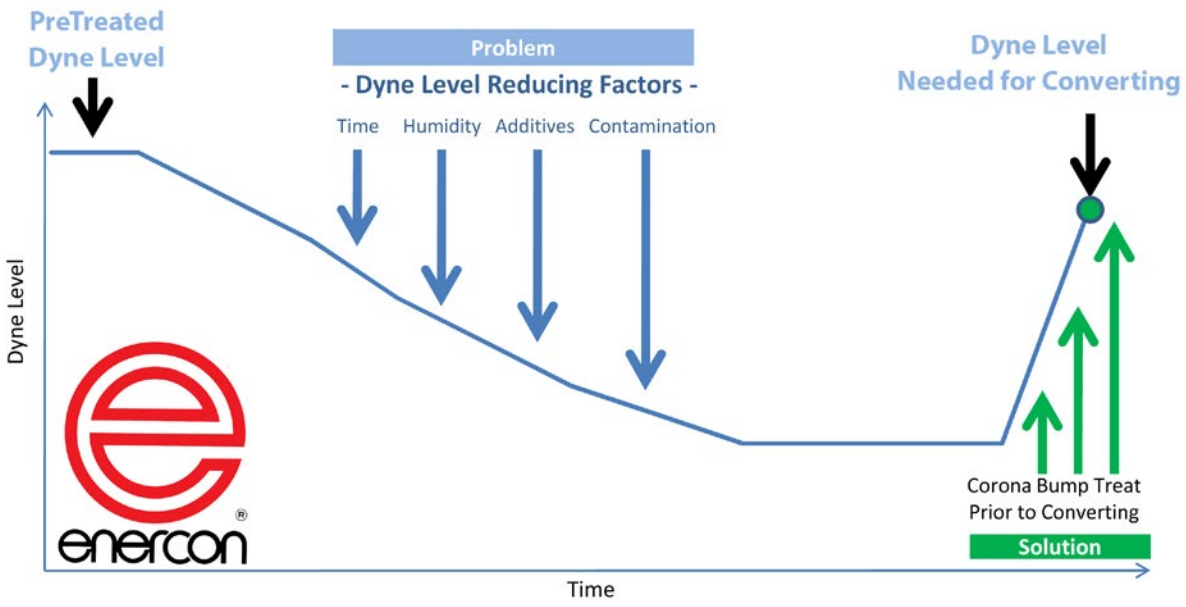
The terms "bump-treating", "re-treat", or "refresh treat" refer to treating a film in-line prior to converting. You might wonder why converters need to do this if they purchase pretreated films from film extruders. This secondary treatment is needed because the effects of corona treatment decay over time. It is an industry best practice to treat films at the time of extrusion and again before converting.

## Surface Energy & Dyne Decay

The purpose of surface treatment is to improve wettability and increase surface energy to enable adhesion with inks, coatings and laminations. The increase in a film's surface energy is not permanent. Surface energy decays over time and the rate of decay depends on a variety of factors including the film's inherent ability to retain surface energy, storage environment, and additives. Additives are used to make the film easier to handle during the converting process. However, when they migrate to a film's surface they create a barrier to successful adhesion.

## What happens if you don't retreat

If you print, coat or laminate a film with a low surface energy you're likely to see poor results. You may experience failed adhesion that will literally stop the press. You may see imperfections that your quality control team will catch before you ship the product. Worse yet, your customer may be the first to recognize something is not right with your product.




## What Industry Experts Say about Bump Treating

An instructor from a flexographic printing program says, "Films are pretreated, but they're not guaranteed to be perfect when it comes time to print. Treatment degrades over time so that's one issue you have to contend with. And, even if the film makes the grade on a dyne test you still have the possibility of additives rising to the surface. These surface imperfections can result in pinholing and other quality issues. A corona treater can help eliminate these problems."

A Director of Engineering from a company that offers custom coating sees other benefits to bump treating, "There's something to be said for a fresh treat. Dyne level does not always guarantee adhesion. Dyne level is simply a measurement of wetting-out. We've seen materials with equal dyne levels, one freshly treated and one from inventory and the freshly treated material consistently provides the better adhesion."

Surface treatment is often associated with water-based applications, however solvent applications also benefit from bump treating solvent processes as well. One solvent printing Operations Manager recently told us, "There's no doubt that our lines with corona treaters have less delays and downtime. The treaters provide a safety net that assures surface dyne levels are optimal for printing."

## Take control of you operation

By following the industry best practice of treating in-line prior to printing, coating or laminating converters can eliminate surface energy as a process variable. With a corona treater your operating window for success greatly expands.

Which corona treater design will work best for your application? Most converters choose Enercon's High Definition™ corona generated by high powered ceramic electrodes and a proprietary ground roll covering that is effective at treating both conductive and nonconductive films. Enercon's New Compak™ Pro corona treater power supplies are also making it easier for operations. Simple to use touch screen interfaces provide smart features that help operators set up, control and troubleshoot corona treating operations for reliable results.

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Corona discharge on film web roller.

# Corona Treatment for Extrusion Coating and Laminating Production Lines

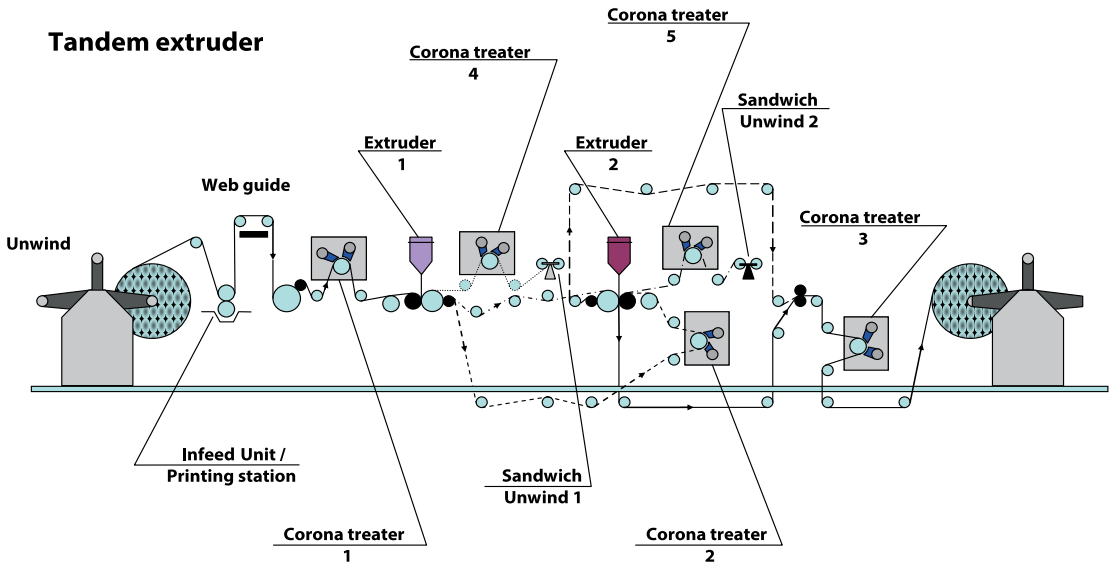
By **Dr. Frank Förster**, Leader of Process Development and Atmospheric Plasma Technology, SOFTAL Corona & Plasma GmbH

Plastic and paper processing companies — especially those converting web materials — are confronted every day with the problems of improving adhesion, quality and increasing the economic efficiency of processing machines. This article illustrates the technology behind corona treatment equipment, how it operates and how it can be applied to the production processes in these companies.

High-frequency corona treatment is widely accepted for improving the adhesion of printing ink, lacquer, glue, coatings on plastic film, paper and metal foil. The controllability and easy handling of corona treatment enable highly reliable and consistent results garnering its success. Over time, the techniques and the effectiveness of the process have been improved to keep pace with the developments of the production machines.

A typical corona treating system consists of a high-voltage electrode and a ground counter electrode. The counter electrode is usually a roller that also guides the treated web. As soon as the applied high voltage reaches the breakdown value in air, an electric discharge between the electrodes occurs. Dielectric coatings on the high-voltage electrode and/or the counter electrode keep the discharge smooth and uniform and avoid transformation into a thermal arc.

The corona treatment effect is based on bombarding the surface of the material with electrons. These leave the electrode and are accelerated under high tension towards the passing material. Subsequently, the electrons collide with air molecules which transmit light and react in part to generate ozone and nitrogen oxide. When the electrons come into contact with polyethylene for instance, they have so much energy that they can break the bond between carbon-hydrogen and carbon-carbon molecules. Reactions with the corona take place at these free radicals, creating




Corona station for extrusion coating and lamination.

oxidation. The functional groups formed are polar and provide the basis for adhesion of applied printing inks, lacquers, etc.

In practice, the surface of aluminum foil, even when annealed, is not free from organic residue. By intensive corona treatment these substances will continue to oxidize and cross-link so that adhesion becomes more certain. The corona "equalizes" the aluminum surface in the machine and transverse directions, and helps to reduce wastage in the case of unevenly annealed foil.

In the case of paper, chemically non-polar fillers and lignin are oxidized by corona treatment. The main component of paper, the cellulose, is hydrophilic due to hydroxyl groups in the aliphatic ring.

Corona generators are used to supply the treating system with high voltage at a frequency between 15-40 kHz. Modern corona generators use a modular design to overcome the limitation of the maximum power per generator or electrode, while significantly increasing the reliability of the system. Characteristic for the generator are several inverter modules connected in parallel, which increases the maximum power of a generator up to 144 kW and so more than doubles power value compared to the standard generators in the market.

Modular generators ensure simple and fast changeover to minimize downtime in the event of failure. Production can even continue with a faulty generator by disabling it at the expense of reduce output power. Dosage can be programmed into the generator which will then automatically set the output power proportionally to the line speed for optimal treatment. With multiple modular generators, power levels can effectively treat very wide and high-speed lines.

The width of web and the speed are a linear function of the power rating — the unit of measurement for specific energy. The formula mentioned below contains the necessary parameters such as generator output P (watts), processing width Treating Width TW (m) and machine speed v (m/min). There the corona dosage D is defined as follows:

$$D = \frac{P}{TW \times v}$$

In extrusion coating and laminating, base materials are such as paper, cardboard, aluminum foil and plastic film. These are laminated together using plastic melt, or are coated with plastic melt. All materials of the laminate must be corona treated in-line before coating or laminating to achieve an acceptable degree of laminating strength. In this case, the corona treater is installed as close as possible to the laminator prior to the anchor coating unit.

The processing of materials will depend on the material type and demand of bond strength. In the example case of an LDPE coating, corona treatment is used to improve the bond strength without the need for an anchor coating, thus reducing cost. It may also be necessary to treat the plastic coating, usually LDPE, for

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The unique design of the IQ Easy Sensor bar allows for various configurations, and placement locations, giving you the ability to position sensors along the web path or in critical areas to receive a complete understanding of electrostatic charges unique to your application. The IQ Easy Sensor incorporates digital technology, offering superior speed and signal transmissions that are impervious to noise.

Used in conjunction with the IQ Power Control Station, the IQ Easy sensor monitors static charges on the web, with user-adjustable fault and warning alarms when static chargers are too high or too low. The Control Station also allows for closed-loop feedback adjustments. Closed-loop Feedback (CLFB) mode allows the Sensor to directly control output of the neutralizer. CLFB mode offers the most precise static neutralization.

The need for quality static control and monitoring the static environment has become more and more critical. As the converting industry continues to require cleaner and higher-quality output, a smarter static neutralization system is key to success. As the worldwide leader in static control, Simco-Ion's application experts offer individualized static solutions to meet the needs of todays' converting industry.

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further processing. This will determine the type of cooling cylinder used on the laminator based on the power rating.

The key features of the corona treater for extrusion and lamination are:

- Dielectric barrier ceramic electrode and dielectric ceramic coated backing roller prevent perforation of paper. The edges of paper and aluminum foil have high mechanical impact at high web tension/web speed (600 m/min) and so ceramic coating is necessary on backing roller.
- High-voltage ceramic electrodes are cooled and ozone generated in corona discharge is removed via ambient air exhaustion of the electrode housing. In case of paper with its rough surface, where ozone adheres, extra exhaustion is necessary for ozone removal.
- A homogenous surface tension can only be achieved by a speed regulated power control of the generator in order to ensure the same effect at different speeds.
- For extrusion coating/lamination the corona dosage is in the range of 25 to 35 Wmin/m$^2$.

Corona treatment is fundamental to the processing of film materials and vital for good lamination. As demands upon packaging, materials and processing become more complex, it is important to rely upon industry experts to ensure optimum product quality and performance. ■

## ABOUT THE AUTHOR

Frank Förster has been at SOFTAL Corona & Plasma GmbH since 1993. He holds a doctorate in Physics from Clausthal University of Technology in Germany. SOFTAL manufactures corona and plasma-based surface treatment systems for foil, film, paper and web material surfaces for numerous industries. SOFTAL Corona & Plasma is represented in North America by 3DT LLC in Germantown, Wisconsin. 3DT also manufactures a broad range of surface treatment systems, all customizable for unique applications.


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- CORONA SYSTEMS FROM 10 INCHES TO 10 METERS
- HIGH-PERFORMING MACHINERY WITH STATE-OF-THE-ART TECHNOLOGY
- CUSTOMER-CENTERED DESIGN & ENGINEERING
- 60+ YEARS IN THE MANUFACTURE OF QUALITY SURFACE TREATMENT SYSTEMS

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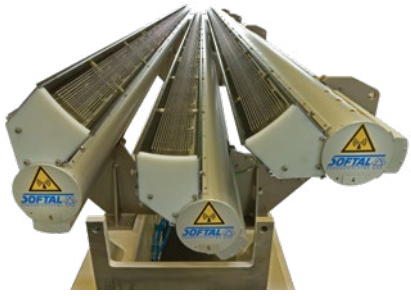


## Let's discuss your adhesion challenges!

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# Converting Solutions
## that get you results

Boost productivity, cut waste, reduce downtime, improve output quality: Catbridge delivers



CATBRIDGE

Catbridge Machinery | 973.808.0029 | www.catbridge.com | sales@catbridge.com

# Leading Manufacturer of Converting Machinery

Catbridge Machinery designs and manufactures innovative, high-performance converting machinery for a wide range of industries including flexible packaging, film, paper, adhesives, nonwovens and building products. In addition to a complete line of slitter rewinders, Catbridge excels at integrating components to build state-of-the-art web converting systems and process lines for coating, laminating and other functions.

## The Catbridge Difference

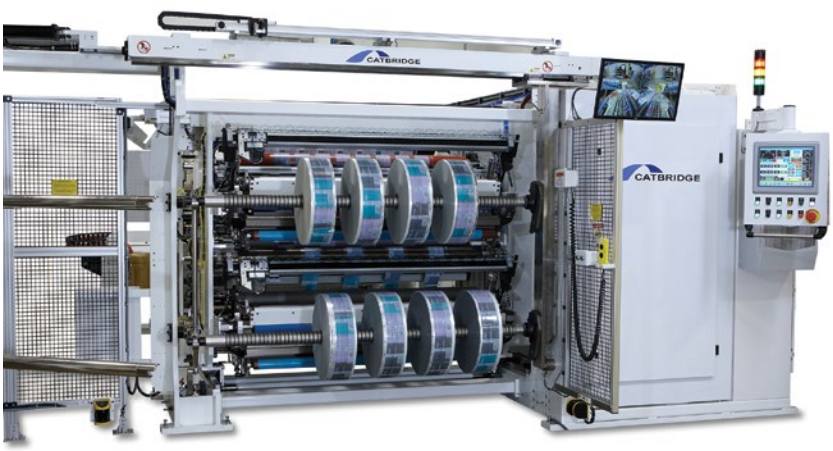
Using an innovative, customer-centric approach to design and engineering, Catbridge has emerged as the leader in state-of-the-art web converting solutions. What makes Catbridge different is their commitment to tailored solutions to meet the customer's needs. Unlike many of its competitors, Catbridge Machinery conceptualizes, engineers, builds, programs, calibrates and tunes every piece of equipment they sell, with customer input playing a role throughout.

Catbridge's highly qualified engineers combine decades of experience in the converting machine industry with the latest computer-assisted design and manufacturing technologies to create the best converting machine design solution for its customers. President, Michael Pappas and Vice President, William Christman, bring an unmatched passion and expertise to the web converting industry. Catbridge Machinery's greatest strength is the ability to provide solutions for a broad range of applications.

## Innovative, Highly-Productive Slitter Rewinders

Catbridge has a complete line of high performance machinery designed to accommodate any level of converting. Catbridge duplex center winders, center surface winders, surface winders and turrets all offer quality and performance that guarantee success. All Catbridge slitter rewinders safely and effectively increase throughput, improve finished roll quality and reduce waste. From unwind to rewind, all models integrate innovative technologies that deliver improved results.

Catbridge Machinery's design and manufacturing facility integrates engineering and construction seamlessly under one roof allowing for unmatched quality control. From start-ups and training to spare parts and remote servicing, Catbridge stays with you for the life of your machine.

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TAKK

TRP08

# Increase Profits and Productivity with TAKK Static Control Solutions

Static Control technologies provide tremendous value and benefits toward ensuring optimal productivity and high-quality produced goods. By applying the appropriate static control technologies, businesses involved in printing, paper & film converting can prevent production losses, material waste and personnel hazards associated with uncontrolled static electricity, resulting in maximum production output and profits.

From extrusion and winding of converted films, to printing and binding of products, it would be difficult to find an application where static control technologies have not made a tangible difference in improving operations. TAKK Industries has over 60 years of experience in developing, recommending, and producing solutions for the management of static electricity in industrial processes. TAKK is dedicated to providing the most efficient products to detect and eliminate static. One of TAKK's most innovative products is the NEOS Series static control eliminators, utilizing a patented Reactive Intelligence process that continually senses the static level and in turn delivers the exact amount of ionization power required to neutralize the static. NEOS Models eliminate static charges at distances up to 60 inches and speeds up to 4500 ft./min without air.

Additionally, TAKK offers a wide range of powerful 24V DC static control models that cover virtually any process of label printing and converting operations.


Incorporating robust built-in power supplies and LED indicators that continuously provide users with local or remote working status of the ionizer bar, these products ensure continuous positive control of static electricity.

TAKK has recently introduced the 3024 Compact and 3024 Ultra DC Static Eliminators. These units are specially designed and suited for both OEM machinery and end-users where there are tight constraints for mounting; especially on digital or conventional label printers, tabletop winders, and other production machinery requiring high performance static elimination in a compact size. The 3024 Ultra and Compact series are also highly suited for narrow labels, webs, sleeves, and tapes.

Static electricity is a hidden yet potent phenomenon that can negatively impact the productivity of manufacturing facilities. However, with the right static control technologies, you can prevent production loss, waste, and personnel hazards. Static controls are proven to lead to higher productivity and profits.

With a full line of static control solutions, and highly experienced technicians, TAKK is prepared to solve any static electricity issue that interferes with production and maximum profit.

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3024 Compact and 3024 Ultra DC Static Eliminators

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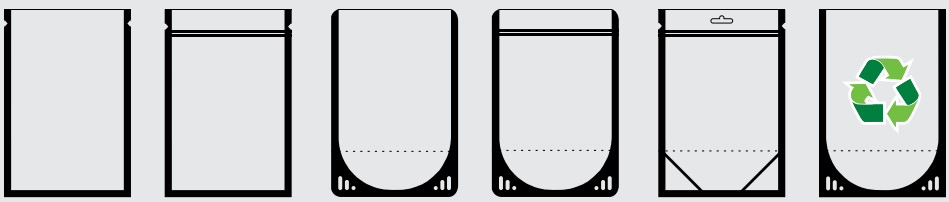
Mechanical speeds

**~20 minute**
changeovers

**Recyclable**
pouches



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# Understanding Corona Treating with QC Electronics

**What are factors that affect corona treatment that should be observed and understood?**

Several factors can affect corona treatment and should be observed and understood to achieve the desired surface modification. Here are some factors that can affect corona treatment:

**1. Material Type:** The type of material being treated can impact the effectiveness of corona treatment. Non-porous materials like plastics and metals are more suitable for corona treatment than porous materials like fabrics and paper.

**2. Surface Characteristics:** The surface characteristics of the material, such as its roughness, porosity and composition, can impact the corona treatment process. Surfaces with low surface energy, such as those containing low surface tension additives, require higher power settings.

**3. Treatment Conditions:** Treatment conditions such as the corona discharge power, frequency and exposure time can significantly impact the surface modification of the material. The optimal conditions for corona treatment depend on the type and characteristics of the material being treated.

**4. Atmospheric Conditions:** The atmospheric conditions, such as temperature, humidity and air composition, can impact the corona treatment process. High humidity can reduce the effectiveness of corona treatment, while dry air can improve the treatment. It is important for corona treaters to be able to accommodate high humidity environments.

By understanding and observing these factors, it is possible to optimize the corona treatment process for specific materials.

**Alyxandria Klein**
Marketing and Sales Director
QC Eelectronics

What are key factors converters should pay attention to when choosing a corona treater manufacturer or supplier?

When choosing a corona treater manufacturer or supplier, converters should pay attention to several key factors to ensure they get the best product and service. Here are some factors to consider:

**1. Expertise and Reputation:** Look for a manufacturer or supplier with a good reputation and expertise in corona treatment technology. Consider their experience in the industry, the quality of their products and their level of customer service.

**2. Customization and Flexibility:** A good corona treater manufacturer or supplier should offer customizable solutions that can be tailored to the specific needs of the converter's operation. They should be able to provide solutions that are flexible enough to accommodate different materials, applications and production requirements.

**3. Technology and Innovation:** Look for a manufacturer or supplier that can provide innovative solutions that can enhance production efficiency and reduce costs.

**4. Technical Support and Service:** A reliable corona treater manufacturer or supplier should provide technical support and service to help converters install, operate and maintain their equipment. They should offer training and troubleshooting assistance, spare parts availability and on-site service if necessary.

**5. Cost-effectiveness:** Cost is always a consideration when choosing a corona treater manufacturer or supplier. Converters should compare the pricing of different suppliers and consider the overall value they provide in terms of quality, customization, innovation and service.

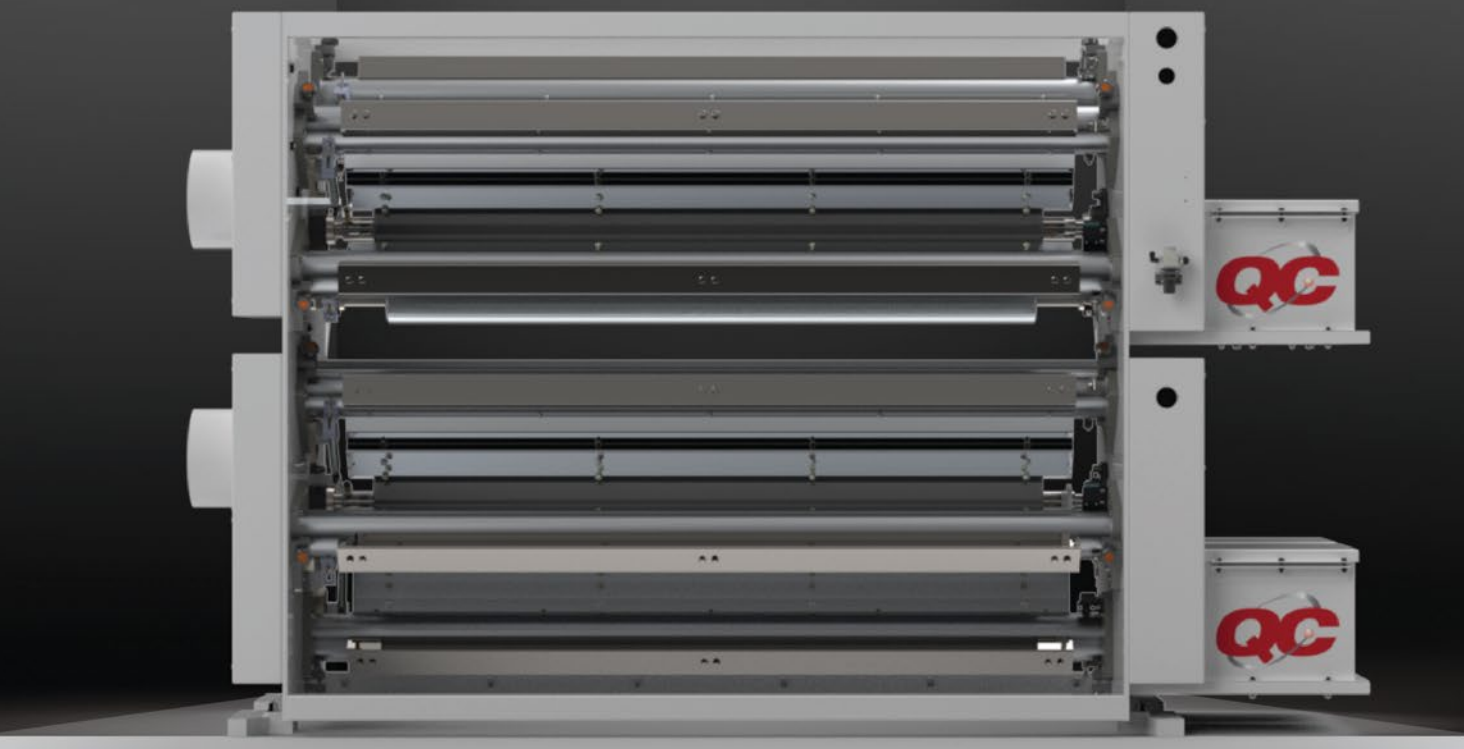
**How can I accurately measure surface energies?**

Surface energy is a key property that determines how well a material can bond with another material. Dyne testing has been a commonly used method to measure the surface energy of a material. However, the accuracy of dyne testing has been widely debated, and it is now understood that surface analyzation devices should be used instead. Surface analyzation devices use objective and automated methods to measure the surface energy of a material. These devices use a variety of techniques, such as contact angle measurement or surface energy mapping, to provide accurate and reliable results. These devices can also measure the surface energy of a wider range of materials, including metals, ceramics and polymers. QC Electronics offers free surface analyzation and reports. This service provides valuable information to companies and manufacturers, helping them to optimize their printing, coating and adhesion processes.

*More questions? Struggling with adhesion and need advice? Contact sales@qcelectronics.com.*

# CORONA TREATMENT

FOR GUARANTEED ADHESION




QC is dedicated to providing top-quality corona treatment and adhesion solutions for our customers. Our commitment to innovation and customer satisfaction has earned us a reputation as a trusted provider of corona treatment solutions, and we are committed to continuing to set the standard in the industry.

As we celebrate 35 years in business, we are truly grateful for the support and loyalty of our customers, partners, and employees. We are proud of the strong foundation we have built and the lasting relationships we have formed over the years. Thank you for helping us reach this milestone and for being a part of our journey. Contact **sales@qcelectronics.com** to get in touch with a representative.

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