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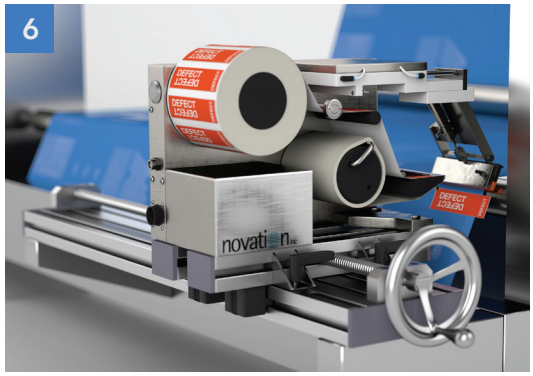

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The ABCs of QC

Angel Morris
Editor

From process to product, first-rate results begin and end with quality control. This month's cover story explains that while having zero defects on a print or converting process may be unrealistic, keeping defects from reaching customers should be the goal. Finding flaws is 50 percent of keeping defects in-house; with implementing a successful flaw-marking process the other half. How to achieve this? Our expert gives some suggestions toward successful inspection plans.

While quality control is a necessity in your business, there is also room for QC in our personal lives. As in the workplace, identifying our flaws is the first step toward improvement. Perhaps our "inspection system" is in the form of a spouse or friend whom we trust to help us recognize our shortcomings. Step two, our "marking process," may be coming up with ways to work through those issues in an effort to share the most "defect-free" versions of ourselves with the world. Perfection need not be the goal … but there's nothing wrong with some in-our-own-house quality control!

On a related note in this issue, we consider how some in the label and packaging industry successfully navigated the last three years of supply shortages and disruptions, as well as escalating supply prices. Wise equipment investing positioned some to better respond to the demands of the times. There are three key savings areas companies should consider before investing in any new capacity, each addressed in this month's Labels & Printing feature.

Improving adhesion and increasing the economic efficiency of processing machines are ongoing quality concerns for plastic and paper processing companies. Optimum product condition and performance in those areas is reliant on corona treatment. Its necessity toward meeting the increasingly complex demands upon packaging, materials and processing is addressed in this edition of *PFFC*.

Sustainability is all the buzz and can be considered another element to quality control. Consumers expect it and laws govern it. Read about how sustainability innovations in the area of liquid packaging can help put companies at a competitive advantage in today's marketplace.

If quality control is not already on your mind, this issue may remind you that it should be. Eliminating defects, reducing waste and meeting others' expectations is the continual goal and QC helps you get there.

Angel Morris
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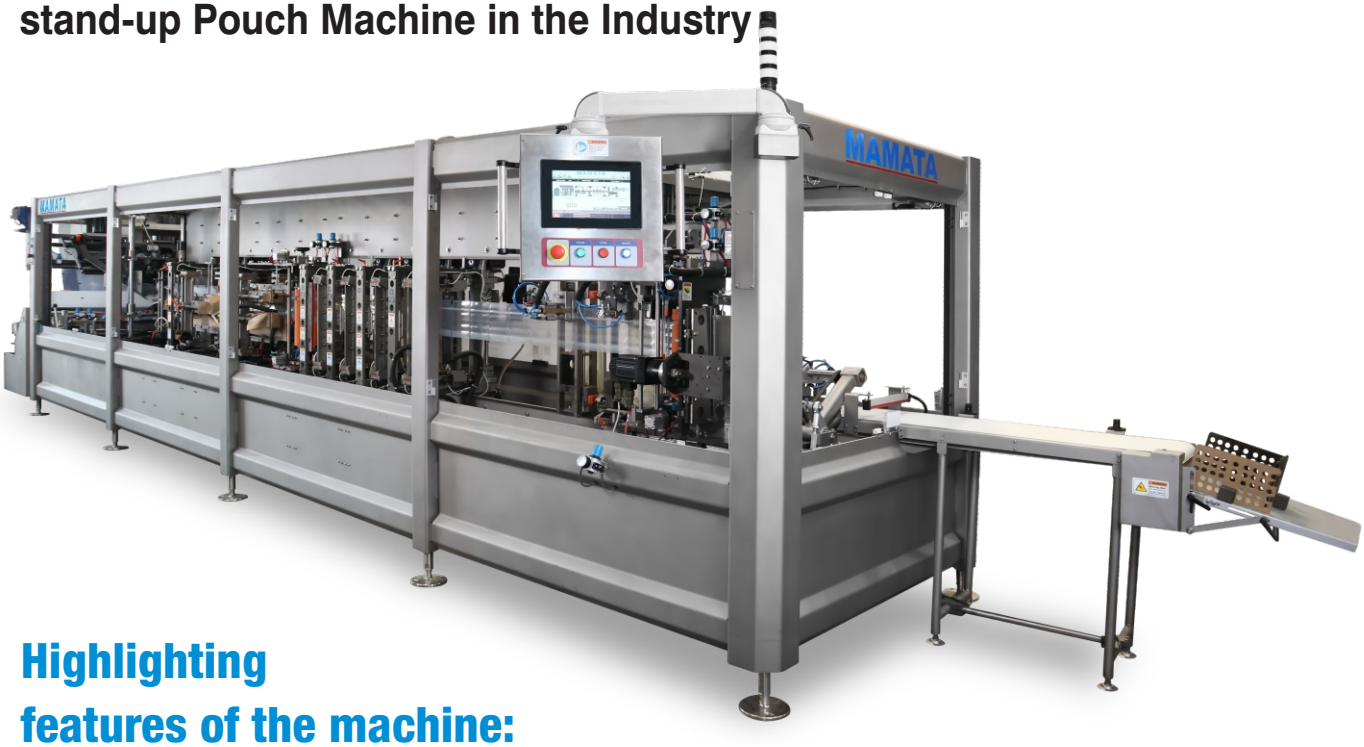

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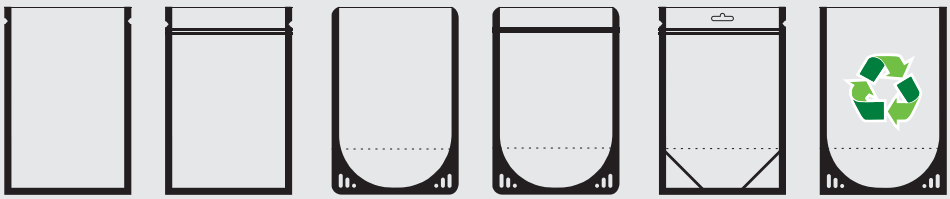

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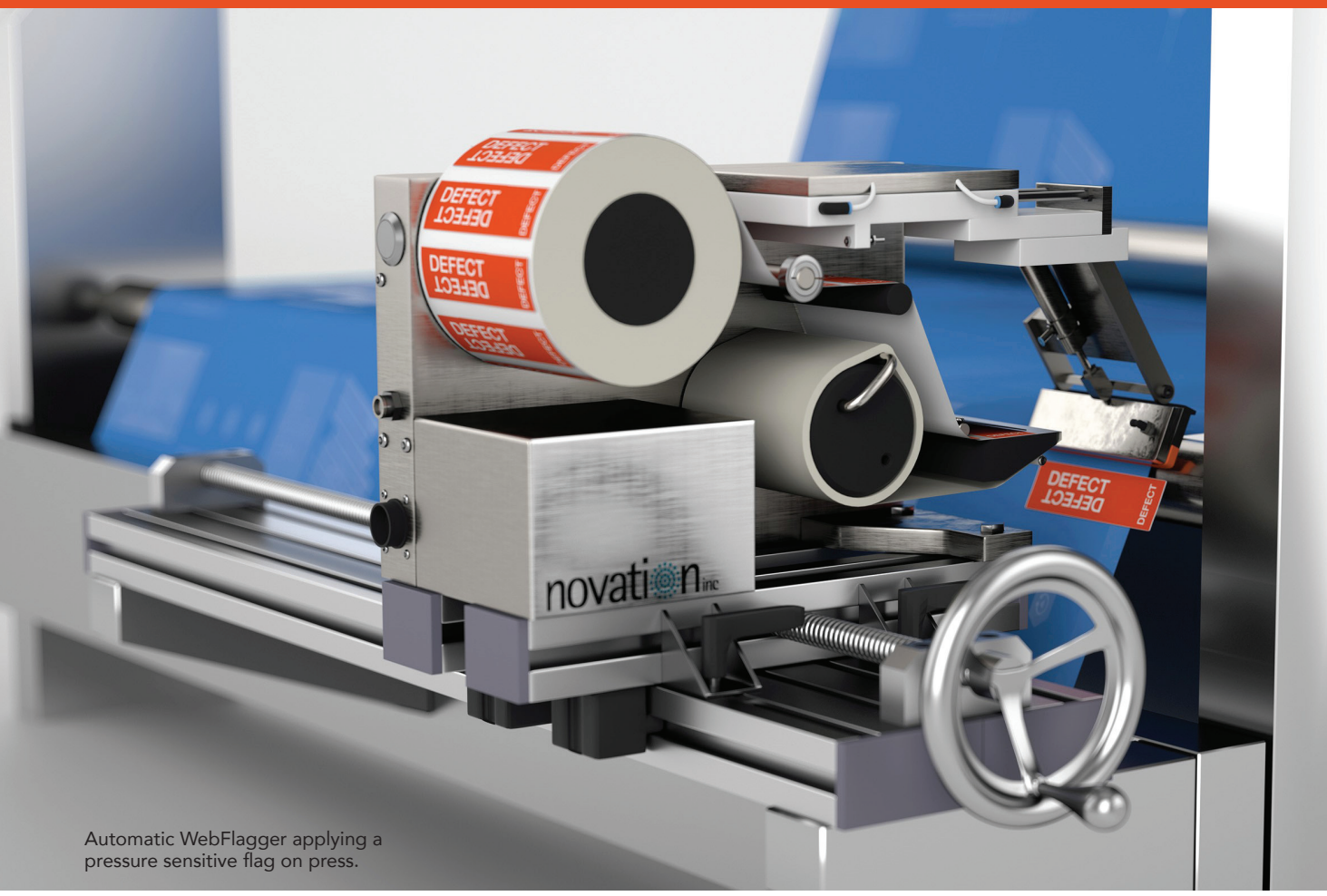


Automatic WebFlagger applying a pressure sensitive flag on press.

How to Keep Defects In House

By **Alfonse Novelli**, President and Founder, Novation, Inc.

Marking and Finding Defects

Although producing zero defects on a print or converting process is a great goal for which to strive, in the real world it is usually an unattainable one. However, preventing defects from reaching your customers is something which should be achievable.

The first part of a "ship no defects" policy is obviously knowing when you're making an unsaleable product. At times a part of the process itself creates an out-of-spec product. Examples of this would be unwind lap splices, coming off print, start-up waste, etc.

Other issues need to be found through inspection. Some are visible and obvious to the naked eye. Some however, are not easily seen by the naked eye, especially at process speeds. Enter 100 percent automatic inspection systems. These systems can inspect for coatweight, printing problems, surface flaws, pinholes, etc.

These inspection systems then need to inform the operator that a defect has been recognized. Usually, an alarm light is activated and possibly an audible alarm as well. In this scenario the operator is then tasked with marking the web in some fashion so the defect can be found and removed at the next process.

Some current inspection systems can remember where scrap is within a roll by creating digital roll maps. These roll maps create a powerful data file which pinpoints all the issues found within a roll and records all the locations by a footage count from the start of the roll.

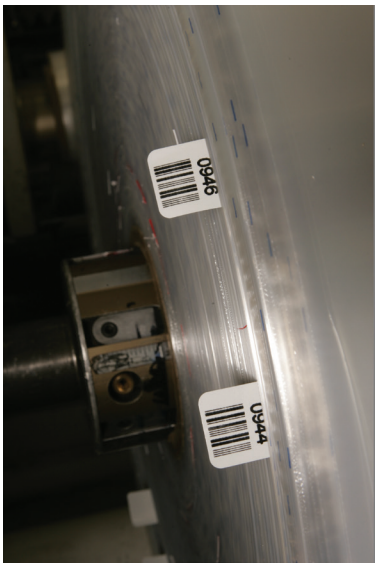
Often, damaged outer wraps of a roll need to be removed when it is next used, and material also has to be removed to cull out all defects. However, without any physical markings on the web, when material is removed from the roll for any reason, the digital information can be rendered useless if it cannot be resynchronized with the physical roll somehow. Physical markings, either as recurring reference points or markings at each defect location, solve this resynchronization problem.

Manual Web Marking

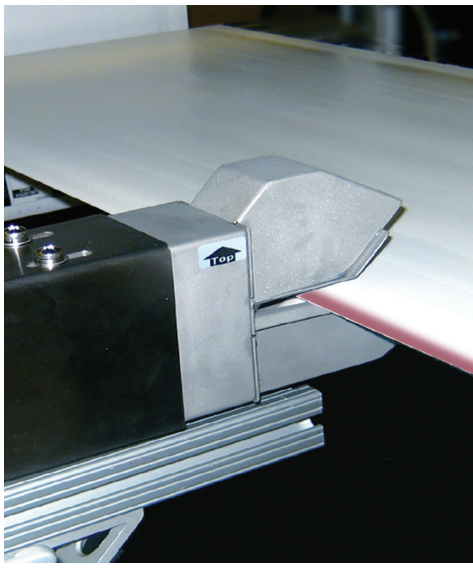
Various methods of manual web marking have been used over the years. These methods include inserting a slip of paper into the winding roll, hand applying a pressure sensitive label to the moving web, or possibly using a felt pen. These methods require an operator to be available to notice the alarm and then react.

This means that by the time the alarm goes off and the operator gets to the location where the web is to be marked, the defect itself could be already wound a hundred feet into the rewinding roll. This inaccuracy in marking makes the subsequent finding and culling out the defects a very inefficient process.

More important than the inefficiencies of hand marking the web is the safety aspect. Hand marking means operators' hands must be very near or even touching the moving web and rollers. Needless to say, this is a dangerous approach which is prohibited by the safety protocols of many organizations.



Sequentially numbered and bar-coded flags mark the locations of defects within the roll.



Edge marking systems spray ink to mark defects. Multiple markers using various colors can be implemented to distinguish defect categories.

In many cases hand marking of the web is not even an option. The propensity for injuries with these methods have resulted in many lines now being equipped with guarding and interlocks which make it impossible for operators to access the moving web.

Automatic Web Marking

Automatic web marking eliminates accidents by keeping hands away from the moving product and rotating machine components and allows webs on completely guarded machines to be marked. Additionally, marking systems eliminate inaccuracies caused by the delay between the sensing and subsequent hand marking. They are typically located toward the end of the process line, downstream of all automatic inspection devices or manual inspection locations.

Often the inspection systems, which track web motion as part of their function, can even delay their output signal to the web marker so that the mark is not activated until the defect actually reaches the marking system. Some of the markers have a method of "tracking" an issue noticed at an upstream manual inspection station, signaled by an operator pushbutton entry.

There are two basic methods of automatic web marking in use today. They are, flagging (also called tabbing), and spray marking. WebFlaggers place a pressure sensitive label on the moving web. Typically, a portion of the label has no adhesive, and that portion hangs off the edge of the web like a "flag" making it visible in the wound roll. Spray

A roll which has been marked with an ink edge marking system. With edge markers, the entire defective section of a roll can be marked.

markers spray the edge of the web with inks. They can place a mark at a particular location, or even color the edge of an entire out-of-spec section of a roll.

WebFlaggers can apply different color flags to identify the various issues while spray marking systems can spray multiple colors of ink. To coordinate roll locations with a digital roll map, flags can be produced with a sequential numbering and a corresponding bar code so each flag has its own machine readable ID. Spray systems are capable of something similar by encoding a number by marking a sequence of dots on the web's edge.

WebFlaggers have a limit to how quickly subsequent flags can be applied. This means individual

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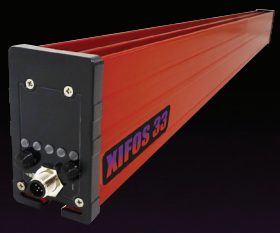

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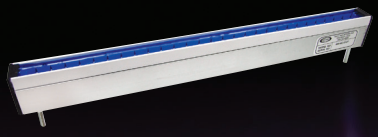

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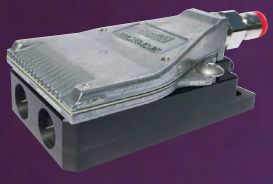

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issues located close to each other cannot always all be flagged. Spray markers have a faster reaction time, and therefore don't have the same limitation. However, the spray marking systems usually require a bit more maintenance than flagging systems.

Permanent vs. Temporary Marking

Once the process has been deemed one which would benefit from a marking system, another decision becomes which type of marking is most appropriate. Some processes have types of scrap which is easily identified and is unquestionably defective. Others may want to mark questionable locations as well and reinspect at a roll edit machine or at the unwind of the next process.

Those with easily identifiable scrap, can and should probably use a permanent marking solution. WebFlaggers can apply flags with very aggressive adhesives which create a destructible bond to the web. They can't fall off or be easily removed. Ink spraying is also a permanent marking method.

For the processes with questionable defects which need to be reinspected, flags can be produced with removable or "repositionable" style adhesives which can be removed cleanly if the material is subsequently deemed good. Spray systems can use inks invisible to the human eye in these cases.

Conclusion

So, it appears that finding all your flaws is only the first half of keeping your defects in house. Safely, accurately and reliably marking those flaws is the other half of preventing any defects from ever leaving your factory. ■

ABOUT THE AUTHOR

President and Founder of Novation, Inc. (www.novation-inc.com), Alfonse Novelli's work experience includes controls engineer with Van Dam Machine Corp. and Fischer and Krecke, and vice-president of Geometric Machine and Design. He studied engineering at University of Connecticut and Fairleigh Dickenson University.

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Label Equipment Considerations for Converters

Looking at Labor, Media and Cash in Future Purchasing Decisions

By **Victor Gomez**, director, Industrial Labels, Epson America, Inc.

It has been an eventful few years in the label industry. Last year's shortages of paper, liners and adhesives were compounded by severe disruptions in the logistics that got them to label and packaging converters. Adding insult to injury, price increase notices seemed to be coming weekly by mid-2022.

In 2023, supplier price increases have begun to wind down. Consumer demand — no longer bolstered by subsidies, more distracted now by spending on services after two lockdown years and recently diluted by inflation — also began to slacken. While these issues recede, the struggle to keep and recruit a workforce, already evident before the pandemic, remains a persistent challenge. An aging workforce and declining birth rates have made it difficult to find workers to replace retirees.

The label and packaging industry has managed to navigate the challenges of these eventful years better than many other sectors in the economy. Indeed, during the worst of the last three years, companies that invested wisely in new equipment were able to respond to the demands of the moment — faster turnaround times, shorter runs, adaptable to shifts in demand — and did better than weather the storm; they thrived.

There are practical lessons to be learned, especially when evaluating investments in capital equipment. If you are considering adding capacity or upgrading what you have, it may be strategically sound to look for the types of features that respond to the moment and position you well for

the mid-term. Anyone in the label and packaging market looking to invest in new capacity should be thinking: Save labor. Save media. Save cash.

Labor

Anything above the minimal amount needed to add value to the final product is waste. That could be equipment, materials, space and labor. When skilled labor is in short supply with no relief in the horizon, whatever equipment you consider should make as little demand on labor as possible. Beyond automation, ask about ease of use. The pool of available labor is wider, and less costly, when an entry-level employee can run a press, a converting line or any other piece of converting equipment. Training tends to be faster as well. And when operators quit or get moved to other jobs in the shop, training new ones is also quicker, compounding the benefits of ease of use.

Some equipment needs to be continually attended by an operator, and when that happens, that headcount is not available to perform other work. Are there alternative models that can run unattended for extended periods of time, or where a single operator runs multiple machines?

Equipment is increasingly being designed with automated cleaning routines to minimize claims on the operator's time. Any time spent in maintenance is not being spent printing and converting paying work, whether automated or not. But time spent in manual maintenance adds the cost of labor to the lost production time.

Investigate remote monitoring options. Can someone remotely anticipate when problems might crop up? If so, maintenance or even service could be scheduled when no work is pending in the queue. Remember the saying, "If you don't schedule maintenance, the press will schedule it for you." And at the worst time possible.

Label images printed on the Epson SurePress® L-4533AW digital label press by Leapin' Lizard Labels, one of Colorado's leading custom label providers.

Media

Supply is slowly beginning to return to normal, but anyone scarred by 2022 should be sensitive to features that can save media through design or waste reduction, e.g., a web design with short lead and tail threading, steering mechanism accuracy and the ability to recover without waste, detecting defects quickly when they happen. These features will minimize wasted media as well as save labor in recovering.

Aside from media loading and webbing, the ability to rewind media automatically will help minimize waste between jobs.

Cash

Anything that conserves cash is going to be even more important when end user demand is flagging, and the cost of money is rising. When evaluating equipment, it's good to remember the least costly option is not always the best, and neither is more expensive necessarily better. Paying for features you will not be using very often is as wasteful as not having the right features for the work you want to do.

For example, take a spec such as speed. How many sellable labels I get out of my press in a shift has to do with up time, set up time, maintenance time, as much as linear speed. Your customer pays for throughput, not speed. How much throughput you need has to do with how much work you are going to be doing. Do not buy less than you need, any more than you pay for more than you will be able to use. The same applies to other

features such as number of colors and resolution.

Capital investment thrives on predictability. Even small differences in engineering can yield more predictability and stability to a press. When evaluating systems, be on the lookout for how the different elements have been conceived, designed and executed to contribute to a predictable, repeatable operation. Find the right throughput and endurance, and you have a profitable combination.

One final consideration for your due diligence: The more control a company has over manufacturing of its critical components, the more control it has over its supply chain, and the better it can face things when things get tough. Do they make their own inks, print heads or other critical components? How much redundancy do they have in their manufacturing? Pandemics happen, fires happen, acts of God happen. Redundancy is expensive, but it can mitigate some of those risks.

We have been through interesting times. As you weigh your next capital equipment investment, you will have a lot of questions to ask that you would not have asked three years ago. And you will be right to ask them: Questions about how the technology in which you are looking to invest will help now, in this strange moment we are living through, but also in the next weird turn and the weird turn after that. ■

ABOUT THE AUTHOR

As Director, Industrial Labels at Epson America, Inc., Victor Gomez is responsible for Epson's line of digital inkjet color label equipment in North America, from the SurePress 13-inch wide UV and AQ ink production presses to the ColorWorks on-demand desktop color label printers. His experience in digital printing dates back to 1995 working with the first network RIP for color copiers and large format printers. Prior to joining Epson in 2014, Gomez held business development and sales leadership roles with Durst Image Technology US. He has an MA in International Affairs from Columbia University and a BA in Art History from Vassar College.

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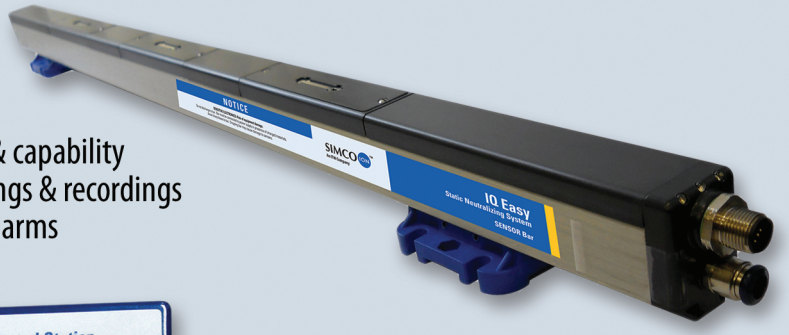

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Corona discharge on film web roller.

Corona Treatment for Extrusion Coating and Laminating Production Lines

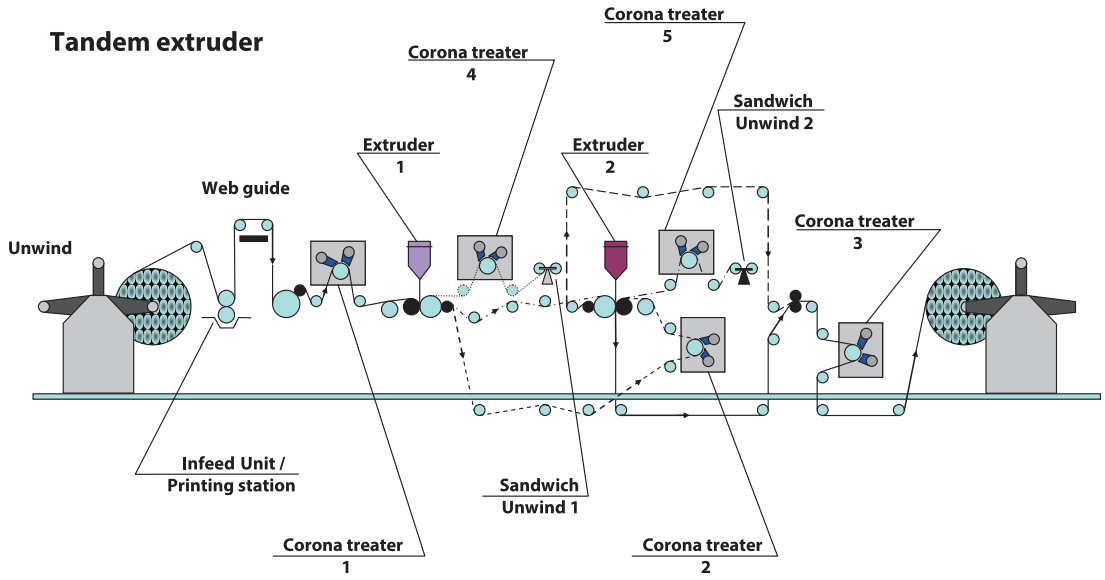
By **Dr. Frank Förster**, Leader of Process Development and Atmospheric Plasma Technology, SOFTAL Corona & Plasma GmbH

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 oxidation. The functional groups formed are polar and provide the basis for adhesion



Corona station for extrusion coating and lamination.

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 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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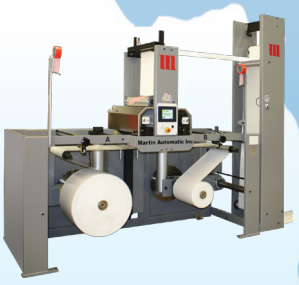

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OUR EXPERIENCE...YOUR ADVANTAGE

Automating Static Control with Online Monitors

By **Dr. Kelly Robinson**, Founder, Electrostatic Answers

Can we "automate" static control so that we do not have to devote time and resources to fighting static problems? Almost! An "automatic" system, once installed, runs reliably, needing only periodic maintenance. A well-designed static control system is "automatic" because it runs reliably, needs only periodic maintenance, and, with online sensors, ensures that finished products have acceptably low static.

The static control system for the coater in Figure 1 including the online sensors accomplishes our three goals:

1) Static is low entering the C1D1 Solvent Zone (safety - static sensitive area);
2) Static is acceptably low entering the winding roll (quality - finished product);
3) The static control system functions properly (production reliability).

Each of the static control elements serves a specific purpose. Static Dissipater $SD1_{unw\text{-}roll}$ neutralizes static charges on the outside surface of the unwinding roll. Unwinding rolls can store large amounts of static charge from the operation where the roll was wound. This static dissipater needs to be a high-performance, long-range static bar because, as the unwinding roll expires, the distance from the static bar to the surface of the roll increases.

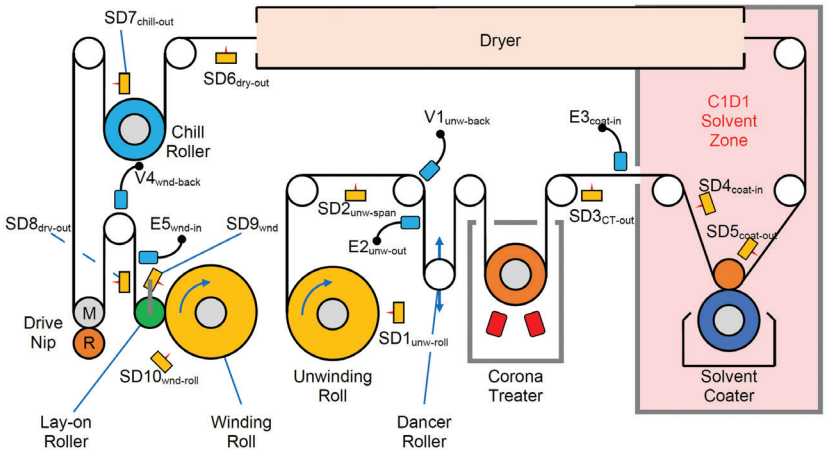


Figure 1: The static control system has 15 elements; 10 powered static dissipaters.

$SD2_{unw\text{-}span}$ neutralizes static charges on the inside surface of the web exiting the unwinding roll. This static bar can be a short-range static bar because the distance from the static bar to the web is fixed.

An electrostatic voltmeter (ESVM) and an electrostatic fieldmeter (ESFM) are two different, complementary instruments. An ESVM responds to the charge density on the exposed surface of the web wrapped on a grounded idler roller. An ESFM responds to the sum of the charge densities on both sides of the web.[1]

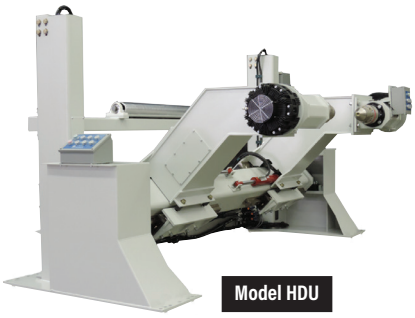
Online electrostatic voltmeter (ESVM) $V1_{unw\text{-}back}$ verifies that $SB1_{unw\text{-}roll}$ is functioning properly by measuring the static charges on the outside surface of the web exiting the unwinding roll. The average reading should not exceed ±0.5 V/um of web thickness. For example, for a 2 mil (50 um) thick web, the average reading should not exceed ±25 V.

Online electrostatic fieldmeter (ESFM) $E2_{unw\text{-}out}$ verifies that $SB2_{unw\text{-}span}$ is functioning properly by measuring the net charge on the web exiting the unwinding roll. The average reading should not exceed ±0.5 kV/cm (±1.3 kV/in).

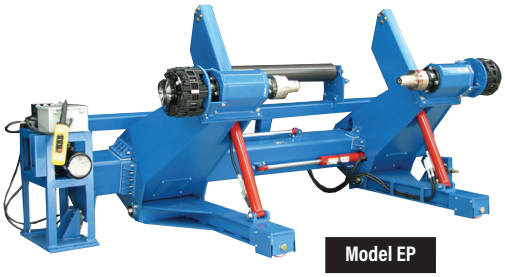
Powered static dissipater $SD3_{CT\text{-}out}$ neutralizes static charges on the treated surface of the web exiting the corona treater. A corona treater can deposit a very large amount of static charge on the treated surface of a web.

Online ESFM $E3_{coat\text{-}in}$ serves

Want More Production?

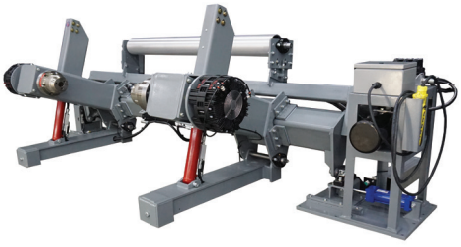


Model HDU

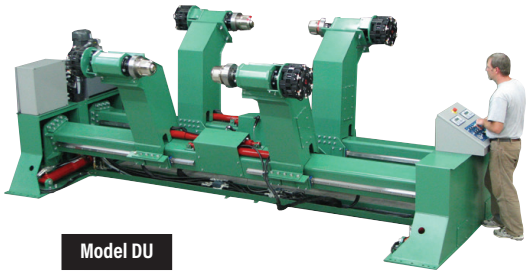


Model EP

Model EP Jr



Model MS2MA



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two purposes. First, it ensures that static is low entering the static sensitivity C1D1 Solvent Zone. Second, $E3_{coat\text{-}in}$ verifies that $SD3_{CT\text{-}out}$ functions properly. The average reading should not exceed ±0.5 kV/cm (±1.3 kV/in).

Powered static dissipater $SD4_{coat\text{-}in}$ protects the C1D1 Solvent Zone if $SC3_{CT\text{-}out}$ fails. Normally, the web entering the C1D1 Solvent Zone is charge-free. However, if $SB3_{CT\text{-}out}$ should fail, the risk of a static spark is high from static charges on the web deposited by the corona treater.

Powered static dissipater $SD5_{coat\text{-}out}$ neutralizes static charges on the web from touching the backing roller especially at the end of a run when coating stops.

Powered static dissipater $SB6_{dry\text{-}out}$ neutralizes static charges on the back side of the web exiting the dryer. The back-side idler rollers in the dryer can deposit significant amounts of static charges on the web. ("Static Control for Dryers."[2])

Powered static dissipater $SD7_{chill\text{-}out}$ neutralizes static charges on the web exiting the chill roller. Chill rollers can deposit significant amounts of static on web surface that touches the roller. Powered static dissipater $SD8_{drv\text{-}out}$ neutralizes static charges on the web surface that touched the rubber nip roller. Nip rollers can deposit large amounts of static charges on the web surface that touches the rubber nip roller.

Online ESVM $V4_{wnd\text{-}back}$ serves three purposes: First, it verifies that $SD6_{dry\text{-}out}$ functions properly by measuring the static charges on the back side of the web; Second, comparing $V4_{wnd\text{-}back}$ with $V1_{unw\text{-}back}$ verifies that the static dissipaters between these two measurements are all functioning properly; Third, if verifies that static charges on the back side of the web entering the winding roll are acceptably low. The average reading should not exceed ±0.5 V/um of web thickness. For example, for a 2 mil (50 um) thick web, the average reading should not exceed ±25 V. And, the average difference $\Delta V = (V4_{wnd\text{-}back} - V1_{unw\text{-}back})$ should not exceed ±0.5 V/um of web thickness.

Online ESFM $E5_{wnd\text{-}in}$ serves two purposes. First, it verifies that

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And finally — the most telling questions of all:

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$SD8_{drv\text{-}out}$ is functioning properly. Second, it verifies that the net static charge on the web entering the winding roll is acceptably low. The average reading should not exceed ±0.5 kV/cm (±1.3 kV/in).

Powered static dissipater $SD9_{wnd}$ neutralizes static charges on the outside surface of the winding roll from touching the lay-on roller. The winder lay-on roller deposits static charges on the web surface that touches the roller. This static dissipater may be mounted to the bracket holding the lay-on roller so that the distance from the static bar to the winding roll remains constant.

Powered static dissipater $SD10_{wnd\text{-}roll}$ neutralizes static charges on the outside surface of the winding roll if $SD9_{wnd}$ should fail. $SD9_{wnd}$ is prone to failure caused by mechanical vibrations. Together, static dissipaters $SD9_{wnd}$ and $SD10_{wnd\text{-}roll}$ effectively neutralize static charges on the finished product.

A well-designed static control system is "automatic" because it runs reliably, needs only periodic maintenance, and, with online sensors, ensures that finished products have acceptably low static.

Install online monitors for three reasons: 1) Safety - Ensure that static charges are low entering sensitive areas; 2) Product Quality - Verify that static levels are acceptably low on finished product; and 3) Production Reliability - Make sure that the static control system is functioning properly. ■

1 https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9915453
2 https://cloud.3dissue.net/33877/33789/34113/91696/index.html

ABOUT THE AUTHOR

Kelly Robinson, PE, Ph.D., is the owner of Electrostatic Answers, an engineering consulting company dedicated to eliminating injury and waste from static electricity. You can reach Kelly directly at Kelly.Robinson@ElectrostaticAnswers.com.

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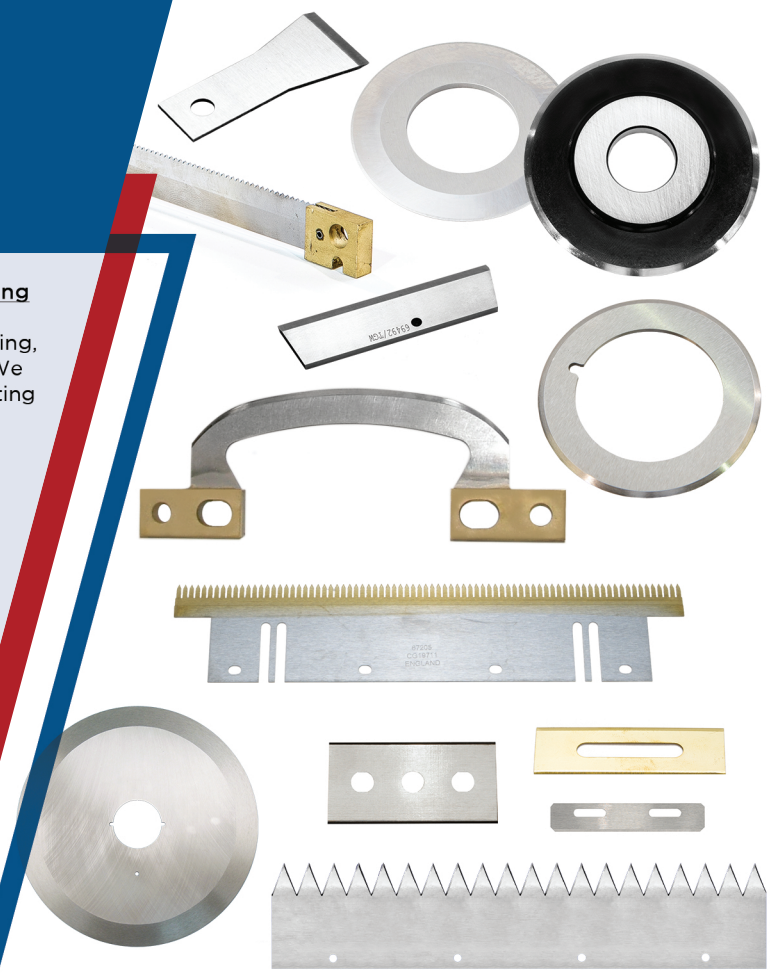
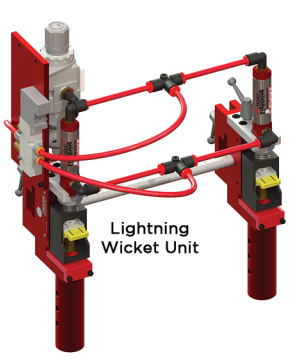
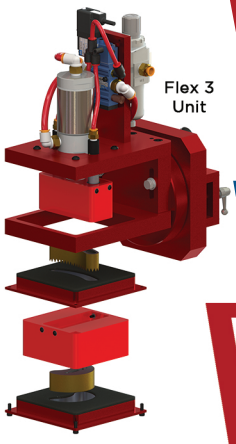
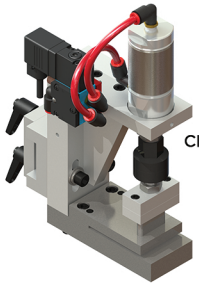




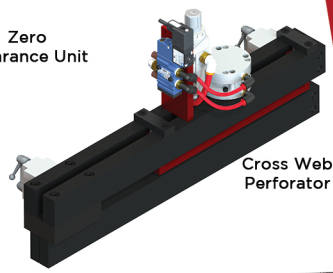
Lightning Wicket Unit



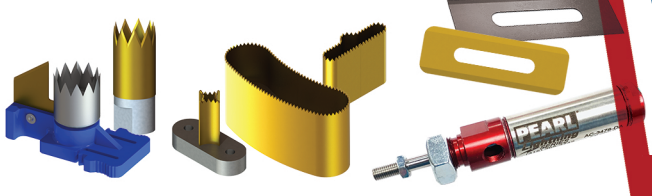
Flex 3 Unit



Zero Clearance Unit



Cross Web Perforator



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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?

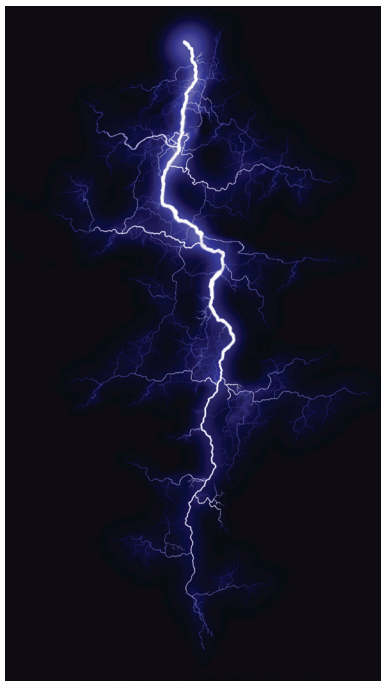
Fyffe: Having a "point person" is always a good idea. However, it is not really a common practice as there are multiple people in the facility that deal with the static control issues in question. They often work in different departments and have their own issues that they oversee.

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

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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Sustainable Liquids Packaging Done Right

By **Andrew Meyer**, CEO, AeroFlexx

The era of sustainability has arrived. As global laws and regulations are put into place requiring stricter environmental compliance[1], companies are taking notice. Consumers[2] worldwide are also supporting the movement, letting businesses know that they intend to shift their spending to products that promote sustainability.

For companies, moving into this era of sustainability is challenging. Sustainable practices promise to ultimately boost profitability[3], as well as provide other benefits such as improving brand reputation and attracting top talent.

Sustainability needs to be a practice as well as a value. It needs to be done — and done right. We believe there is an obligation to society and future generations to do our part to encourage sustainability without compromise. We envision a future where, for generations to come, there will no longer be trade-offs between an enhanced consumer experience, brand value or the planet.

Driven by that belief, our company has pioneered a number of sustainability innovations in the area of liquid packaging. Here are some of the things that we have learned about creating a sustainable product in an effective way.

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Source Reduction is Critical for Sustainability

The amount of plastic waste produced each year is staggering, with some estimates placing the number at 300 million tons[4]. For comparison, that is nearly the weight of the global population.

Source reduction focuses on reducing waste before it is produced. In essence, it seeks to cut down on the amount of raw material that is needed for packaging. It represents the most immediate and impactful approach to reducing the environmental footprint of companies that use plastic packaging. The US Environmental Protection Agency has identified source reduction as its top recommended pathway[5] for achieving higher levels of sustainability.

There are a number of positive environmental impacts that result from source reduction, including:

- Saving natural resources;
- Conserving energy;
- Reducing greenhouse emissions;

Uniquely designed sustainable liquid flexible packaging is less likely to leak or spill during shipping.

- Reducing pollution; and
- Reducing the flow of waste to landfills.

One key benefit of source reduction is that it boosts the sustainability initiatives of companies and brands that practice it. By mitigating the amount of material required to produce packaging upfront, organizations can better demonstrate their commitment to sustainability throughout their supply chain and business practices.

Flexible Packaging Provides Shipping Benefits and Transportation Improvements

While traditional rigid plastics have been around for the better part of a century, flexible plastic packaging for liquids provides a much wider range of benefits that affect profitability as well as sustainability.

Flexible packaging provides companies with a lighter product, which reduces the cost and environmental impacts of shipping. Shipping also requires less packaging, as some flexible packaging can be designed to ship in envelopes rather than boxes. A further innovation is that uniquely designed liquid flexible packaging is less likely to leak or spill during shipping, which are problems that can lead to more transportation impact in the form of product returns or reshipments.

Innovative Designs Inspire More to Embrace Sustainability

When it comes to sustainability initiatives, brands want to ensure that their consumers' experience is not impacted while also seeking marketability for their products. As such, it is critical that solutions that offer improvements in sustainability do not detract from performance or marketability. Ideally, sustainable products will be an upgrade.

One example of this is the capability that flexible packaging provides for limitless artwork. Whereas rigid plastic bottles are typically limited to providing product and marketing information to an applied label, the entire flexible package can be included in the product design. This allows for customized designs that can make a product truly stand out on a shelf or in an e-commerce marketplace.

Flexible packaging also allows for upgrades that provide a better consumer experience. For example, it can incorporate a unique design such as a self-sealing valve, rather than a traditional cap. Flexible packages are also easier to squeeze, making it effortless to dispense the amount of liquid that is needed, which equates to less product being wasted.

Shifting to sustainable packaging, which was once a luxury that could be considered, is quickly becoming a requirement that must be addressed. Along with recent regulations[6] requiring companies to adhere more closely to environmental compliance, a growing number of consumers[7] say they will not support companies that ignore the environmental impacts of their operations. Companies that do not move quickly to

implement sustainable practices could find themselves at a competitive disadvantage. ■

1 https://www.weforum.org/agenda/2021/08/now-time-for-action-on-sustainability-reporting/
2 https://www.businessnewsdaily.com/15087-consumers-want-sustainable-products.html
3 https://greenbusinessbureau.com/topics/sustainability-benefits-topics/why-is-sustainability-important/
4 https://www.nrdc.org/stories/single-use-plastics-101
5 https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy
6 https://stateline.org/2022/11/03/to-reduce-trash-some-states-charge-the-companies-producing-it/
7 https://www.mckinsey.com/industries/consumer-packaged-goods/our-insights/consumers-care-about-sustainability-and-back-it-up-with-their-wallets

ABOUT THE AUTHOR

Andrew Meyer, CEO of AeroFlexx (https://aeroflexx.com/) and Serial CEO for Innventure, brings extensive experience in entrepreneurial environments, having spent the last 15 years within four different venture-backed technology start-ups that included value-add exits such as an IPO and a trade sale to a strategic partner.

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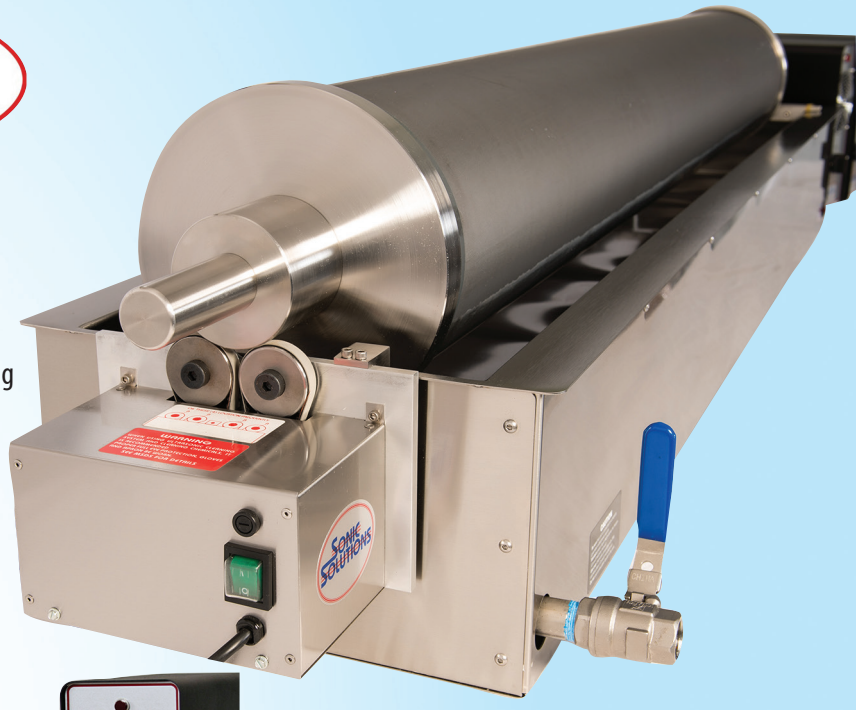

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Future trends and new production monitoring tools within the converting industry

Interview with Zeno Zonato, Sales Director Flexible packaging at LAEM IMS - a brand of IMS TECHNOLOGIES

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

Ever increasing production cost and end users' request for shorter lead time have pushed converters to search the market for machines with reduced set up time, shorter cycle change and automatic finished roll handling.

A great deal of converters with old dual shafts slitter rewinders have seen double turret machines as the perfect answer for their questions.

Very shortchange cycle time and the increasing offer of automatic solutions for finished rolls handling apparently match this market condition; yet, as it often happens, not always a good solution is the right fit for all situations.

The time needed to pass from a cycle to the next one, when using a dual shaft machine, depends on a few job parameters: number of rolls, their outside diameter and the time needed to reach final roll dimensions.

Let's imagine that the job is made of 7 across or more, with a relatively small outside diameter, and the total job length is pretty long; then yes, a double turret machine can "kill" downtime.

On a dual shaft slitter, as a matter of fact, cycles would be pretty short in view of the production of small end roll, whilst the time that machine spends "still" would be pretty long.

Rolls need to be unloaded, new cores have to be positioned, webs need to be glued to new cores and first revolutions of new cores must be checked to make sure winding is ok.

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An automatic cycle change would help a lot. The preparation of the next rolls, on the non-working shafts, will take place while the slitter is winding rolls on working shafts.

But what when the job is made of 3 or 4 across, with a large outside diameter, a short total job length and few minutes are needed to reach final roll dimension?

Change cycle time will be a fraction of the total job time, and after a couple of mother rolls it is anyway time to pass to the next job and to another set up.

A double turret slitter will never have the chance to express its full potential, which is exactly the reduction of change cycle time.

In specific situations, for many jobs, it is surely better to invest in a dual shaft slitter that is able to be ready for the next job in a very short time.

When all job parameters, including taper tension and knives positioning, are saved in the PLC of slitter and are easily retrieved from the recipe, machine will be ready to start by the time new mother roll is loaded at unwinder.

From an educational perspective, what do you wish that your customers knew before your arrive to demonstrate equipment?

Customers should be aware of the nature of their jobs. They should be able to have the reply to questions like:

- What is the typical order of your customers?
- Long or short jobs?
- How many across?
- Small or large diameters?
- If you have a mix, is it possible to specialize a slitter for short runs and another for long runs?
- Have you ever thought of a doctor rewinder machine for roll-to-roll process (perforation, laser scribing, print inspection and roll "cleaning") after printing and lamination but before slitting?
- What is the most important time-consuming activity in your finishing department? Machine set up? Rolls conditioning and handling?
- What is the most important cause of mistakes (losses) in your finishing department?

An awareness of the above would be a great help in the identification of the right machine among the wide product portfolio of LAEM IMS – a brand of IMS

TECHNOLOGIES slitters.

It is true that "all purpose" machines are very flexible, but they risk to be not the right match for jobs with very tight margins.

Most of the time the quest for low budget machines is based on the evidence of the results but not on an analysis of the causes: in the end, you need to treat the disease to eliminate the symptoms.

Looking ahead for the next few years, what types of changes or demands do you anticipate?

Customers who have done precise data analyses of their jobs and are able to specialize machines for different jobs will be able to compete and create profit in a market that will be even more demanding that the one of today.

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

Customers must grow in their capacity to understand when more value and margin are created (which job? Under which condition? On which machine?) and schedule maintenance to prevent downtime.

Production process stops and changes should be programmed, not suffered. Also, in the right conditions, challenging jobs can be accepted at the right price and/or knowing upfront what risks are embedded in such a choice.

Customers will need to know exactly what they are good at, by gathering all kind of information available from machines designed to collect and distribute production data.

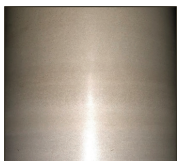
To reach all these purposes, our slitters can exchange data with ERP systems of customer and can be equipped with IMS TECHNOLOGIES industrial IoT platform, called MAIA (Machine Artificial Intelligence Application): an app that will monitor all productivity parameters, as well as all performance parameters. As a matter of fact, MAIA is a cloud-based platform that, thanks to the use of advanced analytics and AI, allows to collect, monitor and analyze data from machines in real-time with a positive impact on efficiency and product quality. ■

Creating Value with Plasma Coatings

Discovering opportunities with existing and new customers is exciting for everyone. It generally starts with a problematic area to improve. A good example is maintenance and downtime associated with cleaning roller surfaces. When debris or buildup is present on critical roller surfaces, loss of traction and web defects can be a major pain point. It can be costly as well. There are multiple angles to address these challenges, but improvement with the roller surface in direct contact with the finished product often brings the highest value.

Single and Dual Layer Plasma Coating systems can be applied to previously coated, bare steel, aluminum, or carbon fiber rollers or

Before Coating



After Coating

parts. These engineered surfaces can breathe new life into your asset and in most cases, can provide added benefits, including extended wear, traction, and release. Newer systems offer extended chemical resistance for the harshest environments, while others are electrically conductive, helping reduce increased static. Depending on the application, the surface finishes available can range from 30 to 1000RA (Roughness Average). With added polymer technology (Dual Layer System) a rather rough finish can provide aggressive traction but not damage or pick the most delicate web substrates. Another advantage of Thermal Coatings is their hardness. Most range from 58-72 Rockwell C, ensuring the coating will reliably perform for many years to come.

If you have a web handling issue and haven't considered Plasma Coating options, you might want to inquire about the latest technology. New systems have been developed along with next generation systems just on the horizon!

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