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MANAGING PRINT QUALITY ON MULTIPLE LEVELS 8

ALSO IN THIS ISSUE

GRAVURE PRINTING, COATING QUALITY CONTENDERS 12

PRACTICING GOOD STATIC CONTROL IN SLITTING 14

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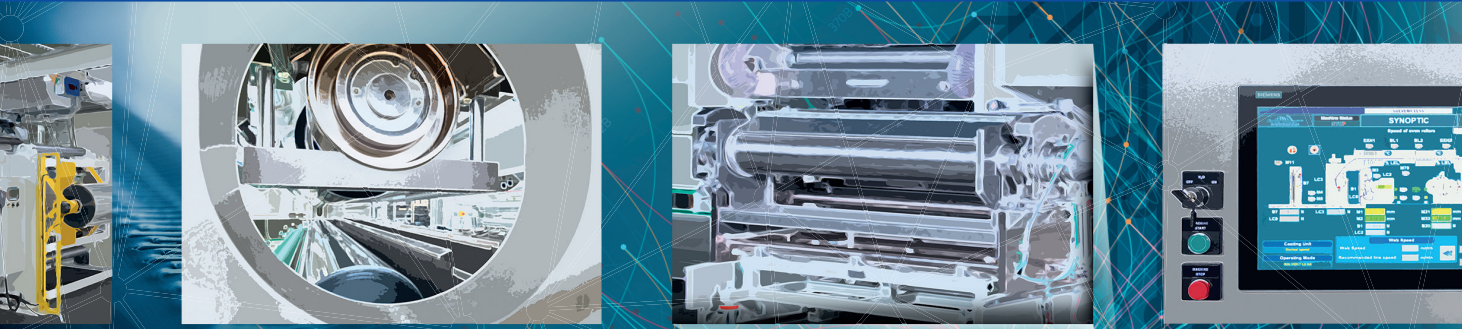
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The "How To" Review



Angel Morris
Editor

Long before Audible or Amazon, books teaching us "how to" existed in mass. Heck, before books were ever printed, "how to" was the topic of topics when stories were shared from person to person: How to build fire, how to hunt and gather and how to avoid extinction were quite likely among the daily discussions of cavemen. The "how to" genre is one that will never cease to exist because it addresses not only current day-to-day challenges (like keeping up with ever-changing technology) but also bigger issues (like raising healthy families and being a positive contributor to society).

One of the best-selling books of all times, in fact, is a "how to." Written in 1936 by Dale Carnegie, "How to Win Friends and Influence People," has sold more than 30 million copies. Credited as one of the first self-help books ever, it is periodically updated to remain relevant, sells an estimated 250,000 copies per year and continues to influence other books of the same theme. In 2013, it landed as the seventh most influential book in American history based on a survey by the Library of Congress.

While any how-to book may offer valuable insight, most of us want explanations of how to be better at something important to us than we currently are — even if we're pretty good at that something already. To that end, this month's magazine shares "how-to" instructions from some of the leaders in our industry. Eliminating press downtime, understanding surface activation and upping your hole punching game are just a few of the ways this issue discusses how to improve upon what you already do!

This month we also announce something new in 2024, PFFC's *Pouches & Printing Focus* — three special editions devoted to the flexible packaging topics most important to converters and package printers. Innovation and sustainability are key focuses as demand grows for flexible packaged products, and advances in machinery, automation, materials and processes are some of the topics that will be covered. As 2023 winds down, we're excited to present this opportunity in the new year! Check out our Editorial Calendar online to learn more at <https://www.pffc-online.com/advertise-print-online#mk-calendar>.

Angel Morris
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P.S. If you are interested in contributing a thought leadership piece from an industry expert perspective next year, please contact me at the email address above.



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Managing Print Quality on Multiple Levels

By **Mike Simonis**, President, Unilux

There are three ways to inspect the printed web during full production speed: Micro, macro and 100 percent. A combination of micro and macro is the most efficient way to protect your reputation for quality.

Wide area strobe lights allow operators to see 100 percent of the web width.

- This method is used to reduce print mistakes down to 1 percent.
- It allows for 100 percent inspection of the full web that allows the operator to see voids, skips, streaking, scumming (fogging), misprint and out-of-registration defects.

- This is defined as MACRO inspection.

Although good, there are times when an operator needs to get a more detailed view by looking directly at the dot matrix that makes up the print. Figure 1 shows the print your eye sees on a

There are times when an operator needs to get a more detailed view by looking directly at the dot matrix that makes up the print.

final label. These colors are made up of an array of color dots to provide different shades of any color and great detail in the print. The positioning of these dots and how they overlay each other are critical to print quality.

Camera-based systems allow the operator to zoom in on the image.

- Figure 2 shows the alignment (registration) of the different colors to get the best image possible.
- Magnification (up to 18x) allows the operator to see if there are problems with the cylinders such as smearing, clumping or even missing dots.
- This type of print defect would have to become very bad before it would be picked up with stroboscopic inspection.
- This type of inspection only allows up to 0.1 percent to 0.5 percent of the printed web to be inspected.
- The camera works its way across the entire web in small sections.
- This is defined as MICRO inspection.

By varying the level of zoom, a camera-based system can do this Micro analysis of each impression



Figure 1: The print your eye sees on a final label. With macro inspection, an operator is able to see voids, skips, streaking, scumming (fogging), and out-of-registration defects.

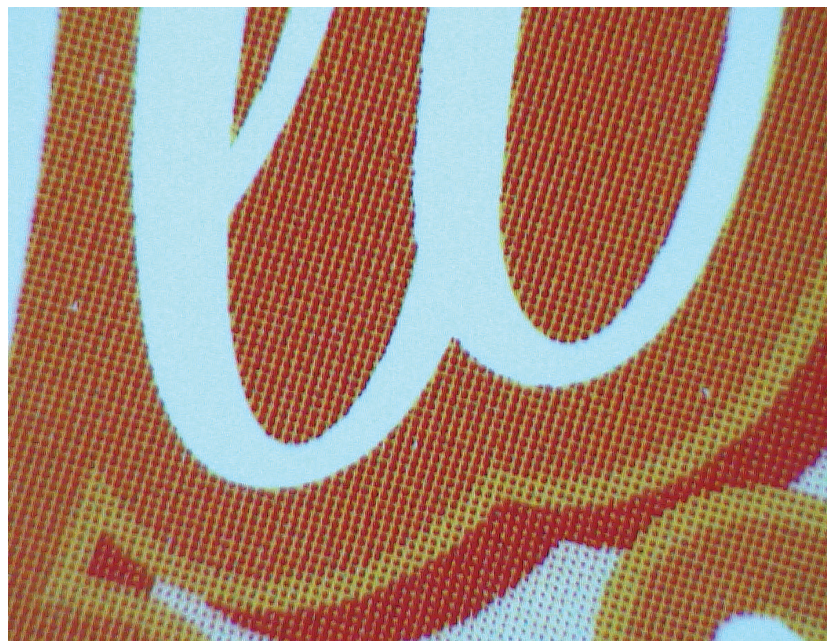


Figure 2: Micro inspection shows the alignment (registration) of the different colors to get the best image possible.

or zoom out and look at the final full impression in that area of the web. Just as with Macro analysis, there are drawbacks.

- By zooming out, a printer can

achieve up to 2 percent of the full web inspection.

- If streaking or smearing starts to occur on one side of the web, it is possible that it

could start and stop before the image is captured with the camera.

- Even if it is captured by the camera, what is the amount of waste that was not seen fast enough?

The ultimate form of in-line inspection is a 100 percent inspection system. By using multiple area scan cameras or line scan cameras across the entire web, printers can see and capture 100 percent of the web width. These systems can be very expensive and most small- to mid-sized businesses have a hard time justifying this cost, especially if they have multiple presses.

The most efficient form of inspection is a combination of Micro and Macro.

When used together ... these complimentary systems create the most efficient method of maintaining print quality at an affordable cost.

Either Micro or Macro inspection solutions are adequate for quality control. When used together, however, these complimentary systems create the most efficient method of maintaining print quality at an affordable cost, as well as a backup should technology in either method fail.

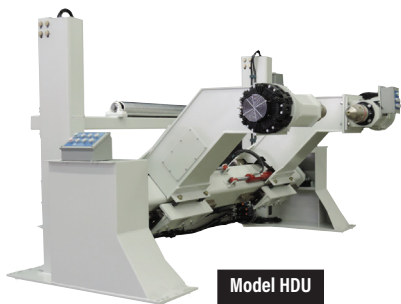
When only one method is

used, printers are forced to run blind during production with only a visual inspection at the end. By having either Micro or Macro inspection as a backup, they can run with the confidence that they will catch a defect and correct it without losing the entire print job. ■

ABOUT THE AUTHOR

Mike Simonis is the President of Unilux. Founded in 1962 to serve the motion film industry, Unilux quickly expanded to inspection solutions for manufacturing. Today, Unilux provides Micro and Macro inspection solutions, helping printers, converters and packaging brands maintain the highest levels of quality control.

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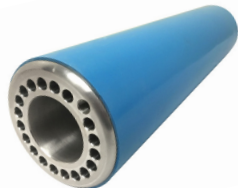
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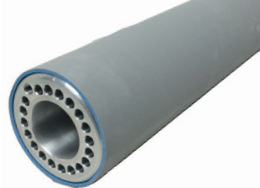
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Gravure Print and Coating Quality Contenders

By Tom Kerchiss, chairman, RK Print Coat Instruments Ltd.



K Printing Proofer with Gravure Head

Print buyers, packaging technologists and others with an interest in printing and converting processes such as coating and laminating will be aware that the market for gravure has changed and that in many respects gravure has shifted direction.

Gravure once tended to be associated with the printing of glossy publications, fashion, TV Guides, mail order catalogs and quality newspapers. It was the process most closely able to accurately replicate and reproduce a photographic image on the page. It came into its own with the printing of weekend color supplements and pull out comic/fashion and lifestyle sections of national newspapers; those with big circulations that relied on photo-quality print to attract and keep readers and advertisers happy.

But as we all know from experience, times change and so, too, do the markets. Printers and converters and the processes they use have to adapt. Gravure as a process is resilient and adaptable.

Publication and catalogue printing declined over time, for the most part brought about by

declining circulations, falling advertising revenues and the introduction of digitized editions of magazines and other publications.

Fortunately, gravure was never just about publication printing. Consider for example, decorative laminates. Decorative laminates are one of a number of design options to enhance the appearance of homes, conference centers, hotels and entertainment venues. Decorative laminates are widely used for automotive, marine and aeronautic applications, indeed any area where attention is given to presentation, comfort and luxury.

Decorative laminates are structures made of multiple layers of film and other materials combined together which are printed and converted using printing processes such as gravure print and coating. On completion the finished product simulates very expensive and often scarce, difficult to extract or manipulate, heavy metals, hard woods and ores.

Materials that can be realistically rendered include mahogany, teak and ebony, chrome, brick, granite, marble and much more besides. Sometimes they can be

manufactured in the form of foils.

Regardless of the appearance of the end product, the majority of printed/coated layers consist of clear layers, decorative layers and a core base or foundation layer. Most items begin with a clear coat that is either produced via extrusion or manufactured using a cast film technique so as to create a lower stress product. The resultant clear-coated layer is often of a high gloss but it can be of a matte finish or manipulated to produce a textured finish.

The next stage in the process is to apply some form of decoration in with the clear coat. The function of the clear coat is to protect the decorative medium from the rigors of the environment. For applications where the main decorative theme is a pattern or patterns, the gravure print process is employed as nearly any pattern can be duplicated or repeated on a continuous basis. Technical finishes, brushed and distressed metals; wood grains; organic patterns or themes can all be rendered looking genuine and natural using gravure print processes.

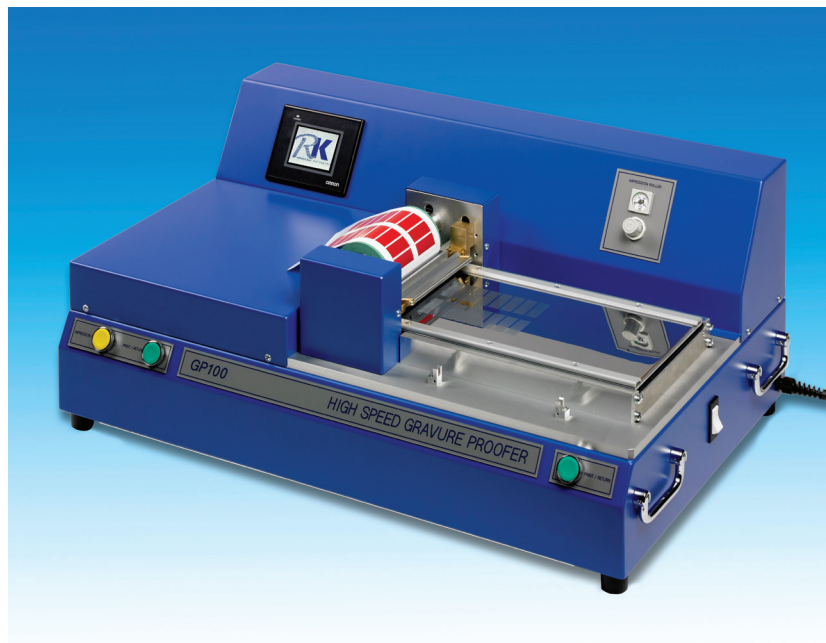
The decorative printed layer

is positioned between the clear layer and the substrate. A primer is applied to the substrate to ensure optimum adhesion. The decorative layer must be protected as many laminates, for example kitchen worktops, are subject over time to the harsh abrasive action of chemical cleaning products. The base layer is much thicker than the other layers and provides the rigidity and strength that the structure needs.

Higher press speeds and low waste are claimed benefits. The process is also simple to execute and once gravure is set up and running there is theoretically little to go wrong.

Gravure printing and coating of décor offers practical, functional, aesthetic and economic benefits. For a moment consider the gravure printing of a wood grain pattern for laminate flooring. With a natural wood product there are natural geometrical limitations in that the wood grain effect only stretches within defined parameters. Gravure, on the other hand, permits any number of repeats to be made.

Because of gravure's remarkable density range it is also used for printing fine art prints, greeting cards, gift-wrap and for security items and for other applications where presentation is important. Gravure has and is being used for packaging work, often for quality driven flexible packaging. For added value work, inline operations are well suited to gravure. Cold seal, varnishing,



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laminating and sheeting are a few of the possibilities.

Higher press speeds and low waste are claimed benefits. The process is also simple to execute and once gravure is set up and running there is theoretically little to go wrong. Gravure can, if need be, work well with cheap or poor quality papers.

Gravure coating differs from gravure printing in that gravure coating provides uniform coverage of the substrate whereas gravure printing prints defined patterns with good edge definition and resolution. Some electronic products however require uniform coverage and good edge definition.

Gravure is available in a number of arrangements. Common variants include direct/in-direct, reverse and gravure offset, etc. The gravure direct uses engraved anilox cylinders with various cell shapes, screens and depths to apply for example, lacquers and varnishes. Coat weight is determined by

gravure roll volume and by coating solids. Gravure-offset can be used where the design benefits from the softening effect that the rubber-offset roller provides. Areas of applications include the printing of frozen food packaging. Low coat weights are one the most important benefits. But, regardless of the coating method, experimentation to see what works best is recommended in order that commercial and product viability requirements are met. ■

ABOUT THE AUTHOR

Tom Kerchiss is the chairman of sample preparation system and print/coat/laminating technology specialist RK PrintCoat Instruments Ltd. The company, which won an Innovator in Pre-Press Award for the FlexiProof 100, supplies printing ink manufacturers, both large and small, as well as printers, converters and other businesses with color communication devices for all of the major print disciplines.

Do Not Ruin a Good Thing ... Practice Good Static Control in Slitting

By Dr. Kelly Robinson, Founder, Electrostatic Answers

Good static control is needed in slitting because this is often the last production operation before shipping to the customer. Is it OK to dissipate static only in slitting? While this seems sensible, practice good static control upstream to minimize static charges stored on the unwinding wide roll in slitting. The best that we can do in slitting is “not to ruin a good thing.”

The two over-arching static control goals are (1) to deliver static-free product to customers and (2) to minimize air-borne debris deposition on the slit web. Slitting can generate a large amount of slitter debris; particles and slivers that break away from the slit edges.

Static charges on the web attract this air-borne debris. While we can minimize contamination with good air flow management, we also need to dissipate static charges on the web entering the knives. And, we need to neutralize static charges on the winding slits.

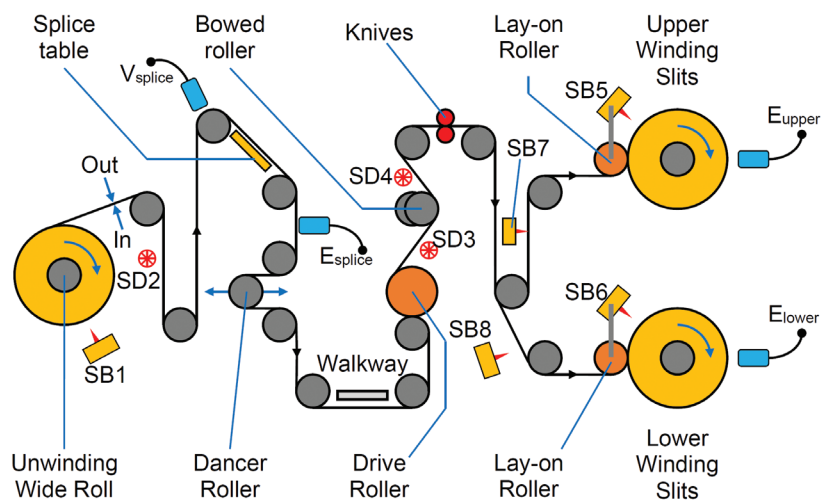


Figure 1: Six static dissipaters are needed on this typical slitter. SB7 and SB8 are optional.

The typical slitter in Figure 1 may be divided into three zones, each having its own static control goals.

1. **Unwinding Wide Roll to Drive Roller** – Neutralize static on the Unwinding Wide Roll.

- 2. **Drive Roller to Knives** – Dissipate static charges from Drive Roller.
- 3. **Knives to Winding Slits** – Neutralize static charges accumulating on Winding Slits.



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In Zone 1 from the Unwinding Roll to the Drive Roller, two static dissipaters are needed to neutralize static on the web exiting an unwinding roll.¹ Powered static bar SB1 in Figure 1 neutralizes static charges on the outside of the unwinding roll. Passive static dissipater (e.g., tinsel, static brush, ionizing cord) SD2 neutralizes static charges on the inside surface of the web exiting the unwinding roll. Powered static bar SB1 must be a long-range static bar because the distance from SB1 to the unwinding roll increases as the roll expires.

The web entering the Splice Table should be nearly charge-free with SB1 and SD2. Verify this by measuring the static charges on the web. Slitters are often congested making it difficult to find

locations to reliably measure static charges on the web. However, usually there are measurement locations near the splice table. Use an electrostatic voltmeter to measure V_{splice} to verify that powered static bar SB1 is functioning properly. V_{splice} should not exceed ± 0.5 volts per micron of web thickness. For example, when running 2 mil (50 μm) thick polypropylene, V_{splice} should not exceed ± 25 volts. Use an electrostatic fieldmeter to measure E_{splice} to verify that passive static dissipater SD2 is functioning properly. E_{splice} should not exceed ± 5 kV/in.

In Zone 2 from the Drive Roller to the Knives in Figure 1, two static dissipaters are needed to neutralize static from the Drive Roller and from the Bowed

Roller. Passive static dissipater SD3 neutralizes static charges on the web from touching the Drive Roller. Polymer covered rollers can deposit large amounts of static charge on the web. The charge is on the web surface that touched the polymer roller. Install SD3 on the web span exiting the Drive Roller facing the web surface that touched the Drive Roller.

The Bowed Roller in Figure 1 prevents wrinkles and creases in the web entering the knives. While this is very important, bowed rollers can deposit significant amounts of static on the web surface that touches the roller. This static charge can attract slitter debris. Install passive static dissipater SD4 on the web span exiting the Bowed Roller facing the web

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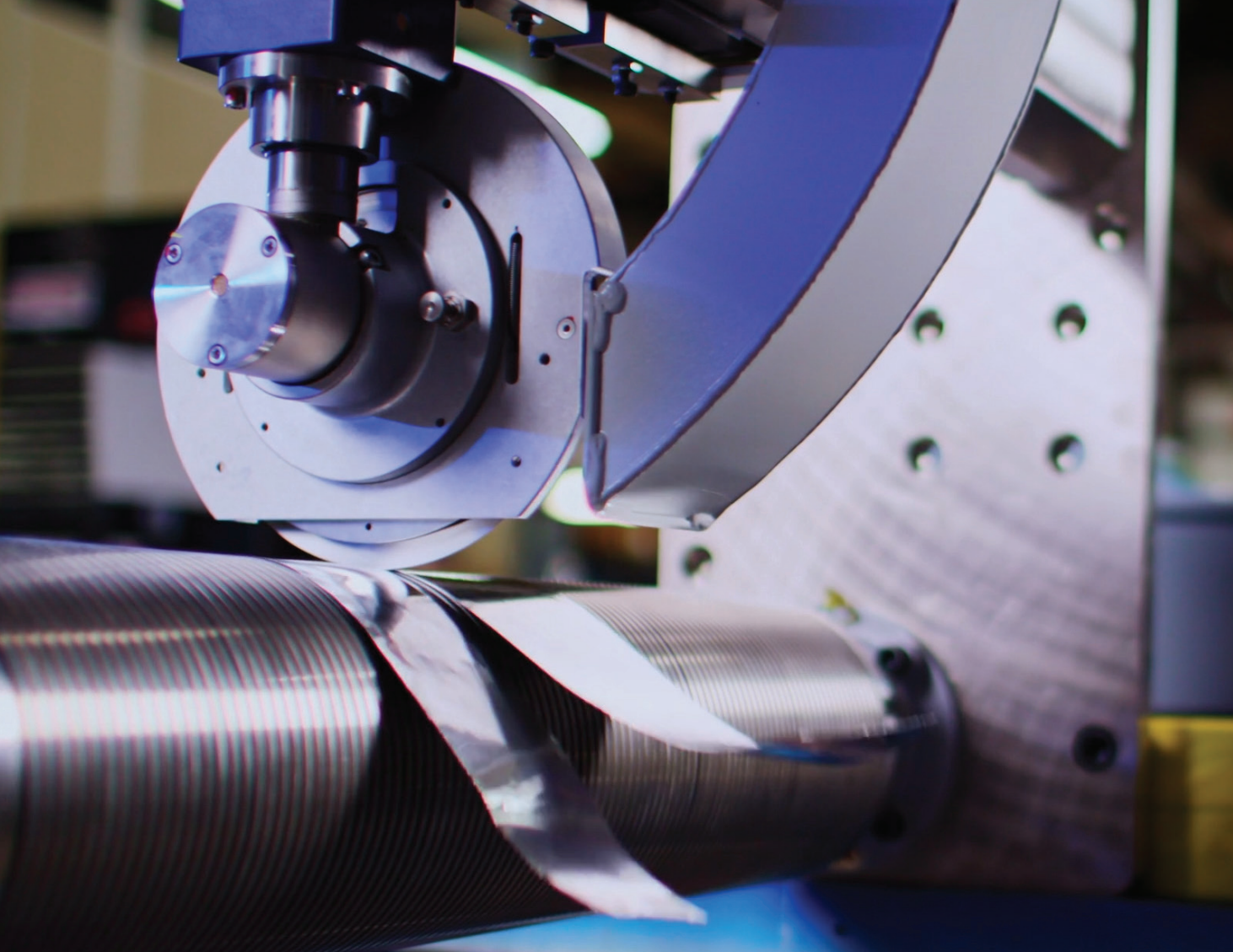
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surface that touched the roller.

The web entering the knives should have only a low level of static charge. However, measuring the web charge in this area is difficult because this area of a slitter is often congested and guarded.

In Zone 3 from the Knives to the Winding Slits in Figure 1, the slits will have some static charges along the slit edges, which is difficult to neutralize. Usually, installing powered static dissipaters SB5 and SB6 to neutralize static charges on the winding slits is sufficient. These static bars may be installed on the frames of the lay-on rollers so that the distance from the static bar to the surface of the winding slits remains constant. Use a mechanically strong static bar because vibrations will limit

the service life. Choose a static bar having epoxy-case component rather than a bar having a plastic housing held together with screws.

Use an electrostatic fieldmeter to measure E_{upper} and E_{lower} in Figure 1, which detect the static charges on the winding slits. E_{upper} and E_{lower} should not exceed ± 5 kV/in.

To further improve static control to minimize web contamination, install powered static bars SB7 and SB8 on the slit webs to neutralize static charges along the slit edges. Powered static bars are needed because the passive static dissipaters will not neutralize static along the slit edges.

Use good static control upstream of slitting to minimize static charges stored on the wide

roll. The over-arching static control goals for slitting are to deliver charge-free slits to the customer and to minimize contamination from slitter debris. ■

- 1 K. S. Robinson, "Static Control for Roll-to-Roll Manufacturing," IEEE Transactions on Industry Applications, vol. 59, no. 1, pp. 93-103, Jan.-Feb. 2023

ABOUT THE AUTHOR

Dr. Kelly Robinson writes on static issues occurring in converting processes. Robinson founded Electrostatic Answers, has 40-plus years experience in industrial problem solving and was named Top Manufacturing Consulting Services Provider 2023 by *Managing MFG*. He can be reached at Kelly.Robinson@ElectrostaticAnswers.com.

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Web Handling, Proper Tensioning & Guiding

By **Bob Pasquale**, President New Era Converting Machinery

A key requirement of every web processing line is the ability to properly handle and convey the web among the various machine sections. Though much time is typically spent focusing on the unwinding, winding, coating, drying, laminating and embossing sections, typically very little time is spent on the equipment sections that are required to allow for the proper handling and conveying of the web from section to section.

The proper handling and conveying of the web covers many areas including:

- Assuring that proper web tension is provided and maintained into, out of and between the various equipment sections;
- Assuring that the web is provided to the next section and removed from the previous section at the proper speed/rate;
- Assuring that the web is delivered to the next section at the required temperature.

Additionally, in certain web processing lines there is the need to change the orientation of the web, whether by:

- Turning it at right angles to the main web direction;
- Inverting it during processing.

In this issue and next, we will break into four major categories

the equipment that is required for the above to occur: Pull Rolls, Heating and Cooling Rolls, Accumulators, Web Turns and Web Flips. For each of these equipment categories we will discuss the need for it, the uses of it, the factors and considerations that go into the design and selection of it, and the pros and cons associated with the selection.

Tension Control of the Unwinding Material

The two major areas to address regarding unwind tension control are the need for constant tension control and the method of generating the tension.

The Need for Constant Tension Control — On a center unwind, web tension is applied by using a device to impart a drag on the shaft/spindle that holds the web roll. This drag force results in a torque on the unwind roll.

The torque is related to web tension through the following formula: $Torque = Force \times Radius$ Where Force = the web tension and Radius = the radius of the unwinding roll. Therefore, in order to keep the web tension constant, the torque needs to be adjusted as the roll size changes.

Non-Constant Tension System = A system where no adjustments are made to the drag force, resulting in a system where the

web tension varies as the unwind roll diameter changes. Advantages: Minimal cost, minimal maintenance. Disadvantages: Web tension varies as the unwind roll diameter changes.

Constant Tension System = A system where adjustments are made to the drag force as the unwind roll diameter changes, resulting in a constant web tension. This can be with no web feedback such as sonic sensor to measure the unwind roll diameter and adjust the drag force accordingly or with web feedback such as a force transducer or dancer to automatically maintain constant tension. Advantages: Allows for the web to be delivered to the process under constant tension. Disadvantages: Costly; requires extra space; higher maintenance.

The Method of Generating the Tension — One must decide on what type of device should be used to generate the web tension. Typically this is done through the use of either a brake or a motor/drive set. Braked System Advantages: Less costly to purchase, install and operate; easier to operate; minimal maintenance; pneumatic brakes are excellent for use in a hazardous environment. Disadvantages: Limited total tension range; may be difficult to use at low tensions; not good for use with damaged rolls; may not work well during roll acceleration where the



Multi-Spindle Driven Unwind System

acceleration force is greater than the required web tension; not good for applications where the web roll needs to be accelerated prior to unwinding

Driven Unwind Motor/Drive System Advantages: Greater total tension range; good for use at low tensions; good for use with damaged rolls; works well during roll acceleration where the required acceleration force is greater than the web tension; good for applications where the web roll needs to be accelerated prior to unwinding
Disadvantages: More costly to purchase and install, especially in a hazardous environment; higher maintenance; not good at low speeds, where reflected inertia is an issue.

Guiding of the Web as it Exits the Unwind

An important consideration is the need to guide the web as it exits the unwind. Though some

unwinds are provided without the means of adjusting the web's cross machine position, most include some form of adjustment, either as a manual or automatic system.

Manual System — A manual system is where either the roll of web or entire unwind is manually shifted in the cross machine direction. **Advantages:** Low cost; minimal maintenance. **Disadvantages:** No method for precision adjustment of the web location; no method for continuous adjustment.

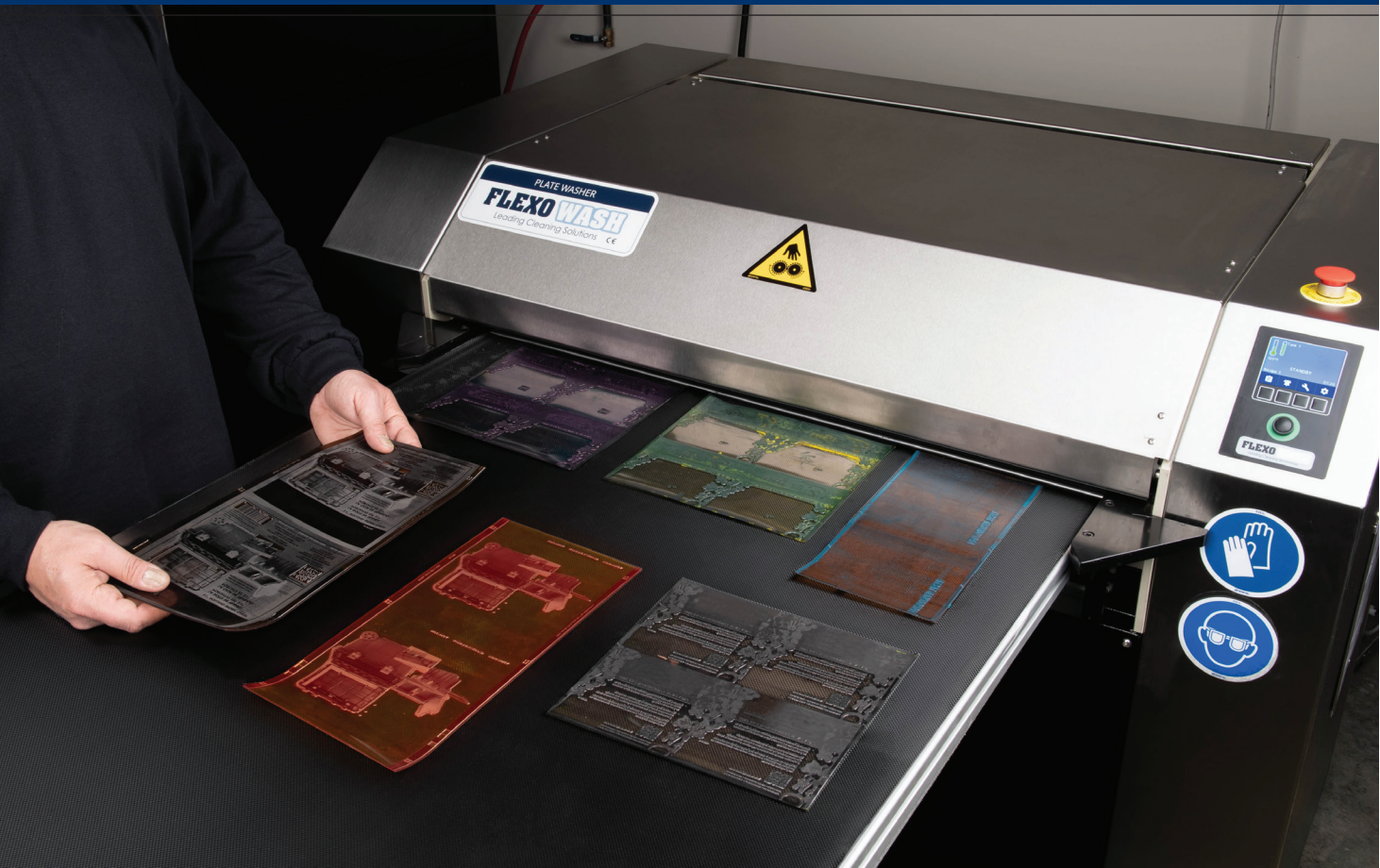
Automatic System — An automatic system is one where the web location is continuously sensed and automatically corrected. This can be edge, line or center guiding and uses an actuating device to adjust the web's position by moving the unwinding roll or entire unwind in the cross machine direction, or by pivoting a roll or pair of rolls that the web passes over upon exiting the unwind to steer it to the desired position.

Advantages: The web is automatically guided to a precise location; guiding of the web is continuous. **Disadvantages:** Higher cost of equipment; higher maintenance.

Next month we will continue the discussion, addressing splicing expiring rolls onto the new roll's web, how the expiring roll's web will be cut, number of unwind positions and roll-to-roll vs. continuous winding. ■

ABOUT THE AUTHOR

Bob Pasquale is one of the founders and principals of New Era Converting Machinery, where he serves as President. He holds a degree in Mechanical Engineering from Stevens Institute of Technology and has worked in the web converting industry since 1985. He is the holder of several patents in the industry. Bob can be reached at bob.pasquale@neweraconverting.com.



Return On Investment is the Primary Reason to Automate Your Cleaning

By Patrick Potter, President, Flexo Wash US

Capital investments generate value when their results are stable and predictable, leading to an overall increase in production and profit. Here is an overview of things to consider when calculating the Return on Investment on these expenditures.

Return on Investment (ROI) is a deciding factor when considering purchasing new equipment for your production line. Why is it the most important factor?

ROI calculation will not only tell you how fast your cleaning system will pay for itself, it will show you how you are actually losing revenue and profits by not purchasing this equipment.

Investing in a cleaning system for your pressroom is a decision to automate a process. Automation brings immediate results: boosted throughput, faster turnaround times, shorter runs, improved quality and a labor savings.

The factors that affect the ROI are generally the same for each converter, but the details will vary depending on the machine.

What Affects the ROI?

There are several factors that affect the calculation of ROI, most of which boil down to quality control issues. A simple overview evaluation can uncover a lot of issues

regarding your production, scheduling and cost operation. Here are a few things to consider when evaluating your production process:

1. Labor expense — Good labor is hard to find, especially labor that is committed to manual cleaning all day. Automating positions formerly done manually by individuals frees those people up to do other, more valuable things in your pressroom.

Also, as printing presses modernize, jobs are more complex, runs are shorter and there are more changeovers in a day. How many changeovers you have in a day definitely impacts your cleaning. A backlog of dirty press parts

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makes changeovers that much harder. At the heart of the pressroom is people, making sure that all of these operations are occurring in line with your production schedule.

How much you spend on labor, and on all the variables that go with labor such as sick days, shortages, human error, etc. contribute to your bottom line.

2. Cost of wasted material — Wasting materials on a project that has to be thrown out may not seem like a big expense, but all of these detract from your earnings in the long run. Materials such as substrate, ink, broken plates, damaged anilox rolls etc. are all elements that do not contribute to the finished product, thereby registering as a loss.

3. Downtime — Downtime is a natural part of the production process for one reason or another. But, it is important to notice your downtime, how often it happens and how long it lasts. It is important to note your price per minute production cost — how much it costs for every minute you are down.

The Things You Cannot Measure

The primary result that you cannot measure is an increase in employee morale. Giving your employees the tools they need to succeed and meet goals is a sign of respect. Respecting your employees and letting them have ownership in their success is the best investment a company can make.

Time and time again, converters give the same feedback about automating their cleaning systems ...

Tara Halpin, Steinhauser: "It is amazing how thankful our guys are to have these tools available to help them do their job more effectively.

"I cannot imagine running a print facility without one. The efficiency this creates for your press crews, the reduction in make-ready times, damaged plates and the appreciation you will get from your team makes it a no brainer."

Todd Luman, Interprint: "The system has lasted due to our preventative maintenance program and a dedicated group of individuals (operators) who take pride in their work environment and respect the equipment they use."

What Should You Do?

Calculating your ROI is a lot more than just plugging numbers into a formula. Each company has

specific issues that contribute to their decision. Evaluating your pressroom points of pain related to labor, downtime and material costs will help pinpoint what system is best for you. Most importantly, giving your employees all of the tools they need to meet production goals will increase your profit and revenue stream for years and years to come, long after the machine has paid for itself.

The Truth

Here is the truth that all businesses either know already or need to know about the future:

**Whatever CAN be automated
WILL be automated.**

Makes sense, right? Workers are harder to come by but production needs to be maximized. Downtime is unacceptable and a huge liability. Businesses in the printing industry that formerly had full pressrooms of employees are a thing of the past. Automation is the future. Actually, automation is YOUR future.

This is better than the alternative, right? Nobody can afford to waste the manpower, the valuable time or the poor output of manual cleaning anymore. The market is too competitive.

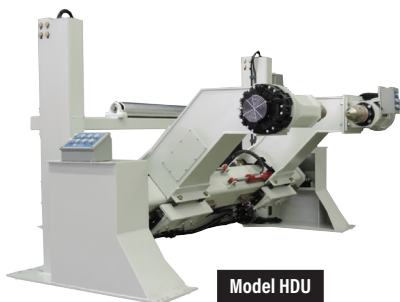
The advantage to automation is that it is constantly innovating. For converters, they can decide how much automation they want for their business, ranging from printing processes to cleaning

processes. Depending on their points of pain and what level of production they need to achieve, the level of their automation is in their hands. ■

ABOUT THE AUTHOR

Ten years ago, Patrick joined his father Mike Potter and his brother Ryan Potter at Flexo Wash US. As President, he has been involved in growing the company to over 5,000 installations in 95 countries across the globe offering Leading Cleaning Solutions to their customers. A Louisville, Kentucky native and a graduate of Xavier University, Patrick is a board member of TLMI and is actively involved in the printing industry. Patrick can be reached at 888-493-5396.

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Materials Lead The Way

By **Susan Stansbury**, Industry Consultant

Increasingly, materials are going beyond their functionality of just a few years ago. Several factors account for looking at substrates as super performers. Careful selection is both critical to good outcomes and can also be a detriment to product design. It pays to know how to figure out selection of these base layers.

To understand the myriad possibilities in materials choices, these are some of the factors to consider:

- Materials building blocks begin with pulp, fibers, resins and all the raw strands that come together to form a web.
- Web forming processes determine how the items above make a continuous mat that has certain strength (tensile, tear, machine direction, cross direction), smoothness or rough results, ability to combine with other materials and so forth.
- The range of web forming machines continues to evolve to meet the needs of substrate designers. Papermaking via fourdrinier or cylinder or combinations is still the mainstay.

Then nonwovens came into play.

- Then, add on nonwovens that spun out of papermaking such as airlaid which offers the prospect of combining fibers or layering the mat. When introduced before 1990, it was airlaid paper, and then the more modern-sounding term became airlaid nonwoven.



Many factors must be considered in the selection of materials.

- Airlaid machines deliver materials ranging from very lofty and absorbent outcomes for bed pads and similar hygiene products, to thinner materials used in cutlery wraps, wet wipes, dry wipers and combine with other materials. Specialty “fluff pulp,” plus synthetic fibers and resins are common raw materials.
- Domtar’s Engineered Absorbent Materials (EAM) facility in Jessup, Georgia, recently celebrated the completion of a \$90 million project adding a large-scale airlaid production line. The EAM expansion makes Domtar a leading nonwovens provider.
- At Glatfelter, headquartered in Charlotte, NC, spunlace and airlaid “upgrade the performance of pads and increase the softness of the total product. The special blend of fibers is

chosen for a faster multiple acquisition time and competitive rewet performance. The surface structure supports process-ability on converting lines.”

- Stronger nonwovens webs incorporate synthetics such as polyester and polypropylene made in other processes, from hydroentangling and spunlacing to needlepunch equipment. Again, results range from thin to very thick. Needle-punched substrates have been enjoying a renaissance from the older equipment to current “boutique” machines engineered to offer more final benefits, including high loft and scrubbing ability.
- In recent years, combining these materials has played a crucial role in making masks, with three-layer fabrics sandwiching an inner layer that filters Covid. At Biax-Fiberfilm polymer resins are transformed into fine microfibers and converted into a nonwoven web in one step via a conventional Meltblown system or their proprietary and patented Spun-blown® system technology.

Combinations offer an advanced role.

- From adhesives, liners and face stocks, changes roll out. “Direct Thermal Linerless blank labels manufactured in Ohio, offer excellent thermal sensitivity and consistent release. Our portfolio is available with semi-permanent and

removable emulsion adhesives to allow you to meet a variety of application needs,” according to Avery Dennison.

- Promoters continue to tout their products that contain bamboo. I still question the distance to transport this material to U.S. converters and processing needed to treat the material for use.

Then there are plastics.

- Different plastic films offer great strength, heat resistance or melting ability and many properties that make them great stand-alone options ... or suitability to combine. When combined with airlaid, for example, one side can be absorbent and the other side moisture resistant such as for dental bibs.

The environmental dilemma.

- It's no secret that sustainability has moved up the list when it comes to raw material sourcing, along with the standard requisites, quality, efficiency,

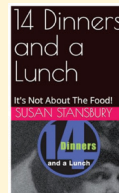
cost and processability. While downstream activities are vital to bringing sustainability to life in tangible ways through products and partnerships, there is considerable value to be discussed in the actions being taken upstream to reduce our footprint, according to *Nonwovens Industry*.

- The problem is: Every day, the equivalent of 2,000 garbage trucks full of plastic are dumped into the world's oceans, rivers and lakes. Plastic pollution is a global problem. Every year 19-23 million metric tonnes of plastic waste leaks into aquatic ecosystems, polluting lakes, rivers and seas. Further, “We will not recycle our way out of the plastic pollution crisis,” reported the UN Environmental Program.
- Source reduction, using less plastic, creating less waste, is always a first environmental effort.
- Some materials providers are trying to improve their environmental posture in other, indirect ways. “As the global personal care giant's first wind farm project outside of

North America, the 50 MW 12-turbine Cumberhead facility will supply the company with approximately 160,000 megawatt hours (MWh) of renewable energy every year. It's an onshore wind farm that will supply around 80 percent of its U.K. electrical power. According to *Nonwovens Industry*, this will result in a total emissions reduction of 55,625 MT CO₂e per year — the equivalent of taking 38,628 passenger vehicles off the road every year. ■

ABOUT THE AUTHOR

Susan Stansbury is a converting advocate with extensive experience in paper, converting, printing and related industries serving in roles including sales, marketing and product development. She is also the author of a new e-book, *14 Dinners and A Lunch: It's Not About the Food*, sharing stories about her decades in the industry.



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INDUSTRY NEWS



Toray Plastics Receives International Sustainability and Carbon Certification

Toray Plastics (America), Inc., has received the International Sustainability and Carbon Certification (ISCC) for locations in North Kingstown, Rhode Island, and Front Royal, Virginia. The ISCC is the world’s largest certifications system with more than 50,000 valid certificates and 250 members in 130 countries.

The sustainability certification system covers all sustainable feedstocks, including agricultural and forestry biomass, biogenic wastes and residues, and circular materials and renewables. Chain of custody can be established for Toray’s recycled scrap, resin and films. A list of ISCC certificates and statements of conformity can be found here: <https://www.iscc-system.org/certification/certificate-database/valid-certificates/>.

Carton Council of North America Podcast Goes Live

“The Road to Recycling: A School Striving for Zero Waste” features Jeremy Drake of Strategy Zero Waste Solutions and Michele Wagner, Carton Council schools and field team member. This audio-only podcast features a discussion on why schools across the country have been striving to become more environmentally

conscious. Listeners will hear how it’s being done in schools in Missoula, Montana including obstacles faced and tips for diverting additional materials from the school waste stream.

Listen at <https://open.spotify.com/episode/4rVQRkyHxcD106xmQrkR9Y>.

Martin Automatic Installs Renewable Energy

Martin Automatic, global supplier of splicing and rewinding systems, has announced a recent investment in renewable energy at its headquarters in Rockford, Illinois, with the successful implementation of a solar panel project that will help power its manufacturing center.

Martin has been evaluating the solar initiative for several years culminating in roof modifications on its 170,000 sq. ft. facility, a white silicone reflective coating being applied, and a total of 2,800 solar panels being installed in three different fixed planes to harness the sun’s light most efficiently. The 1.2-megawatt system represents one of the largest building solar installations in northern Illinois.

Initial results indicate savings greater than were originally projected, with the company reporting a reduction in electricity costs of more than 75 percent from the same period last year.



Martin Automatic solar panels at its Illinois plant.



Sergio Casella, President, BWCS Hygiene Division, and Kerem Coskuner, Baris Coskuner and Beyza Bozkurt of Unitek.

PCMC, Unitek Paper & Chemicals Form Alliance

PCMC, specializing in the design and manufacture of high-performance converting machinery for the global tissue, nonwoven, hygiene, package-printing and bag-converting industries, has entered into an alliance with Unitek Paper & Chemicals.

PCMC is part of the new BW Converting Solutions (BWCS) platform, Hygiene Division. Istanbul-based Unitek Paper & Chemicals was founded by Dr. Umit Coskuner in 1999. It represents internationally renowned companies in the pulp and paper sector.

PRODUCT NEWS

Mark Andy Adds Retrofit Option to its Digital Inkjet Offering

Mark Andy has partnered with Domino to further extend its Digital Series iQ product line. DSiQ-R is a retrofit digital inkjet module designed to integrate with

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WE HOST THE INDUSTRY'S TOP EVENTS...

Each year TLMI hosts three in person events across the country where members learn about industry trends, participate in panel discussions and peer groups, and create connections with other industry leaders.

THE FACTS



SCAN TO JOIN TLMI!

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event satisfaction

65%

label industry sales revenue attributed to TLMI members

90

TLMI is celebrating it's 90th anniversary this year

Mark Andy Evolution and Performance Series press platforms for a fully hybrid, single-pass production solution. The 600dpi engine, powered by Domino technology, accommodates web widths up to 13.4 inch (340mm) and in production mode runs up to 230 fpm (70m/min), bringing higher productivity to versioning and multi-SKU jobs. Available with four (CMYK) or five (WW+CMYK) color modes, it mounts directly to the press, making high-end label enhancements including cold foil, lamination or diecutting a reality in single-pass production.

The DSiQ-R is equipped with iTech features including ActiFlow2, CleanCap2 and SetAlign. Software integration is

seamless, with the Digital Front End (DFE) included, and a single user interface makes job set-up and management intuitive. All equipment is compatible with Mark Andy's sMART link technology.

Nordson to Introduce New Compact Coat Weight System

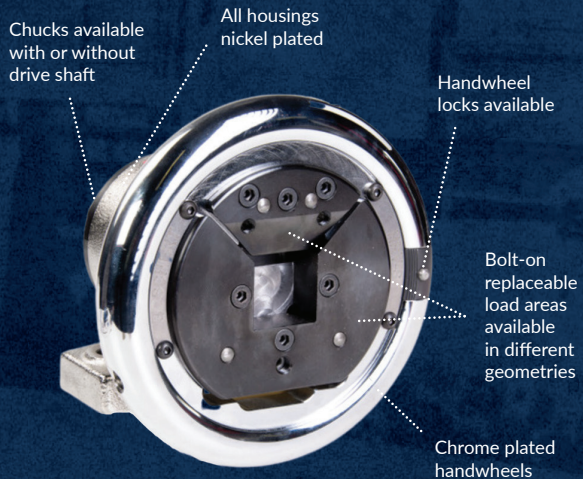
Nordson has developed a new compact coat weight system for adhesive measurement of flexible packaging manufactured on coating and laminating lines — the CW 9000. The system is built upon Nordson's proven Pro.Net Total Distributed Intelligence system. It includes the new compact CW 9000 sensor combined with the

new LPS 1000 Scanner.

At the heart of the CW 9000 gauge is Nordson's infrared sensor engine adapted through extensive R&D and proven with on-line testing. Fast bi-directional scanning updates at the end of each scan with maximum coverage of your production run. Unique infrared optics are coupled with advanced algorithms to achieve measurement resolution and performance meeting the quality demands of the flexible packaging industry. Applications include clear films, printed films, aluminum foils, as well as metallized film or paper. The sensor is highly flexible and capable of measuring other coatings besides polyurethane. The LPS 1000 fits inside the frame of compact coating machines. ■

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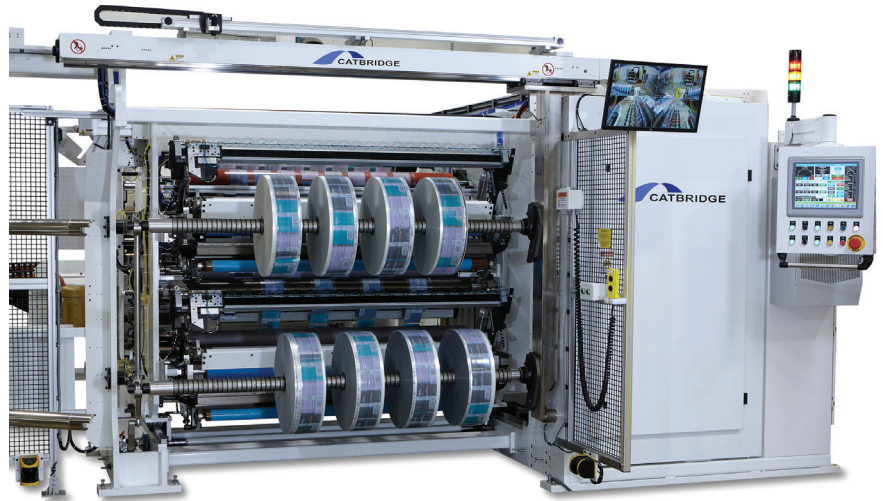
HOW TO: Combine the Capabilities of a Duplex Center Winder with the Productivity Gains of a Turret

Introducing the Catbridge 900MC: The best of both worlds

The innovative 900MC combines the capabilities of a duplex center winder with the productivity gains of a turret. The 900MC can rewind to a 32" diameter and will handle materials including paper, primary films, flexible packaging laminations, pressure sensitives, and label stock. To significantly reduce downtime between sets, this duplex center winder uses auto tabbing and auto cut and transfer technologies. Cutoff is done close to the rewind point, producing short strands that can be precisely controlled for roll alignment. Additionally, this machine offers proven technologies that increase production including auto knife positioning and auto core loading. For ease of use, the 900MC provides an advanced yet intuitive control system and an ergonomically-friendly design.

Key Features

- The simplicity of a duplex center winder & the advantages of a turret
- 32" rewind diameter & auto cutoff and transfer
- Friendly ergonomics & increased throughput
- Automatic knife positioning & tabbing, core loading
- Slits close to the winding point & multiple slitting methods



The 900MC is ideal for flexible packaging and label applications.

Standard Features

- 32" (813 mm) diameter duplex rewind
- Web widths up to 62" (1575 mm)
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Catbridge manufactures high-performance slitter rewinders for diverse industries and applications. We build a complete line of center, center-surface, and surface

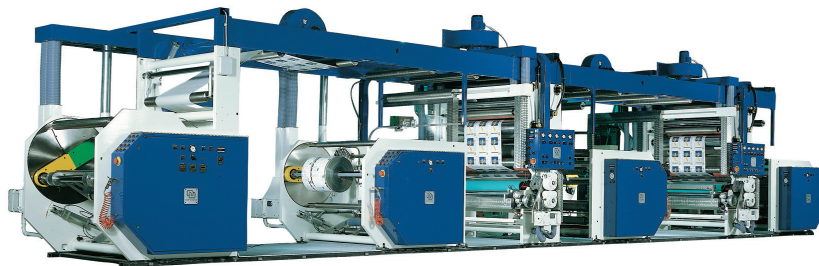
slitter rewinders that efficiently convert a broad range of materials. Catbridge incorporates state-of-the-art technologies for significant gains in productivity, slit width control, and finished roll quality

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HOW TO: Properly Handle Tri-Ply Adhesive Lamination

While the industry is working to sustainable solutions to serve the flexible packaging industry, the demand for conventional packaging is under constant growth. The driver is mainly the need to reduce food waste by extending shelf life. The task to extend shelf life is accomplished mainly by higher barrier properties of the packaging. This is in act the driver for the growth in orders of 3-ply laminators single pass we have experienced in the past 3 years. One segment of this machine set up those records a remarkable rise is the one of 3-ply solvent less laminators. This is a segment Nordmeccanica has served since the 90s with innovations that gave to the industry the flexibility to approach such conversion process in total reliability. Triplex Compact SL was the machine set up that allowed to approach the task since 1994. Machine has been sold prevalently in Europe to converters involved mainly in coffee packaging. A typical coffee lamination structure was in fact: PET – FOIL – LDPE. It was the pass PET-FOIL to offer the side effect of CO2 entrapment and consequently to influence the overall process speed. In any case the constant use of the same process recipe allowed to configure a machine set up suitable for easy set up at back to back job. Experience and process development informed smart adhesive approach among converters: High Performance high viscosity (and consequently expensive) adhesive on the PET-FOIL pass and a generic SL formulation for the second pass, second pass that was easier to handle because of the short path between the lamination nip and the rewind. The machine set-up remained the state of the



Triplex Compact SL



Triplex SL One Shot™

art for the following 15 years. Then the configuration developed as obsolete influenced by features that, as the lamination technology was growing, required rethink and innovation. The webbing set up in example featured an extremely long path with the consequence to affect process scrap; the speed limitation due to CO2 entrapment influenced by the close set up of coating and lamination nip; the ever-decreasing viscosity of new adhesive formulations introduced to the market that, at a lower viscosity, influenced the sheer resistance negatively.

To overcome all of the above Nordmeccanica presented to the industry Triplex SL One Shot™. The patented innovation features 2 coating stations, one only lamination nip, and is designed to accept any set up of unwinds and rewinds in our product range. The coating

station location allowed to coat the two outer webs in the 3-ply structure with the additional benefit to overcome any potential pinhole problem on foil. The configuration has been serving as well alternative industries allowing to laminate 3-ply structures incorporating as middle web a reinforcement synthetic mesh. One of the greatest benefits of the configuration of the Triplex One Shot being the extremely short web path allowing to save significant amounts of scraps at start up versus more traditional configurations.

Triplex SL One Shot™ with its remarkable energy saving set up and its unique configuration is “the” technical solution to convert 3-ply structures at the highest level of quality, productivity and cost reduction.

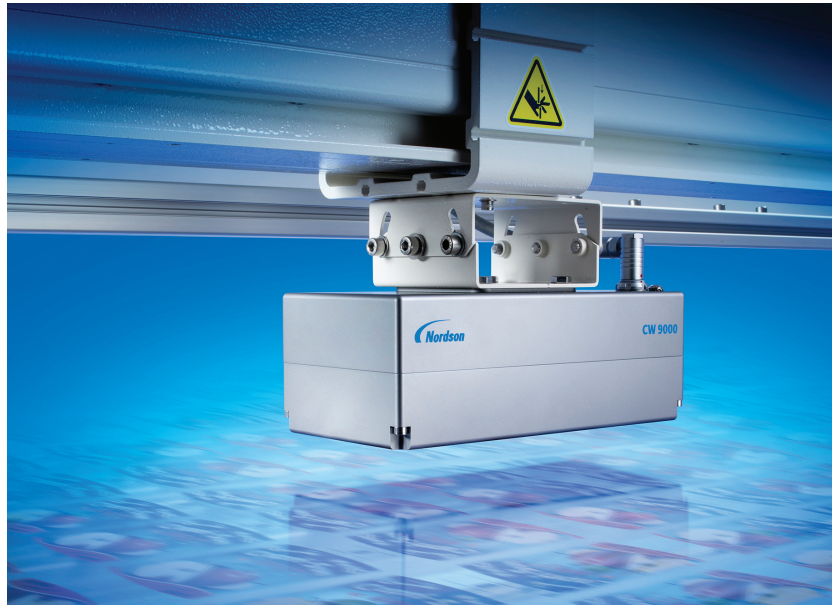
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Nordson Measurement & Control Solutions Introduces a New Compact Coat-Weight System for Converting Applications

Nordson (formerly NDC Technologies) has developed a new compact coat weight system for adhesive measurement of flexible packaging manufactured on coating and laminating lines – the CW 9000. “The new CW 9000 makes possible what flexible packaging manufacturers have been asking for – accurate and fast adhesive coat weight and mix ratio measurements,” said Mark Rainville, Product Manager for Nordson’s film extrusion and converting businesses. “Nordson worked with several OEM line manufacturers and flexible packaging customers to make sure that this new system would be a game changer. At a glance – operators and other personnel can immediately see key quality indicators. Coat weight and mix ratio profiles are available after a single scan – providing the operator with immediate information needed to confirm quality and make necessary process adjustments. A trend display shows if the coating goes outside of tolerance to enable corrective actions before a problem appears. The results are shortened startup time, reduced scrap, and minimized adhesive usage. All while maintaining product quality!”

The system is built upon Nordson’s proven Pro.Net Total Distributed Intelligence system. It includes the new compact CW 9000 sensor combined with the new LPS 1000 Scanner.

At the heart of the CW 9000 gauge is Nordson’s proven infrared sensor engine adapted through extensive R&D and proven with on-line testing. Fast bi-directional



scanning updates at the end of each scan with maximum coverage of your production run. Unique infrared optics are coupled with advanced algorithms to achieve measurement resolution and performance meeting the quality demands of the flexible packaging industry. Applications include clear films, printed films, aluminum foils, as well as metalized film or paper. The sensor is highly flexible and capable of measuring other coatings besides polyurethane. Nordson’s applications team will be happy to evaluate your specific needs.

The LPS 1000 is a self-contained Low-Profile Scanner that fits inside the frame of compact coating machines. It can perform fast scans and operate in a single point to analyze machine direction variations. The enclosed scanning frame prevents dirt from the scanner from falling onto the coating; it

is easy to maintain and easy to remove from the coating frame. The precise motor/drive system delivers optimal positioning.

The Pro.Net user interface provides real-time process quality, automatic coat weight control (if properly interfaced with the machine), and alarms. The display is user-configurable supporting multiple informative display boxes all on a single high-resolution screen. Some of the selectable display boxes are trends, profiles, zone data, zone statistics, roll statistics, and historical coat weight via colored profile/3D map. The Pro.Net system supports multiple recipes and selectable reporting tools. Last but not least, it features an embedded OPC-UA communication package to export/import valuable data and information.

For more information and contacts, visit www.ndc.com.

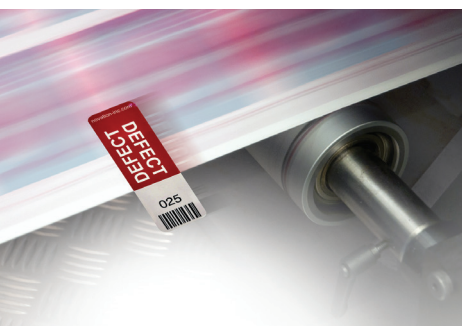
HOW TO: Mark Defects Safely and Automatically

Let's face it. Despite your best efforts to eliminate it, scrap happens. And when it does, you need to always know where it happened so you can find and remove it before it reaches your customer.

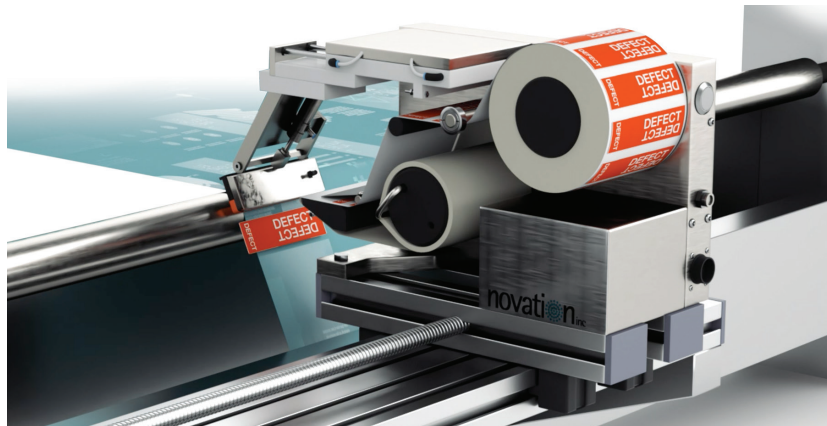
Maybe you insert a slip of paper into the winding roll, or hand apply a pressure sensitive label to the moving web, or possibly use a felt pen. These too often used manual practices are extremely dangerous and result in countless injuries. As a result, many lines are now equipped with guarding and interlocks making it impossible for operators to access the moving web.

Not only is hand marking webs an unsafe practice, but it is inaccurate and costly as well. By the time a defect is noticed and the web is hand marked, yards of defective product can pass, resulting in wasted time and product when removing the bad material downstream.

Maybe you "remember" where scrap is with digital roll maps which are used to locate and identify scrap. These systems work well until material is removed from the roll. If you slab off damaged material on the outside of the roll or you remove scrap



Novation AF3 WebFlaggers can apply colored or barcoded flags for marking and tracking.



Keep hands away from moving machinery with automatic flagging.

within the roll, some physical marker is required to then resynchronize with the roll map.

So, how can one safely and accurately mark defects, and also track scrap? Automatic web marking offers a solution.

Novation's WebFlaggers safely, accurately, and automatically place pressure sensitive labels on webs at any process speed. A portion of the label has no adhesive and hangs off the edge of the web like a "flag" making it visible in wound rolls. They can be triggered manually, from inspection systems, or from any machine signal.

WebFlaggers can also be combined with digital roll mapping to solve the resynchronization problem mentioned above. Novation's AF3 WebFlagger can be integrated with most all roll mapping systems as well as their own.

Novation's ScrapTracker system applies pre-printed, numbered, bar-coded flags and creates roll maps with each flag ID number, defect location, amount and type. This data file can be printed as a report or uploaded to plant LAN or any data storage

device. The data in the roll map can be used to help identify the type of defect to be inspected and/or removed or to create custom reports for scrap. These reports aid in process improvement and scrap reduction programs.

Novation has been serving the printing and converting industries since 2002. They are a world leader in safety and waste reduction through the automatic marking and tracking of defects. Novation's WebFlaggers have become an industry standard. Novation's products have been an integral part of safety of waste management programs implemented by some of the world's largest corporations. Their customers supply markets such as flexible packaging, electronics, automotive, films, tapes, non-wovens, healthcare and hygiene products and more. With almost two thousand installations worldwide, Novation's equipment has marked hundreds of millions of defects. All Novation products are designed and manufactured in their plant in Bethlehem, PA.

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HOW TO: Eliminate Press Downtime

How frustrating is it to see the press sitting idle when the operators are scurrying around to solve the most recent problem that comes up to bite them. Having trouble hitting densities? Having trouble *maintaining* densities? Might not be the inks or the substrate. Focus on the anilox roll. Focus on how clean the anilox roll is. Better yet, why not just start with a perfectly clean roll in the first place? Why not start with a perfectly clean roll EVERY TIME?

More and more of our larger customers are trending to ultrasonically cleaning their anilox roll after every press run. That way they know the anilox roll that was specified for a print job will work correctly every time. Density problems are automatically eliminated as a problem from the very start. Period!

I know what you're thinking: Won't that damage the anilox roll? No. Plus, cleaning times will only be a few minutes if you are consistently following this program.

With Sonic Solutions' updated Phoenix line of cleaning systems you don't need to worry. We've made our systems safer for your highest line count anilox rolls. Our systems are all preset at a fixed level of 68 kHz of power. No need to guess the right level or worry about using too much power. Our generators are now external to the unit, so a quick swapping out of equipment can be done in minutes and not months. Our heating system now has an automatic shut off that will prevent the unit from burning up if someone leaves the heater system on. Simply put, our systems are the safest in the marketplace for your anilox and if you maintain them



properly they can last forever.

Sonic Solutions products are all 100 percent built and sourced in the U.S. Common cleaning systems are typically in stock as well as their respective parts. Custom systems can easily be designed and implemented and we can clean any roll from 10 inches

to 10 feet. We can clean them all.

Feel free to contact Joe Walczak with any of your anilox roll cleaning needs. He can be reached at 877/654-7800 or Joe_Walczak@SonicSolutionsUSA.com and will be happy to help

Why not take that next step in eliminating press downtime?

Understanding Surface Activation: Corona Treatment

Achieving flawless adhesion and high-quality printing is essential in the creation of appealing packages that not only protect the contents but also stand out on the shelves. In this article, we will explore how to prepare for a perfect bond.

Common Challenges

Packaging materials come in a vast variety of forms. Preparing these substrates for adhesion can be challenging due to the diverse nature of these materials. Common issues include:

- 1. Poor Adhesion:** Substrates with inherently low surface energies make it difficult for inks and adhesives to bond effectively. This leads to adhesion failure, causing labels or coatings to peel off or fail.
- 2. Ink and Coating Repellence:** Inks and coatings may fail to spread evenly, resulting in inconsistencies and poor quality.

The Role of Corona Treaters

Corona treaters were invented to address these challenges. Here's how they work:

- 1. Surface Activation:** Corona treatment introduces polar functional groups such as hydroxyl, carbonyl, and carboxylic groups onto the film surfaces. The presence of these functional groups on the film surface raises the substrate's surface energy.
- 2. Improved Wettability and Bonding Characteristics:** Treated surfaces exhibit enhanced wettability thanks to the raised surface energy. By creating compatible surface



energies, inks and adhesives can spread more evenly and form a strong bond with the substrate.

Understanding Surface Energy

Surface energy is a fundamental concept in the packaging industry. Think of it as the ability of a surface to attract and hold inks, adhesives, and coatings. For a liquid to wet a solid surface, the substrate must have a higher surface tension than that of the liquid. For a strong bond and sharp print, the surface energies of the solid and the liquid must also be molecularly compatible. Every type of liquid has a different surface energy required of the solid.

Means of Measurement

There are two common forms of measuring surface energy of corona treated substrates – dyne testing and contact angle measurement.

Dyne Measurements

When using dyne solution, we recommend the ASTM drawdown technique using dyne solution fluid with cotton swab applicators. Make sure your dyne solution is

also up to ASTM standards.

Dyne pens employ the limitation of contamination. Over time, dyne pens often accumulate residues from surfaces they encounter. This contamination can significantly impact the accuracy of measurements leading to unreliable and inconsistent data. Inaccurate data can lead to defects that are costly and time-consuming to address.

Contact Angle Measurements

Drop shape analysis tools not only measure the surface energy increase but also the polar components of the surface energy. This is made possible by examining the contact angle with different liquids, commonly utilizing water and diiodomethane. With this additional data, you can calculate your work of adhesion. The work of adhesion is a measure of the strength of the contact between two phases, in this case the solid and liquid.

Conclusion

Understanding surface energy and the requirements of various applications allow converters and printers to finetune their process for optimal results. If you are having difficulties with adhesion or print quality, contact QC for solutions.

Visit us at www.qcelectronics.com.

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Email: sales@qcelectronics.com

HOW TO: Take Your Hole Punching to the Next Level

Navigating the intricate demands of modern consumers for flexible pouches, bags, and laminated materials presents unprecedented challenges for converters. This pressure is felt by both packaging machinery OEMs and end use packaging operations who are striving to meet the increasing demand for products of superior quality on a larger scale.

To enhance the efficiency and longevity of your converting operations, consider these industry best practices:

1. **Invest in quality solutions upfront.**
2. **Select the appropriate punch for the job—consider material, speed, and tooth pitch.**

3. **Opt for the right wear-coating for extended punch life.**
4. **Choose the right partner.**

At Pearl Technologies, we acknowledge the critical role our products play in your flexible packaging equipment. Our punches are indispensable for maintaining product quality, directly impacting your long-term bottom line.

While our precision-engineered Performance Barracuda and Piranha punches from the USA might not seem the most economical up front, even as they offer lower overall cost per cut, investing more in these quality punches yields long-term benefits:

- Enhanced precision in cuts
- Extended product lifespan
- Reduced machinery wear and tear
- Minimized downtime

Pearl excels in producing the sharpest, most durable punches, with customers boasting our punches outlast the competition by at least 4-times, depending on the material and application. We not only have a broader range of punches readily available to suit your needs, but we can also provide unmatched customization options, too. Don't wait, learn how upgrading to Pearl's double-beveled ground edged Performance Barracuda and Piranha Punches can bring your hole punching to the next level.

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As the leading manufacturer of quality toothed punches for the flexible packaging industry, Pearl offers three tiers of precision engineered solutions:

- 1) **Value Punches** offer an economical hole-making solution, providing good cut quality and durability at an affordable price.
- 2) **NEW Impact Punches** offer the best of both worlds - affordability, great cut quality and 1.5-2.5 times the durability of our entry-level Value Punches.
- 3) **Performance Punches** offer the optimum combination of hole cut quality and 4 times the durability of our Value Punches. Custom shapes and sizes available!

Call today to learn more about the industry leading punches.



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HOW TO: Know When It's Too Late to Buy QC Equipment

Why do so many converters look at quality control products for your manufacturing process only after there is a problem? As a manufacturer of web guiding and QC inspection systems, we frequently receive calls only after an issue has occurred, resulting in a substantial financial loss and a significant dent in your company's revenues. This has often been referred to as a defensive purchase. Defensive because you either cannot afford another costly QC issue or your customer has stated that you must fix the problem or lose their business. BST North America manufactures a wide assortment of products that are designed to mitigate any future QC issues you may encounter, such as web guiding



equipment with the most sophisticated sensors and controllers to ensure your product is produced with precise accuracy. We also manufacture print and surface inspection equipment, which ensures that the product's quality is within the tolerances you specify from start to finish.

All too often, older equipment relies on outdated web guides that

simply cannot perform as well as they did when you purchased them. Time to update!

Quality control equipment should never be a defensive purchase because it already cost you money. If you look at this as an offensive purchase, it will ensure the highest quality of products leaving your plant, and your customers will be far more satisfied. So, how much will it cost you not to invest, or how much has it cost you for not investing?

For more information on BST web guiding systems, please contact Paul Henke at "Paul.Henke@BST.group" and for more information of inspection systems, please contact Ernest Schneider at "Ernest.Schneider@BST.group".

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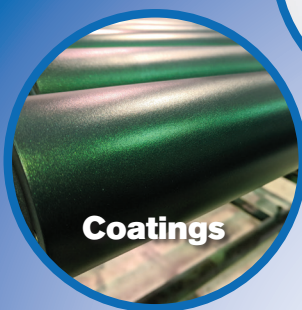
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