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TABLE OF CONTENTS

6 **WAYS PULP AND PAPER INDUSTRY BENEFIT FROM NIR TECHNOLOGY**
Instant Near Infrared moisture measurement facilitates many benefits.

14 **TRENDS IN THE PRESSURE SENSITIVE LABEL MARKET**
A look at AWA's 2022 Labeling and Product Decoration Annual Review.

28 **WHY LED IS THE ONLY SUSTAINABLE CHOICE FOR UV CURING**
Energy savings, waste reduction and pollution prevention for users.

DEPARTMENTS

4 **EDITOR'S NOTE**

22 **EXPERT'S VOICE**
Wound Roll Mechanics: Part 1

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On With the Show

Angel Morris
Editor

There is a certain frenzy around the rebound of in-person gatherings, be they conferences or conventions, expos or trade shows. Fall seems to be a popular time for these events, likely due to more pleasant weather and the return to routine after summer breaks and vacations. Following a couple of years when face-to-face get-togethers were frowned upon — if not completely banned — folks are a little manic to be in each others' presence again, sharing their knowledge and goods and services. When schedules of events began inundating my inbox for these activities, I started wondering how the concept began.

The roots of these gatherings can be traced back thousands of years to 3000 BCE, with some suggesting Middle Eastern bazaars as the earliest form of trade shows, where vendors traveled from town to town selling goods to locals. In the early 1800s, what is considered the first agricultural fair took place in Massachusetts, and in the mid-1800s, The Great Exhibition debuted in England as the world's first recognized trade show, with new moving machinery, surgical and scientific equipment and even telegraphs on display. Expos and world fairs followed, with things like the telephone, the Eiffel Tower, the ferris wheel, video games and even virtual reality all said to have debuted at such gatherings.

Besides the attendees they attract, is there any difference between such events? A trade show is defined as "an exhibition at which businesses in a particular industry promote their products and services." They typically include booths at which companies exchange information about themselves, helping them build partnerships and meet potential clients.

Similarly, expos (or, expositions) allow businesses to promote themselves through product demonstrations or discussions. These events tend to allow visitors to come and go, stopping at booths that interest them, and may follow a loose schedule of presentations, or none at all.

Conferences and conventions tend to be more formal, although they can share many similar opportunities. One can expect an agenda of educational activities during which professionals learn from others in their field through keynote speakers or lectures from industry experts.

2020 introduced us to virtual trade shows, which will continue to have a place even as we re-introduce in-person events. Whatever their form, trade shows will undoubtedly continue to be fundamental aspects of building and sharing expertise and growing your business sphere.

Angel Morris
Editor-in-Chief
angelm@rdgmedia.net

P.S. If you're interested in contributing a thought leadership piece from an industry expert perspective to PFFC, please contact me at the email address above.

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A RDG Media, Inc. Publication
P.O. Box 529
Estero, FL 33929
586.227.9344
www.pffc-online.com

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Three Ways the Pulp and Paper Industry Can Benefit from NIR Technology

Instant Near Infrared (NIR) moisture measurement facilitates more efficient labor, higher quality and better pricing on inputs, product and shipping

By **John Bogart**, Managing Director, Kett US

For the pulp and paper industry, measuring and controlling moisture content is critical to ensure product quality and efficient production since the amount of moisture in deliverables can have diverse effects when converting feedstock into products. Moisture content can impact product quality, production throughput and processing efficiency, as well as the purchase price of wood chips, pulp and converted paper products, not to mention shipping costs.

Compared to traditional moisture measurement methods such as Karl Fischer (KF) or Loss On Drying (LOD), an advanced technology utilizing NIR measurement offers significant benefits. Today, NIR moisture meters can help pulp and paper producers and converters achieve substantial production labor savings and superior product quality, while optimizing raw input purchase price, end product sales price and shipping cost.

The Advantages of NIR Technology

NIR measurement uses reflectance and absorbance principles for calculating the moisture content of an item. The meter bounces a beam of light off the product and in some cases transmits light through the sample. The light is filtered to a wavelength or multiple wavelengths that excite the moisture molecules.

The higher the moisture content, the higher the amount of light absorbed. The instrument measures the light reflected, and an algorithm determines the light absorbed by the sample. The moisture meters enable very accurate measurement of solids, pastes and liquids without contact or sample preparation, so there is no contamination in handheld and online models.

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Pulp and paper producers can benefit from NIR technology in three notable ways:

1. More Efficient Personnel and Production

If a pulp and paper producer or converter uses the KF or LOD method for determining moisture, considerable personnel time is tied up conducting these tests.

The KF test involves adding chemical reagents to the sample to separate the water from the remaining product. The water removed is compared with the initial mass or volume. Since chemical reagents are used, skilled personnel must determine the initial parameters, confirm the system is properly calibrated, maintained and may

The size of a camcorder, the unit is designed for frequent spot checks wherever necessary, on both stationary and moving (process line) products.

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conduct the tests.

The LOD test, which measures the total material weight change after drying, typically requires a sample to be prepared and brought to a lab. The test takes at least 15 minutes to several hours to perform and requires the sample to be altered or destroyed.

In contrast, NIR technology enables the user to get the accurate measurement results needed instantly and is simple enough for virtually anyone to use with minimal training. Generally, only 7-10 samples are needed for a valid calibration, and once calibrated the moisture level in a product is determined immediately.

As an example, with a handheld portable instant moisture meter, the user simply points the instrument at the product and the moisture content is instantly shown on a digital display, with results accurate to .01 percent in a 0-100 percent measurement range.

For ease of use, the unit is operated via user friendly menu commands that any worker can operate. The unit, which is the size of a camcorder, is designed for frequent spot checks wherever necessary, on both stationary and moving (process line) products. Moisture measurement data may be stored in the instrument, downloaded continuously or manually recorded.

2. Improved Quality Control

Quality can be compromised if pulp and paper producers do not have the correct amount of moisture in their product. This can result in either product loss or reduced shelf life. Just as important, it can also result in unhappy customers who could forgo future purchases and even share their displeasure on social media.

Fortunately, the speed and accuracy with which pulp and paper producers can obtain results from NIR technology will enable them to conduct more tests within a given time period. Because facilities can conduct more tests and at a higher frequency, production managers will achieve tighter control of their product quality.

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Users simply point the KJT130 handheld portable instant moisture meter at the product and its moisture content is instantly shown on a digital display.

NIR moisture meters, particle size variation and unusual textures are not an issue. This can be important when used with a range of feedstocks, formulations or end products in different settings.

The versatility of this technology means the pulp and paper industry can achieve accurate moisture measurements when needed, whether on the process line, in the lab or in the field. All of this equates to faster test results and feedback. The approach enables managers to ensure high quality at all levels of production.

Because the process is non-destructive, samples also remain unaltered so they can be used for additional tests or, if removed for a desktop test, may be returned into the product stream.

3. Optimized Buy/Sell Transactions and Shipping Cost

When moisture level is a factor in the purchase price of raw inputs or the end product sales price, accurate moisture measurement and adjustment can help to secure the best deal. For instance, if purchasing raw inputs with high moisture content, negotiating a discount might be possible in some circumstances. If selling a product by weight, moisture content could be kept within acceptable limits, but modified to secure the best price.

Having the incorrect amount of moisture in a product can also reduce profit by increasing the cost of shipping. With extra moisture in the product the total shipment will be heavier, resulting in higher shipping costs. Properly drying a substance to acceptable limits before it is transported can substantially reduce shipping costs.

Although pulp and paper producers are more familiar with traditional moisture measurement methods like KF and LOD, the availability of advanced NIR technology is presenting an opportunity to the industry.

By taking advantage of the speed, accuracy, versatility and ease of NIR moisture meters, the pulp and paper industry can dramatically improve production, quality and profit.

For this reason, NIR technology for moisture measurement is growing in popularity across many industries including pulp/paper, chemical, pharmaceutical, food and textile. ■

ABOUT THE AUTHOR

John Bogart is an expert in moisture and composition analysis at Kett US, www.kett.com, a manufacturer of a full range of moisture and organic composition analyzers.

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Trends in the Pressure Sensitive Label Market

By **Ann Brink**, Contributing Writer

The following summation is based on data from Alexander Watson Associates' 2022 edition of the Labeling and Product Decoration Annual Review.

The 2022 AWAreness™ Report on the Global Pressure-sensitive Label Market stated that the global need for labels had grown 3.8 percent since 2020. While a decline in label demands in 2020 could be attributed to the COVID-19 pandemic, further data suggested growth within the label market since then worldwide.

Specifically, in 2021, North America saw an 18 percent growth in marketing demands for labels. This differs, however, from Asia which experienced a 45 percent market share. Meanwhile, Africa and the Middle East showed the least amount of growth in their need for label products.

Regarding the technology of labels in 2021, additional data shows that pressure-sensitive labels only proceeded a growth percentage compared to glue-applied labels by 7 percent. Therefore, pressure-sensitive labels experienced a percentage growth of 41 percent, whereas glue-applied labels followed at 34 percent. Mold labels experienced the least amount of growth, at 4 percent.

The 21st century's ever-growing technological advancements, as well as more efficient manufacturing tactics play a role in the data. 2021's collected data found that the leading application of labels was VIP by 48 percent. Primary products followed closely behind with only a 5 percent difference measuring the percentage at 43 percent. Functional/Security and Promotional applications exhibited a much lower percentage at both 5 and 4 percent.

Considering the global popularity of pressure-sensitive Label Market by End-Use Segments from 2021 data collections, exhibit 4 displays greater percentage variety than previous data noted within this article. Food, transport

Exhibit 1 - Global Label Market by Region, 2021

Source: AWA Global PSL Label Market Overview

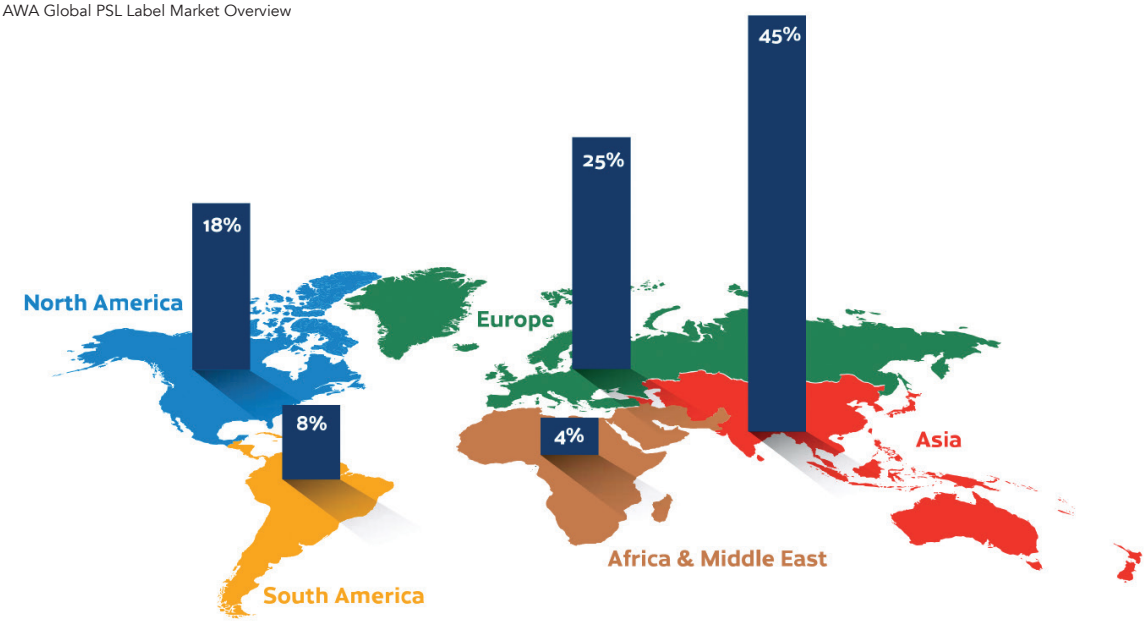
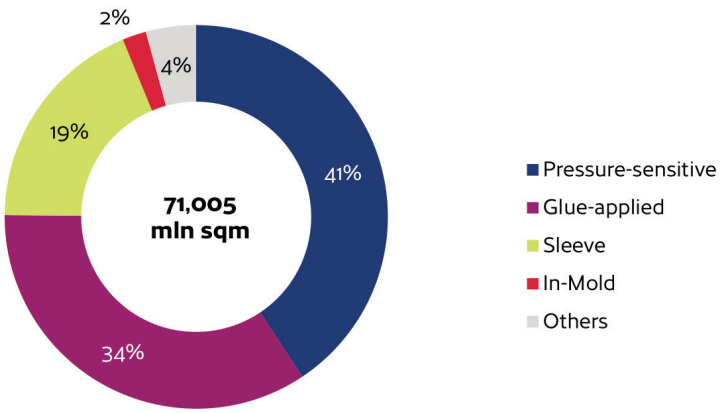


Exhibit 2 - Global Label Market in Volume by Label Technology, 2021

Source: AWA Global PSL Label Market Overview



and logistics, and beverage labels shared close percentages from 23 to 16 to 13 percent. That said, other pressure-sensitive Label Market by End-Use segments present much lower percentages. The categories of retail and pharmaceuticals are most popular amongst these lower percentages.

Considering these percentages, the demand for food, transport and logistics, and beverage labels are most popular in terms of End-Use segments.

With the topic of growth and decline in mind, exhibit 4 showcases the Global Label Market Growth versus the Global GDP Growth beginning from 2006 to predictions about the year 2024.

As the line graph demonstrates, the Label Market saw a fairly large increase in growth in approximately 2011, remaining steady up until the present day, and predicted to remain somewhat steady to 2024. The Global GDP Growth, however, experienced a decline in 2009 when the Global Label Market was growing, then,

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a rather dramatic drop between 2020 and 2021.

Learning Opportunities

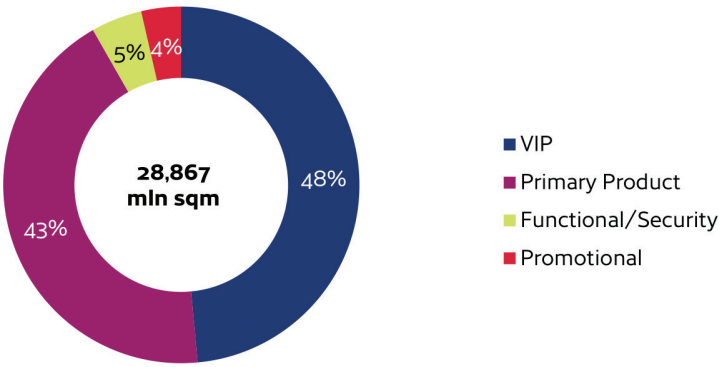
AWA will host three exclusive in-person Seminars September 11-12, co-located with Labelexpo Americas 2022 in Chicago. The parallel seminars will be dedicated to respective markets: the label release liners seminar, the sleeve labels seminar (in partnership with TLMI) and the narrow web pouch seminar.

The comprehensive program of the seminars on the 11th include opening networking receptions and two special Key Note presentations. Kelly Murosky, manager of packaging development, 7th Generation, will discuss innovation and sustainability from a brand owner perspective, and Jonathan White, director, Mazzone Associates, will provide an overview of the M&A activity in the labeling and product decoration market.

September 12, each seminar

Exhibit 3 - Global Pressure-sensitive Label Market by Application Segment, 2021

Source: AWA Global PSL Label Market Overview



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will feature a separate track of presentations and panel discussions from experts across the value chain, with insights toward label release liners, sleeve labels and narrow web pouches.

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The seminars will be held at the Hyatt Rosemont in Chicago, US, across from Labelexpo Americas 2022. Registration for each seminar can be found through the website at awa-bv.com/conferences-events/ or through direct event links.

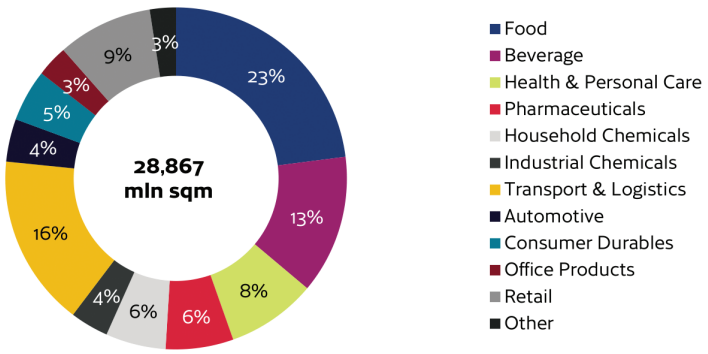
AWA Label Release Liner Seminar 2022 - https://awa-bv.com/product/lrls22/

AWA & TLMI Sleeve Label Seminar 2022 - https://awa-bv.com/product/islce2022/

AWA North America Narrow Web Pouch Seminar 2022 - https://awa-bv.com/product/narrow-web-pouch-seminar-north-america/ ■

Exhibit 4 - Global Pressure-sensitive Label Market by End-use Segment, 2021

Source: AWA Global PSL Label Market Overview



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Anna Brink is a student and writer in Erie, Pennsylvania.

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Wound Roll Mechanics: Part 1

By **Neal Michal**, Principal, Converting Expert, LLC

This is Part 1 in a four-part series regarding winding, with this month's focus on wound roll mechanics.

Winding – Introduction

Winding is an integral process in the manufacturing and converting of nearly all web materials such as paper, film, tissue, nonwovens, foils and laminates. Wound rolls are the most convenient and economical form of storage and transport for web materials.

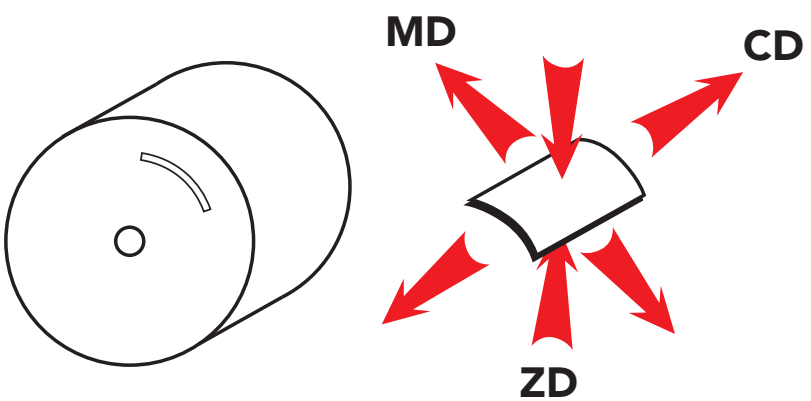
Center winders are common for film. The addition of a nip roll will allow higher speeds. Surface winders are common for building large rolls. The addition of center wind assist allows lower nip load for delicate high loft webs. Two drum winders are common for high-speed tissue and paper. Belted reels can wind tissue rolls to large diameters with consistent thru roll properties.

Wound rolls store web materials compactly without folding or cutting. Wound rolls are a form of compressed packaging. A roll that has been wound firm enough for routine handling will have internal stress and strain that will determine your aged thru roll properties and the potential for wound roll defects.

Three Principal Stresses

Every layer of material stored inside of a wound roll will experience three stresses: MD, CD and ZD. The shape of these stresses thru-roll is known as the wound roll structure.

- **MD** — Machine direction stress in the plane of the web. Often described in terms of strain.
- **CD** — Cross machine direction stress in the plane of the web. Often ignored.
- **ZD** — Stress perpendicular to the plane of the web. Also referred to as Interlayer pressure.



Wound Roll Stresses – MD, CD & ZD

This series will focus on MD and ZD stress. CD stress is only important for webs with high Poisson.

Wound Roll Structure

The wound roll structure describes the shape of MD and ZD stress profile. There are only two types of wound roll structures: "Soft Roll" and "Hard Roll." The naming convention "Soft" versus "Hard" is not completely satisfactory. This is not to be confused with a qualitative assessment of how hard a roll is wound. It really deals with the relationship between the MD modulus versus the ZD modulus of the web. (Refer to my previous series that describes material testing.) If the MD modulus is significantly greater than the ZD the roll structure is described as a "Soft Roll."

There is significant compliance in the ZD direction. The web can be compressed in the ZD direction easily. Examples of materials that fall into this category are Creped Tissue, Spunbond and Film/Spunbond laminates.

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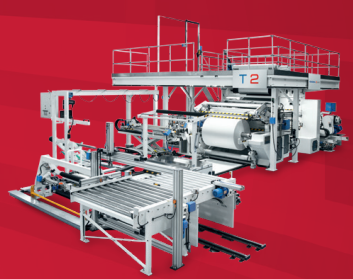

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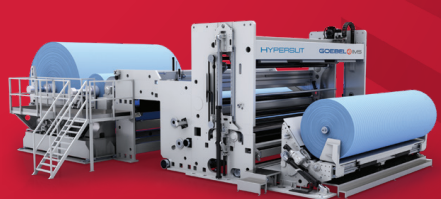

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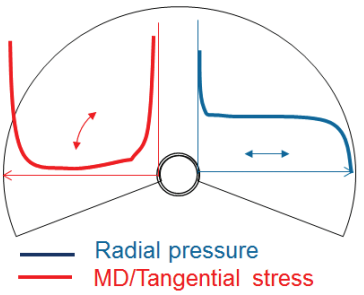
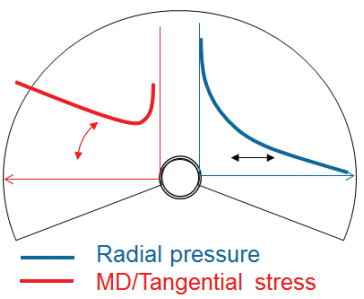


'Soft' Roll

- $E_t >> E_r$
- Newsprint, Creped Tissue, Spunbond, Film/SB laminate
- Plateau-type radial pressure
- Less thru-roll MD strain variation



'Hard' Roll

- $E_t \approx E_r$
- Film, Cast Rubber, MD Elastics, Highly Textured Tissue
- Taper-type Radial Pressure
- 'Nike®-Swoosh' type thru-roll MD strain variation

If the MD modulus is approximately the same as the ZD modulus the roll structure is described as a "Hard Roll." In the ZD direction the web is fully compressed. This is often known as a fully compressed roll structure. Examples of materials that fall into this category are Film, Cast rubber, MD Elastics and Highly Textured Tissues.

Impact of Wound Roll Structure

We will first discuss ZD stress which is often referred to as Interlayer Pressure (ILP). (Refer to the graph.)

A soft roll will display an S-shaped ILP (blue line). ILP peaks at the core and will have a wide plateau through the middle of the roll. This is why caliper-sensitive materials like tissue will be compressed up to 60 percent at the core with 25 percent compression through the wide plateau.

A hard roll structure like film will have much greater ILP close to the core. High ILP is the root cause for film blocking. It also restricts the buildup

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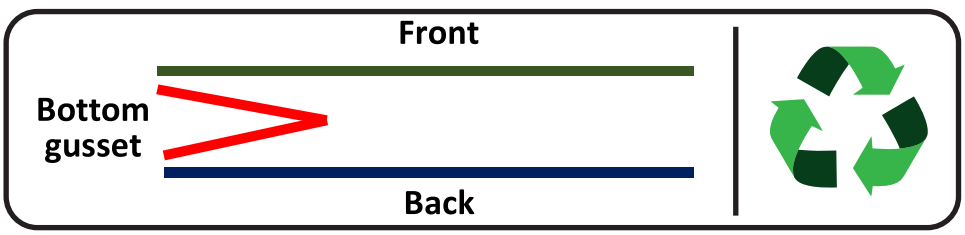

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ratio (Roll OD / Core OD) for a roll of film.

It is a common misbelief that the MD stress (or strain) thru roll will be the same from the outside of the roll to the core. The outer layers of the roll compress the inner layers. This interaction will result in one of two unique MD stress thru roll profiles as shown (red line).

For soft rolls the outer third of the roll length will compress the inner two thirds. This is graphed as a U-shaped profile. It is common for the material inside the plateau region to be close to zero MD stress. If the roll is wound too tight the layers may buckle which can cause CD Buckles.

Conversely a hard roll will have a Nike™ Swoosh profile for stored MD strain. All of the web stored in the roll is under tension. The resulting MD strain profile is the root cause of registration shift for printed film rolls.

Bigger Rolls

Longer rolls with more material can provide cost savings. The addition of more material on a soft roll does not make a big effect on the interlayer pressure or stored MD strain. This is why tissue-base sheet rolls are often 10 foot in diameter. Conversely, the addition of more web material on a hard roll will have a dramatic effect on the interlayer pressure and stored MD strain for a hard roll. That is why most film rolls are limited to 30-inch diameter.

It is important to know what type of wound roll structure you have in order to make improvements to your delivered quality.

In our next article, we will discuss how you can document your wound roll structure and the importance of tension, nip and torque on your winding process. ■

ABOUT THE AUTHOR

Neal Michal of Converting Expert is a well-known authority in web handling, process design and optimization. He worked with the Web Handling Research Center for 20 years. Currently serving as a technical advisor with AIMCAL, he can be reached at neal@convertingexpert.com or through www.convertingexpert.com.

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Why LED is the Only Sustainable Choice for UV Curing

By **Stacy Hoge**, Marketing Communications Manager, Phoseon Technology

Today, all the major brands are requiring their suppliers to deliver more sustainable printing practices. The environmental benefits of UV LED curing in the printing process are numerous and significant. UV LED brings energy savings, reduces waste and prevents pollution for users all over the world.

With traditional UV curing processes, the tremendous heat associated with mercury UV lamps required a lot of electricity to operate. In addition to high amounts of electricity, these bulbs need to be replaced frequently, generating a high amount of waste. If built correctly, LED curing systems have a very long lifetime of up to 60,000 hours and require zero bulb replacements. The mercury lamps produce ozone, which is dangerous to breathe, especially in a constricted space like a print shop. Air exhaust systems are required to extract the toxic fumes from the presses. These exhaust systems can be eliminated with UV LED curing, making it a far more environmentally friendly process.

Energy Savings

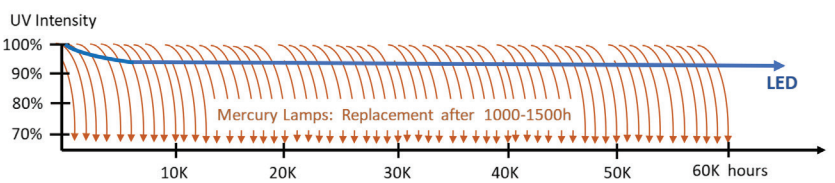
Traditional UV curing processes require a significant amount of electricity to operate, making the electricity bill very high. UV LED technologies provide energy savings up to 85 percent compared to traditional drying systems. With LED curing, there is no need for fume extraction units to remove the gases generated by mercury-vapor UV lamps. UV LED is not only good for the environment, but also has a very positive effect on the finances, sustainability, health and safety of company operations.

As an example, family-run printing company Eticod from Katowice, Poland, focused on the sustainable production of labels at an early stage and has already invested in photovoltaic systems and heat exchangers in the past. With the investment in UV LED for drying, the CO_2 emissions at Eticod have been reduced even further while energy savings have increased.

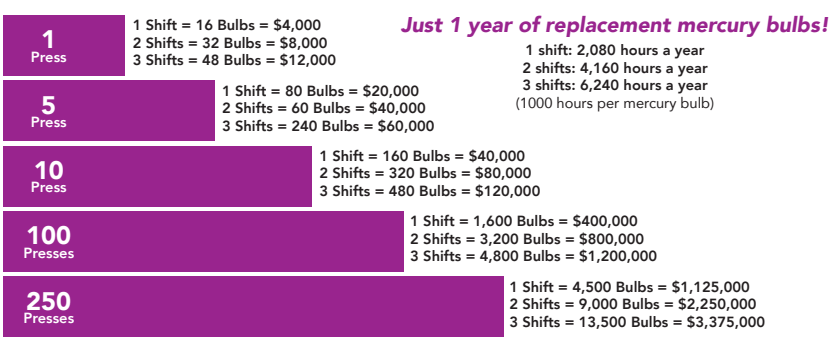
Eticod's Bobst M5 430, 10-color press with UV LED curing was successfully installed and put into operation. The machine consumes approximately 60 percent less electricity, which corresponds to an annual saving of some 50 kWh, while eliminating 200 tons of CO_2.

Pollution Prevention

UV LED lamps offer better than 50 percent lower CO_2 emissions. UV LED lamps generate no ozone and offer the promise of elimi-



Mercury bulb replacements vs. LED over 60,000 hours.



Cost of mercury bulb replacements over one year for flexographic printing presses.

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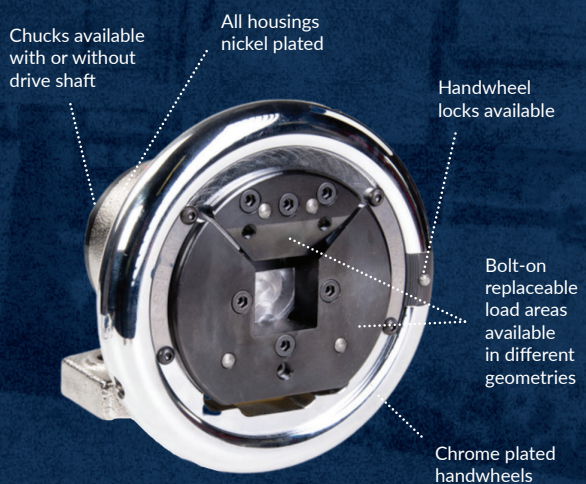

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nating toxic mercury in an entire category of industrial processes. With UV LED lamps, there is no need for fume extraction units to remove the harmful gases and Ozone generated by mercury-vapor UV lamps.

With LED systems, converters can diversify their product lines and enter new markets without having to expand their floor space or expose employees to volatile organic compounds (VOCs) harmful UV-C ozone. By removing UV mercury stations and upgrading to LED lamps, users can reduce up to 200 tons of CO_2 annually per press. Users do not need to re-integrate into the building the millions of cubic meters of air extracted every year to remove ozone and heat produced by the mercury lamps.

Waste Reduction

Conventional mercury lamps have a very short lifetime and need to be replaced every 1,000-1,500 hours. LED curing lamps extend beyond 60,000 hours if maintained properly. Upgrading to UV LED technology eliminates these replacement costs, offering significant environmental benefits with the elimination of mercury.

Central Valley Label in California experienced significant operational cost savings by upgrading from mercury to LED. Before switching to UV LED curing technology, Central Valley Label was spending $40,000 to $50,000 per year on UV bulb replacement for their old UV mercury presses. When the company switched to the UV LED solution, that expense was eliminated.

Initial Investment Costs: Mercury vs. LED

Although the initial costs of mercury may be lower than LED, the long-term costs for mercury are much higher. The initial investment for LED might be slightly higher or the same as mercury, but all the additional costs required for mercury add up over time. The long-term costs for LED after installation, on the other hand, are zero.

Mercury UV costs continue to mount over the life of the system.

- Consumables (bulbs, reflectors, lenses, shutters, dichroic filters, etc.) are a significant revenue

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stream for mercury UV manufacturers.
- Lost production, lost substrate and reoccurring consumable expenses erode the profitability of the converter.

UV LED has little maintenance, no consumables and predictable performance.
- UV LED allows the converter to focus on their work and increase profitability of the converter.
- Constant, repeatable and predictable.

The Cost of Mercury Bulb Replacements

When investigating a new curing system, make sure to look at the long-term costs of mercury bulb replacements and other costs that add up over time. Mercury UV continues to significantly impact your bottom line for the lifetime of the system.

Legislation

The Minamata Convention on Mercury is a global treaty to protect human health and the environment from the adverse effects of mercury.

Major highlights of the Minamata Convention include a ban on new mercury mines, the phase-out of existing ones, the phase out and phase down of mercury use in a number of products and processes, control measures on emissions to air and on releases to land and water, and the regulation of the informal sector of artisanal and small-scale gold mining.

The Convention also addresses interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury as well as health issues.
- Minamata Convention became law in 2017 in the European Union and many other countries. Today, the Minamata Convention is currently joined by 127 countries.
- 2020 was a key year for the Minamata Convention as the deadline for mercury-added products.
- Parties shall not allow, by taking appropriate measures, the manufacture, import or export of mercury-added products listed in Part I of Annex A after 2020.
- Some countries have already banned the mining of mercury.
- Use of mercury in some products already banned.

Conclusion

UV LED curing technology offers equipment manufacturers a high-performance curing technology that

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also saves significant energy while eliminating greenhouse gases and dangerous mercury and ozone from the UV curing process. UV LED products offer significant environmental improvements compared to traditional mercury-based products. ■

ABOUT THE AUTHOR

Stacy Hoge joined Phoseon in 2009, bringing more than 10 years of experience in Marketing Communications. Ms. Hoge is responsible for the Marketing Communications strategy and implementation at Phoseon Technology. She holds a bachelors of science degree in both Mass Communications and Psychology from St. Cloud State University in Minnesota.

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Plastics and packaging – understanding test and inspection solutions

A question-and-answer with Toby Lane, Product and Applications Manager.

What are some of the biggest myths surrounding plastic in packaging that you feel should be debunked?

The simple myth is that plastic is the bad guy. And absolutely - there are applications where a paper product alternative can be more suitable than plastic.

But the performance of plastic materials can lead to environmental benefits that we don't want to lose by completely rejecting plastics. Because of their ability to be recycled effectively, plastics can often offer a more sustainable future that sees high performance packaging with a low environmental impact. The challenge facing us is implementing an infrastructure that supports this result.

What types of test and inspection solutions do you offer?

Industrial Physics is a global packaging, product, and material test and inspection partner that has been protecting the integrity of manufacturers, production lines, and laboratories for almost a century. Across the Industrial Physics group, we have a number of well-known brands, including Ray-Ran, United Testing Systems, Messmer Buchel, Testing Machines Inc., TQC Sheen, and many more.

The Ray-Ran product line covers typical plastics materials characterization techniques such as melt flow, pendulum impact, falling dart impact and HDT/vicat softening point testing.

We also supply less common but highly regarded testing instruments such as our Instrumented Falling Weight Impact Tester and our Density Gradient Apparatus. The other side of our product offering is our test sample preparation equipment.

What are the biggest benefits your solutions give to customers?

It's our purpose to protect the integrity of our customer's brands and products. And we pride ourselves on building robust instruments for industrial environments that offer customers the simplest and most reliable method of achieving characterization results from their polymer samples.

We optimize our products to satisfy the precise requirements of international testing standards and only include additional features that contribute to better results, or standards conformity. Allowing customers to get the maximum return on investment - only spending what is required to satisfy their application.

What do you think are the biggest trends impacting customers right now, and how can you (Industrial Physics) support them?

The biggest trend we are seeing is greater research into materials including a higher percentage of either recycled materials or environmentally friendly additives.

The difficulty this type of testing has always presented is the need for versatile testing equipment.

Broadly speaking, the introduction of new materials calls for greater testing requirements from the full spectrum of materials testing areas. Companies like Industrial Physics that offer such a wide range of equipment are therefore hugely beneficial partners, as they can often advise on and support all the pieces of equipment in a given laboratory. Customers can work with a single supplier and organize calibration and maintenance for the entire laboratory at once.

What do you believe is the single biggest challenge facing your customers today and how do you help them overcome this?

There will be many innovations across the board. Ultimately, our customers are keen to establish a long-term relationship with a packaging, product, and material testing partner like Industrial Physics - one that will allow them to remain supported and explore new techniques and test types with confidence as they progress. There are very few companies like Industrial Physics that can provide this broad scope of on-going support, so we are diligent in understanding and offering the latest innovations in materials testing so that our customers can continue to adapt in a changing and unpredictable environment.

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