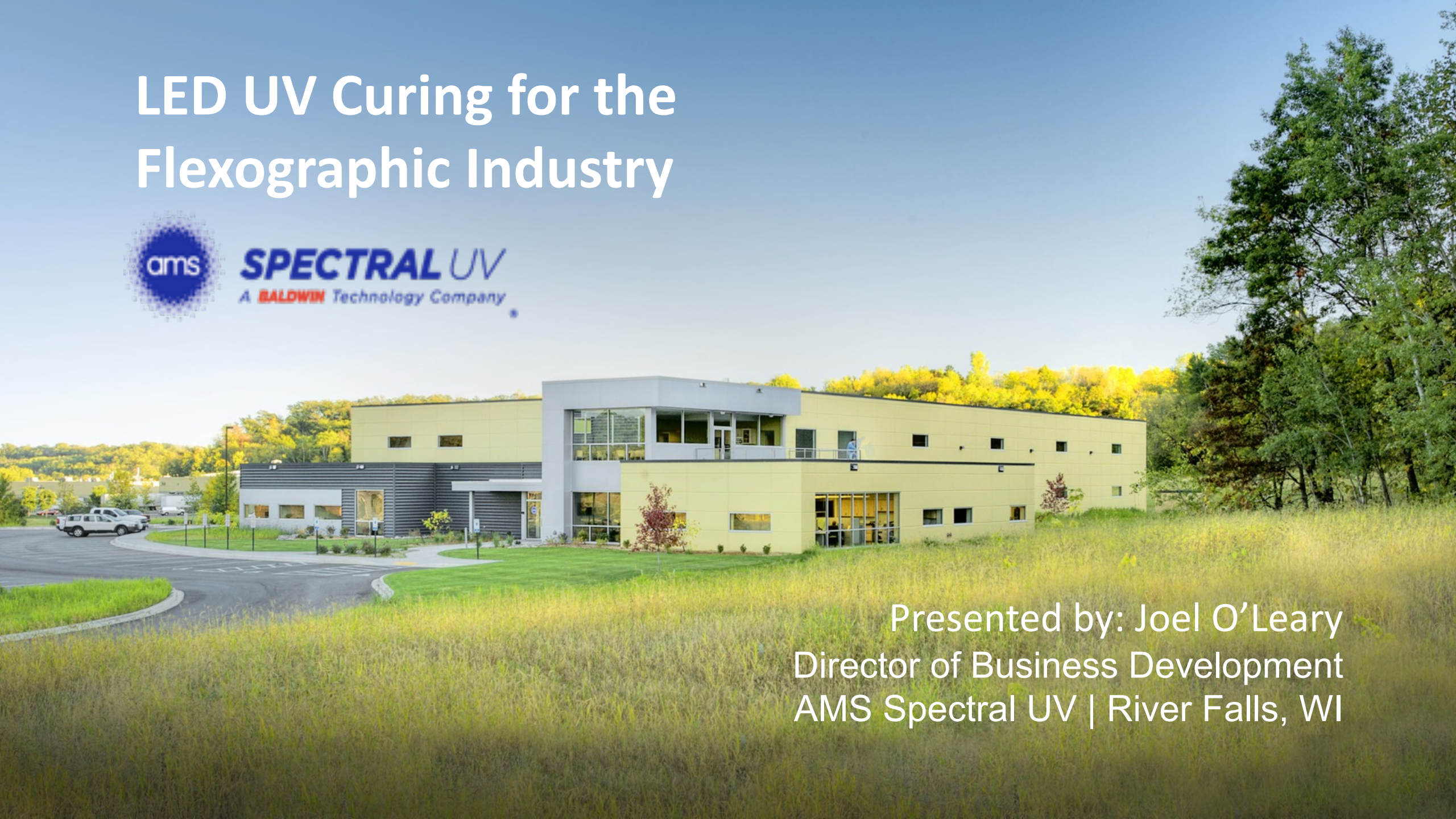


LED UV Curing for the Flexographic Industry



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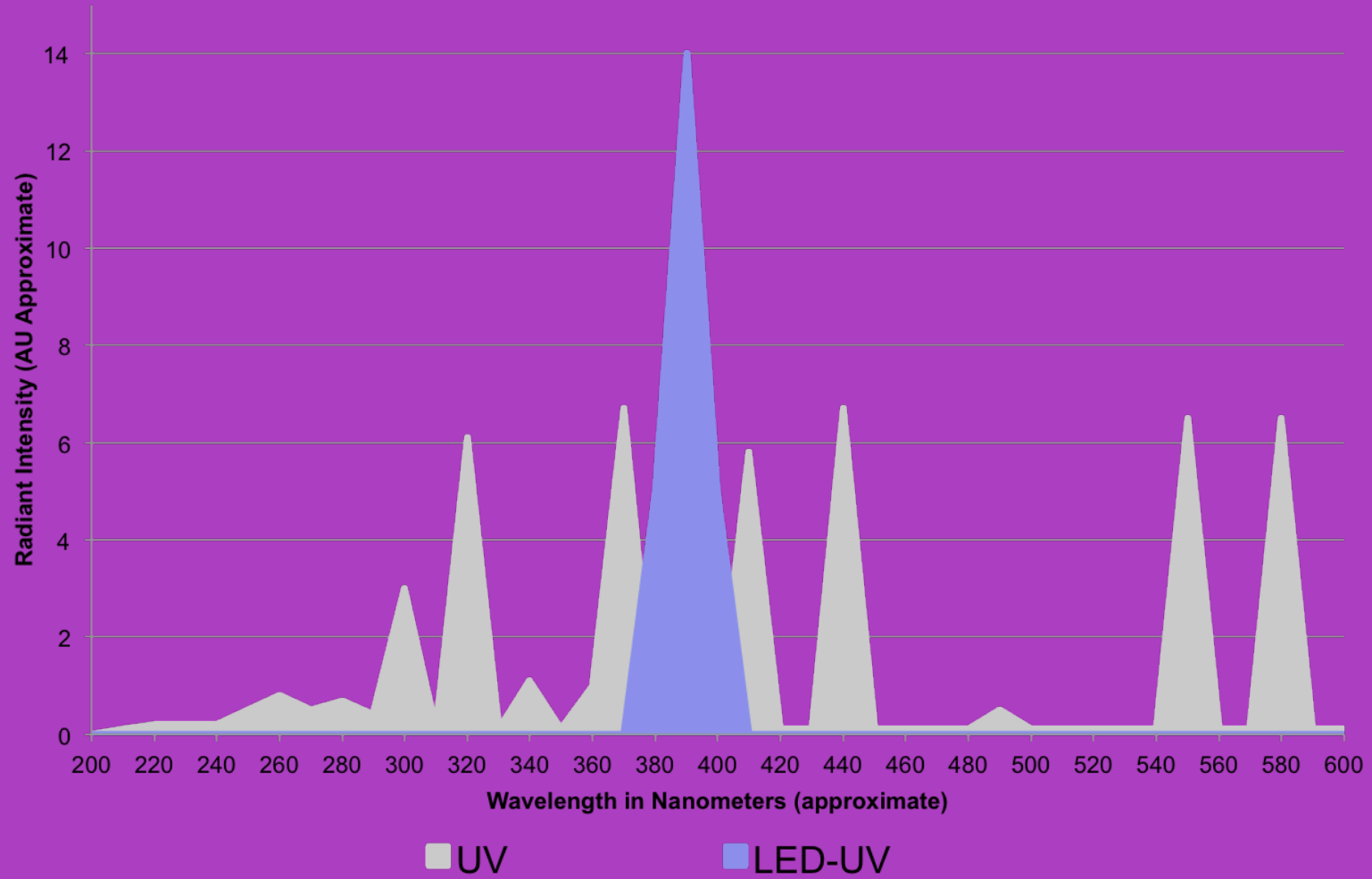
November 9th - This Day in History

- 697 - 1800 – Mostly all war-related events and prominent people being killed.
- 1851 Kentucky marshals abduct abolitionist minister Calvin Fairbank from Jeffersonville, Indiana, and took him to Kentucky to stand trial for helping a slave escape.
- 1872 The Great Boston fire destroyed nearly 1,000 buildings.
- 1904 1st airplane flight to last more than 5 minutes.
- 1932 A hurricane sweeps over Cuba killing 2,500. (Hurricane Maria killed 55 in Puerto Rico.)
- 1944 Red Cross wins Nobel Peace Prize.
- 1961 PGA eliminates Caucasians only rule.
- 1967 Rolling Stone Magazine released its first issue.
- 1980 Iraqi president Saddam Hussein declares holy war against Iran.
- 1984 Wes Craven's horror film "A Nightmare on Elm Street" premieres in the US.
- 1989 East Berlin opens its borders.
- 1992 Howard Stern's radio show begins broadcast in Las Vegas.
- 2017 **APR hosts Narrow Web Flexible Packaging Summit!**

What is LED UV Curing and how does it work with Flexible Packaging?

- LED curing uses light-emitting diodes to generate UV energy at a specific wave length
- LED energy “cures” by triggering photo-initiators formulated in the inks & coatings, causing them to solidify via photo-polymerization
- LED curing employs wavelengths similar to those created by traditional UV curing systems – however, LED is focused energy rather than broad ban

LED-UV versus Traditional UV



LED Compared With UV

Traditional UV

- Bulbs typically last < 1,500 hours – UV bulbs typically are expensive to replace
- UV curing generates ozone and requires exhaust systems to remove the ozone from the work environment
- UV curing modules require shutters and a long warm-up/cool-down period
- UV modules generate significant heat, which gets trapped in the substrate and results in “hot rolls”

LED

- LED chips can last as long as 40,000 hours
- LED does not generate ozone, so exhaust/ventilation systems aren't required
- Instant on/off – no mechanical shutters
- Does not require warm-up time
- LED modules do not emit heat to the substrate, so printed material comes off the press cool
- Requires significantly less energy compared to UV

There Are Only Three Ways to Increase Profits

- Increase Revenue
- Decrease Expenses
- Cheat on your Taxes!

Issues with UV Mercury Curing

- Inefficient ink curing due to
 - Bulb age
 - Dirty reflectors
 - A need for thick/opaque inks
 - Lamps overhead and turn off
 - Lost run time for warm up and cool down
 - Web breaks are a result of too much heat
- Require extra systems / practices to ensure safe operation
 - Need to remove Ozone
 - Heat generated can be hazardous
 - Improperly shaded light can cause eye damage
 - Mercury is a hazardous waste
 - Noise – nearing OSHA standard limits

How Will LED Increase Your Revenue

- Run your press faster - product more in less time
- Take on work you previously couldn't do (Shrink)
- Add new customers with environmental concerns / issues
- Market LED as a point of differentiation over your competition

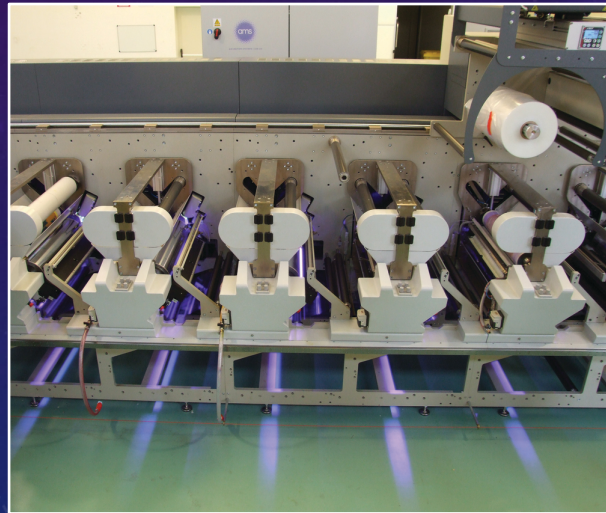
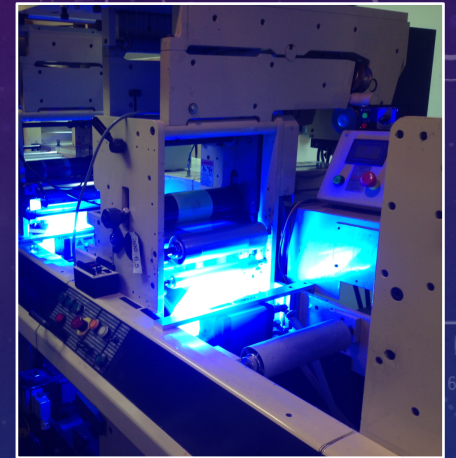
How Will LED Decrease your Expenses

- Never again replace a UV bulbs
- Reduced energy consumption by >50%
- Use thinner substrates – minimal heat to the press
- Eliminate need to exhaust
- Turn down or turn off your chill rollers
- No warm-up or cool-down times required
- Possibly eliminate the need for a new press – greater capacity
- Eliminate mechanical down-time associated with shutters, bulbs, heat issues, etc.

Additional Cost Savings with LED

- Most electric companies will subsidize a portion of the cost to replace UV with LED – for both retro and new presses.

LED is for New Presses and Retrofits



AMS LED Video



Availability of LED Inks / Coatings



FlintGroup

LED inks are widely available
from major suppliers including:



SunChemical
a member of the DIC group 
Color & Comfort



INX®

Flint Group
Toyo Ink
Nazdar



TOYO INK



**ENVIRONMENTAL
INKS**
a member of the Siegwerk group

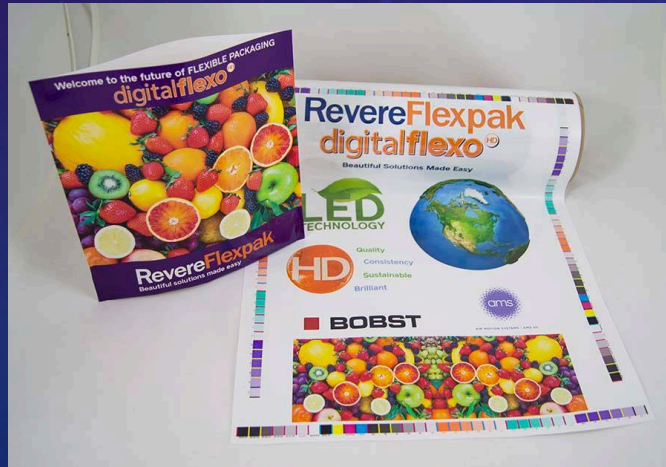
Environmental/Siegwerk
INX
Sun Chemical



NAZDAR®

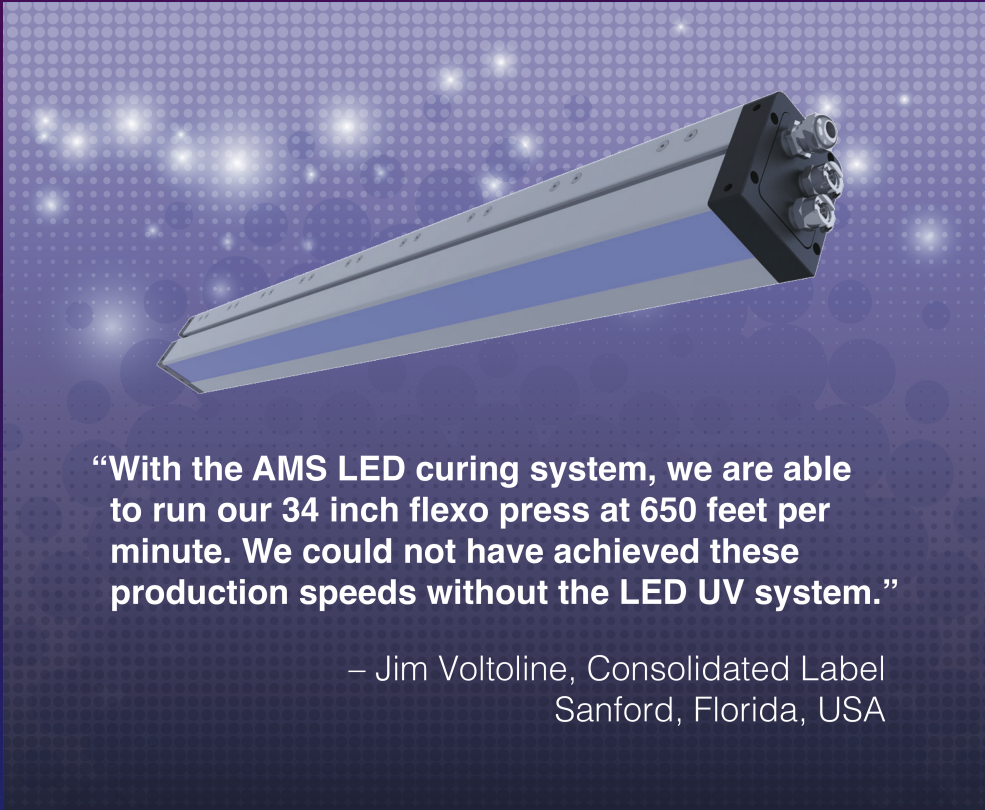
LED Expands Your Substrate Options

- Self-adhesive labels
- Packaging: shrink sleeves (PET-G, PVC, OPS, etc.)
- Unsupported films
- Thin plastics, films, and foils that would melt, warp, or discolor if exposed to heat





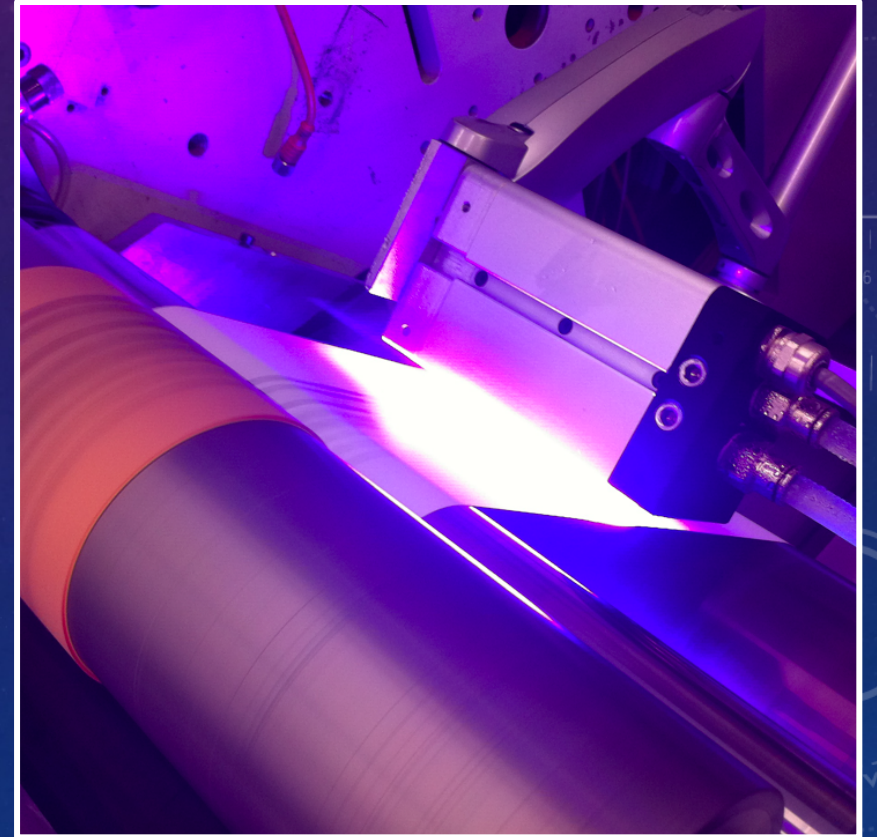
Competitive Advantages of LED



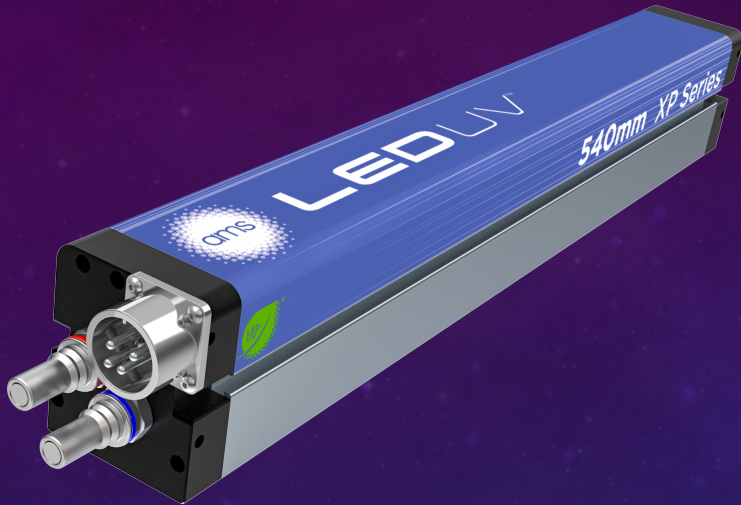
- **Faster press speeds**
- **Removal of heat**
- **Print on thinner stocks**
- **Better substrate adhesion**
- **Greater assurance of cure**
- **Lower energy consumption**
- **Elimination of mercury & ozone**
- **Very little maintenance**
- **Reduction of downtime**

ROI Advantages of LED

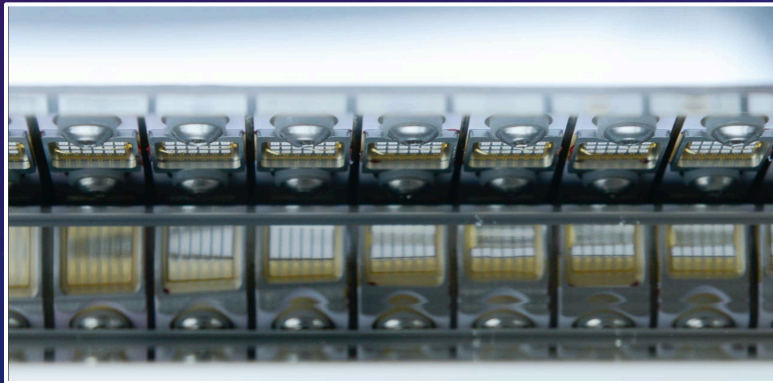
- Increase cure speed of “bottleneck” colors and coatings
- Elimination of registration and shrinkage issues caused by heat
- No cool-down time required
- Reduction of substrate costs (use thinner films and less waste)
- Eliminate nearly all downtime common with UV
- Significant energy savings (as great as 70%)
- LED can last up to 40,000 hours of operation
- No make-up air or exhaust blowers required



AMS's LED Systems

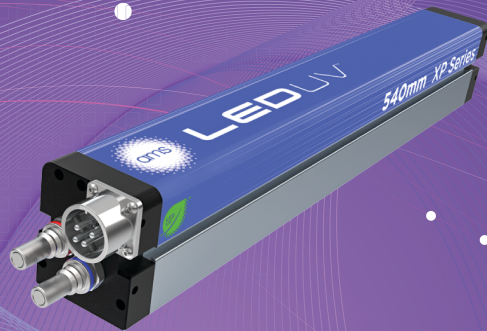


- Highest intensity (up to 50 W/cm²)
- Upgradeable LED chips
- One continuous module (not daisy-chain)
- Widths: 100mm to 2 meters
- Rugged industrial design
- Turnkey solutions
- Service/support available 24/7
- UV-to-LED swapping



Why switch to LED?

- Double Your Press Speed
- 100% Assurance of Cure
- 50% Energy Savings
- No Heat to Substrate
- No Bulbs to Replace
- No Exhaust Venting
- No Maintenance



Why choose AMS?

- Highest LED Intensity
- Upgradeable LED Chips
- Rugged Industrial Design
- Turnkey Installation
- 24/7 Support
- Made in America



AIR MOTION SYSTEMS | AMS UV

Perceived Barriers to LED

- **Reluctance to change**
- **Industry learning curve**
- **Added cost of LED inks and coatings**
- **New technology – who really wants to be first?**
- **Lack knowledge – what you don't know, you don't know**
- **High price of entry – Low cost of ownership!**

The Bottom Line to LED

If you are in business to make money, LED will help increase revenues and reduce expenses.

- **LED is a proven technology**
- **What have you heard about LED that isn't true?**
- **Are you waiting until your competition has LED?**
- **AMS offers a money-back guarantee – so why wait?**

November 9, 2017

*The Day LED Made Total Sense
for Flexible Packaging!*

Go Fast, Stay Cool