



Illuminate Dark Spots with LED

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An EXCELITAS TECHNOLOGIES Company

What is this about?



True Benefits of LED



**Examples of production
dark spots**



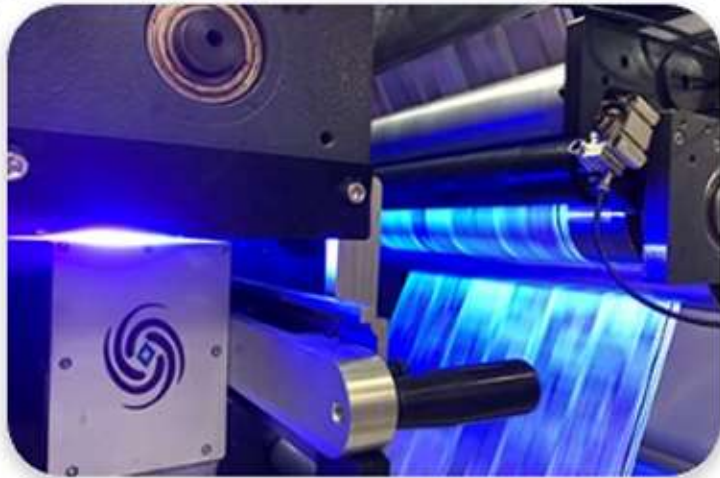
**What do LED curable
coatings cost?**



Sustainability

Application Segments for LED

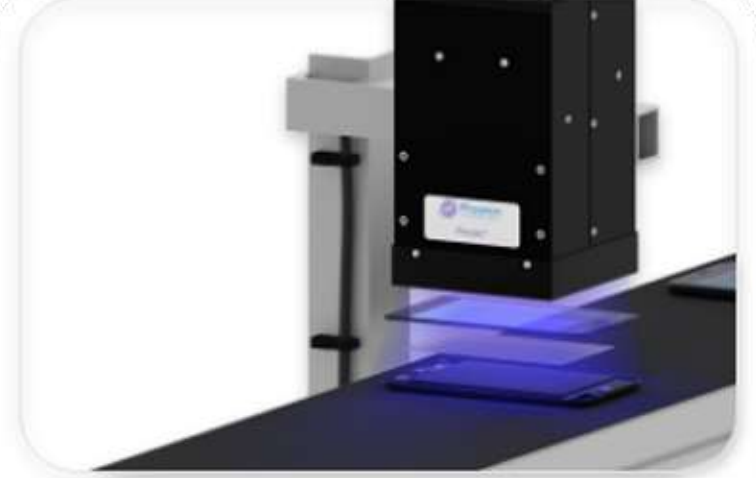
LED has an established presence in various UV market segments each of which can benefit from upgrading to LED versus the existing curing technology:



Printing



Coatings



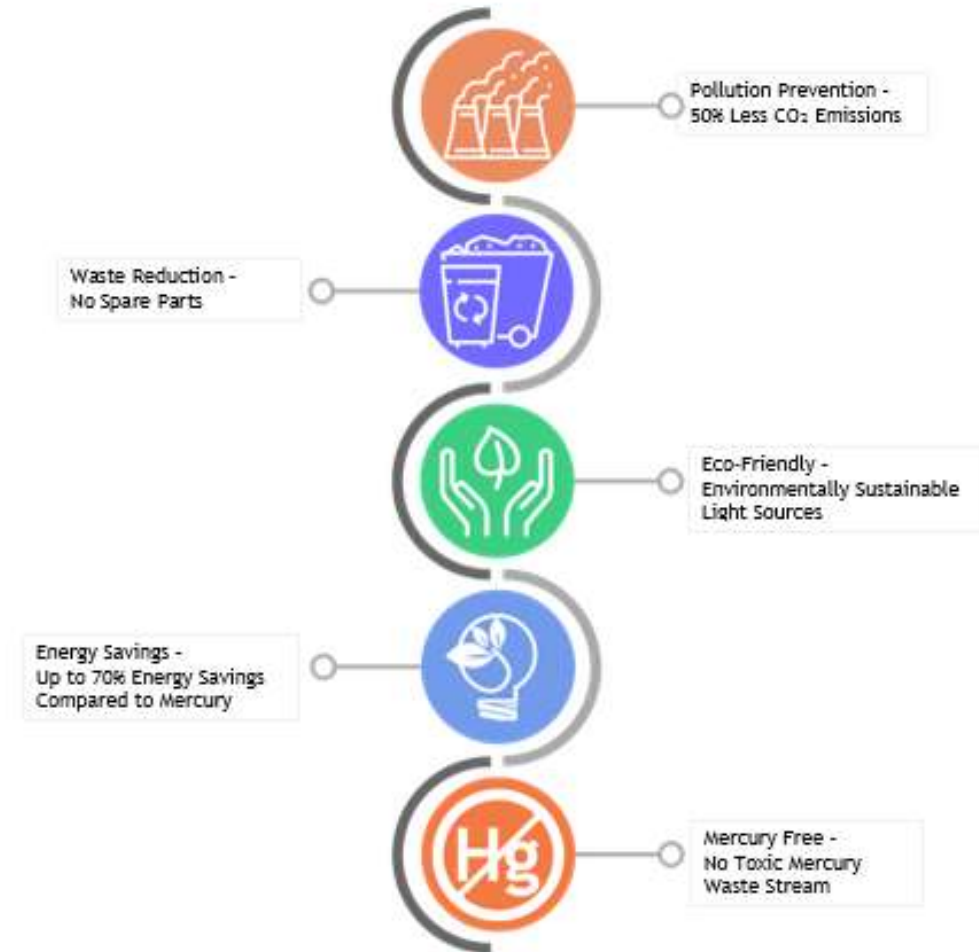
Adhesives

All these applications benefit from energy density (dose) which is optimized by total number and arrangement of diodes

LED Value Proposition

- Consistency of output over time, wavelength never changes and in the right working conditions LED curing systems will last 5+ years
- Footprint of LED vs traditional mercury or thermal ovens is a fraction of the size. Space is more expensive than ever, **why expand when you can reduce existing footprint!**
- Safer, Sustainable, Uptime
 - Workplace safety is on top of mind for all business managers
 - “What are you doing to be more sustainable?”
 - Uptime is money, increase uptime with instant on/off solid-state technology

LED Benefits Compared to Mercury



UV LED Ecosystem

Understanding that companies need end to end solutions for today's challenges, **Phoseon Technology** along with our industry leading **Ecosystem Partners** are actively working together to optimize your process

Your Support System



Industrial Coatings

- **Dark Spot** = Thermal cure process requiring 1 hr bake and 2 hr cool down. Warehouse was filled with WIP waiting to cool while demand increased.
- **Challenge** = Will LED cure a coating on metal?
- **Process** = Machine builder, coating supplier and Phoseon LED worked together with customer to prove out the best combination of curing conditions. Proved out with a trial.

- Outcome** = First system is installed and running well, several more systems on order. ROI less than 1yr
- Main driver increased throughput & workflow
 - Energy and space savings a plus
 - No more paying trucks to sit in parking lot



Flexo Printing

- **Dark Spot** = Maxed out on power draw, cost to add more was \$100K+
- **Challenge** = Uncertain about how well LED will cure inks and coatings
- **Process** = Ink Company, Phoseon LED and converter proved out the technology running trials, confidence grew, and transition did not seem as daunting

Outcome = Energy draw on new system was even less than expected, and the reduction of exhaust through roof and associated infrastructure was an added benefit



Composites

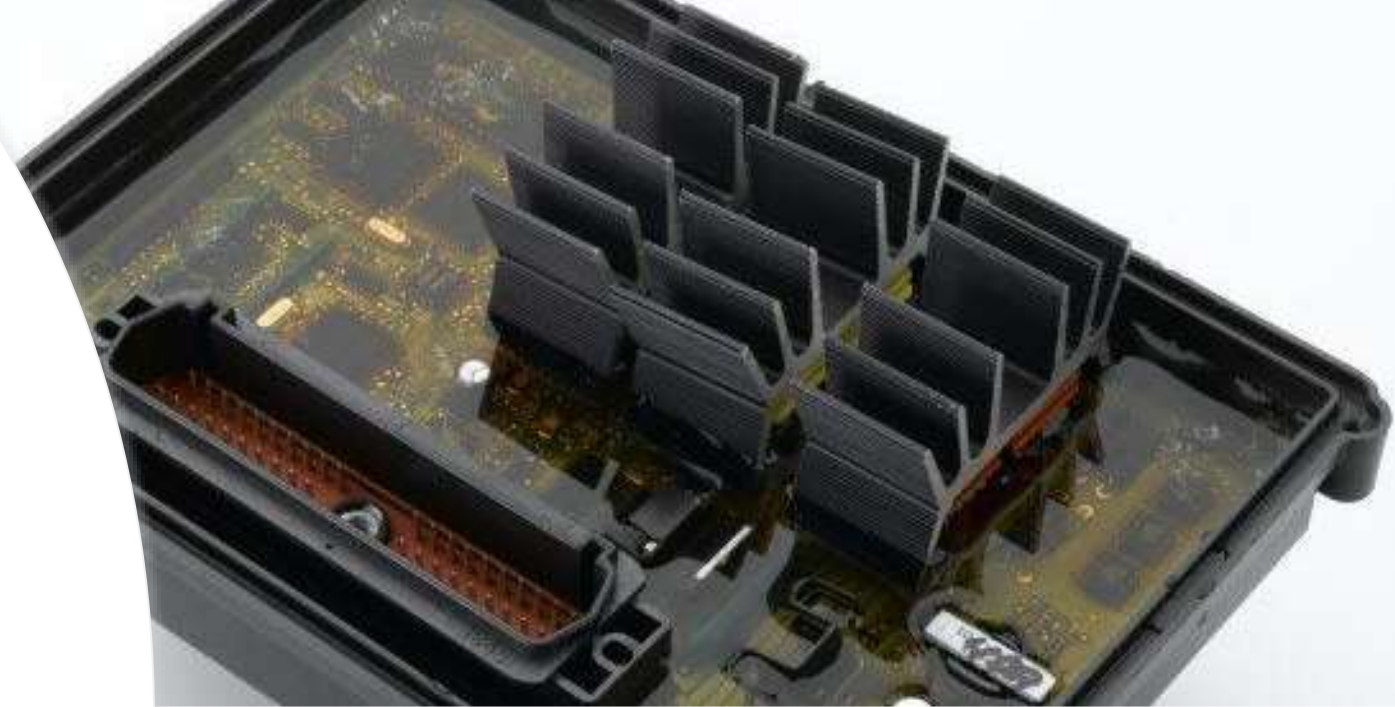
- **Dark Spot** = Slow pultruded process requiring excessive heat, lengthy thermal bake, and inconsistent properties. Dated equipment in need of constant repair and bulky
- **Challenge** = Will LED provide the needed through cure on this opaque resin?
- **Process** = Several trials and tweaks to the formula, once everything was dialed in a significant stride was made and got the attention of top management



Outcome = Unexpected benefit was the composite tested 40% stronger than existing technology; although increasing line speed is challenging, curing will not be limiting

Potting Compound

- **Dark Spot** = Field failure of potting compound cured with mercury on an automotive connector
- **Challenge** = Meeting more demanding spec and passing automotive standards testing; integrating a new solution into existing equipment (cost of brand-new line prohibitive)
- **Process** = Close collaboration with adhesive supplier revealed improved properties with LED curable version of potting compound. Optical simulations run to maximize exposure



Outcome = Size of LED equipment easily fit within existing mercury footprint, power supplies significantly smaller/lighter, overall system much safer

LED vs Water Based Coatings

1.0 mils thick clear pipe coating (9.6 in diameter)

LED Coating

- 100% solids (all coating)
- \$67.90 per gallon
- WFT 1.0 mils
- DFT 1.0 mils
- Spray efficiency = 96%
- **Cost per linear foot \$0.11**

Water Based Coating

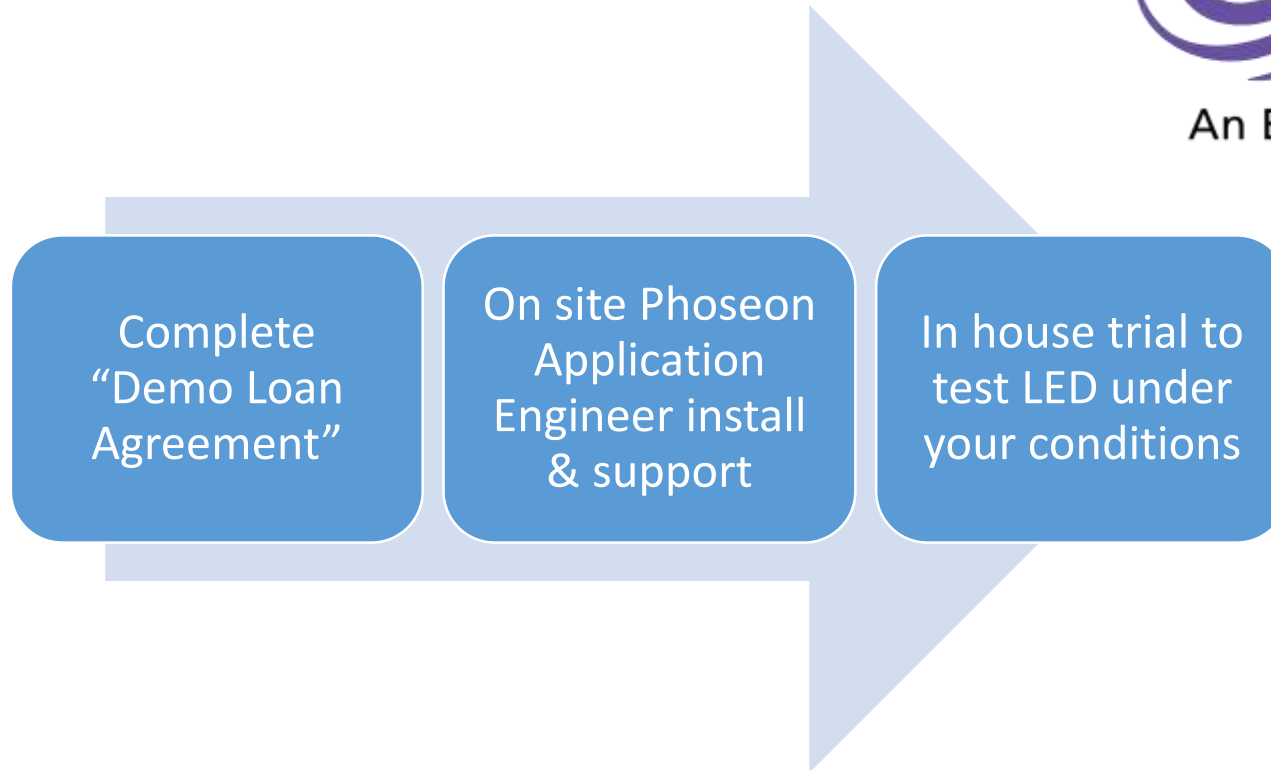
- 28% solids (some coating)
- \$26.60 per gallon
- WFT 5.0 mils
- DFT 1.0 mils (4.0 mils evaporation)
- Spray efficiency = 70%
- **Cost per linear foot \$0.21**

Process Improvements



- Increase speed 150 FPM -> 225 FPM
- Footprint Instant cure / No drying tables or racks
- Eliminates 2,600 square feet of wasted space
- Less Energy - No Induction Heating / Fans
- Humidity Effect Eliminated
- Temperature Effect Eliminated
- NO Coating Adjustments – Get rid of your Zahn Cup
- Transportation - No Freeze or Evaporation
- Reclaim Coating Overspray Reused

Know Before You Go!



- ◆ No charge for demo, FedEx or UPS number required for shipping
- ◆ Test materials (coatings, etc.) in house when LED equipment arrives
- ◆ Test period limited to ~4 weeks

Sustainability

Futureproof your business for the next generation

Check The Boxes

- ▀ Increasing pressure on suppliers to offer eco-friendly solutions and reduce CO2 emissions to offset regulatory costs
- ▀ LED Checks SEVERAL boxes:
 - ✓ No Hg = Zero Greenhouse Gas Emissions
 - ✓ No UV-C = No Ozone & No Odor
 - ✓ LED Lamp EOL is 90% Recyclable
 - ✓ Operator Safety



70%
ENERGY
SAVINGS
COMPARED TO MERCURY

WASTE REDUCTION

160
MERCURY BULBS WASTED

\$32,000
BULB REPLACEMENTS COSTS

*ANNUALLY PER 8 STATION FLEXO PRESS

POLLUTION PREVENTION

REPLACING MERCURY WITH LED CAN
REDUCE UP TO 20 TONS OF CO₂ PER
PRODUCT ANNUALLY

500,000,000
TONS OF CO₂ ELIMINATED SINCE 2002



Energy Credit – State Incentives

- Have you considered contacting your energy company for subsidies? Working through the process can be daunting, so we have a solution:
- Titan Energy Solutions (CT) has worked with end users to identify and apply for rebate/funding dollars toward purchase of Phoseon LED
 - Offset the cost of upgrading by spending government money!
 - Electricity and Natural Gas, all States have programs, de-regulated tend to offer more
 - Energy prices have increased 50-88% in last 12 months

CO2 savings:
4,755 tons

Net annual:
1,873,201 kWh savings

Total electric savings:
22,526,977 lifetime kWh savings



Global Coverage & Support



- ✓ LED Pioneer Since 2002
- ✓ 100% LED Focused
- ✓ More than 325 Patents
- ✓ Over 200,000 Units Shipped
- ✓ Complete Supply Chain Control
- ✓ Worldwide Support

Thank You