

Advances in Corona Treating Technology for Improving Ink Adhesion



Aaron Hootkin
Enercon Industries



72nd Annual Technical Conference · Oklahoma City, OK · 2020

Overview

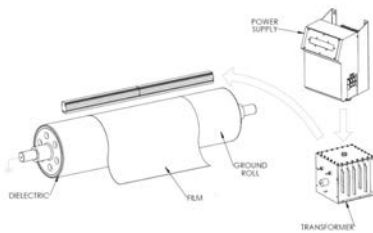


- Basics of corona treating
- Why it's important to corona treat prior to printing
- How to determine treatment parameters and measure changes in surface energy
- Review data that explores why all films don't respond the same to corona treatment and the relationship between watt density, surface energy and equipment cost
- Advancements in corona treater technology through the years

72nd Annual Technical Conference · Oklahoma City, OK · 2020



What is a corona treater?



72nd Annual Technical Conference · Oklahoma City, OK · 2020



How a Corona Treater Affects Surfaces



- Cleans surface of contamination & debris
- Forms low-molecular-weight (LMWOM) on film's surface
- Oxidizes film's surface
- Forms positive and negative sites by adding and deleting electrons

72nd Annual Technical Conference · Oklahoma City, OK · 2020



Corona Treater Configurations



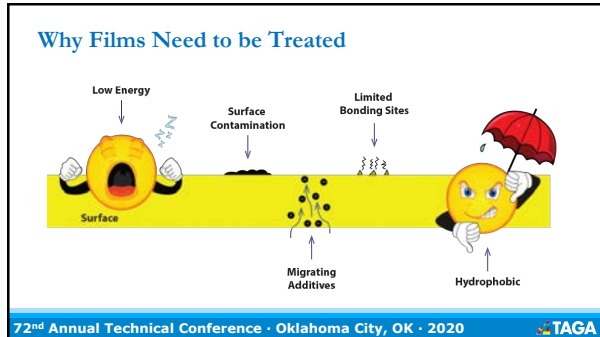
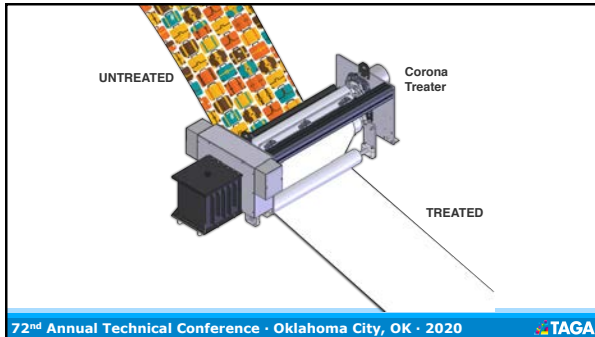
72nd Annual Technical Conference · Oklahoma City, OK · 2020



Why Films Need Treatment
(variables outside of your control)

72nd Annual Technical Conference · Oklahoma City, OK · 2020





Do all films respond to corona treating equally?

72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

You Control the Amount of Treatment
(aka watt density)

$$Wd = \frac{PSO}{EW \times LS \times NST}$$

Wd = Watt Density (w / ft² or m² / minute)
 PSO = Power Supply Output (w)
 EW = Electrode Width (ft or m)
 LS = Line Speed (ft or m / minute)
 NST = Number of Sides Treated

72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

You Control the Amount of Treatment
(aka watt density)

$$2.0 Wd = \frac{5,000w}{5ft \times 500 \times 1}$$

Wd = Watt Density (w / ft² or m² / minute)
 PSO = Power Supply Output (w)
 EW = Electrode Width (ft or m)
 LS = Line Speed (ft or m / minute)
 NST = Number of Sides Treated

72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

Dyne Levels Provide a Quick Check

Dyne levels do not guarantee adhesion

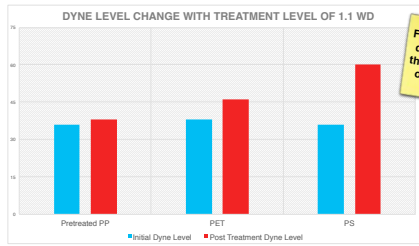


You cannot use watt density to predict dyne levels

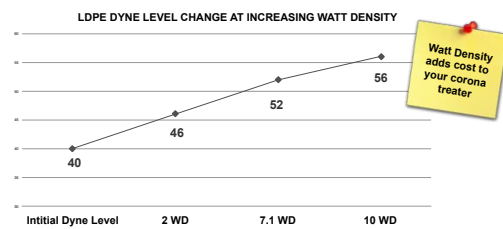
System parameters · Material parameters · Process parameters

72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

Differences in Film Responsiveness



Differences in Film Responsiveness



How Watt Density Increases Corona Treater Cost

- Power supply needs increased capacity
- Additional electrode assemblies may be required
- Larger ground roll is required to dissipate the heat
- Larger system frame
- Increased air flow – larger exhaust blower

Do you need higher watt density?

Dyne level?
As requested by who?
Have you defined your application?

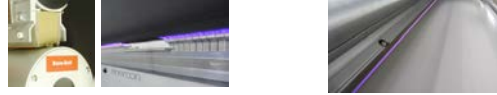


Advances in Corona Treater Technology

72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

Electrode & Ground Roll Advancements

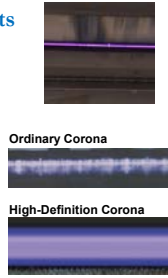
- Transition from metal electrodes with covered roll surfaces to ceramic electrodes with bare rolls.
 - Enabled the treatment of conductive or metallized films
 - Eliminated roll covering failures



72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

Electrode & Ground Roll Advancements

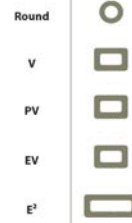
- Development of dual dielectric system using ceramic electrodes and a conductive ceramic ground roll cover
 - Reduced maintenance that bare rolls require due to oxidation
- Enercon's introduction of a proprietary non-conductive coating
 - Provides a more uniform and homogenous treatment with reduced filamentary discharge. (More consistent treatment and minimized chance of pinholes.)
 - Better management of heat reducing film wrinkling and backside treatment



72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

Electrode & Ground Roll Advancements

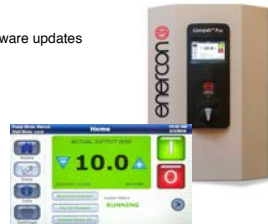
- Ceramic electrode developments allowing us to apply more power in a smaller area
- Round (50wpi), P (60wpi), PV (85wpi), EV (100wpi), E2(150wpi)
 - Benefit: Reduced Footprint from the.....
 - Possibility of reducing number of electrodes required
 - Possibility of a smaller diameter ground roll
 - Possibility of a smaller frame



72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

Next Generation of Power Supplies

- Industry 4.0 Ready
- USB port – upload logs/download software updates
- Custom maintenance reminders
- On-screen troubleshooting
- Remote support options
- Integrated artificial intelligence
- Supervisory Lockout



72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

Summary

- Corona Treatment is used to clean a surface from contaminants, improving ink adhesion
- Surface treating is available in a variety of technologies (corona, plasma, and flame) and a variety of configurations
- Films respond differently to treatment for reasons inherent to the film type
- Advances in corona treater technology
 - Ceramic electrode advancements enable treatment of conductive or metallized films
 - Ceramic electrode advancements allowing more power in a smaller footprint
 - New power supplies are Industry 4.0 ready and can communicate operating and fault data over network control infrastructures

72nd Annual Technical Conference · Oklahoma City, OK · 2020 TAGA

Questions?



Aaron Hootkin
Enercon Industries
+1 (262) 255.6070
ahootkin@enerconmail.com
www.enerconind.com/web-treating



Thank You