Advances in Corona Treating Technology for Improving Ink Adhesion

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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

What is a corona treater?
- 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

How a Corona Treater Affects Surfaces

Corona Treater Configurations

Why Films Need Treatment (variables outside of your control)
Why Films Need to be Treated

Dyne Levels Decay

Do all films respond to corona treating equally?

Watt Density

You Control the Amount of Treatment

\[ W_d = \frac{PSO \times EW \times LS \times NST}{E_0} \]

- \( W_d \): Watt Density (W/ft\(^2\) or m\(^2\)/minute)
- \( PSO \): Power Supply Output (W)
- \( EW \): Electrode Width (feet or m)
- \( LS \): Line Speed (ft or m/minute)
- \( NST \): Number of Sides Treated

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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

Differences in Film Responsiveness

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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

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

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

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

Next Generation of Power Supplies
- Industry 4.0 Ready
- USB port – upload log/download software updates
- Custom maintenance reminders
- On-screen troubleshooting
- Remote support options
- Integrated artificial intelligence
- Supervisory Lockout

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