Agenda

1. **Motivation**
   a. Lamination provides unique features - excellent barrier properties, mechanical strength.
   b. Static sealed within the laminate cannot be neutralized.

2. **Charge Control Strategy**
   a. Prevent charge from accumulating on both surfaces.
   b. Neutralize charge at the source.

3. **Analysis: Lamination Line**
   a. Static dissipaters are located through the line (not just near the winder).
   b. 13 Static bars and 3 passive devices are needed.

4. **Summary**
Motivation

The neutralizing ions from the static dissipater deposit on the insulating surface and cannot penetrate to the static sealed within the laminate.

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The electric field from the static on the web surface draws ions from the static dissipater.
Charge Control Strategy

With static one on surface and an equal amount of opposite polarity static on the other surface, no ions are drawn to the web.

Jargon: “Polar charge”
Lamination Line

The static control system for this lamination line includes static dissipaters in each operation.

- Unwind #2
- Lam
- Wind
- Unwind #1
- Corona Treat
- Coat

Roll Handling

Roll Handling
Static is neutralized on both sides of the web exiting the unwinding roll. Static bars SB1 & SB2 and idler rollers 1 – 5 are in fixed positions. SB3 neutralizes static from the nip.
The high level of static on the treated surface must be neutralized prior to the first roller that touches the back side.
Pre-nip ionization at rollers that touch the charged side of the web help neutralize static.

Note that the electric field does not cross the web.
Pre-nip Ionization

This roller that touches the neutral side of a charged web deposits static on the neutral side by pre-nip ionization. Note that the electric field crosses the web.
Corona Treater

The charged surface touches with roller 3 (OK).
The neutral surface touches roller 4 (BAD).

Neutralize static before it reaches roller 4!
Static bar SB5 is a safety net and SB6 prevents ignitions should the coater run dry.
Dryer

Ionizing cords on the backside prevent ignitions in the event of a fan failure.
SB7 neutralizes static from backside contact.
Static bar 8 neutralizes charge from the polymer lamination roller. Note that there are no static dissipaters on the webs prior to lamination.
Static bar 9 neutralizes charge from the polymer nip roller. SB10 neutralizes static from the lay-on roller and also limits the potential of the winding roll.
Summary

1. Neutralize static at the source.

2. Neutralize static before the neutral surface of the web touches a roller.

3. Polar charge - one surface has positive charge and the other has negative charge.

4. Static dissipaters are unable to neutralize polar charge. As a consequence, polar charge persists through the process to the winding roll.

5. Charge control in a lamination line is important to prevent static from being sealed within the laminate.

6. The static control system neutralizes static during normal operation and provides fail-safe neutralization for the solvent rich coater and potentially solvent rich dryer.

7. A static bar is needed to neutralize static from a winder lay-on roller. This final static bar also reduces the electric potential of the winding roll caused by residual levels of static on the web.
Questions?! 

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