Electrostatics in Web Handling

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Abstract

Static charges on webs cause many problems including coating defects, sheet sticking, dust attraction, and sparks that can ignite solvent vapors, shock operators, and reset control systems. Controlling static charge is more demanding for electronic products built on flexible substrates. Using a roll-to-roll manufacturing process to produce RFIDs and printed electronic circuits brings electrostatic discharge (ESD) level sensitivities to web handling operations.

Our half-day seminar begins with a review of fundamental concepts in electrostatics with many demonstrations to illustrate ideas and reinforce understanding. We build on these concepts to identify sources of web charging and to demonstrate methods for measuring web charge. The course concludes with demonstrations of static bars and ionizing strings.

Some questions that will be answered in this seminar:

- Why do webs become charged?
- How is charge related to the voltage and to electric fields?
- How much charge is needed on a web to cause problems?
- Can static be reliably measured? If so, how?
- How can static on webs be effectively controlled?

AGENDA

Fundamental Concepts in Electrostatics (8:00 AM – 9:30 AM)

- Triboelectrification of solids
- Relaxation/dissipation of electric charge
- The electrophorus & dissectible capacitor
- Capacitance & capacitive discharges
- Induction charging
- Shielding: antistatic & Faraday bags
- Charges & conductors

Web Electrostatics (10:00 AM – 11:30AM)

- Web charging & the triboelectric series
- Faraday cup measures charge
- Electrostatic fieldmeter measures charge
- Van de Graaff generator & a needle point ionizer
- Electrostatic voltmeter measures surface charge
- On which web surface is the charge?
- Charge dissipaters
  Static String
  ionizing blower
  static bar