

Fundamentals of Electrostatic Discharge Part 1: An Introduction to ESD

Electrostatic discharge, or ESD, is often described as the shock experienced when one comes into contact with metal after walking across a carpeted floor during the winter. Although an accurate description, static electricity and ESD have been creating serious industrial issues for hundreds of years.

Dating back to as long ago as the 1400s, militaries in European and Caribbean countries were employing static control procedures in an effort to prevent accidental electrostatic discharge ignition of stored gunpowder. In the 1860s, US paper mills utilized techniques such as flame ionization, basic grounding and steam drums to control static electricity, dissipating it from the paper web as it completed the drying procedure.

At one time or another, all types of businesses and industrial or manufacturing processes encounter problems with electrostatic charge or discharge. For example, munitions and explosives, petrochemical, pharmaceutical, agricultural, printing, graphic arts, textiles, painting, and plastics manufacturing industries are all significantly susceptible to the effects of ESD.

However, with the age of electronics came an entirely new range of issues caused by static electricity and electrostatic discharge. Electronic devices have become steadily faster while the circuitry grows ever smaller, leading to an overall increase in ESD sensitivity – a trend that continues to accelerate. The ESD Association’s “Electrostatic Discharge (ESD) Technology Roadmap” states that “with devices becoming more sensitive through 2010-2015 and beyond, it is imperative that companies begin to scrutinize the ESD capabilities of their handling processes”.

The modern effects of ESD can be observed in every facet of the electronics industry, anywhere in the world. Although the past several decades have brought forth a great deal of improvement, the effects of ESD continue to be reflected in production yields, manufacturing cost, product quality, and reliability and profit. While the price tag of a damaged device can be as small as a few cents ranging to upwards of a thousand dollars, once the associated costs for repair, rework, shipping, labor, and overhead are added the impact can be more accurately measured.

Today, electronics manufacturing companies around the globe routinely monitor the elements of electrostatic discharge using ESD Association standards as a guide. By actively establishing fundamental static control techniques, manufacturers can ensure their continued success while safeguarding the integrity of their products.