

Mitigating Electrostatic Effects on Manufacturing Processes and Measurement Accuracy

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Abstract — High technology manufacturing continues to evolve at a rapid pace. Many new manufacturing methods have been devised to keep pace with the technology change in the products. The technology changes have made the control of static charge levels on and around the product more critically important. Smaller device geometries and the magneto-resistive (MR) heads of disk drives require control of static charge to very low levels. Control of particles in manufacturing areas has always been needed, but smaller devices features mean smaller particles have the potential to cause defects. Smaller particles are more easily attracted to static charge on surfaces. Finally, increased automation in the manufacturing process increases the likelihood of equipment problems caused by particles and static discharges. Electrostatic forces interact directly with the mechanisms of weighing machines, making precise measurements in the microgram range all but impossible. Electrostatic forces of attraction and repulsion affect light weight sample materials, causing unwanted movement and losses during transfers, as well as the movement and clinging of unwanted particles to measurement surfaces. Measurement problems caused by static charge are not limited to weighing applications. Whenever small physical quantities or objects need to be measured as part of a manufacturing process, electrostatic forces can cause errors or unwanted movement of the object being measured. This is true for atomic force microscopes, force and mass measurements, and electrochemical measurements. Mitigation methods for static charge are well known in the electronics industry, and air ionization is one of the primary static control methods. Air ionization technology have had to change, as other manufacturing methods have changed. The need to make increasingly more precision measurements in many industries has increased the use of specialized ionizers for static control. This paper will discuss changes in manufacturing processes and measurement applications that have affected air ionization technology.