SIMCO ION™
An ITW Company

APPLICATION NOTE

Detecting Production Line ESD Events in Real-time

ESD Production Line Control

Summary

Under certain circumstances, pulse ceiling ionization systems can cause significant interference problems for processes and tools. This interference most often takes the form of large ESD transient pulses radiating broadband noise throughout the production area, causing tool lockup, process interruption and a host of other problems.

Pulse ionization systems, most commonly deployed on production area ceilings over sensitive tools and processes, can sometimes ironically lead to significant electrostatic problems in their own right. These ceiling ionization systems work by propagating large volumes of alternate polarity ions into the laminar airflow from ceiling to work surface. Pulse ionization systems are typically deployed where a considerable distance exists between the ionizer and the discharge target. Under optimal conditions, emitter points are far enough from the ceiling and the airflow is linear enough to carry these single polarity ions directly to the target work surface or product. Under those circumstances, no problem exists.

Production Line Control

If a more accurate assurance is needed to evaluate actual risk to product, then a method must be employed which captures and evaluates ESD events at the point of origin and as they occur. The ideal goal here is to not only to characterize the type of ESD event (HBM, CDM, etc.), but also to observe the activity which caused it. The payoff with this method is that:

1. The location and severity of ESD events can be evaluated during the investigation,
2. Specific remedies for each situation can be determined at that time, and
3. Basic calibration requirements for ESD sensors can be recommended if continuous monitoring of specific production line locations is desired.

An Example Investigation

At a facility where blood glucose monitors were being manufactured, an ESD/EMI investigation characterized the production line from automated board population through product assembly and inspection to QA and packaging.

A station by station evaluation, including deep inside automated tools, indicated several areas where ESD events were occurring at critical points. At product assembly stations, even though technicians were using wrist-

straps and ESD-safe table mats, ESD events were still occurring. Correlating the captured ESD waveforms with specific actions by the assembly technicians, it was discovered that plastic cases were highly charged even upon removal from the vendors packaging (which was on the table top). Discharge events occurred when the electronic components were merged with the case.

In addition, it was discovered that the installed overhead bench-top ionizers were deflected away from the workstation area where assembly was performed. They were having no effect on removing electrostatic charges from the highly charged covers.

The final discovery during this evaluation process was that, of the two products handled on this assembly line, only one of them had ESD events associated with it.

Conclusion

The efficiency provided by this investigative approach enabled the production manager to understand and address all of the problems discovered at the time of observation. It gave an immediately useful diagnostic for their ESD program effectiveness, and allowed rapid remediation for the problems found. As a result, enhancements in the form of purchased ESD equipment and staff training were made to the program so that continuous monitoring and improvement could be carried out.

How Involved is this Process?

Actually, the ESD/EMI investigative process is quite brief. Some production facilities can be effectively evaluated in a single day, depending upon the number of processing lines and other product handling areas (QA, packaging, etc.). In addition, since the investigative method depends upon diagnosing ESD events as they happen, it is important to view the production process in its normal flow. This means no interruption to production schedules.

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