

# 3M *Static Digest*

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## 3M Offers New Innovative Solutions For Critical Manufacturing Environments

If you design and produce components such as semiconductors, hard disk drives and flat panel displays, 3M can help you better manage ESD and EMI issues as a result of acquiring Credence Technologies Inc. last fall.

The organization features high-end monitoring equipment such as the 3M™ EM Aware® Monitor for critical manufacturing environments and a variety of other instruments for electronics assembly and cost-effective ESD management. Company founder Vladimir Kraz holds 21 issued and pending patents — some jointly with other inventors — in communications and instrumentation, the most recent one being for a design that eliminates soldering when replacing the jack in a wrist strap monitor.

### A Growing Static Control Business

Static control represents a key growth opportunity for 3M's electronics platform.

"Demand for static control is expected to increase as smaller, more complex components require greater protection against electrostatic discharge," said Frank Little, division vice president, 3M Electronics Solutions, at the time of the acquisition. "Together, 3M and Credence Technologies will offer a powerful lineup of products, technology and industry experience that will help customers increase productivity and product reliability."

Announced in September 2006, the acquisition allows 3M to expand its presence in the semiconductor, hard disk



*3M has acquired Credence Technologies Inc., a Soquel, Calif., provider of high-end monitoring equipment for critical manufacturing environments and a variety of other instruments for electronics assembly and cost-effective ESD management.*

drive and flat panel display industries and further build its business in Asia and Europe, two of the fastest growing areas for static control.

3M also acquired SCC Products Inc. and JJ Converting LLC, producers of flexible packaging and workstation products, in North Carolina in July 2006.

### Superior Customer Service

Credence Technologies shares 3M's dedication to superior customer service. The company employs 12 people at its operation in Soquel, near Santa Cruz, Calif.

Information about the addition of

Credence products to 3M's static control product line will be announced as the products become available under the 3M brand. 3M's network of manufacturer's representatives and authorized distributors will update customers in a timely fashion.

*For more information about Credence Technologies products:*

[www.credencetech.com](http://www.credencetech.com)

Phone: 831-459-7488

## Quantify ESD Events with Continuous Monitoring

By Vladimir Kraz

The main purpose of ESD control is to prevent ESD exposure to sensitive components. What damages components is electrostatic discharge, or an ESD event. A discharge causes rapid infusion of energy into the device, such as an integrated circuit, and causes its failure. It takes little energy – sometimes less than one nanojoule — to damage a sensitive part. In comparison, a professional baseball pitcher would use about two joules to throw a baseball.

Proper detection and measurement of ESD events is essential for effective ESD management, especially in critical environments, such as disk drive, semiconductor and flat panel display manufacturing.

### Why Traditional Tools Fall Short

Traditional measurement instruments such as static field meters and voltmeters are incapable of measuring ESD events. First, they are too slow to notice discharges. Second, the presence of static voltage does not guarantee that a discharge has occurred or will occur, nor can the measured voltage predict with any accuracy how strong the discharge may be. In short, static voltage measurements are “once removed” from the key parameter that damages the devices and thus are inherently inaccurate for assessing the actual ESD exposure to the components.

The traditional approach to ESD protection is concentrated mostly on individual components of a process but not on the result that it’s supposed to achieve. ESD-conscious companies spend millions of dollars on ESD-protective measures such as static dissipative floors, ionizers, special garments, grounding, wrist straps, and personnel training in an effort to completely eliminate ESD events.

Nonetheless, despite best efforts, ESD problems persist. The question is: How would a diligent ESD specialist in a production facility obtain factual knowledge about ESD events in order to verify that the environment is ESD-safe?

### A Better Way

What’s needed is a monitoring tool such as the 3M™ EM Aware® ESD Monitor, now available from 3M. This monitor detects and measures ESD events and provides factual measurements of ESD exposure on each component. It measures electrostatic discharges by the electromagnetic field generated by the event. This electromagnetic field has a specific signature — namely, an extremely short duration of a few nanoseconds and an even shorter rise time (down to tens of picoseconds). The monitor can pick up and measure such signals in a way that is correlated to the damage to the components. More specifically, it combines the analysis of the rise time

of the discharge, its peak maximum magnitude and the total energy of the discharge. This way the monitor readings can be correlated to the strength of the discharges measured in standardized ways — that is, CDM (Charged Device Model), MM (Machine Model) and HBM (Human Body Model).

The EM Aware ESD monitor is small: its footprint is the size of a business card. Its remote antenna is also small, ~1 cubic inch, and can fit virtually anywhere in the manufacturing process without disturbing it.

In addition to monitoring ESD events, some EM Aware models are capable of monitoring static voltage and ionization parameters, such as ionizer balance and decay. These models thus provide the ability to monitor the entire ESD environment.

Effective management of ESD starts and ends with monitoring. Without it, no one knows for sure the current status of the ESD environment. Further, there is no way to quantify ESD exposure and no way to associate ESD exposure with the specific steps in the process and the specific tools and materials used. Only by monitoring ESD events as described above is it possible to analyze and quantify the ESD environment and decide on corrective actions, such as using new materials, improving tools or adding special equipment such as ionizers and wrist straps.

Once such improvements have been implemented, it is immediately obvious with monitoring how effective the changes are and to what degree. Most important, a continuous monitor provides immediate feedback on any ESD-related problems. It also allows for recording the data on the ESD environment, which can be used to track down the problems, communicate with the customers and conduct a continuous “ESD Audit.”

With monitoring, it is now possible to determine whether a particular tool, such as an IC handler or a wire bonder for example, is suitable to process a device with a specific sensitivity, such as 100V CDM. The EM Aware monitor can serve as a tool and process qualification instrument, as a diagnostics tool and as a continuous monitor since the ESD environment changes all the time.



### About the Author

**Vladimir Kraz** is the founder of Credence Technologies Inc., of Santa Cruz, Calif. Credence introduced its first EMC (electromagnetic compliance) product in 1993. He holds master’s degrees in electrical and mechanical engineering, both from universities in the former U.S.S.R. He has been awarded 21 U.S. patents in communications and instrumentation.

*Vladimir Kraz*

## Is Your Soldering Iron Grounded?

Soldering irons and other manufacturing tools can often be poorly grounded or overlooked altogether. Now, however, these tools and other problem areas on the plant floor can be effectively monitored in real time and provide you with instant feedback.

3M is preparing the release of a new line of products, one of which is the patent-pending 3M™ Iron Man™ Monitors – an overvoltage monitor for electronics assembly. The Iron Man Monitors produce an alarm on every dangerous overvoltage exposure from poorly grounded soldering irons and other tools as well as from the approach of ungrounded operators.

The Iron Man Monitors were developed by Credence Technologies Inc. and will soon be released under the 3M brand.

3M is excited to introduce the Iron Man to the market and intends to make a formal announcement soon.

## Renovating your plant? Start with an ESD Audit

If you're thinking about renovating your plant, make sure to include static control as a top priority for upgrade.

Invite a 3M representative to conduct an ESD audit. The audit will look at your entire operation, not just the assembly line but also receiving, inventory, shipping and elsewhere. It will consider the sensitivity of items you manufacture, your current static control program, your procedures manual and worker training.

To find the nearest representative, see [http://solutions.3m.com/wps/portal/3M/en\\_US/electronics/home/SupportTraining/ContactUs/ContactUsStaticControl](http://solutions.3m.com/wps/portal/3M/en_US/electronics/home/SupportTraining/ContactUs/ContactUsStaticControl).

In the United States, you can also contact Don Reynolds at 512-984-5430 or [djreynolds@3M.com](mailto:djreynolds@3M.com) or Bill Pellegrin at 512-984-5447 or [wepellegrin1@3M.com](mailto:wepellegrin1@3M.com).

## 3M Dual Conductor Cords Test Continuously



*The 3M™ Dual Conductor Cord 2300 Series, used with wrist strap monitoring systems, offers either a right angle or straight plug design as one of several recent enhancements. The gray plug's 3.0 mm-diameter tip fits 3M Workstation Monitors 724, 725 and 790, while the blue plug's 3.4 mm-diameter tip is compatible with many other manufacturers' monitors. Instead of a single-wire system used in capacitance monitoring systems that are easily fooled, the 3M cord uses a dual conductor to continuously test loop resistance and ensure the wrist strap is always connected and functioning properly. If one conductor fails, the other can still maintain the wearer's grounding. For more information, contact a 3M manufacturer's representative or an authorized distributor. Or call 3M Electronic Solutions at 1-800-328-1368.*

## Where to Find 3M's Newly Acquired ESD-Protective Packaging

As a result of two recent acquisitions, 3M Electronics now owns one of the largest ESD-protective bag manufacturing facility in the world, providing customers a broader array of high quality packaging and other products.

SCC Products Inc. manufactures static shielding and moisture barrier bags, using film supplied by JJ Converting LLC. 3M acquired both companies, based in North Carolina, last summer.

In addition to manufacturing bags, SCC offers a number of grounding products for the workstation. Its manufacturing processes follow ISO 9000 guidelines and meet auditing standards of the military and commercial sectors.

*For more information and purchasing of SCC products:*

1-800-356-2728

[www.staticcontrol.com](http://www.staticcontrol.com)

# New 3M™ Overhead Air Ionizer – It's Self-Balancing and Self-Cleaning



*The new 3M™ Overhead Air Ionizer 991 delivers ionized air over a 2-foot-by-4-foot work area, neutralizing charges on non-conductive objects and surfaces at the workstation. The 991 is self-cleaning and never needs calibration.*

3M's new overhead air ionizer cleans itself and continually balances its ion emission, providing for lower maintenance and repair costs and improving plant productivity.

The 3M™ Overhead Air Ionizer 991 is equipped with a brush mechanism that sweeps the air emitter points behind the fans as they slow to a stop when the unit is turned off. When the unit is turned on, the brush cleaners automatically retract to prevent emitter point wear.

During operation the 991 delivers ionized air over a 2-foot-by-4-foot work area, neutralizing static charge that can damage sensitive components. It uses steady state DC ionizing technology that offers an intrinsic balance of  $\pm 20V$  so it never needs calibration.

## Adjust the Fan Speed

Workers can adjust the speed of the unit's three fans – high or low – to control ionization rate and worker comfort. At high speed, the ionizer neutralizes charges from 100V to 1,000V on non-conductive objects and surfaces 18 inches below the fans in less than

eight seconds. At low speed, the ionizer runs quieter and is less likely to dry out contact lenses.

## Cut Down on Contamination

The emitter points are placed behind the fans to eliminate field-induced charge. In addition, the fan intakes are equipped with open-cell foam filters to keep out dust, thus protecting the internal components from environmental contamination. The filters can be washed when they become dirty.

3M recommends activating the automatic cleaning system as least once a week. Cleaning schedules will vary, depending on environmental conditions and application requirements.

## Free Up Space

The 44 inch unit fits easily into small spaces, freeing up valuable workbench space. The ionizer weighs 10 pounds and can be hung above the workbench with S hooks or mounted on the workbench with brackets.

The unit is RoHS compliant\* and ergonomically sound. It also meets a variety of safety standards: cULus (Underwriters Laboratories, United States and Canada), TUV-GS (Germany), CE (Europe) and C-Tick (Australia and New Zealand).

For more information, contact a 3M manufacturer's representative or an authorized distributor. You can also call 3M Electronic Solutions at 1-800-328-1368.

\*"RoHS Compliant" 2005/95/EC means that the product or part ("Product") does not contain any of the substances in excess of the maximum concentration values in EU Directive 2002/95/EC, as amended by Commission Decision 2005/618/EC, unless the substance is in an application that is exempt under EU RoHS. This information represents 3M's knowledge and belief, which may be based in whole or in part on information provided by third party suppliers to 3M.

# 3M Mat Uses New Technology to Reduce Worker Fatigue

3M has introduced a new family of anti-fatigue mats that enable workers to stand comfortably for long periods while helping to control the static electricity that workers generate.

The 3M™ Static Control Anti-Fatigue Mat 9900 Series uses a new technology consisting of an interior matrix of hollow cylinders. When compressed, the cylinders function like springs, responding to changes in weight and position. Compression makes the mat softer, not harder like products made of foam. As a result, the mat lessens fatigue while providing secure footing and reducing static charge.

## Ideal for Assembly and Shipping Areas

The mats, which are connected through a 3M™ Ground Man 3040, have a surface-to-ground resistance of  $<2 \times 10^6$  ohms. The mats are ideal for use at assembly and manufacturing stations, in warehouse and shipping areas, in medical labs and in field service applications.

The mats are made of SBR rubber polymers for durability and ease of maintenance. They are easily cleaned by sweeping, vacuuming or wiping with a damp mop.

The mats come in three sizes: a standard 3-foot-by-5-foot rectangle, an octagonal 22 inches in diameter, and 3 foot wide runners that can be cut to a custom length. Each mat is 0.6 inches (1.52 cm) thick, with a beveled edge of solid molded rubber, and weighs two pounds per square foot. The mats have a three year warranty.

For more information, contact a 3M manufacturer's representative or an authorized distributor. You can also call 3M Electronic Solutions at 1-800-328-1368.



*Workers who stand for long periods will welcome the new 3M™ Static Control Anti-Fatigue Mat 9900 Series, which uses a new technology to lessen fatigue and offers a surface-to-ground resistance that reduces static electricity.*

# We Do More Than Control Static

A leader in static control for a quarter century, 3M provides numerous technologies to a wide segment of the electronics industry.

Our advanced technologies enable us to design specialized solutions that help you improve quality, reduce costs and control emissions as you manufacture products for the consumer, aerospace, military, automotive or medical markets.

3M products include connectors, cables and cable/connector assemblies; tape and reel transport media for passive semiconductor and electromechanical components; IC transport media; test and burn-in sockets; flexible and multilayer microinterconnect packaging solutions; tapes; abrasives; chemicals and materials; and ceramic textiles and composites.

All electronics products, including static control equipment and materials, come from the 3M Electronics Solutions Division, headquartered in Austin, Texas. See [www.3M.com/electronics](http://www.3M.com/electronics).

## 3M Verification and Calibration Service

Call Customer Service at 1-800-328-1368. A customer service representative will refer you to the appropriate lab.

Or call 3M Repair & Service Center, at 1-800-426-8688, option 2.

# 3M Electronics Hosts National ESD Training



Photo reproduced with permission of the Texas ESD Association.

*Charvaka Duvvury, Ph.D., a Texas Instruments Fellow in Dallas and a director of the national ESD Association, presents a workshop on Silicon Technology Scaling and ESD Challenges Jan. 18 for members of the Texas ESD Association at the 3M Innovation Center in Austin.*

If you are working toward the Program Manager or Device Design certifications offered by the National ESD Association, you may be coming to the 3M Innovation Center in Austin for training during the coming months.

**On June 21 the association will offer training consisting of two parts:**

1. ESD Standards Overview for the Program Manager, taught by David E. Swenson, Affinity Static Control Consulting and retired 3M technical specialist, and
2. Device Technology and Failure Analysis Overview, taught by Leo G. Henry, ESD/TLP Consultants.

The association completed a training session April 24-25 on ANSI/ESD S20.20 for the Program Manager certification as well as three Device Design tutorials. The 20.20 seminar was taught by Ron Gibson, Celestica, and John Kinnear, IBM. The tutorials were taught by Charvaka Duvvury, Texas Instruments; Jim Miller, Freescale Semiconductor; and Leo G. Henry, ESD/TLP Consultants.

## Interested in Certification?

For more information about the National ESD Association's Program Manager and Device Design certifications and a complete training schedule, see [www.esda.org/certification.html](http://www.esda.org/certification.html).

## Texas Group Looks at Silicon Technology Scaling

Earlier in the year, the national association in conjunction with the Texas ESD Association presented a workshop on Silicon Technology Scaling and ESD Challenges at the 3M Innovation Center.

In the Jan. 18 session, Charvaka Duvvury, Texas Instruments Fellow, examined advances in transistor structures, reviewed new effects of IC packages, and offered practical control methods from the ESD Technology Roadmap to maintain product reliability into the next decade.

## See Latest in Static Control Technology At EOS/ESD Symposium in Anaheim

See demonstrations of the latest advancements in continuous monitors, testers and other equipment, including those acquired from Credence Technologies and SCC, at the 3M booth at the EOS/ESD Symposium.

The annual symposium and exhibit will be in the Disneyland Hotel in Anaheim, Calif., Sept. 16-21.

Find out how the 3M Electronic Solutions Division can recommend improvements that can protect increasingly sensitive electronics products during manufacturing, testing, and shipping.

## See You at the Show!

**What:** 3M Exhibit at EOS/ESD Symposium and Exhibits

**Where:** Booth 213, South Exhibit Hall, Disneyland Hotel, Anaheim

**When:** Three days

- Monday, September 17: 6 p.m. to 9 p.m.
- Tuesday, September 18: 9 a.m. to 5 p.m.
- Wednesday, September 19: 9 a.m. to Noon

For more information about the symposium, see [www.esda.org](http://www.esda.org).

**3M Static Control  
Customer Service**

**1-800-328-1368**

# After a Day of ESD Training in Austin, Experience the Electricity of the Live Music Capital of the World

When you sign up for an ESD Manager Workshop at 3M Austin, plan an evening or two of music at one of the city's night spots. After a full day of boning up on ESD basics, experience the electricity that flows between musicians and fans in live performance. Feel the vibes you can't get from a CD or the radio.

What kind of music do you like? Austin, the self-proclaimed "Live Music Capital of the World," can provide a range of sounds almost every night. Here's a sampling:

- Country music at the Broken Spoke, a genuine Texas dance hall and eatery serving chicken-fried steak;
- Jazz at the Elephant Room, in a cozy basement in the heart of downtown;
- Blues and rock at Stubb's, which also serves traditional Texas barbecue;
- Blues, Cajun and Zydeco at

Antone's, which many consider the premier blues club of Texas; and

- Country and rockabilly at the Continental Club, which has been entertaining crowds with live music since 1957.

Balance your schedule to include a golf game, sailboat ride or run through tree-covered hills. Learn more about Austin attractions at <http://www.austintexas.org>.

The two-day workshop offers a beginning to intermediate approach to ESD for those developing a company's static control program or those wanting assurance that proper controls are in place. 3M training manager Bill Pellegrin will review protective flooring, personnel grounding, surfacing materials, packaging and ionization and explain how ANSI/ESD S20.20 can be part of a quality management system.

## Training Dates 2007

May 8-9  
Aug. 7-8  
Nov. 13-14

3M Austin Center  
Austin, Texas

Advance registration required  
Class size is limited.

Registration cost is \$599 US.

Hotel, transportation and recreation are the responsibility of the attendee.

Get registration information online at [http://solutions.3m.com/wps/portal/3M/en\\_US/electronics/home/SupportTraining/ESDTraining/](http://solutions.3m.com/wps/portal/3M/en_US/electronics/home/SupportTraining/ESDTraining/).

Or contact Bill Pellegrin, training manager, at (512) 984-5447, or by e-mail [wepellegrin1@3m.com](mailto:wepellegrin1@3m.com).

## Get Connected with New 3M Staff

Staff members at 3M Electronics are always eager to hear your questions and concerns about ESD control and discuss cost-effective solutions. Contact staff directly by phone or e-mail and visit them at trade shows.



### Vladimir Kraz

Vladimir Kraz founded 3M's recently acquired Credence Technologies Inc., in Santa Cruz,

Calif., which introduced its first EMC (electromagnetic compliance) product in 1993. Prior to founding Credence, he worked on CDMA (code division multiple access), GSM (Global System for Mobile communication), WLAN (wireless local area network), satellite and other wireless and wired data and voice communications and instrumentation controls.

Kraz holds master's degrees in electrical and mechanical engineering, both from universities in the

former U.S.S.R. He holds 21 U.S. patents — some jointly with other inventors — in communications and instrumentation. He has written articles for trade journals, presented papers at the EOS/ESD Symposium and given workshops at SEMATECH, an association of companies formed to accelerate technology innovations into manufacturing solutions.

He is a member of the ESD Association's standards committee as well as chair of the EMC Task Force of the SEMI (Semiconductor Equipment and Materials International) standards committee.

Contact him at 831-459-7488 or see [credencetech.com](http://credencetech.com)



### Robin Chamness

When you call 3M's customer service, a new person may come on the line to help you: Robin Chamness.

"I enjoy talking to customers," she says. "When they call, they need something. I try to give them the help they need."

Chamness first began helping 3M customers nearly 20 years ago. During that time, she has assisted callers with a number of telecommunications, electrical and electronics products, including interconnects and Textool™ test and burn-in sockets. She was assigned last summer to help customers inquiring about static control products.

A native of California's Bay area, she moved to Texas as a teenager. Today one of her favorite pastimes, besides reading, is cruising through the Texas Hill Country with her favorite beau on the back of a Suzuki Boulevard. Not bad for a mom with two daughters in college.

Contact her at 1-800-328-1368 or [rachamness1@3m.com](mailto:rachamness1@3m.com).

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## Important Notice

Before using these products, you must evaluate them and determine if they are suitable for your intended application(s). You assume all risks and liability associated with such use.

## Warranty; Limited Remedy; Limited Liability.

3M's product warranty is stated in its Product Literature available upon request. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** If this product is defective within the warranty period stated

above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. **Except where prohibited by law, 3M will not be liable for any loss or damage arising from this 3M product, whether direct, indirect, special, incidental or consequential regardless of the legal theory asserted.**



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