

*Merry Christmas*

&

Happy New Year



Volume 21 • Issue 3

# Leading the Way In Electronics



NEWSLETTER



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

261 Palmer Road, Madison, AL 35758 • Tel: (256) 461-9191 • Fax: (256) 461-9566



# *Merry Christmas*

We would like to express  
our sincerest  
appreciation for  
the trust you have placed  
in us and best wishes for  
the holidays.

We will be closed  
December 25, 26, and  
January 1 to allow our team to  
celebrate the holidays with  
their family and friends.





*Happy  
Holiday  
Merry  
Christmas  
and Happy  
New Year*



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# Dave's World

## *Wow! What A Year?!?*

I've said many times (probably 39) that no two years are ever the same and 2023 proved that again. We've spent the past few years struggling through COVID and supply chain issues but we have kept investing in ourselves and looking at the future. This was the year it started to pay off.

By almost every metric we track, 2023 was our best year ever. I can talk all day about all the growth and the sales records set by both Training Resources and Engineering/Manufacturing Services but what I'm most proud of are the people that made all of this work. Diana and Mark have done a fantastic job in preparing for our current state and getting us ready for the future.

Diana and Pat have led the Training Resources Department from an almost complete shutdown during COVID to our best year ever in 2023 and an even better outlook for 2024. Pat and Frank have coordinated the implementation of new classes and making sure their co-workers, aka the world's best instructors, are up to date and all on the same page. Three new instructors, Meagan, Brian and Jenny, have joined our team of professionals this year. We have 3 classrooms in Madison and 2 in Houston but about half of our classes are taught on the road at customer's facilities. As a result, Pat and Frank spend a lot of time coordinating training calendars, instructor schedules, flights, hotels, rental cars, shipping, etc. Once that is done, they have to prepare the contingency plans for materials not getting somewhere on time or not at all (it happens) and anything else that could possibly go wrong. All of our instructors do a great job of adapting to the random things that happen when they are traveling a large part of their time. In addition to Training Services, the Training Materials team lead by Chuck have shipped a record number of training kits and other training items. The addition of Cesar to

David  
Raby

President/CEO  
[draby@stiusa.com](mailto:draby@stiusa.com)





the team has helped us keep up with the growth. We've added more customized kits (just ask!) and many items to support the new training programs.

Mark and Chris have done a great job expanding our capabilities and capacity in manufacturing but primarily just taking care of customers by delivering quality products. Our product mix continues to diversify but one constant is that the majority of our customers products fall in the critical end use category and as a result we take our jobs very seriously. Quality is the most important thing and something we strive to provide to our customers. We've benefited greatly by adding Norma as Quality Manager to the Quality Department. She oversees our overall quality policies and procedures but also led us through our AS 9100D:2016 recertification and has started the process for STI's ISO 13485 (Medical) certification which we expect to achieve in 2024. Chris and AJ have led the growth in our manufacturing department in 2023 and they work the puzzle everyday of which product goes first on which line by which operator. Jeff Z (JZ), Gina, Tammy, and Nika have all joined the team this year and all make our manufacturing operations better. AJ and Bobby have overseen the addition of our 3rd SMT line which is part of the reason we expect 2024 to be even better than the record setting 2023. Caroline has led our Analytical Lab through another great year. We added a new Scanning Electron Microscope at the beginning of the year which following the theme from other areas, has expanded our capabilities.

Thank you for your contributions to our success this year. It doesn't matter how good we are, without our customers and suppliers, nothing happens. We appreciate you and promise we never take your trust for granted.

I thank you again for your support and wish you a happy, healthy, and prosperous 2024. ★

David Raby

PS. You'll notice in our group photo that somehow, for the 41st consecutive years, we just keep getting better looking.

# UP CLOSE and PERSONAL

"You only have 1  
Life 2 Live".  
Live it with a  
purpose and make  
the best out of it."

## Interview with Narnika Bailey

### Meet Narnika

Job Title: **Incoming Inspection**

How long have you been part of STI Electronics? **4 months**

What do you do for STI? **Incoming Inspection**

### Just For Fun

Tell us about your family: **I have 2 kids my daughter is 18 and my son is 20**

Tell us about your pets: **I have 2 dogs A Pitbull (Boy-8 months) and an American Bully (Girl 4 months)**

Do you have a favorite place to visit? **Las Vegas**

What's your favorite type of music/song/artist? **Gospel, and R&B Soul**

What's your favorite meal/food? **Pizza**

Tell us about any hobbies that you enjoy. **I enjoy singing, helping in the community, and recording podcast segments on daily life events.**

What's one fun thing to know about you? **I enjoy writing Fiction and Non-Fiction stories.**

What's your favorite thing about working at STI? **Everyone is nice, helpful, and unique in their own different ways.**

What is your favorite non-profit to support and why? **S.T.E.P.A.N.-N- Our City (Stopping The Extra Pain and Negativity) and The Boys and Girls Clubs around North Alabama. I enjoy mentoring, helping the youth, and giving the extra hand of help when its wanted and needed. Sometimes Our youth just needs someone to listen to them and understand their outlook of Life and help them with Guidance through whatever they are standing up against.**

Anything else you'd like to share with your team members? **"You are never too old to set another goal or to dream a new dream." — Malala Yousafzai**





# HAPPENINGS

## *Congratulations*

During the second part of 2023 we have had several anniversaries to celebrate. We would like to congratulate each one on achieving this anniversary with us! They have all worked hard for this accomplishment and we truly appreciate their dedication.



**Mark • 23 Years**



**Diana • 26 Years**



**Yolanda • 4 Years**



**Sharon • 6 Years**



**Joel • 6 Years**



**Katrena • 13 Years**



**Caroline - 4 Years**



**Robert - 2 Years**



**Robert - 5 Years**



**Edna • 14 Years**



**Pam • 17 Years**



**Kim • 4 Years**



**Donna • 24 Years**



**Robbie • 4 Years**



**Troy - 6 Years**



**K.P. - 13 Years**



**Jeff - 10 Years**



**Jonnie - 19 Years**



**Chris - 8 Years**



**Lisa - 10 Years**



**Jean - 4 Years**



**Shawn - 5 Years**



**Bobby - 15 Years**



# • MERRY • Christmas



As the holiday season is upon us, I wanted to take a moment to extend warm wishes to you and your loved ones. On behalf of the entire STI Operations family, we send heartfelt greetings.

May this Christmas bring joy, peace, and cherished moments to you and your family. We appreciate the trust and partnership you have bestowed upon us throughout the year, and we look forward to serving you with the same dedication and excellence in the coming year.

If you have any questions, concerns, or if there's anything we can do to enhance your experience with us, please don't hesitate to reach out. Your satisfaction is our top priority.

Thank you for being a valued part of STI Electronics, Inc. Wishing you a Merry Christmas filled with love, laughter, and the warmth of the holiday spirit.

Thanks,

**Diana Bradford**

Vice President,  
Operations/Training Resources





**Christy**  
Executive Assistant



**Sheila**  
Corporate Secretary



**Donna**  
Receptionist



**Erick**  
Job Cost Analyst



**Scott**  
Accounting Manager



**Robbie**  
Marketing Coordinator



**Roger**  
Facilities Manager



**Jean**  
Facilities Maintenance



Merry  
Christmas

## ENGINEERING/MANUFACTURING SERVICES



**Mark**  
V.P. Engineering/Manufacturing  
Services



**Chris**  
Manufacturing Manager



**Troy**  
Systems Engineer



**Caroline**  
Analytical Lab Mgr.



**A.J.**  
Prod. Engineering Supvr.



**James**  
Customer Account Manager



**Norma**  
Quality Manager



**Jeff**  
Logistics Manager



**Contact Information:**

**Mark McMeen**

**VP, Engineering/Manufacturing Services**

**[mmcmeen@stiusa.com](mailto:mmcmeen@stiusa.com)**

## Engineering/Manufacturing Services

**The World is an everchanging Economic and Technological Ecosystem and Electronics is the leading change agent. Are we prepared for a change in our Electrical design thinking?**

As you are aware, the electronics Industry is an everchanging ecosystem that drives a shrinking form, fit and function factor or better definition of a shrinking size weight and power function called SWaP. The last 30 years in electronics has seen a desire to drive the SWaP to its smallest form factor / miniaturization. We achieved this mantra thru a number of innovations and game changing technologies such as integrated circuit shrink from 80 to 100 nanometer nodes to <5 nanometer node. Also, packaging miniaturization of integrated circuits (IC) from SOIC to Ball Grid Array to quad flat no lead packages and ultimately chip scale packaging (CSP). CSP is defined as a packaged die that has an area

no greater than 1.2 times the size of the actual die (integrated circuit) and has a direct attach capability to the pcb board itself or multi-chip module. The last major breakthrough was in drive voltages  $V_{cc}$  reduction which has migrated downward from 5v to 3.3v to 2.5v to 1.8v because the gate oxide used to make transistors has been reducing and shrinking which impacts the electrostatic field strength which influences the efficiency of switching the transistor on and off.

These accomplishments allowed the electronic system design engineer the ability to shrink and miniaturize over the years to smaller and smaller electronic devices and systems and also add more and more features and capabilities into a smaller end product. We see Samsung, Intel and TSMC battling over the smallest 5 and ultimately 3 nm technology in production capabilities which has driven the integrated circuit density – i.e., number of transistors per available space.

Remember the 5 and 3 nm technology is slightly different in each of the companies and nm is a loose measuring stick that allows us to define the improvement of each company's microprocessor / ic but in general each company is striving to create a process of increasing the number of transistors on the ic per surface area over previous generations. So smaller lighter faster has been the goal and is still the goal for computational purposes. So, what could cause a shift in design from our goal in smaller form fit and function or SWaP?

Now the world requires a change in thinking and direction when we start wanting electric vehicles and other electric products that need



power and torque and duration to eliminate green house effects and gases Electricity, batteries, battery charging and production of electricity require drive voltages of 24, 28, 48, 60, 100, 120, and 240-, 480-, 600-, and 1000-volt electronic systems. This leads to electronic design changes as well as design rule changes for electronic subsystems and products. Imagine having electric chargers in an outside environment using 120, 240, 480 and 600 volts to charge your vehicle or even 1000 volts. What type of safety protocols are required to handle this drive voltage and protect the consumer and its asset / product from damage should something go wrong? Well, the future problems of designing electronics for these high voltages are here today and the system designer and their respective companies are designing and creating tests and design rules on the fly without past experiences and industry guidelines because the electronic ecosystem does not have industry guidelines / test protocols to draw on in these times. Design engineers are building, testing and creating design rules and testing standards on a company per company basis and are all striving to be first to market with the best product and subsystem that addresses these concerns. The physics of high drive voltages requires the design engineer to add space and/or gap between adjacent conductors to prevent arcing, carbon arc tracking and/or electrical chemical migration. There is a big difference between low drive voltages <24 volts vs. High drive voltages >120 / 240 volts vs. extreme high voltages >600 to 1000 volts. The world or should I say physics of drive voltages, becomes a lot more difficult when we move from low voltage < 24 volts to 120 to 240 volts and then to extreme high voltage applications where arcing, and carbon arc tracking become real hazards. Electronics and electronic design and voltage transmission between electronic subsystems becomes different as we add higher and higher drive voltages and their voltage bias field created by running these types of voltages. The voltage potential gradient per mil / per mm / per length is now a measurable baseline that must be defined and monitored as we now can

have 5, 10 or even 20 volts per mil, per mm, and/or per a defined length for reference so we can define thresholds and define risks. These measurements now take on a relevance and importance in safety because the introduction of high voltage / potential bias gradients can drive adverse effects. An example would be ECM (ELECTRICAL CHEMICAL MIGRATION) or arcing between adjacent conductors and/or carbon arc tracking which reduces the surface insulation resistance by creating its own carbon track or short circuiting of adjacent pads or vias on electronic boards or power distribution busses or transmission cabling systems.

The surface insulation resistance value and/or cleanliness of these areas now play a huge roll in reliability and long-term safety of the end product or subsystem. Even adjacent low voltage electronic control cards can be influenced by high voltage systems or transmission cables that are running near to adjacent subsystems, which all play a roll in their performance in a high voltage application. High voltage drives and their electronic control of high voltage requires a design change or paradigm that requires the future designer to address spacing / gap between interconnects. These electronic designs can arc or carbon arc track between adjacent pads or interconnects and cause serious damage to the product / system and/or human interaction. Cleanliness and surface insulation resistance (SIR) will take on a new meaning and definition as we continue to introduce higher and higher control voltages to our products and subsystems. With these requirements for cleaner and better / higher surface insulation requirements, the industry will need to develop tests and standards to measure and quantify cleanliness and surface insulation thresholds to ensure a minimum level of safety and reliability in all products that use high drive voltages for their products. Higher voltage is more efficient and its operational use as well as in the recharging of batteries / battery packs that are required for electric vehicles and products that are becoming main stream.

electric vehicles and products that are becoming main stream.

There is a lot of effort being put forth by the electronics industry:

1. IPC (GOVERNING STANDARDS) is working hard to develop high voltage standards and test protocols for SIR – Surface Insulation Resistance / cleanliness standards
2. Solder paste manufacturers are working on low ionic and benign solder flux systems specifically for high voltage applications
3. OEM / EMS companies are working on electronic design rules specifically around the application of High Voltage devices and sub systems
4. Electronic materials companies are working on cleaning agents to aid in removing flux systems
5. Conformal Coating and Encapsulation vendors are working on enhanced materials to aid in dielectric standoff for high voltage applications
6. Test and Engineering companies are working on unique ways to test high voltage applications in various high temperature and humid environmental conditions.

As you can see this shift to high voltage fully electric devices and products brings a new paradigm and change agents to the market place. STI has been developing custom testing of solutions to specific products in the high voltage arena for 10 years. There are unique challenges to testing electronics at 240 to 1000 volts and the designs of these test fixtures and their associated electronics is also challenging when one needs to test in 40 to 90 °C temperature wise and from 65% to 95% RH. These humid environments facilitate arcing and promote ECM type events and or carbon arc tracking. As voltage gradients increase so does the propensity for these events to occur – i.e., Arcing and or carbon arc tracking. One can also be lulled into thinking that conformal coating and or encapsulation of the electronics is the answer and the short answer is

it greatly helps but one can also arc, ECM and or carbon arc track underneath these coatings and encapsulants.

The picture below shows a burn out of a trace and the underlying FR4 material that burned it self open underneath a potted and encapsulated electronic assembly. These types of occurrences are becoming more prevalent as the industry introduces higher voltage VCC and the requirement for ionic free or low ionic free surfaces under encapsulation and conformal coatings are being used. One can see the copper trace and the underlying FR4 material has burned and melted away. The encapsulation in this application worked to prevent a fire but the underlying electronic board failed to work after this area short circuited to ground.







## CERTIFICATIONS/CAPABILITIES

- ✓ AS9100D/ISO 9001:2015
- ✓ ISO 13485:2016 (Pending)
- ✓ ITAR REGISTERED
- ✓ Cage Code 1JX07
- ✓ System for Award Management (SAM) Registration
- ✓ NIST 800-171 Compliant
- ✓ Joint Certification Program (JCP) Registration (DD 2345)
- ✓ IPC J-STD-001/IPC-A-610 Qualified Manufacturers Listing (QML)
- ✓ IPC J-STD-001 Space and Military Addendum Qualified Manufacturers Listing (QML)
- ✓ IPC 1791 Qualified Manufacturers Listing (QML)
- ✓ Approved on DOE (Department of Energy) MASL
- ✓ IPC Authorized Training Center
- ✓ IPC Distributor

The electronic industry is an everchanging ecosystem that is pushing the boundaries of design and technologies to address an everchanging consumer, DOD and aerospace world that uses leading edge technologies to its advantages. With these changing dynamics, the electronics world in some areas will not continue to shrink but to design larger spaces/ gaps and material sets so we can properly handle the side effects of increased battery use and power / voltage gradient density to increase efficiency and functionality of these new products and subsystems.

STI Analytical lab and engineering teams are working with companies to develop test protocols and design guidelines to handle the new technology shifts and innovations to meet the products of today and the future. Product reliability and safety will be at the fore front of these new products and concepts and thus we need to develop test protocol and standards to insure consistency and performance. Please reach out if you have any comments or thoughts on these challenges and as we welcome a new year 2024, we can all look forward to new inventions and products that require cutting edge design in the electronics world. It is an exciting and a scary time as we move forward with greener and cleaner energy in their use and applications.....

For more info:

**Mark McMeen**

***V.P. of Eng / Mfg.***

**mmcmeen@stiusa.com**

**256-705-5515**

**STI ELECTRONICS Inc.**

261 Palmer Road  
Madison Alabama 35758.



# Merry Christmas

Warmest greetings from the training team at STI Electronics, Inc.! As we celebrate the joyous season of Christmas, our Training Resources extends heartfelt wishes to you and your loved ones. May this festive occasion be filled with moments of happiness, love, and togetherness. We appreciate your commitment to growth and learning throughout the year, and we look forward to continuing our journey together in the coming year. Wishing you a Merry Christmas and a prosperous New Year filled with success and new opportunities.

Thanks,

**Pat Scott**

Training Services Manager





**Frank**  
Lead Master Instructor



**Michelle**  
Customer Service Manager



**Melissa**  
Customer Service Rep.



**Robert**  
Master Instructor



**Travis**  
Master Instructor



**Meagen**  
Master Instructor



**Brian**  
Master Instructor



**Jenny**  
Master Instructor





# Training Services 2023

## Contact Information:

**Pat Scott**

**Training Manager**

**pscott@stiusa.com**

2023 has been a successful year for STI's Training Services Department. We appreciate your business and want to thank everyone who has attended courses at our training facilities in Madison, AL and Houston, TX as well as classes taught at customer's facilities. We strive to be customer focused and are committed to providing the best experience possible for all course attendees. Customer service continues even after you complete your training course. STI's instructors are available to answer any technical or training questions you may have.

In 2024, we will continue to:

- Conduct IPC Certification/Recertification courses for both CIS's and CIT's, NASA-STD-8739.1 and NASA-STD-8739.4 initial training and retraining courses for Operators/Inspectors, and advanced soldering and BGA Rework classes etc.
- Attend and support IPC meetings. STI attends IPC meetings to keep up to date with what's going on with the IPC Standards and Training courses and to provide you with some timely updates similar to the following:
- The IPC-7711/7721D has passed ballot

and is in the final tweaking for printing. Expect to see it released before the end of 2023 with the training program available 4 – 6 months after that.

- The IPC J-STD-001 J and the IPC-A-610 J are both on second ballot which closed 30 November 2023 and if they pass the second ballot IPC might be able to publish them before 2024. If the second ballot does not pass, we can expect an early 2024 release with both training programs releasing in the same 4 – 6 month time frame as all other training programs.

So why does it take 4 to 6 months to get a training program ready? The training programs at this point are very mature and do not require as much time to update as starting from scratch. However, the test questions for the courses come from the certification committee and that is where the delay happens. Each test bank must be checked and verified before testing can start so that takes time to ensure the validity of each question.

## Upcoming events:

IPC Wintercom is the next big event for committee work and it is taking place in Barcelona Spain January 22-25, 2024. This would be a great chance to meet all of the great contributors from Europe who don't normally make it to the US for meetings.

The next US based IPC meeting is APEX 2024 in Anaheim April 6-11, 2024 and if you register before March 1, 2024, you can get a 20% discount.

Go to [IPCAPEXEXPO.ORG](http://IPCAPEXEXPO.ORG) to sign-up.

*STI values your business and we look forward to working with you in 2024.*



# STI Celebrated 41 Years in 2023



In 2023, our renowned organization, joyously marked its 41st anniversary, commemorating four decades of innovation, progress, and unwavering commitment to excellence. Since its inception, STI has consistently been at the forefront of advancements in science, technology, and industry, playing a pivotal role in shaping the landscape of numerous sectors. The celebratory milestone not only signifies the longevity of STI's impactful journey

but also underscores its resilience and adaptability in navigating the ever-evolving global landscape. Over the past 41 years, STI has contributed significantly to societal growth, pushing boundaries, and fostering a culture of continuous improvement. As we reflect on our remarkable journey, STI remains dedicated to pushing the boundaries of possibility, anticipating future challenges, and continuing to lead the way in innovative solutions for years to come.



**41** YEARS  
Since 1982



*Merry  
Christmas*

— and —

HAPPY NEW YEAR

