sti electronics inc.

Volume 18 • Issue 1

APRIL, 2020

Leading the Way In Electronics

For Over 30 years.

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

Contents

Volume 18, Issue 1 • April, 2020

features

STI Electronics, Inc.
261 Palmer Road
Madison, AL 35758

256.461.9191
www.stiusa.com
email: info@stiusa.com

Dave's World

April, 2020

Welcome to Dave's World 2.0. The article below was written over a month ago. As we all know very well, the world has changed since then.

Here at STI right now, I have two priorities.

> #1 Keep STI employees and their families as safe and healthy as possible.
>
> #2 Keep business as "normal" as possible.

So far, we are accomplishing those goals but I know that could change at any minute. We have adopted many new requirements to get sick people home and to keep well people well. Our work stations in both manufacturing and training have been separated by 6 feet or more and our always clean facility is now multiple times cleaner than ever. We are still hosting students but only if they can positively answer the same health/travel questions our own employees must answer. Our instructors are only traveling if they can do so by their own automobile and if we are happy with the procedures at the customer's facility. We plan to keep operating in this manner until we all can go back to "normal" but realize as quickly as things are changing, none of us know what we'll be doing tomorrow or next week. I hope and pray for our health, your health, and that we are through this pandemic soon. One thing I am sure of is each day, we are one day closer to the end.

With that backdrop, let's go back to where we were:

February, 2020

I'm sitting in the front row in a presentation at the Pan Pacific Conference during what had thus far been an enjoyable experience. The speaker is talking about how much some technology has changed and he says something along the lines of "for all of you young people, this is the only way you've ever known this to be done. For people like myself and, um… Dave here, we know this technology has evolved tremendously over the years." You know I like to brag that STI (along with me) has been around for 38 years. I grew up in the industry prior to joining STI (then Soldering Technology International) but I don't usually think of myself as being THAT old. I don't remember a time before electricity or cars and my social security number isn't just 3 digits. I never had a pet dinosaur but I've seen a lot and my decay is happening faster than ever. The "call out" during the presentation was a quick reminder of how quickly I've gone from being one of the youngest people in the room to one of the oldest.

APEX was fun and informative as always. San Diego is not a bad place to visit in February, although I did notice the show is going back to Anaheim in 2024 & 2025. Burt Rutan did his usual great job giving the keynote address. I arrived

David Raby

President/CEO

draby@stiusa.com

right on time for the presentation (which was too late) and was one of the many people standing 2+ deep around the back of the room. I've heard Mr. Rutan speak several times and even played one hole of golf with him. I look forward to listening to many more of his tales of advancing airplane and spacecraft designs. He is a true pioneer and not afraid to voice an opinion.

There were some fears that the Coronavirus would hamper attendance at APEX, although I didn't notice any significant decline. There were some empty booth spaces as some of the Asian exhibitors had to cancel travel plans at the last minute. The committee and technical sessions seemed to be well attended. I heard good things from STI's Frank Honyotski, Robert Fornefeld and Mark McMeen's committee meetings as well as Mark's technical presentations for both STI and Magnalytix. The show floor had lots of shiny, new, expensive toys that would supposedly make my life better if I'd just agree to a big check with lots of zeros or some large monthly payments the rest of my life or longer. Other than Mirtec's fan/LED/hologram signs, my slightly (ok greatly) biased opinion was that Magnalytix had the best technological advance on display at the show. The booth stayed full with multiple demos going on almost the entire show. I was proud of the way the whole Magnalytix team worked together as I tried to stay out their way (I'm old) and give them a chance to show off the real time production line SIR tester. Magnalytix also received the New Product Innovation (NPI) Award for the first SIR Electrical Test Device for the shop floor at APEX. In case you don't remember, Magnalytix is a joint venture between STI and KYZEN.

My favorite part of the week is catching up with friends and acquaintances at lunches or dinners or in the booths or aisles at the show. Some I only see a couple of times a year at events of this type but some really do become friends over time. It is always great to meet new people whether they are young and just coming into the industry or someone that somehow our paths haven't crossed previously. My engineering personality makes meeting new people a challenge but somehow big industry events like this make even me sociable.

For the first time APEX was immediately followed by the SMTA's Pan Pacific Conference on the Big Island of Hawaii. The conference started Monday afternoon with four, very good, keynote presentations on a variety of subjects that had very little to do with the rest of the conference but started everyone thinking and talking. Those keynotes covered subjects such as Using Data to Advance Precision Medicine (Dr John Quackenbush – Harvard) to the future of Astronomy (Doug Simons – Mauna Kea Observatory) to Power Electronics (Dr Chris Bailey – University of Greenwich) and The Origins of Silicon Valley: Why and How it Happened (Paul Weslling – IEEE). The next three days featured a very solid technical program. What makes this conference special is the comradery that is built from being that close to the same group of people for 3 ½ days and nights. It is hard to describe to someone who hasn't attended but this was the 25th year of the conference and it really is different than other conferences. The differences are much easier to experience than to describe.

This year's Pan Pac was fun for me because of the group in the photograph (FYI: I am the old guy). During the 2019 college basketball Final Four, Auburn Basketball Coach Bruce Pearl was asked what it was like being the basketball coach at a football school. "Auburn isn't a football school; it is an everything school," responded Coach Pearl. He went on to list the accomplishments of many other sports at the University and the accomplishments of some of the schools within the University. This year at Pan Pac, we had 7 alumni from the Auburn School of Engineering and hopefully just added to the "Everything School" list. Dr. Pradeep Lall (Auburn of course) won the Best Paper Award for his presentation on Sustained High-Temperature Vibration Reliability of Thermally Aged Lead-Free Assemblies in Automotive Environments. War Eagle!

David Raby

Leading the Way In Electronics

STI Electronics, Inc. (STI) will celebrate our 38th year in business in 2020. Our purpose and vision have always been and will continue to be about providing the highest quality manufacturing, training, and engineering services to our customers around the world.

STI's world renowned training will continue to grow with advanced programs, updated standards as well as customized courses covering new technology in our Alabama, Indiana, and Texas classrooms. This is on top of our always popular IPC Certification programs.

STI's AS9100 certified manufacturing operations will continue to grow our high reliability government and commercial production in both flex and ridged assemblies. We reorganized our STI team in 2019 to better utilize existing talents and strengths. That reorganization is already paying off for STI and its customers. In addition, we will continue to add talent, capital equipment and software to better serve our customers.

2020 should be an interesting year for everyone in our industry. There will be a lot of noise from the US elections, Brexit, Hong Kong, China, and unpredictable tariffs. However, I am cautiously optimistic that the electronics manufacturing industry and resulting demands will overcome these obstacles.

We are looking for a great year in 2020 and wish the same for our industry neighbors and friends. I'm quite confident that STI is positioned to take advantage of whatever surprises the new year may bring.

Art Within The Workplace

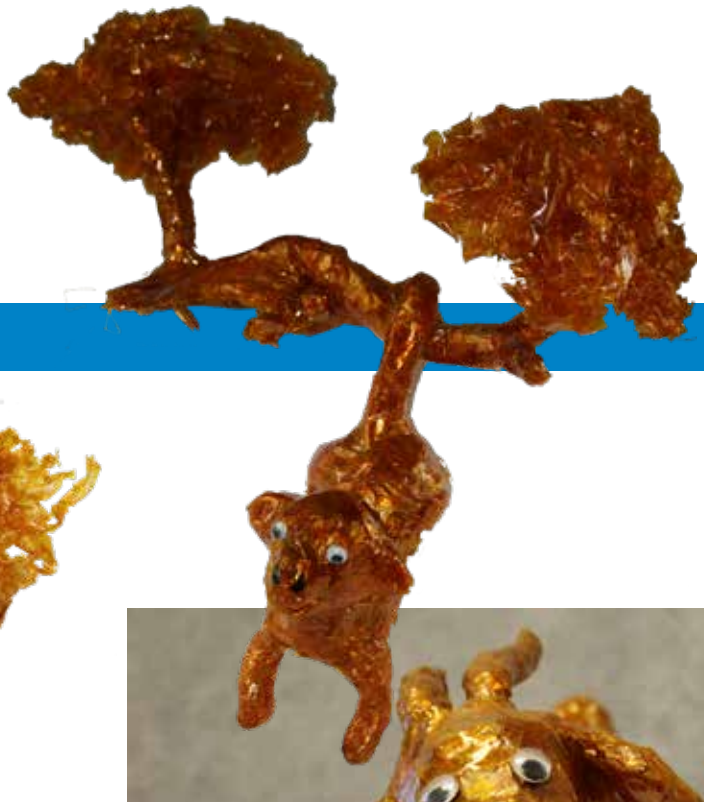
The Woman Behind the Art

CORNELIA POSEY

Wife, mother, and grandmother with a gift to create smiles.

A challenge was made to create a ball out of Kapton tape just as the former staff member had made for years. Cornelia Posey, who works in SMT Assembly and has been with STI Electronics, Inc. for about 6 years, decided to take that challenge. Her artistic abilities soon emerged and her colleagues realized their co-worker had crafty skills that went beyond working in production manufacturing. Cornelia's art can only be described as remarkable. The animals she creates with the tape is one-of-a-kind craftsmanship from a very imaginative person. The love of her artistic resourcefulness has led her to create these favorable animals for others. She enjoys the ability to be able to create a uniqueness that inspires and the smile she

LinkedIn | (800) 767-4919 • Fax (256) 461-9566 • www.stiusa.com



receives from her recipients. The inspiration for each animal usually comes from requests she gets from her co-workers and some from her own ideas.

Cornelia, a wife, mother, and grandmother has many hobbies other than her Tape Art. She also enjoys camping, horseback riding, and paintball on horseback. Speaking with Cornelia you can tell she is an active and fun loving person who once competed in Equestrian Endurance Racing.

Everywhere you look at STI you'll find these quaint little animals that is created from tape that would otherwise be placed in the trash. One colleague said, "She makes them from her heart and that's what makes them special."

Mark McMeen
VP Engineering Services/Manufacturing
mmcmeen@stiusa.com

Can Thermal Cycle Testing be incorporated into SIR Testing to accelerate the test results to find Cleanliness Issues and Weaknesses in Electronic Assemblies?

LinkedIn | (800) 767-4919 • Fax (256) 461-9566 • www.stiusa.com

STI Electronics and Kyzen Corp. have started to experiment and study the ability to accelerate a multi variable test protocol that looks at that question. Thermal cycling has been around and has a long history of testing solder interconnection reliability in electronic hardware. The hot to cold cycling is a great acceleration test protocol used to look for poor solderability and solder interconnection issues. Coefficient of thermal expansion (CTE) stress is the failure mechanism that accelerates the failure mode if the solder joint / interconnection is suspect or has been processed / soldered incorrectly. This proven technique is good at finding weaknesses in material choices and or processing issues of leaded and unleaded solder alloys.

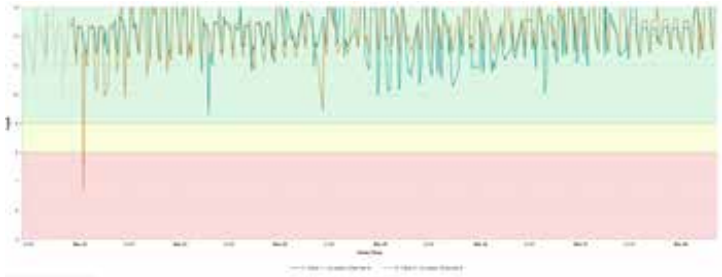
Can the same concept be applied to a SIR test with temperature cycling to help accelerate the test to help find weaknesses in cleanliness underneath components – ie. bottom terminated components which are susceptible to unactivated flux residues?



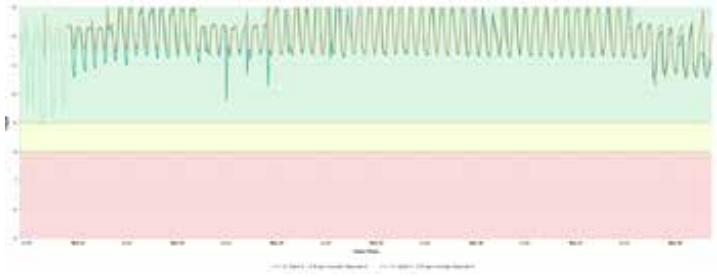

The ability to thermal cycle during SIR testing introduces a new failure mechanism of frost and condensation as it cycles between -40c and 40c. The following test protocol was used whereby test cards were run to accelerate both thermal cycling -40c to 40c with SIR measurements to see if we can detect issues. Note these test vehicles passed standard SIR pre and post thermal cycle testing in the 10 to 11 log ohm range. Note the failure spikes.

This is a QFN with no thermal vias in the ground lug region - thus minimal ingression / access underneath the QFN device.

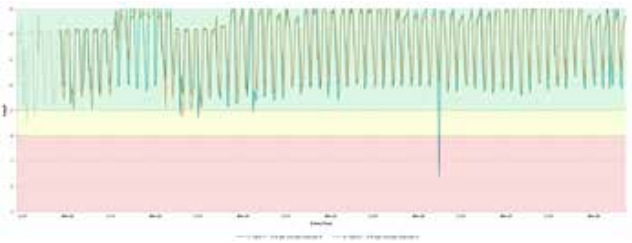
NO CLEAN



2 FPM CLEAN

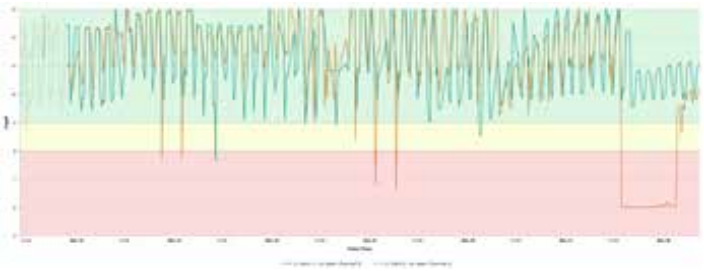


.5 FPM CLEAN

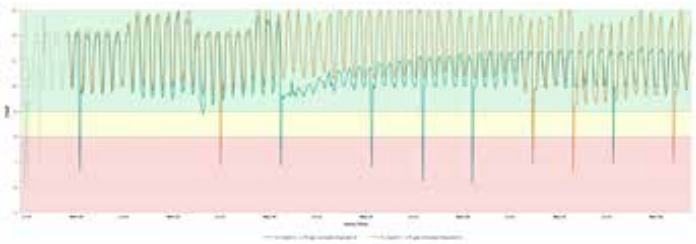


This is a QFN with thermal vias in the ground lug region - this has numerous ingression access points underneath the QFN device

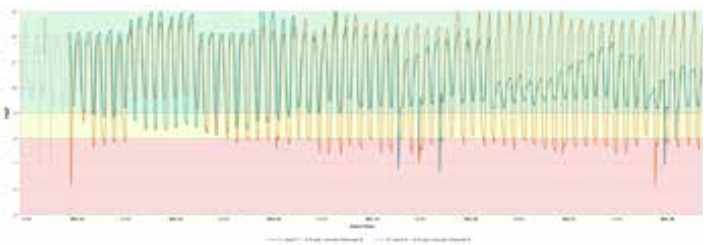
NO CLEAN - NOTE THE SPIKES AND SHORT



2FPM CLEAN – NOTE THE SPIKE INTO RED REGION



.5FPM CLEAN - NOTE THE SPIKES INTO RED REGION



CONCLUSION:

Even though these test vehicles passed standard SIR TEST PROTOCOL OF 40 / 90% RH pre and post Thermal Cycle testing with SIR testing the actual thermal cycle test protocol with SIR measurements found an interesting pcb design issue. The ability to have a thermal via void region underneath the Bottom Terminated Component (BTC) allowed for moisture ingression and accumulation of ionics to a level whereby leak currents could occur and thus manifest in downward spikes as measured by SIR. The non- thermal via designed pcb test vehicle for QFN component style performed better than the design which had thermal vias. This type of testing of using a multivariable acceleration of both thermal cycling and SIR measurement allowed the design team to find a potential root cause mechanism for pcb which would be exposed to environments whereby frost and condensation could occur. Most pcb designers would prefer to design with thermal vias underneath the ground lug region to aid in out gassing of the flux residues underneath BTC components, but in this case whereby this finished electronic assembly would be exposed to environmental extremes of both frost and condensation in its fielded state would not be the preferred pcb design. This also showed that once you cleaned the BTC – QFN part then underfilling it would be beneficial to its long term reliability by eliminating the voided area between the ground lug and signal pins as well as the pin to pin thus eliminating the region whereby free ionics can accumulate and influence your cleanliness state / sir values.

SUMMARY:
The use of temperature cyclic with condensation is a unique test tool and protocol that is designed to put a number of variables into an accelerated format to find and uncover weaknesses in electronic assembly methods. This test is designed to find cleanliness issues as well as design issues and manufacturing process issues.

By using this multi variable test that uses both hot and cold thermal cycling to drive coefficient of thermal expansion (cte) (-40 to 40c) and the introduction of frost and condensation into the test protocol aids in ionic mobility and high humidity. These conditions aids in the dew point condensation and frost condition. This is an extreme accelerated test to uncover and find weaknesses in material choices, process control, process parameters, and circuit card layout design and component package choices.

This Particular test DOE exposed the problem with via structures underneath BTC (Bottom Terminated Components) by crating voids and blank space for frost and condensation to ingress into the area that we needed to be clean and minimize ionic movement and leakage currents. The idea of via structures for improving out gassing and minimizing unvolatized flux residues, which improves SIR results is quite proven as a good design rule. The vulnerability of ingression issues underneath BTC during thermal cyclic environments with frost and condensation shows the need for better test methodologies for design engineers to insure they address these potential failure modes in real fielded applications. This DOE was designed to explore the need to gather real test data and objective evidence to help develop new test protocols that better define BTC vulnerabilities and create a greater understanding of the variables that greatly impact BTC's.

SIR testing along with temperature cyclic testing with frost / condensation is a good tool in collecting beneficial data and objective evidence of what material sets, production parameters, and process control parameters, and design rules and layout best practices to meet your fielded environmental objectives. SIR testing using specific real world components (SIR Designed test components) in a test environment and in different layout designs allows for determining and finding the weakest link in your design and which design gives you the best results from an SIR cleanliness objective before testing it in the final layout configuration. The more testing and objective evidence one can perform at the development and design stage the better the final design will work in a real fielded state because of the lessons learned on the front end.

This DOE showed how SIR test data in a non - thermal cyclic state all passed with sir readings in the Log 10 and 11 range but once thermal cyclic testing with frost and condensation started then downward spikes and a drop in SIR was seen on the different designed pad and via structures. Depending on your fielded application the use of SIR alone and in conjunction with thermal cyclic testing may better prepare and prevent latent warranty issues in production.

On-line IPC Training & Certification

Register Now

IPC® Training Center

In response to the COVID-19 pandemic, IPC has worked diligently to develop a remote testing solution that will allow certification/recertification candidates the ability to take certification exams remotely.

In addition to our classroom and on-site training courses, starting immediately STI will be offering on-line training and remote testing for the following IPC lecture based Certification/Recertification courses:

IPC-A-610 Certified IPC Trainer (CIT) and Certified IPC Specialist (CIS)
-Standard required for class
IPC/WHMA-A-620 CIT, and CIS
-Standard required for class
IPC-A-600 CIT and CIS
-Standard required for class

Note: Currently hands-on courses are not available for on-line training or remote testing for CIT's or CIS's.

The following on-line courses will be available for Certified Subject Matter Expert's (CSE's) as of April 13, 2020.

IPC-A-610, IPC/WHMA-A-620, IPC-A-600, IPC-7711/7721 and J-STD-001
-Standard required for class

Exams that are required for these courses can now be proctored remotely using IPC EDGE.

Leading the Way In Electronics

800-858-0604 • www.stiusa.com

MIXED TECHNOLOGY TRAINING KIT with LEAD Free Option

Now available in both Lead Free and Tin Lead versions, the Mixed Technology Solder Training Kit offers a realistic mixture of Through-Hole and SMT technology. It contains many of the common components found in mature technology applications for both through-hole and surface mount production. It is our most popular training kit due to its tremendous flexibility for production training. The Solder Training Kits provide a cost effective and consistent approach to solder training. Instructors no longer have to spend their valuable time keeping track of inventory and sorting through production scrap. The parts are packaged in static shield bags to promote ESD practices. The kits are a reliable and economical way to ensure that each student and each class receive the same training materials. All parts and boards are guaranteed solderable. Custom boards, kits, and individual parts are also available. The Combination Kit has increased focus on SMT as reflected in additional component count.

To place an order or for more information click on the link below.

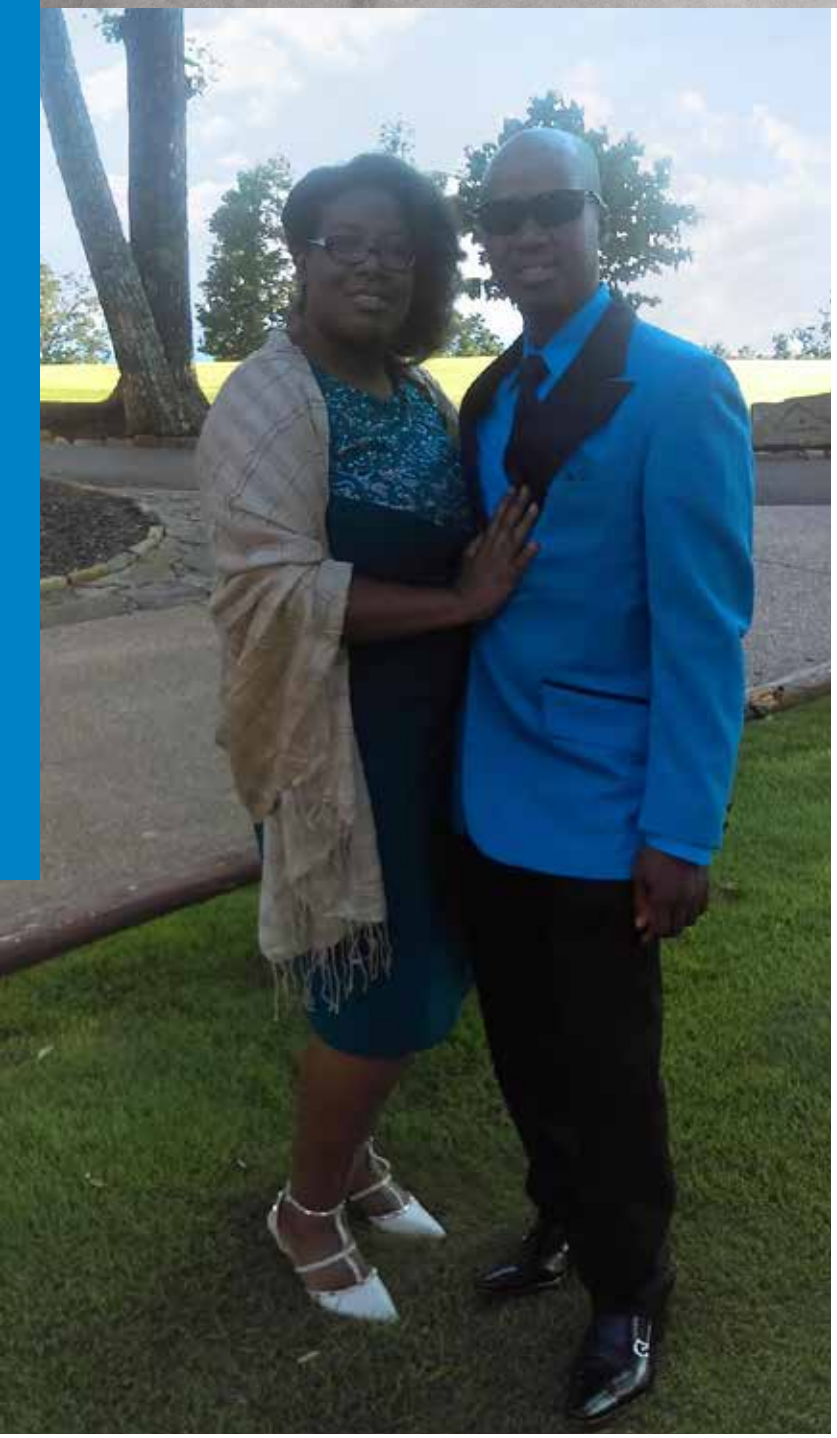
https://stiusa.com

(800) 858-0604

NEWS & INFO
Get the Latest News, Updates, and Information

UP CLOSE and PERSONAL

"Peace I leave with you; my peace I give you. I do not give to you as the world gives. Do not let your hearts be troubled and do not be afraid." John 14:27



Each morning when we walk into STI Electronics, Inc. we smell the lingering freshness in the air and our reflection in the floors which is evident Jean Beaubrun has been here. He joined STI this past December 16th and works as the Facilities Maintenance Technician insuring everything is working properly and there are no problems. One of the things he enjoys about his job are the people, as he described as having open arms. He said he also liked the hours. His desire to touch people and make them laugh has it's on unique quality within itself. Jean is originally from Haiti and lived in New York for four years before moving to the great state of Alabama where he declares his fondness of the area. He said he likes living here because of the diversity of people from all over who have moved to Huntsville to work. He has lived in this area for the past 16 years with his wife, Ophenide and their two children, Jolynn and Samuel. Jean is passionate about his family and his faith. He is committed to his church, where he serves as a deacon & Bible teacher. His high regards of his church comes from it's support of helping others. When asked about his wife he said, "She is the best thing that has ever happened to me. She is wonderful." His eyes light up when speaking about his family and in describing their close knit bond.

One of his favorite places to visit is Europe and his traditional language is French and Creole. He likes gospel music and the song "How Great Is Our God". Jean said he also enjoys watching 60 Minutes and Meet the Press along with playing soccer, volleyball, and reading. Jean also said he hoped to go on a Caribbean Cruise one day. His love of food goes back to his home country of Haiti, and when describing Haitian beans and rice, it sounds a little like Louisiana.

We Welcome Jean!

LinkedIn | (800) 767-4919 • Fax (256) 461-9566 • www.stiusa.com

HAPPENINGS

Christmas 2019

The magic of the season landed on STI Electronics, Inc. this past December. The festivities included the annual breakfast and of course, joyous games full of the Christmas theme, fun, and mischief. Engaging employees dressed in their favorite ugly sweater while celebrating the holiday. Prizes were won, laughter was heard, and memories were made.

Each year STI arranges an annual Christmas breakfast that is held reminding everyone of the heartwarming season and the tradition of giving. Laughter can be heard throughout the building and smiles to remember for years to come. We would like to thank everyone who took the time to plan and participate in our annual Christmas Breakfast and look forward to the 2020 Celebration.

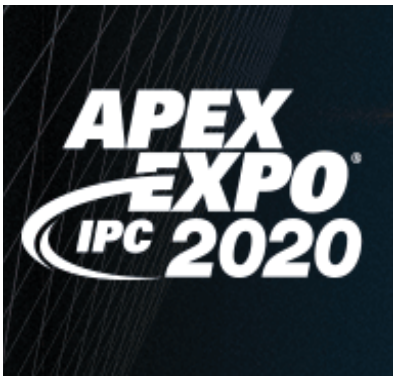
New Intern

In February, we welcomed a new Engineering Intern, Trey Lockhart, a senior at the Bob Jones High School Engineering Academy.

Trey is a promising young student who has signed with Jackson State on a football scholarship. He explains in the article published by The Madison Record how he learned to use his experiences to focus on his skills.

This opportunity to work with STI's engineers on a multitude of projects will broaden his exposure to multi-disciplined engineering, build confidence, and generate enthusiasm for a future in Electronics and Engineering.

We wish him all the best in his new endeavors.



APEX EXPO 2020

This year STI Electronics, Inc. was one of the sponsors for the APEX EXPO 2020 held in San Diego, CA. Dave, Mark, Frank and Robert attended the event and brought back much anticipated news and innovative information.

The event brought thousands of people from various countries together to learn about inventive and original products and services offered within the electronics industry. This industry has a predicted growth of approximately 5.6% annually for the next six years. The need and desire for current and ingenious products drives the market to an all time high.

The growth in the industry will not only turn out more products but produce training and jobs on a continuous level. STI has availability for upcoming classes that can give you an advantage.

A VISIT FROM TOMMY

Tommy Tuberville for US Senate

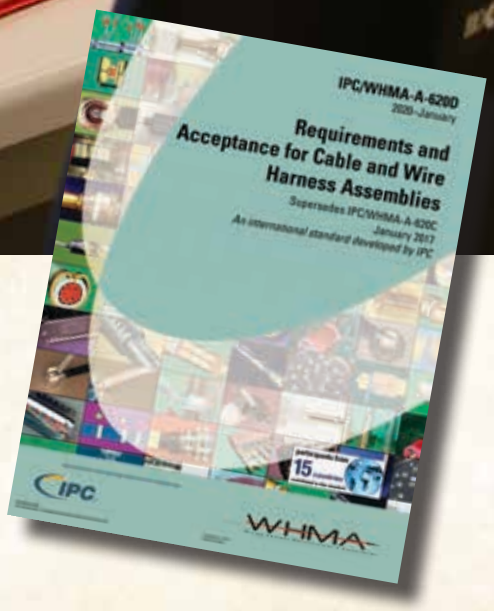
Tommy Tuberville, former Auburn University Football Coach, made a stop by STI on his campaign trail. Speaking with some of the employees, he made a bold statement of the changes that needed to be made within our American government.

From his mere beginnings in the small town of Camden, Arkansas, Tommy through his hardwork became Auburn University's Head Coach in 1998, and became the only coach in Auburn football history to beat in-state rival Alabama six consecutive times.

Tommy is passionate about our veterans, family, and religious freedoms. He answered questions from employees and signed an autograph.

We wish Tommy well in the upcoming election.

IPC/WHMA-A-620D



IPC/WHMA-A-620D is the only industry-consensus standard for Requirements and Acceptance of Cable and Wire Harness Assemblies. IPC/WHMA-A-620D describes materials, methods, tests and acceptance criteria for producing crimped, mechanically secured and soldered interconnections and the related assembly activities associated with cable and harness assemblies.

IPC/WHMA-A-620D was developed by IPC and the Wire Harness Manufacturers Association (WHMA) (An affiliate of IPC).

Number of Pages: 420
Release Date: 1/22/2020
ISBN: 978-1-951577-07-0
Product ID: A620-STD-0-P-0-EN-D

ORDER NOW

While Supplies Last

800-858-0604

sti electronics inc.

Pat Scott
Training Services Manager
pscott@stiusa.com

APEX 2020 HIGHLIGHTS

Recently both Frank Honyotski and Robert Fornefeld attended Apex 2020 in San Diego, CA. Here are a few highlights from their trip.

First, Frank Honyotski has become chair of the 7-34 Reparability Subcommittee & 7-34T Training Committee for IPC-7711/7721 Rework & Repair document. This is a great fit for Frank since he has extensive experience in Rework and Repair.

Frank Honyotski
Lead Master Instructor

Robert Fornefeld
Master Instructor

Edge 2.0 is expected to be updated this summer to allow all training related administration to take place in one location. The new Policy & Procedures 7.3 document is due to be released soon and contains only minor changes.

IPC Works will have a new URL starting on March 1 to move hosting from Mango Apps to IPC servers. Update your bookmarks after that date for the desktop and mobile apps. IPC Works uses the same password as the Edge portal and IPC web store. IPC Works is used by committee members to share information and get updates for example when an FDIR (Final Draft for Industry Review) is released. Applications for committee membership is also available.

IPC plans the release of Revision H for both the J-STD-001 and IPC-A-610 in October 2020.

J-STD-001H added a new conformal coating type SC (Styrene Block Co-Polymer) to Table 10-1. Appendix D will be added for X-ray so industry can view it and make comments on the content.

IPC-A-610H will have Target conditions removed.

The IPC/WHMA-A-620D was recently released. The electronic version and the hard copy is currently available.

Here are a few changes that were made to the IPC/WHMA-A620D:

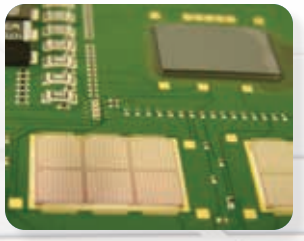
- The deletion of the definition of Target condition and the removal of all Target conditions from the document. This was done in an attempt to tone down some inspectors' (usually third party) attempts to obtain perfect hardware that can sometimes lead to damage from unnecessary rework.
- There are multiple terms used that are not consistent throughout the document (Drawing, Engineering Drawing, Drawing/Documentation, Assembly Drawing, Engineering Documentation). It was decided that Engineering Documentation would be used and that it covers all other terms.
- New criteria for Over-Molding of Flexible Flat Ribbon was added.

The training programs for IPC/WHMA-A-620D CIT (Certified

IPC Trainer) & CIS (Certified IPC Specialist) training courses are in the process of being updated and comments from users of the training program are encouraged to be submitted. IPC expects to publish the new training material sometime around the August timeframe.

Work has already started on the IPC/WHMA-A-620E. There is an action item to look at the impact of changing all wire references to conductor, this will be revisited at SummerCom which will be held in Raleigh NC, June 13-18.

On another note please make sure and check the IPC portal periodically to keep yourself updated on new policy changes etc. There were a number of people that were caught off guard with the change to extensions as an example.



FLIP CHIP ASSEMBLY

Direct Chip Attach (DCA)
Lead-Free Interconnect
Eutectic 63Sn37Pb
Interconnect

High Lead Interconnect
Anisotropic Conductive
Adhesive Interconnect
Underfill Encapsulation

THERMAL OPTIMIZATION

- Passive Cooling Design
- Thermal Material Selection
- Thermography Testing

CLEANROOM (CLASS 1000/ISO CLASS 6)

- ISO 14644-1 Certification to ISO Class 6
- Controlled Temperature/Humidity Environment
- Ionizer/Dissipative Flooring ESD Control

sti electronics inc®

Your Total Solutions PARTNER

www.stiusa.com

email: sales@stiusa.com

261 Palmer Road, Madison, AL 35758 • **Phone: 800-767-4919**

Monday - Friday 7:30 a.m. - 4:30 p.m. CST