



*Wishing You a
Merry Christmas
& a Happy New Year*

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The latest from our President

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By: David Raby

December, 2016

It doesn't seem like it was a year ago that I was writing a "year in review" article but here we go again.

2016 has been a fun year at STI with a lot of ups, downs and sideways moments and very few straight and level ones. The life of a contract manufacturer is always going to have its ups and downs but theoretically when one or two customers are down, others will be up. This year didn't work that way with everyone up for the first half of the year, every one down for the 3rd quarter, and then everyone back up for the 4th quarter. It is why my office chair now has a seat belt. Training has been relatively steady which helps some with my remaining sanity.

Just to add some additional challenges during the roller coaster ride of 2016, STI has added a new job costing, time and attendance and payroll software. Did I also mention

that we revamped our entire chart of accounts?!? All of this was supposed to be relatively painless but caused us about 3 months of blind folded pin the tail on the donkey which could have caused a lot of personnel issues but our team stuck together and will live to see all of this pay off.

We added a 3D AOI machine and a new Pick & Place machine in our manufacturing lab to continue to keep our manufacturing capabilities where they need to be. The one goal we are going to miss in 2016 (other than world peace and another Auburn National Championship) is our new AS-9100 certification. Certification is now expected to happen the first half of 2017.

We had our first non-Raby retirement earlier this year when our Training Materials Manager, Mel Parrish, retired after 15+ years.

We have added nine new people to our team this year; one in accounting and the other eight either in the



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manufacturing or analytical areas. One of my favorite statistics is we now have 21 people who have been at STI 10 or more years.

As they always do, STI employees continue to amaze me with their willingness to help others. STI employees are again helping to feed the hungry in our area (WAFF Can-A-Thon) as well as provide toys for kids that wouldn't have any at Christmas (Toys for Tots). Earlier in the year we hosted a blood drive as well as various fund raisers for the Michael J Fox Parkinson's Foundation and the American Heart Association. We're a sponsor of the 2017 Huntsville Heart Association Walk and we'll be having our own team walking so watch for emails on how



you can help with this great cause.

You can see by the company photo in this issue that we've continued our 34 year streak of getting better looking each year. Seriously, just look at those folks. They are the best and I am proud to work with them every day.

Thank you for your support in 2016 and we look forward to working with you in 2017 and beyond. You are the reason

we are here. Please let us know what we can do to serve you better.





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Manufacturing & Engineering

All manufacturing and engineering projects start with our customer point of contact.



For many years now, Angela Harbin and her team have worked closely with our customers to coordinate all planning, logistics and procurement.

Everything starts and ends with them and she stands ready with her staff to help assist and get your orders into the process. Please call her anytime if you have any questions at 256-705-5519.

Of course, having great customer service is only one component of our services. We have continued to improve our manufacturing capabilities during the year by the acquisition of new equipment. STI has added a new high speed Juki 3020 Pick-n-Place and a Yestech 3-D AOI machine as well as upgraded software on all equipment to ensure capability and traceability. Our goal is to continue to add the equipment and software needed to keep STI firmly

Manufacturing & Engineering

Engineering/Manufacturing Services Year End Review 2016



What a great year Engineering Services had in 2016. With the significant growth in our business, it challenged us to keep pace and ensure we maintained customer satisfaction. Those challenges resulted in making changes to our quality systems, equipment and personnel. Speaking of personnel, I want to thank every single member of TEAM STI for their hard work and effort to make sure that all these improvements never resulted in a slip in quality or on-time delivery for our valued customers. Knowledgeable employees are the key to creating and maintaining successful businesses that can continue to grow. STI has a lot of talented and dedicated employees and I want to thank them for their efforts in 2016.

in position as a leader in the industry. All of these efforts have not gone unnoticed. We were also honored as a recipient of the Global Technology award for Manufacturing Services.

One of the biggest advantages we have over our competition is an analytical lab under the same roof. Marietta Lemieux and her team ensures we are building your products correctly through the manufacturing lab. They have all

the cool toys that allow us to see solder connections that are under components or inside the PCB itself. They can also tell if something is dirty at the ionic level or what happened inside the packaged IC. They are an integral part of TEAM STI that works quietly and efficiently behind the scenes to not only ensure we are building quality hardware on the manufacturing floor, but also provide failure and material analysis services to a broad array of customers all over the world.

Also, if you have not yet had the chance to see our setup in the Analytical Lab, you have missed out!

The analytical lab has approximately quadrupled in size from our old facility. We have updated one of our Scanning Electron Microscopes this year with the latest versions of both hardware and software, so we can continue to provide you with high magnification imaging and elemental analysis. We also added a brand new Keyence VHX digital microscope. This free-angle observation Keyence high-resolution digital microscope is able to achieve a 20x greater depth of field when compared to a typical optical microscope. This allows objects with large variations in surface topography to be focused and accurately observed in a single image. Even at higher magnifications you can obtain a fully-focused image. Our system has a wide range of 20x-2500x magnification. After collection of either a 2D or 3D image, we can perform real-time measurements of distance, angle, radius, areas, etc. and three-dimensional measurements such as profile and volume.

Our Analytical Lab added two staff members this year: Parker Baldwin and Thomas Henderson. Parker is currently majoring in Chemical Engineering at the University of Alabama in Huntsville, while Thomas is pursuing an Associate's Degree

in Machine Tool Technology at Calhoun Community College. Both Parker and Thomas will be helping us with sample preparation and will be learning the ins and outs of the various analytical techniques.

Quality

*M*el Scott has been keeping busy leading the Quality department. 2017 will see STI sit for its official AS9100

Revision D audit as it builds off its success with ISO 9001 certifications/foundation and AS9100 compliant systems. STI has never been asked to be officially AS9100 but as the AS9100 Certification program migrates to an ISO 9001 back bone it is only prudent to migrate our system to AS9100 Revision D which was released in

September 2016. We are actively incorporating the latest additions of the specification outlined in the new rev. D standard and are looking forward to the audit mid-year 2017.

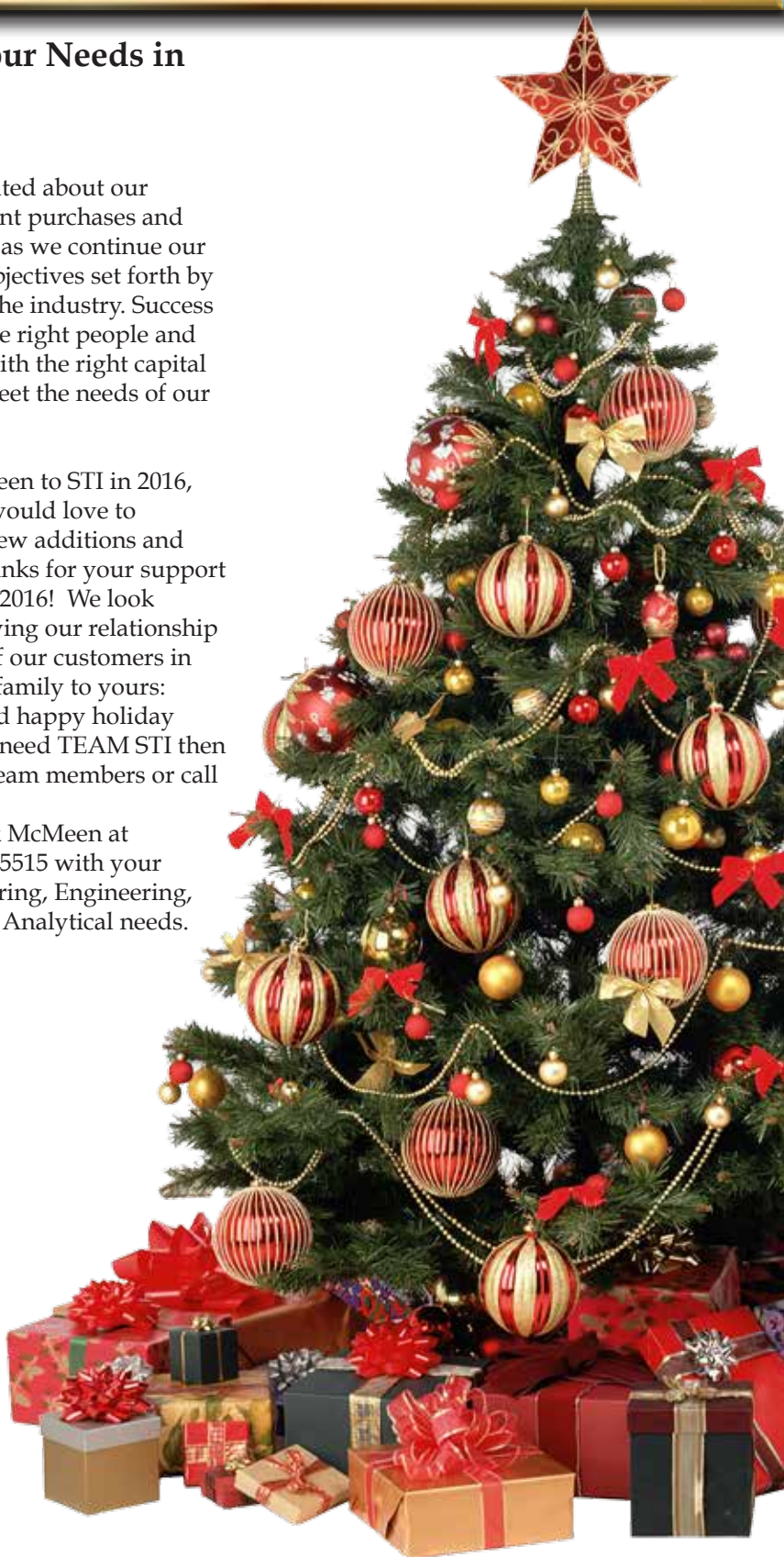
Team STI "Stands Ready

to Serve Your Needs in 2017"

We are excited about our capital equipment purchases and vendor support as we continue our improvement objectives set forth by customers and the industry. Success lies in having the right people and skill set along with the right capital equipment to meet the needs of our customers.

If you haven't been to STI in 2016, come visit, we would love to show you our new additions and capabilities. Thanks for your support and business in 2016! We look forward to growing our relationship with each one of our customers in 2017. From our family to yours: "Have a safe and happy holiday season". If you need TEAM STI then call one of our team members or call me:

Mark McMeen at
256-705-5515 with your
Manufacturing, Engineering,
Quality, or Analytical needs.



Training Materials



Contact Information:

Ray Cirimele

Director of Media

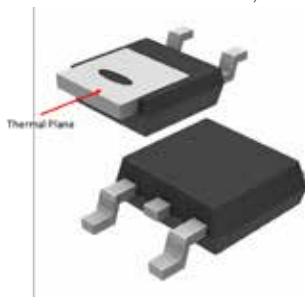
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Heat Dissipation & Residual Stresses

These devices can generate quite a bit of heat during operation. If this heat is not dissipated, it will result in reduced reliability of the device. The large thermal plane of the device is intended to be used with a corresponding ground plane on the printed board. The ground plane on the printed board can be designed with filled or unfilled thermally conductive vias to route the heat to internal ground planes or to the opposite side of the printed board where fans, heat sinks, or ambient cooling can be used

to dissipate the heat. Are the concerns about component lead hold down valid for this thermal plane termination? Even if the thermal plane is held down during solder solidification there are no residual stresses remaining that would present a reliability risk. It is true that there is slightly improved reliability for most leadless SMT components when the solder thickness under the termination (dimension G) is greater. However, the

D-Pak thermal plane has such a large contact area for the solder termination that it does not face the same risks as other leadless SMT components such as chip resistors. This leaves us with determining the effect of the solder thickness and coverage on heat dissipation. Typically the terminations of the printed boards and of the thermal plane of the D-Pak are copper with a plated surface finish. Copper is, of course, not just an excellent electrical conductor, but also an excellent thermal conductor (393 W/(m.K)). Solder is also a good thermal conductor, but not quite as good as copper (50 W/(m.K)). This means that a thick "G" dimension (solder thickness) is not desirable. We do need the solder to connect the two copper terminations,



SMT Land Patterns



Window-Paned Paste Deposits

I wanted to write this article to question the intent of clause 7.4, Hold Down of Surface Mount Leads/Components, in J-STD-001 Revision F. The wording of this clause states that surface mounted components shall not be pressed down against the land during the soldering operation or during solder solidification. Does this clause apply, or should it apply to devices with thermal planes? Let's look at how this criteria applies to D-Pak (TO-263) style components in particular.

we just don't need a thick "G" dimension. In general, a 1-1 solder paste print to printed board land area works well for solder coverage and heat dissipation when other factors such as thermal vias, board thickness and copper thickness are taken into consideration. Because of the large surface area of the thermal plane, the paste print should be "window-paned" for approximately 50% coverage. This "window-paning" will also reduce the effect of the solder "crowning" in the thermal plane area and causing the device to raise up on a taller solder fillet. After the solder process is complete, the solder wetting should enable a larger percentage of coverage. Remember to check the application notes from the component vendor to ensure that solder coverage is adequate for proper device operation. Voids in the solder deposit can affect the total contact area. High percentages of voids will result in reduced contact area and will affect the thermal transfer from the device to the printed board. Many component vendors recommend minimum solder coverage to ensure proper device operation. While voids are common in the thermal plane solder terminations, a good reflow process will usually minimize solder voids.

Now let's take a look at a typical hand soldering process for placing a D-Pak:

1. Apply some external liquid flux to the printed board land area to improve the wetting performance.



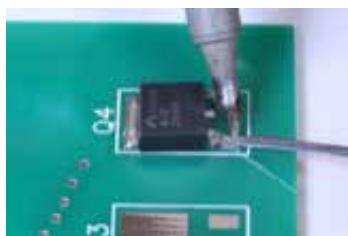
2. "Solder Bump" the land to provide the necessary solder volume.



3. Clean and flux the printed board land. Place the component and then use a soldering iron with a tip optimized for a large contact area to solder the thermal plane connection.



4. Use an appropriate sized soldering iron tip to solder the remaining leads of the device.



5. Clean the solder connection areas to remove flux residues.



Post-Soldering Results

First, let's take a look at the difference in the occurrences of solder voids in the thermal plane area. Transmissive X-Ray was used to quantify the voiding with both the hand soldered device that was held down during the soldering process and the reflow soldered device that had no external pressures applied. While it is obvious that the voiding is significantly greater on the reflow soldered device, it would probably still pass most of the component vendor's requirements for solder coverage.

Conclusion

The requirements of Clause 7.4, Hold Down of Surface Mount Leads/Components should not be applied to every SMT lead or component termination. Remember that regardless of what the specification might require, it is the manufacturer's responsibility to ensure that the assemblies they produce will function as required in their end use environment.

Did I mention that STI can provide you with training kits that can be used to develop your own process for D-Paks?

Use the following link to place an order online:

Tin-Lead 405-2872

<http://estore.stielectronicsinc.com//>

Lead-Free 405-2873

http://estore.stielectronicsinc.com//pc_product

Or call our customer service number to talk to one of our friendly team members about your order.
800-858-0604

Thank you for continuing to follow our newsletters.

On behalf of myself and STI,

I wish you a

Merry Christmas
& **HAPPY NEW YEAR**



IPC J-STD-001F Certification Kit with Lead-Free Option

Soldering workmanship kits are required for the IPC J-STD-001F Certification and Training Program for both CIT (Trainers) and CIS (Operators). This revised J-STD-001 Kit provides additional QFP100 components that are 20 mil pitch as well as smaller 0402 chips and DPAKs. The revised components are representative of those commonly experienced in today's industry and the kits are packaged with enough components to populate the two boards. The kits are available in both Lead-Free as well as Tin Lead versions. This kit provides one board for skill development and one board for final assessment. Individual parts and boards are available as well as the kit form.



Part List

Part	Quantity
J-STD-001F Board	2
1/4 Watt Res Axial	4
TO18/39 Transistor	4
Diode Axial	4
CK06 Cap	4
Cap Standoff	4
16 Pin DIP	4
0402 Resistor	4
0805 Resistor	4
1206 Resistor	4
1206 Cap	4
1206 MELF Diode	4
SOIC 14	2
QFP 100 T20	4
PLCC 20	2
DPAK	4

Prices

Quantity	405-2873 Lead Free Kit	405-2872 Tin lead Kit	405-0115 Lead Free Board	405-0114 Tin Lead Board
1 to 49	\$35.25	\$30.00	\$6.25	\$6.25
50 to 99	\$31.75	\$27.00	\$6.25	\$6.25
100 to 249	\$28.25	\$25.40	\$5.95	\$5.95
250+	\$27.05	\$23.00	\$5.95	\$5.95

2016 Year End Review

STI's Training Services department has been very busy this year teaching classes at our training centers in Alabama, Florida, Texas, Indiana, and on-site at customer facilities throughout the US. We owe our continued success to all of our loyal customers. We appreciate your business and look forward to seeing you in future classes. Please visit our website at www.stielectronicsinc.com to view our 2017 Course Schedule. If you don't see a course on the schedule that meets your needs please contact our customer service department at 1-800-858-0604 and we'll try our best to accommodate your request.



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Director, Training Services

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Back Row: Kelli King and Julia Adamczyk, Front Row: Ann Duncan

IPC Training Course Updates:

Here are some updates regarding two proposed standards that are out for ballot, status of the training and certification courses for these standards, and a new course developed by IPC.

- IPC/WHMA-A-620C "Requirements and Acceptance for Cable and Wire Harness Assemblies"
 - Proposed standard is out for ballot.
 - Training and Certification courses are being developed and the US Beta class will be held January 9-14, 2017
 - Optional Certified hands-on module

- CIT's – Complete two wire harnesses with various types of terminations, wire securing, routing, and shielding
- CIS's – Training is modular and the hands-on projects correspond to the optional modules taught. No separate instructor guides will be developed or printed. All instructor notes/references will be found on the power point slides.
- IPC-7711/7721C "Rework, Modification and Repair of Electronic Assemblies"
 - Proposed Document is out for ballot.
 - Training and Certification courses are being developed and the US Beta class will be held December 12 – 16, 2016.

- New workmanship board – New components (D-Pak, 0201, etc.) added.
- No separate instructor guides will be developed or printed. All instructor notes/references will be found on the power point slides.
- **New IPC Essentials course released November 1, 2016**
 - Based on member and industry feedback, IPC has developed a new IPC Essentials course that addresses the following:
 - IPC – Electronics Industry
 - Standards Development
 - Impact to the industry
 - Mandatory for initial certification and recertification for CITs
 - It doesn't matter how long you've been certified or how long you've been attending the IPC Standards meetings you are still required to take this on-line course.
 - The good news is that you'll only have to take it once.
- You have from now until Feb 1 to get this done. If not, you will not be able to schedule classes in the portal.
- Additional information regarding this course:
 - The cost of this course is \$75.00 for members and \$95.00 for Nonmembers
 - Use your same log-in that you use for signing into the portal
 - This on-line class is approximately 2 hours in length
 - Course requires a passing score of 80% on the exam
 - Currently CIS's are not required to take this course
 - Exams are not timed
 - No online print options are available for this course
 - Upon successful completion of this course your training record will be updated.
 - Don't forget to print out your certificate.

If you have any questions or comments concerning this article please contact me at psscott@stielectronics.com or 256-705-5528.



Happy Holidays
from
STI's Training Services Department!



Back Row: Julia Adamczyk, Kelli King, Michelle Moring, Darlene Hoffer
Front Row: Ann Duncan, Pat Scott, Frank Honyotski



Julio Estrada



Travis Wease



Martin Hickey



Ray Cirimele



STI's Houston Training Center

In January 2013 STI opened its new Training Center in Southwest Houston. We offer the following IPC Certification Training Courses for all IPC training programs as well as STI's training courses:

- IPC Training Courses Certified IPC Trainer (CIT) and Certified IPC Application Specialist (CIS)
 - J-STD-001 "Requirements for Soldered Electrical and Electronic Assemblies"
 - IPC-A-610 "Acceptability of Electronic Assemblies"
 - IPC-A-600 "Acceptability of Printed Boards"
 - IPC/WHMA-A-620 "Requirements and Acceptance of Cable and Wire Harness Assemblies"
 - IPC-7711/7721 "Rework, Repair and Modification of Printed Boards and Electronic Assemblies"
- STI Training Courses
 - Basic Soldering
 - ESD Awareness
 - Wave Soldering
 - Lead Free Soldering
 - HMP Soldering
 - BGA Rework
 - Customized courses based on company specific needs

Our hands-on classroom is fully equipped with all the materials, tools, and soldering equipment to handle all soldering and rework courses. We're also able to provide training in Spanish for our Spanish speaking customers. Keep in mind that we can also offer all training on site at your facility. Please visit our website at www.stielectronicsinc.com to view the 2017 training schedule.

If you have any questions on courses, pricing etc. please email me or give me a call.

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**A VERY MERRY
CHRISTMAS
and Happy New Year!**



THERE IS NO TIME
MORE FITTING TO SAY

Thank You
AND TO WISH YOU A
Happy Holiday Season



sti
electronics

