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NEWSLETTER

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Dave's World

By: David Raby
October, 2019

I think it has been well documented that STI Electronics is constantly evolving and that pattern continues. We've made several changes that we expect to have a positive impact on how we do business. Mark McMeen, who has been our Vice President of Engineering Services as well as over the daily operations of our manufacturing area, is still our Vice President of Engineering and ultimately over manufacturing but the day to day running of manufacturing will be by our new Manufacturing Manager Chris Cosgray. Chris has been with STI almost 4 years and has quickly moved from Quality Engineer under Mel Scott to Quality Manager and now to Manufacturing Manager. Chris' quality background aligns with our goals of standardizing and documenting how we do things and making sure we follow through on those things and delivering products efficiently that exceed our customer's expectations. I'm also happy that Joe Schrenk, who has served as STI's Quality Engineer, has been promoted to be our Quality Manager. We will be backfilling Joe's previous position later this year. Mark will be busy providing technical expertise for our manufacturing, engineering, design, and analytical lab as well as some special projects he's been working on. He's also going to be doing a lot more business development.

I was very disappointed that longtime Analytical Lab Manager Marietta Lemieux left STI for another opportunity this year. Brittany, Joel, and Thomas have done a great job of maintaining operations in Marietta's absence. I am very pleased to announce that we have hired a new Analytical Lab Manager, Dr. Caroline Spencer (New Faces in this issue). Caroline started August 26th and is quickly acclimating herself to the lab, equipment, staff and customers. You'll be hearing a lot about her (and from her) in the future but I'll just start out by saying I'm very excited to add Caroline and her skill sets to our team and I'm also happy to add STI's first Ph.D. (in Chemistry).

You've heard me talk about being involved with IPC's Government Relations Committee and the annual trip to Washington, DC to meet policy and decision makers and lobby for our industry. This year's trip was in May. If you are not already involved, you should plan to be there next year (March 25 & 26) but that's not what I'm going to talk about now. I had a trip planned to the west coast to make a few stops (Portland, Phoenix & San Jose) and visit some people I needed to visit. Nothing exotic but a typical week on the road. One morning a few days before the trip while still at home getting ready for work, my phone buzzes and it is an email wanting to know if I'd like to attend a meeting at The White House with The President the following Thursday (middle of my planned trip). I immediately replied "yes" (maybe it was "YES") and then began the task of figuring out how to make it physically work. Once that part was done (thank you Delta and thank you American

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Express), I waited for the itinerary. Eventually, the formal invitation from The President came through The White House Social Affairs Office. Then the background check and probably a few other things I'm leaving out. A few days later (after Portland & Phoenix and before San Jose), I found myself in the lobby of The White House with about 80 people in awe of everything and everyone there but having a great experience and casual conversations with people I've only seen on TV. At the appointed time, the doors to the State Dining Room opened and we found our assigned seat. After a few minutes of soaking in the experience, everything went quiet and someone (I never did actually see the person) announces "Ladies and Gentlemen, The President of The United States" and it was on. The next 30 to 45 minutes flew by. My seat was about 30 feet from President Trump's and about 20 from Vice President Pence's. Afterwards, May Sorani of TTM Technologies, Audra Thurston of Calumet Electronics, and myself were speaking with Ivanka Trump (this is really her program) and asked if we could get a photo as the IPC representatives. She was most gracious and we turned and there were probably 20 cameras pointed at us continually clicking and at some point I realized I had no idea how to get a copy of one of those photos so I took my cell phone and handed it to one of the photographers and asked if she would get one for me. Everyone had been so polite until that moment I handed my cell phone to a professional photographer and asked for a free photo but they eventually obliged (thank you whoever you are, I'm sure you do great work and I hope you earn a lot of money for your photos) and the resulting photo has been used many times by many people and published in a variety of publications.

The purpose of the visit was to celebrate the 1-year anniversary of the Administration's Pledge to America's Workers. The original goal was to create 500,000 new opportunities over the next 5 years for American students and workers "… through apprenticeships and work-based learning, continuing education, on-the-job training, and/or reskilling." IPC helped break the original goal a year ago by pledging 1,000,000 opportunities in our industry. Now the total pledges have reached over 12,000,000. It is a great program trying to help us fill significant gaps in opportunities and skill sets. Additional information can be found at https://www.whitehouse.gov/pledge-to-americas-workers.

Two more things I'd like to add about the visit. First, I'd like to thank the IPC and especially John Mitchell and Chris Mitchell for giving me the opportunity to represent IPC at this event. Second, I'd like to say it was an honor to be invited to The White House and that's an invitation I will accept any time no matter who The President may be.

PS. My fantasy football draft happened this week. What is the significance of that, you ask?!? Last year, while driving to the draft, my doctor called to tell me I had cancer. It has been an interesting year with surgery and recovery and so far, three follow-ups with all good reports. Thank you for all of your calls, emails, texts, thoughts and prayers over the past year. I can't tell you how much each one has meant. This year at the draft I was able to totally concentrate on football. Make sure you get your test done!

New Faces

Caroline Spencer, Ph.D., Analytical Lab Manager

STI would like to welcome Caroline Spencer as our new Analytical Lab Manager.

Caroline is originally from Decatur, AL. She completed her undergraduate degree at The University of Mississippi with a major in Forensic Chemistry. During her time as an undergraduate student she completed a research internship at the University of Leicester, United Kingdom, under the advisement of Dr. John W. Bond OBE, focusing on latent fingerprint development on thermal paper. After completing her undergraduate degree, Caroline continued her education at The University of Mississippi pursuing her doctoral degree. The focus of her research during her graduate career was on forensic applications including DNA analysis, studying new psychoactive substances (NPS) and database development. Caroline completed her Doctorate in chemistry, with an analytical chemistry focus, in 2019.

Additional new faces include Bobby Inman, Senior Process Technician (left), Kaven Howard, Test Technician (center), Yolanda Villarreal-Sanchez, SMT Assembly Technician (right)

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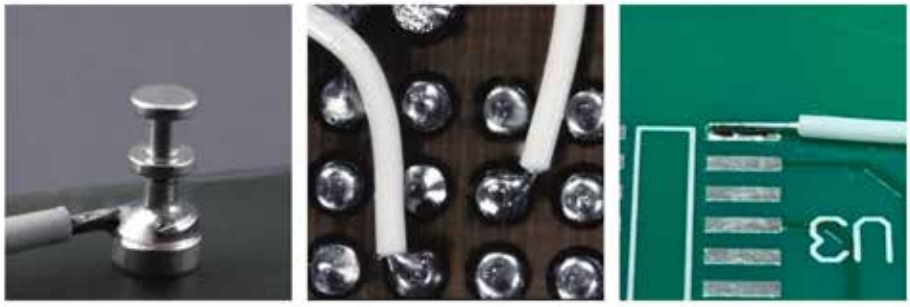
Back To Basics

Soldered Wire Terminations

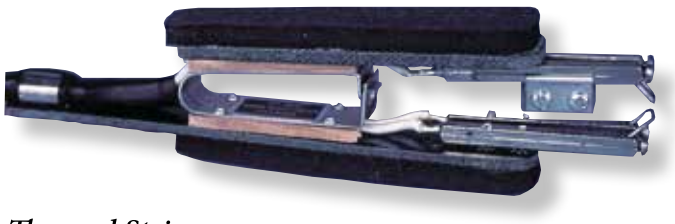


This is the first of a series that will review soldered wire terminations from beginning to end in detail. Wire preparation is the first step in the process and wire insulation removal (stripping) is the first step in wire preparation.

There are many methods of insulation removal. We will focus on manual insulation stripping using one of the two most common tools for manual stripping.

Thermal strippers usually come in a hot tweezer configuration with various styles of opposing elements. Thermal strippers have one major advantage over

other types of handheld wire stripping devices. When the heated blades of the stripper comes into contact with the wire insulation, it will slowly melt through the insulation, and with normal pressure applied, it will leave a very thin film of insulation between the blades and the wire strands. With no physical contact between the blades and the wire strands, strand damage from the stripping operation is avoided. This can be important because in the past, specification requirements stated that wire 22 AWG and smaller could not use mechanical strippers due to the slight risk that the cutting edges could scrape the strands exposing the underlying copper.

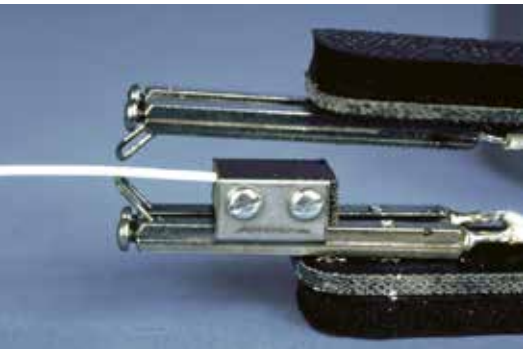


Thermal Strippers

Mechanical Strippers

Step 1: Set the wire stop

Many of the handheld thermal strippers have adjustable wire stops to multiple wires have the same strip length. A setup wire may be used to ensure that the wire stop is set correctly before proceeding.



Step 2: Place the wire

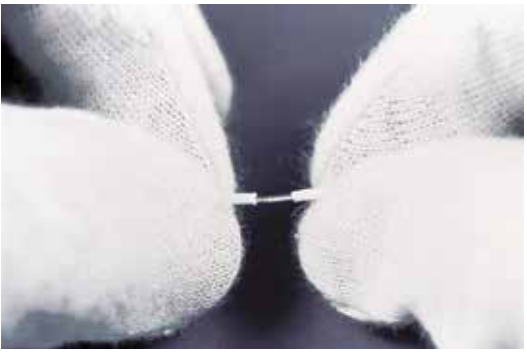
Place the wire in the correct position between the blades.

Step 3: Squeeze the handles

Use firm pressure to bring the opposing blades into contact with both sides of the wire insulation.

Step 4: Melt through the insulation

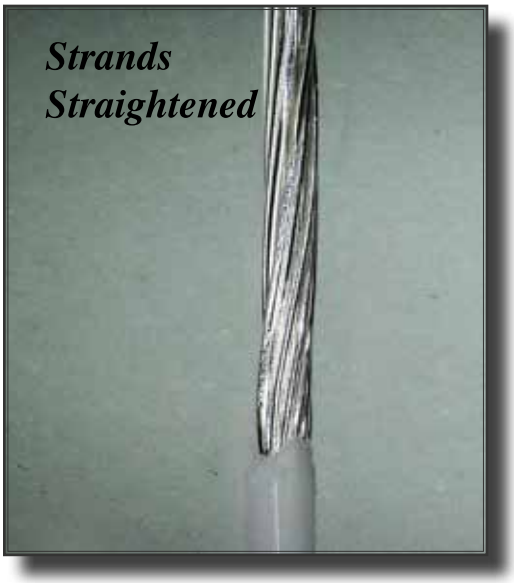
Allow the heated blades to melt through the insulation until resistance is felt from the wire strands. Give the blades a quarter turn before releasing the pressure and removing the wire. The quarter turn will ensure that there is no area of the insulation that did not make contact with the heated blades.



Step 5: Removing the insulation slug

Give a gentle pull on both sides of the insulation to break the thin film of insulation still connecting the insulation slug from the insulation. When removing the insulation slug it is important to keep the pattern of the wire strands in the same condition as it was when covered with insulation. Changes to the wire strand pattern can actually affect the electrical characteristics of the wire. The best way to maintain the natural lay of the strands is to slowly twist in the direction of the strand twist as you are pulling the insulation slug from the wire.

Examples of Wire Lay



When the strands have been straightened out during the insulation removal, birdcaging of the wire strands is likely to occur resulting in diminished long term reliability. When the strands are overtwisted it may result in diminished long term reliability and may also affect the electrical characteristics of the wire. Obviously, leaving the strands in the same spiral lay they were in under the insulation is the desired condition because this will make it a lot easier for Mister Electron to navigate through the strands to his destination.

If you want to try your hand at escorting Mister Electron on his journey, use the following link to place an order online for the Wire Terminal Kit:

WIRE TERMINAL KIT
https://stiusa.com/product/wire-terminal-kit/

Or Call Our
Customer Service Department
and Talk to One of Our Friendly
Team Members
About Your Order

800-858-0604

What is a Tin Copper Intermetallic Compound and when is it a problem?

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What is a Tin Copper Intermetallic Compound (IMC) and when is it a problem?

I have been asked this question over the last two months by two different clients. What is IMC (Intermetallic Compound)? And when does brittleness occur? IMC Intermetallic Compound is an interesting topic and is required to form a good solder joint. IMC is formed between the solder alloy (63/37 tin lead eutectic solder) and the pcb copper pad. Depending on its solder surface or pad surface finish will dictate which chemical formation occurs. If the solder pad is copper with an organic surface protectant such as OSP+ then the resultant IMC layer is cu6sn5 and cu3sn. The cu3sn will be near the copper source itself and then the cu6sn5 forms on top of it. The cu3sn is usually very thin and difficult to see initially because the cu6sn5 is the prominent intermetallic formation. As the solder joint ages (Time and Temperature) and thickens over time then the cu3sn will grow and become visible and the cu6sn5 becomes consumed into the cu3sn. The visible intermetallic formation is usually called the IMC formation or intermetallic compound. Initially the IMC formation for tin copper intermetallic formations are 1 to 2.5 microns or 39 to 97 microinches thick and is made up of both cu6sn5 and cu3sn. As the solder joint ages or has multiple thermal cycle excursions then the IMC can grow to 2 to 4 microns or 78 to 156 microinches in thickness. When IMC grows to 5 to 7 microns or 195 to 273 microinches then the potential for excessive brittleness can occur and this thickness is vulnerable to fractures or microfractures inside the IMC structure itself. One needs some level and thickness of IMC (1 to 2.5 microns) for there to be a good solder joint but once one crosses the 4 micron / 156 microinches threshold then one is becoming susceptible to IMC brittleness issues. The forces which propagate intermetallic formation fractures are constant strain forces in excess of 500 – 600 microstrains and or sudden mechanical forces of 1000 to 1500 microstrains. One can also see intermetallic formation fractures when thermal cycling or thermal shock cycles are applied to thicker than normal IMC thicknesses; which indicates that temperature changes from hot to cold can induce coefficient of thermal expansion (CTE) movement on this region of the solder joint and cause fracturing within that IMC region. The last known obvious variable influence is vibrational forces whereby the energy is applied into this region of the solder joint and it propagates a micro fracture first followed by a standard fracture throughout the solder joint IMC region. These different force variables all weaken or manifest itself on thicker than normal IMC structures. Thus we now know IMC is a needed component of a good solder joint but when it grows excessively then it becomes a liability to the solder joint. IMC brittleness is a direct function of the z axis thickness of the IMC structure and one becomes concerned when it approaches or exceeds 5 microns or 195 microinches. This is for reference only because every situation is different due to its environmental operating environment and thus if one has a harsh operating environment then having a thinner IMC layer is desired to prevent fracturing thru the IMC region which is brittle in nature but becomes really vulnerable as it approaches 5 microns or 195 microinches.

DIFFERENT SOLDER PAD PLATING FINISH

If the underlying solder joint pad solder surface is nickel such as with Electroless Nickel Immersion Gold (ENIG) then the corresponding initial IMC thickness will be .4 to .8 microns or 15 microinches to 31 microinches thick. This drop in thickness is because the nickel barrier is slower to dissolve into the IMC itself and thus it forms a thinner IMC zone initially but it will continue to grow overtime. ENIG

is preferred by some customers for lead free soldering because the reflow temperature for Lead free solder alloys is higher than the 63/37 eutectic leaded solder alloys which promotes more copper dissolution into the IMC layer when soldering to copper pads. This is why we are starting to see alternate plating finish materials being tested and used for lead free solder applications. Note copper pad dissolution is another topic and it is an issue when wave soldering / selective soldering is performed and the copper pad dissolves into the solder pot itself, this is a different topic all together than the dissolution of copper into the tin copper IMC region. It is sometimes confused as a the same topic but it is a different topic for a different day.

LEAD FREE SOLDER ARE MORE PRONE TO BRITTLE FRACTURES?

Lead free solders such as SAC 305 solders are more prone to brittleness fractures for two reasons over using 63/37 leaded solders. First reason, the higher elastic modulus of lead free solders are less ductile or compliant and are more prone to shear fracturing or putting the strain at the weakest point which is the intermetallic compound zone. Second reason, the IMC layer or zone is thicker because the reflow temperatures are higher with longer dwell times and they are more complex because you now have a more complex solder chemistry. We now get ternary intermetallic phase with lead free solders such as (ni,cu)3sn4 and(cu,ni)6sn5 when soldering a copper containing lead free solder to a nickel plated pad surface. These intermetallic compounds (IMC) are thinner in nature but due to their low ductility or compliant nature they are more prone to brittle fractures. Again it all depends on their operating environment and one should take these thickness recommendations as reference points and make the best decision based on your fielded application. There are a number of studies going on to determine the ideal thickness for range for lead free solders but again thinner is better provided that there is enough present initially to warrant a good solder joint during the initial fabrication and reflow function.

The answer to the questions is quite interesting because most people believe more is better does not apply in this application; we want to see good IMC present but we do not want to see too much which then it becomes a liability.

Please email or call if you have any questions as it relates to IMC and when does it become brittle. Remember IMC is always brittle as it relates to the adjoining bulk solder alloy region but it becomes to brittle when it crosses the 4 microns thickness for tin copper intermetallic compounds. As always thanks for your questions and feedback and hopefully these short articles are beneficial to our followers.

You can reach me at

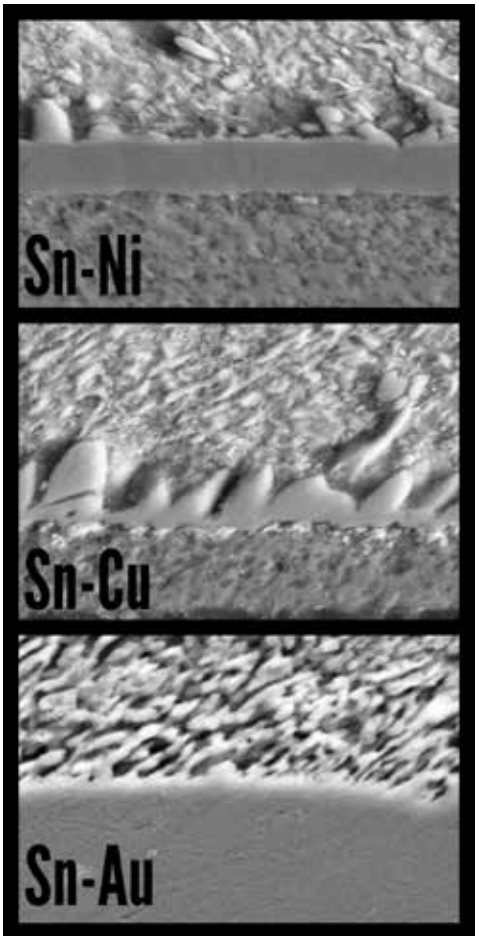
mmcmeen@stiusa.com

or

256-705-5515

for any comments or questions.

Reference photos of different intermetallic compounds - notice the different grain structures and sizes – this is what is inside the solder joint you cannot see from the outside. This is the weakest non compliant region of a solder joint – the IMC (Intermetallic Compound zone)



EMPLOYEE *Spotlight*

Meet Kris

KRIS ROBERSON

Job Title: Master Instructor

Work Background:
Operator, then Engineering technician – Motorola – Libertyville, IL
Machine Technician – US Robotics – Morton Grove, IL
Engineering Technician, then Technical Trainer – Bose – Columbia, SC
Process Engineer – TRMI, Inc. – Battle Creek, MI
Technical Instructor – Stiles Machinery – Grand Rapids, MI
Master Instructor – BEST, Inc. – Rolling Meadows, IL
Technical programs manager, then Certification Programs Manager, then Director of Certification – IPC

Family Information: Kris and his wife Megan have been married for 30 years. Together they have 6 children (28 to 18) and 1 Granddaughter Elinor (2 yrs). Over the years the family has had a variety of pets including Dogs, Cats, Goats, Chickens, Turkeys, Ducks, Guinea Fowl, Llamas, and a Pot-Bellied Pig (named Petunia).
Originally from Wisconsin, the family has lived in Tulsa, OK, Columbia, SC, Delton, MI, Marengo, IL, and now Rockford, IL. Kris was trained in Aviation and is a Licensed Airframe & Power Plant mechanic as well as a Licensed Commercial Pilot with Multi-engine and Instrument ratings. Megan has a K-12 teaching degree and has homeschooled all 6 children. Kris will work mostly from his home in Rockford, IL for the time being and will travel as needed for STI training classes and business.

Hobbies: Flight Simulator, Stage Shows, Music, Tea, gardening, cooking… family.

Fun Fact About Self: Is not Santa Claus but does occasionally portray the Jolly Saint.

Training Services

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Certified Standards Expert (CSE) Certification

In this issue of the Newsletter the Certified Standards Expert (CSE) certification course will be highlighted. The following information covers:

- What is a CSE?
- How does a CSE Differ from a Certified IPC Trainer (CIT)?
- Exam information
- Other requirements/information
- Why did IPC develop the CSE Certification?

CERTIFIED STANDARDS EXPERT

What is an IPC Certified Standards Expert?

A CSE is an individual who has demonstrated the knowledge, skills, and abilities required to act as a subject matter expert for a specific IPC standard or group of standards.

- Is the subject matter expert on a specific IPC Standard
- Applies one or more standards to specific company needs
- Is the Standards liaison between your organization and industry experts
- Updates your organization on the latest standards and best practices
- Provides feedback to IPC Standards Committees
- Interfaces with designers and process engineers
- Judges organizational conflicts and provides expert opinion on IPC standards

A CSE can be certified in one or more of the following IPC Standards:

- IPC-A-610
- IPC J-STD-001
- IPC/WHMA-A-620
- IPC-A-600
- IPC-6012
- IPC-7711/21

How does a CSE differ from a CIT?

- CSEs are not trainers, therefore, CSEs are not required to train IPC Certified Specialists (CIS) as a requirement for certification
- The CSE Certification Exam validates an individual's understanding of a specific IPC Standard

CSE candidates must successfully complete the following exams:

1. Enhanced Policies and Procedures Exam
   - assesses knowledge of IPC P&P document and IPC Essentials program
   - closed book, 30 questions
2. General Knowledge Exam
   - assesses knowledge of content and structure common to all IPC standards
   - closed book, 30 questions
3. Standard Endorsement Exam
   - assesses knowledge of content and structure of a specific IPC standard
   - open book, 70 questions

CERTIFIED STANDARDS EXPERT

Other Requirements/Information

- Certification is valid for two years
- Exam retakes are possible for an additional fee
- CSEs that wish to certify to one or more additional standards are only required to take the Standards Endorsement Exam for each of those standards
- CSE certification candidates are advised, but not required, to take the CSE training program in order to sit for the CSE Certification Exams
- CITs may take the CSE exams and become CSEs. Each certification is managed separately

Why did IPC develop the CSE certification?

- Over 60% of member companies, indicated a need for a non-training certification employee to act as a standards expert at their companies
- To enhance employee skills and knowledge
- Provides a career path for operators as they gain knowledge on standards
- Increase a company's ability to build quality products
- Many CITs were not conducting training classes for CISs, voiding their certification as a CIT

If you have any questions regarding the CSE courses please contact
***Julia Adamczyk* (256) 705-5514 or *Kelli King* (256) 705-5516**
To enroll in a course, visit our website
www.stiusa.com

As seen in Wiring Harness News

Thanks to Joe Tito

A Day in the Life of a Standards Trainer

Discussion with Frank Honyotski of STI

https://wiringharnessnews.com/authors/joe-tito/a-day-in-the-life-of-a-standards-trainer/

WHN ran into Frank Honyotski, Lead Master Instructor for STI Electronics, Inc. at a recent trade event. Among other things, STI is a leading training center for the IPC/WHMA A-620 specification. Frank had some great insights on training and committee involvement, so we vowed to catch up with him for an interview.

Frank has been doing instruction for electrical assembly for over 26 years. He got his start in the Navy and has traveled to over 40 countries teaching classes. He came to STI 19 years ago from a large soldering iron manufacturer. Having entered STI as a rework and repair instructor and J-STD-001 specialist, he is now lead master instructor, and teaches all the programs STI has to offer (J-STD-001, IPC/WHMA-A-620, IPC-A-610, IPC-A-600, IPC-7711/7721, NASA-STD-8739.1/.4, as well as basic soldering and custom classes).

In addition to technical training services, STI is also a manufacturer of electronic assemblies. As Frank pointed out, they're not just teaching it, they're doing it. STI's manufacturing lab encompasses 26,000 square feet of floor space containing two surface mount lines, automated through-hole processing, and multiple flexible work cells for final assembly, rework and repair, box build, harnesses, and test.

Following are highlights from our Q&A session:

WHN: At what point do companies turn to you for training?

Frank: The majority of companies contact us for training because they have landed a contract that requires them to be certified/trained or show proficiency to a particular specification, whether that's the A-620 spec, the NASA spec, or any of the others. As a result, they start looking for a provider. So, usually we find its contract driven, but we have also helped a number of companies that are just starting out. They've got a workforce, but they don't know exactly what it takes to build a cable assembly. We go in and give them the hands-on skills for that.

Some companies train again and again. Others get the certification, perform the work to finish the contract, and move on to something else that doesn't require certification. But most companies see the value in being able to market their certifications or proficiencies. Basically, you can go for bigger and better contracts when you can tell customers you have a certified/trained staff.

WHN: At what point do companies see it beneficial to have in-house instructor?

Frank: If you have a small workforce of, say 20 to 30 individuals, then it may be more beneficial just to have an outside company come in because they're going to instruct on what is the latest and greatest. If they have someone in-house, they may only get the opportunity to train people once every two years or so.

If you have hundreds or thousands of employees, then it doesn't make sense to bring us in to do the training for your workers because we can only train a relatively small number of employees per class. So, I'd say with over about 30 employees, it begins to become cost effective to have in-house trainers.

WHN: How often do in-house trainers have to be recertified, and what's involved in that?

Frank: Currently every two years for both NASA and for IPC specs. Right now, for the A-620 instructor, it is a two-day class. There's lecture for about a day and a half, and then they take an industry-standard test on the IPC Edge 2.0 portal. It's a 75-question open book test with a 25-question closed book test.

WHN: Are classes at your facility, or are there satellite locations?

Frank: Most courses can be customized to meet a specific need or requirement and can be conducted at STI's facilities in Indiana, Alabama and Texas, or at a customer's site throughout the world.

WHN: Is it just contract manufacturers you train? What about OEM's and component manufacturers?

Frank: We recently did training for a large defense organization. The audience was engineers who design weapon systems. The intent was for them to know the process and inspection standards. You can design almost anything, and you can even build a prototype. But you can't necessarily put it into production because it just can't be built on a mass scale, or even in batch quantities. So, having the engineers attend helps them to design for manufacturability.

From time to time, we do train some of the component suppliers. They need to know what their customers are doing with their product. They may also want to be able to market themselves to their customers by saying 'we have certified IPC 620 instructors on staff.' That way, they can better understand what their customers are asking them to do.

WHN: What types of suppliers have come to you?

Frank: Typically, connector manufactures, but there's a large wire manufacturer in our town and we recently did some training for

them so they could better understand how their customers meet the J-STD solderability criteria. You test your wire or component to see how solderable they are. That standard requires you to do a wetting balance test where you dip the wire into a solder pot and have it wet up on the, wire then measure how many newtons of force it takes to break the surface. So, if I'm selling wire and I'm going to give the certificate of compliance to meet the requirement of the J-STD, it's helpful if I know how to perform the test.

We don't currently deal with the manufactures of the [processing] equipment. It's not that we wouldn't like to. I think it would be great for them to see what their customers are doing. It's just that, for the most part, they have their own in-house specifications and don't really see the need for any outside training.

WHN: IPC and WHMA are always encouraging folks to get involved in A-620 committees. From your standpoint, what are the advantages of getting involved in this and other committees?

Frank: The biggest benefit is instead of being reactionary, you can be proactive because you see the changes coming. I don't know if you heard about the new 620 D, but a significant change that was voted on and passed, was the removal of the target classification. You will just have an acceptable process indicator and defect. So, companies can actually find out what's happening before it happens, and they can prepare for it.

You can also help direct the industry. If you build a lot of harnesses, you can provide data to the committee to get a particular requirement changed to something that is actually real. Often you look at a spec and say, 'that's not actually how that works.' But nobody has presented data to say it's wrong, and until they do, it just stays there revision after revision. Participation allows you to help make the document better, not only for your company, but for others as well.

WHN: You also mentioned the Training Committee at the show. What is the advantage of that and, what type of folks make up that committee?

Frank: If you're on the training committee, you can help direct what actually needs to be covered for the industry. Not everything in the book is equally critical. Some pieces are more important than others.

Most of the people that are on the training committee are actual trainers, so they have an idea of how a training course should go. But there's also people who actually build the hardware. They can help direct what needs to be covered, and then the trainers can come up with the best way to cover it. You don't want just trainers on the committee, because you end up with a course that only the trainers like. It might be easy material to teach and easy for students to understand, but it may not be the material that the audience really wants.

I think a lot of OEMs and contract manufacturers think 'well there's no reason for us to go to the training committee, we just care about the document.' But the training committee is not required to design courses covering everything that's in the document. They can pick and choose what parts they think would be best for training. So, the stakeholders are definitely an important part of the committee…if they will show up.

We have eight trainers. If we have two of our trainers at the committee, that's a significant portion of our workforce, and it takes away our ability to make revenue for that week. But that's a commitment that we make because it's very important to us as a company, and also to our customers.

WHN: What should folks look for when choosing a company to do training?

Frank: look for people who actually know the technology and are involved with the committees. Anybody can read the book, but do they actually understand the technology and have they done it themselves? There's no way to be proficient on everything in the book. But you can have somebody who's proficient in the majority of the things in the document. So, look for a provider who supports the committees. Make sure they are active in the community for wire and cable harness building. You don't want a training center where you read the book and take an exam. You can do that at home!

WHN: How can folks prepare themselves to get the most out of training?

Frank: First they can let the training provider know exactly what it is that they are looking for. One of the first things I do when I go to location, is get a tour. I go around the floor to see what they're doing. Then I can throw real-world examples of workmanship into the training program. They often say, 'how did you know we do this?' Because I walked around and looked, and I understand how these things are built so I understand what you're doing. That way I can tell them what changes they can make to meet requirements. Beyond that, they should make sure they have the actual tools necessary to build the product. You'd be surprised how many companies are attempting to build harnesses and don't even have the right tools to do it. I've been in manufactures talking about pull testing and they say, 'oh yes we do pull testing – I pull on the wire with my hands, and if it doesn't come out it's good,' so be prepared.

WHN: Why are standards like the A-620 so important anyway?

Frank: Because it gives everybody a starting point. In the past, you would essentially sit down with two blank sheets of paper, and the customer and supplier would each write down all the things they wanted. Now they can both look to the standard, and it's already written down. Having the standard is quite nice for the industry because, I was around before the A-620 came out, and there was a lot of confusion between harness suppliers and their customers. It took over 10 years to develop the A-620. I don't know if you saw the original A-620 but there wasn't a whole lot in it. But at least it gave us a starting point. Even though some of the things in it were blatantly wrong, it brought people into the IPC training community to say, 'Hey this is wrong, and here's the data to support that.' So, the document keeps getting better after every revision, and our cable building courses are really taking off.

WHN: Anything else to ad on training?

Frank: If the company is starting a new training program, we can help in setting it up. If they're uncomfortable with a certain part of the training, we can step in and help them, or we can actually design a training course for them.

We also do corrective action training. If a company has been told they need to initiate corrective action for training on a particular procedure, we can help them with that. We've done that on numerous occasions. It's hard do it yourself, because that's where you're deficient. You didn't realize your training wasn't meeting your needs.

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