Metering, Mixing and Dispensing Adhesive

Three Levels of Process Control in Thermal Profiling

Kulicke & Soffa
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If you don’t already have one, search for a QR code reader app in your smartphone’s app marketplace. Then use it to scan the code above & download this magazine issue right to your phone.
Forty years ago people mocked electronics toys and consumer products that came out of Japan. In fact, the stigma of cheap, unreliable Japanese products was so bad, a new town that opened on the outskirts of Tokyo was called Usa, thus enabling local manufacturers to stamp “Made in USA” on their products!

Fast forward 40 years and it is almost a complete role reversal. The Japanese are past masters of robotics and miniaturization. It is hardly surprising therefore that most of the leading pick and place machines (or mounters as they call them) are Japanese, as are many of the world’s leading automotive brands.

Another area where Japan leads the world is payment software and processing. For over a decade the Japanese have been paying their bills using their phones. We only introduced it last year with Apply Pay and Google Wallet.

Wearable technology is the latest area to capture the Japanese imagination. Almost 19,000 curious people turned out for the new Wearable Technology Expo at Tokyo Big Site last week. Many of the examples had been on display at CES the previous week, but it was interesting to see the range of applications where this might be used; ranging from Industrial applications such as fast-food restaurants or store rooms where the employee needs to have use of both hands, medical, sport, entertainment and military are all sectors that will have some requirement in the future.

So is this going to be the next electronics revolution? Like the ubiquitous cellphone, it is a consumer led product that will be driven by fashion and the desire to have the latest gadgets. But add in the industrial applications and the scale becomes enormous.”

Will wearables follow a similar path? Unlike the ubiquitous cellphone, which is a market driven and not policy driven. That said, many of the eyeglass examples on display were downright ugly or impractical. No doubt there will be many small potholes in the road to success for these entrepreneurs.

– Trevor Galbraith
Editor-in-Chief
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The Land of the Rising Technology

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Learn more about the Quantum
Without doubt my favorite part of this year’s Consumer Electronics Show (CES) in Las Vegas was Eureka Park. This is not the area with the huge multi million dollar booths with amazing visuals and even more amazing products. This is the area of 675 small businesses occupying small pole and drape booths promoting brand new products that are often not even on the market yet.

There are a couple of reasons this is the most vibrant part of the show for me. One is that this is the innovation coal-face, where ideas are potentially seen for the very first time. The second is that nine times out of ten the guy on the booth is the founder, inventor, designer, CFO and supply chain manager...

“The democratization of capital is just half of the process of democratizing innovation. The second part is fulfillment, bringing the product to market.”

RocketSkates propel Acton at CES2015; Swarovski partner with Misfit; IndieGOGO and Kickstarter have changed the way startups are funded.

IndieGOGO are at the center of an innovation revolution in the USA and worldwide, a democratization if you will, that allows good ideas to surface regardless of the background education and wealth of the innovator. It’s no longer about where you went to school or about your rich uncle, it’s about the idea, and that’s refreshing. IndieGOGO was founded by three individuals frustrated with the way the venture capital market seemed to work and determined to change it for the better. And they, along with the likes of Kickstarter, began the crowdfunding revolution that was to democratize...
capital and bring innovators closer to their potential customers and investors simultaneously.

Crowdfunding did more than just democratize capital, it also created a platform for innovators to test the market's appetite for their products, build a beta community, and gain a level of market intelligence previously unavailable.

But the democratization of capital is just half of the process of democratizing innovation. The second part is fulfillment, bringing the product to market. Formerly innovators needed some level of understanding of how their product would be manufactured, how it needed to be designed and how it needed to be fulfilled to the end user, be they customer or investor. Outsourcing has changed all that, and the industry's desire to engage with these startups has forever changed the climes for innovators. GoPro and the like have taught the outsourced industry to ignore innovation at their peril. These successes, one year in Eureka Park and the next on the main show floor, are testament to the value of a good idea and even the large EMS companies don't want to be the guys that said no to the next big thing!

So, halcyon days for innovators! Readily available capital for startups supported by market intelligence, a beta customer base and a ready made community, and the ability to design for manufacture, prototype and eventually scale through outsourced manufacturing partners world wide.

Of the twelve or so innovators I interviewed at CES, at least ten were funded through crowdfunding. A similar number had outsourced their manufacturing, and probably half of those had outsourced to Chinese vendors, offering good low volume solutions at very competitive prices.

You can find many of the video interviews from CES at Global SMT's YouTube channel or on SMTflix. The interview with IndieGOGO's Kate Drane is at http://youtu.be/CsXk9ZaTeA

- PHILIP STOTEN (@PHILIPSTOTEN)

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North American PCB order growth bolsters book-to-bill ratio

IPC – Association Connecting Electronics Industries announced the November findings from its monthly North American Printed Circuit Board (PCB) Statistical Program. Strong year-on-year order growth kept the PCB book-to-bill ratio high, while sales remained slightly below last year.

Total North American PCB shipments decreased 3.4 percent in November 2014 from November 2013, bringing year-to-date shipment growth to -1.2 percent. Compared to the previous month, PCB shipments were down 5.0 percent.

PCB bookings increased by 12.4 percent compared to November 2013, improving the year-to-date order growth rate to -0.1 percent. Order growth declined 25.5 percent in November compared to the previous month when orders were unusually strong.

Tony Noto joins Conexus rep team for Chicago Area, Wisconsin

Experienced sales professional Anthony Noto has joined Conexus LLC’s rep team, E-Tronix, to serve customers in the Northern Illinois (Chicago area) and adjacent Wisconsin territories beginning January 1, 2015. Tony will assume the responsibilities of Managing Partner for E-Tronix’ Illinois branch.

In making the announcement, Pete Ruth, North American Business Manager of Conexus, stated, “Anthony Noto has been actively engaged in the Electronics manufacturing, Wire and cable harness, and other Industrial markets for more than 14 years. He brings an extensive knowledge of these industries to our customer base and channel partners. Tony’s knowledge makes him a tremendous resource and a valuable asset to Conexus and to our E-Tronix sales team. We look forward to working with him.”

Mycronic receives order for an advanced mask writer

Mycronic AB, has received order for a Prexision-80 (P-80) mask writer for advanced display applications from an Asian customer. The machine will be delivered during the second half of 2015.

The P-80 mask writer, which was launched earlier in 2014, offers the highest image quality, together with improved production efficiency for mask makers, and therefore enables manufacturing of future display products.

Each mask writer is unique and each mask writer is individually developed to meet the specific needs and requirements of each customer. The price for a P-80 machine can therefore differ substantially depending on the functionality and be in the span of USD 35-45 million. In addition to a custom made P-80, this order covers enhanced functionality including measurement capability during the manufacturing process. The extended functionality will be delivered later, probably early 2016.

Bentek celebrates 30 years in business

Bentek Corporation, a recognized leader in power distribution solutions has marked the occasion of their 30th year in business. Since opening its doors in 1985, Bentek’s products and services have become an integral part of the nation’s electromechanical and power distribution solutions.

Founded in 1985, Bentek Corporation began by providing comprehensive design, manufacturing, and logistics services for the semiconductor equipment industry. We continue to specialize in the design and manufacture of electromechanical and power distribution solutions for high-tech and industrial markets.

In 2009 Bentek expanded its offerings with the creation of their Solar Products division. Bentek Solar provides a wide range of Balance of System (BOS) equipment including combiners, recombiners, safety systems, cables, harnesses, and accessories for the residential, commercial, and utility markets.

Horizon sales announces Q1 incentive on FSInspection equipment

Horizon Sales, a manufacturers’ representative corporation, specializing in the sales and marketing of premier electronics assembly equipment, is pleased to offer a sales incentive on equipment from FSInspection, a division of Freedom Scientific.

Dave Trail, President of Horizon Sales, commented, “We proposed to FSInspection a one-time special deal to start Q1 2015 off big. They accepted our proposal and we have taken delivery of 25 reduced-cost PKMag 50s. We are excited to pass this savings onto our customers.”

FSInspection’s high-quality, industrial inspection solutions provide greater productivity, improved operator accuracy, and are more ergonomic and cost-effective vs. traditional microscopes. The
result is a cost reduction in the overall quality inspection process.

www.horizonsales.com
www.fsinspection.com

**Sono-Tek Corporation celebrates 40-year milestone in 2015**

Sono-Tek Corporation is pleased to announce the company’s 40-year anniversary. Sono-Tek has delivered more than 10,000 ultrasonic coating systems around the world during the company’s history. Sono-Tek Corporation was established in 1975 by Dr. Harvey Berger, inventor of the ultrasonic nozzle. Sono-Tek’s initial developments included fuel efficient nozzles for lower emission oil burners sponsored by the EPA, and blood collection tube coaters for a major pharmaceutical company. Sono-Tek next developed the SonoFlux line of ultrasonic spray fluxing equipment, now used by countless printed circuit board (PCB) manufacturers around the world.

According to Christopher L. Coccio, PhD, Chairman and CEO, “We began to diversify both by market segment and geography, as we realized the potential benefits of our ultrasonic spraying systems for other manufacturers requiring precision thin-film coatings. An added benefit is very little waste and environmental loss of expensive materials compared to other coating methods. This has led to a quadrupling of our business in the past decade with an upside limited only by our imagination.”

www.sono-tek.com

**Kulicke & Soffa acquires Assembléon**

Kulicke and Soffa Industries, Inc announced it has entered into a definitive agreement to acquire a 100% equity stake of Assembléon B.V., in an all cash transaction for $98 million. Assembléon is a leading technology solutions provider that offers assembly equipment, processes and services for the automotive, industrial, and advanced packaging markets.

Bruno Guilmart, Kulicke & Soffa’s President and Chief Executive Officer, remarked, “We are extremely pleased to welcome Assembléon and its talented employees into the K&S family. Assembléon’s existing solutions and technological competencies present a very attractive strategic opportunity and further extend our ability to capitalize on the advanced packaging market. Assembléon brings a deep-rooted history of innovation, a portfolio of solutions with industry leading process capabilities and meaningful participation in the automotive and industrial markets serving a strong base of leading customers. Our corporate cultures of technology and market leadership serve complementary core businesses and increase our collective presence in high-growth markets.”

www.kns.com

**Molex acquires SDP Telecom**

Molex Incorporated, a global interconnect and cable assembly provider, announced that it and certain of its affiliates have acquired SDP Telecom. Headquartered in Montreal, Canada, SDP designs and manufactures RF/microwave solutions for the wireless communications industry.

“Together, Molex and SDP will broaden our RF/Microwave product capabilities and create additional value for our customers in the growing wireless infrastructure market, said Tim Ruff, senior vice president, Molex. “This is a next step towards achieving our vision to offer total integrated solutions to the markets we serve.”

www.molex.com/link/register

**Electrolube announce increased global sales**

Electrolube, the manufacturer of specialist chemicals for the electronics, automotive and industrial manufacturing industries, has announced double-digit growth in global sales for 2014. Following the approval of the ISO 14001 standard for the company’s Environmental Management System and the successful international rebrand at the end of 2013, Electrolube emerged into 2014 with a fresh new identity and escalating demand for new products, which opened up new opportunities and markets.

With increased growth figures year on year, 2014 has seen the biggest growth in the company’s 72 year history. The Chinese R&D team, based at Electrolube’s manufacturing facility in Beijing, is making rapid advances in high performance, innovative materials at a pace that is hard to match. The company’s long term strategy of developing subsidiaries, incorporating warehousing and sales, for customers in each country has also proved highly successful in expanding the business and effectively meeting the demands of its customers worldwide.

www.electrolube.com
**INDUSTRY NEWS EUROPE**

**Changes to Candidate List for REACH Regulation Six new SVHCs and new DEHP Classification**

Since December 17, 2014, the REACH Candidate List of ECHA not only includes six new substances, but also an update to the existing list entry for the plasticiser DEHP. Whereas DEHP was previously classified as toxic to reproduction, the Committee of Member States has now unanimously confirmed its hormone-like (endocrine-disrupting) effects in the environment. Since this substance is already included in Annex XIV (Authorisation List), its use without authorisation may only continue until 21.2.2015.

The new substances included in the Authorisation List are:

- Cadmium fluoride, which is variously used as a raw material in electroplating and in the production of photovoltaic modules, and cadmium sulphate, which is used as a raw material for the surface treatment of metals. Both cadmium salts are classified as Carcinogenic, Mutagenic and Toxic to reproduction.
- UV-320 and UV-328, two UV-stabilizers (plasticisers) from the group of phenol benzotriazoles, are very persistent in the environment, toxic, and highly bioaccumulative. They are used primarily in plastics, rubber and coatings.
- DOTE and reaction mass of DOTE:MOTE – these two organic tin compounds are used as stabilisers in PVC; they have properties that are toxic to reproduction.
- UV-stabilizers (plasticisers) from the group of phenol benzotriazoles, are very persistent in the environment, toxic, and highly bioaccumulative. They are used primarily in plastics, rubber and coatings.

As a result, the REACH Candidate List now includes 161 substances of very high concern (SVHCs). In this context, the FBDi would like to explicitly draw attention to the general notification obligation that applies to SVHCs (Substances of Very High Concern) since 1 June 2011. This also applies to existing SVHCs in Annex XIV. From the time when a substance is added to the Candidate List, companies and distributors/importers have 6 months to notify the ECHA if the substance is present in their imported products above a concentration of 0.1 % weight by weight AND cumulatively in quantities totalling over one tonne per year (across all affected and imported products). For information on possible exceptions, refer to Article 7(6); these do not remove the obligation to notify customers/consumers according to Article 33 (1+2). Violations of these regulations will result in sanctions ranging in severity from warnings to significant penalties.

The complete list with the candidates including support documents for inclusion in Annex XIV of the REACH Regulation can be viewed on the ECHA website at: http://echa.europa.eu/web/guest/candidate-list-table

**Global semiconductor market set for strongest growth in four years in 2014**

Worldwide semiconductor market revenue is on track to achieve a 9.4 percent expansion this year, with broad-based growth across multiple chip segments driving the best industry performance since 2010.

Global revenue in 2014 is expected to total $353.2 billion, up from $322.8 billion in 2013, according to a preliminary estimate from IHS Technology. The nearly double-digit-percentage increase follows respectable growth of 6.4 percent in 2013, a decline of more than 2.0 percent in 2012 and a marginal increase of 1.0 percent in 2011. The performance in 2014 represents the highest rate of annual growth since the 33 percent boom of 2010.

www.technology.ihs.com

**Mycronic machines soldier on for Aaron PCB**

When Aaron PCB’s long-standing Myronic machine had clocked in almost 50,000 manufacturing hours, the company management decided it was time for an upgrade. So they got in touch with Myronic and, based on their new manufacturing needs and future projections, placed an order for a state of the art MY100LXe-10.

Aaron PCB is a contract manufacturer specialising in SMT electronics assembly, through-hole assembly, electro-mechanical assembly, cabling and box build assembling. Located in Shannon, Ireland, the ten-strong team covers low–to medium-volume areas of manufacturing. High mix complex boards for the semiconductor sector, heating products, metrology and instruments are just some of the company’s most recent projects.

www.mycronic.com
“MIRTEC’s MS-11 3D SPI Systems were the perfect enhancement to our SMT Manufacturing Process. Their revolutionary Intelli-Track Software provides “Real-Time” communication between our MS-11 and MV-7xi systems allowing us to analyze SPI and AOI results “Side-by-Side” for superior process control. Overall, MIRTEC stands out as a company that offers Technologically Advanced Solutions that have been easy to implement within our challenging production environment.”

Jason R. Sciberras, Manufacturing Manager

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Consider the Gerber Plots When Purchasing a Solder Paste Stencil

BY WILLIAM COLEMAN

When purchasing a stencil for printing solder paste on a printed circuit board (PCB), there are many things to consider, such as aperture size, area ratio, and the material the stencil is made of. One factor that is equally important, but often overlooked, is how the stencil manufacturer outputs the stencil given the Gerber files it is provided. This becomes extremely important, especially when it comes to programming a solder paste inspection machine. Plexus Corp., an electronics manufacturing and engineering services provider, was able to prove that a considerable amount of time and money can be saved when you work with a stencil manufacturer who is very exacting when it comes to providing plots for its stencils.

Gerber Plots

Plexus was engaged with a customer in its new facility in Guadalajara, Mexico. During training of how to program a solder paste inspection machine, a few new engineers received 274x Gerber plots from the customer’s stencil vendor to use for internal engineering and qualification builds. It took hours to correct the errors in the files. The apertures were all made up of draws, nothing was flashed, and fiducials were made of hundreds of line segments.

Generally, Gerber files that are used to manufacture the PCB are given to the stencil manufacturer to produce a stencil. That Gerber plot helps the stencil manufacturer know and understand the customer’s application. When all the draws are flashed and all the customer modifications made, a 274x check plot is output. Although a 274x Gerber plot is the most common format, other types of files can be exported, such as DXF and PDF.

Draws, Flashing, and Apertures

To clean a stencil file, the manufacturer has to take the draws and translate them into apertures. A draw is a little line on the file. Draws are a problem because apertures should be one entity, or a flash. Draws, on the other hand, are comprised of multiple lines. In the case of the stencils being used by Plexus to program a solder paste inspection machine, there were a considerable amount of little lines that comprised the apertures. It is the job of the stencil manufacturer to clean up all those lines so only open apertures are demarcated and visible. Any lines inside the apertures prevent the creation of a good clean stencil.

The stencil manufacturer performs a task called flashing. Flashing converts multiple lines, or draws, into one entity. Fiducials should be made of a flash. It is

CASE STUDY

Consider the Gerber Plots When Purchasing a Solder Paste Stencil

- Good pad vs. 287 bad draws
- Good homeplate pad vs. 12 bad homeplate draws
easier to program a single flash than hundreds of lines. When the printer reads the stencil program, if there is just one entity, the printer can program it easily. It takes a considerable amount of time and printer memory if there are hundreds of lines that have to be read in order to create a program. Add to this employee time, the cost of running the printer, and downtime for preparation and programming and the costs quickly add up.

“I was training new engineers to program a paste inspection machine,” said Travis Tanner, Senior CIM/CAM Technician at Plexus. “For the first two programs I used their past vendor’s plots for internal engineering/qualification builds. It took hours to clean them up. Apertures were all made up of draws, nothing was flashed, and fiducials were made up of hundreds of line segments. The list goes on and on.”

“I requested that they use these two bad files to drive a point,” continued Tanner. “And the people I taught were reluctant. Their old behavior of using stencils was that they were ‘good enough’ and they were hesitant to talk to me about using anybody else. So I made them a bet. I gave them two of their vendor files and I took 12 Photo Stencil 274X Gerber plots. My time spent cleaning was zero because of the process Photo Stencil uses. It was a big eye opener for my team here. We were done within minutes rather than hours."

“**My time spent cleaning was zero because of the process Photo Stencil uses. We were done within minutes rather than hours.**”

Specialized Stencil Software

To do the clean-up, Photo Stencil uses specialized stencil creation software that has a lot of latitude to enable Photo Stencil to clean up the files they receive and get them in a style that allows the stencil to be manufactured, and also gives the customer a format that fits their requirements in production. Programming on the paste inspection tool takes the Gerber file and then does scans of the printed board to understand placement and paste volume. In the case of Plexus, Photo Stencil provided them with “cleansed” data, which makes the programming much simpler than it would be otherwise. Any draws that are present are fixed manually. The program can then be uploaded into the paste inspection machine.

“Using properly prepared stencils, like we receive from Photo Stencil, saves money and time,” said Tanner. “Having an actual comparison helped us to realize the importance of making sure best practices are used in preparing our stencils.”

www.PhotoStencil.com
The Three Levels of Process Control in Thermal Profiling and How They Have Advanced Manufacturing

BY PATRICK MCWIGGIN

With today’s more sophisticated electronics market, which calls for more intricate and diverse requirements, together with decreased development cycles and improved capacity, the need to ensure products are produced correctly with the right process control and within tight constraints is ever more important.

To guarantee products are soldered correctly and process parameters are met, thermal management is a necessity. To produce electronic assemblies without a known thermal profile is detrimental, as you ‘cannot manage what you do not measure’. Without correct profile management, increases in rework costs may occur and potentially give rise to early field failures. There are three levels of process control which are commonly employed today, all with differing benefits and failures starting with the traditional test board method, through to the advanced automatic profiling systems. Over the years thermal profiling has advanced significantly and now offers exact profiles aiding in the advancement of technology manufacture. We will first look at the traditional manual method.

Traditional profiling devices – how this method is no longer the preferred choice for production line verification profiles

The method of passing a profiling device through an oven to ensure the machine is set correctly is an important one, and having a test board to do the initial profile setup is still a fundamental step that needs to be performed. Thermocouples are placed on the crucial components of the board and when passed through the oven measurements are taken to ensure the thermal profile meets the target profile.

With the introduction of more complex or smaller fragile assemblies, or when high production volumes of mobile phones and tablet PCs are involved, this is simply not enough. Verification of the oven profile must be performed much more frequently. Using the test board for on-going process checking is error prone, resulting in false alarms or measurement data with poor repeatability or accuracy.

The main problem with this method is keeping the test board in good working order. The thermocouple sensors used to establish the profile during the initial set-up stage needs to respond quickly to temperature change and not influence the measurement. The result of this is that they are inherently fragile and need to be frequently replaced which is both time consuming and can result in measure-
inaccurate measurement, the drawbacks to this method are great.

Man hours is another drawback to the manual method. The process interrupts production and is very labour intensive. It is also very dependent on an individual’s expertise to attach the thermocouple sensors correctly and in the right place. Capturing the true profile, then the ‘golden standard’, which is imperative to the product working correctly, is not easily achieved.

Oven Verification devices – add-on technology to capture the Golden Standard

Because of these drawbacks to using traditional thermal profiling devices, combined with test cards, companies like SolderStar, worked on devising technologies that would ease the process of capturing oven verification profiles. There was a need for a device that monitored oven temperatures effectively, without putting constraints on the machine, and the

“The DeltaProbe was designed to use the unique SolderStar ‘Smart link interface’, this makes for an intelligent fixture which can hold product and process recipe information to allow efficient profile capture, download and organisation.”

problems of traditional manual profiling and gives manufacturers a more streamlined method for periodic profile. The DeltaProbe offers a process control and intelligence that matches manufacturers more intricate and detailed production requirements, without the need to use fragile test boards for daily oven checks.

The DeltaProbe was designed to use the unique SolderStar ‘Smart link interface’, this makes for an intelligent fixture which can hold product and process recipe information to allow efficient profile capture, download and organisation. Smart link provides the secondary function of a quick connection system eliminating the possibility of channel mix-up error.

Oven verification devices like the DeltaProbe include specially designed measurement sensors where all process records are captured without a test card or wires getting in the way of the procedure. This makes it not only robust, but the appropriate tool to generate highly repeatable results, an important requirement today, which stands up to regulatory requirements.

By using an oven verification tool, a ‘golden’ process profile can be measured easily and tolerance limits can be set around the temperature traces and process parameters. This ensures measurements are precise and any oven performance changes or problems are quickly flagged and remedial action can be taken. This makes periodic testing of the oven more repeatable, convenient and user-friendly, resulting in better process documentation at a lower cost to the manufacturer.

Platforms like DeltaProbe far out-

weigh test card methods for a number of reasons;
• The usual use of test cards need constant maintenance and it is not easily repeatable. This results in false errors due to measurement platform problems.
• Statistical Process Control (SPC) gathering is easy and offers a more accurate measurement.
• Matched sensors show any performance problems across the width of the oven heater.
• There are independent limit settings per oven zone which gives more control in critical zones.
• A number of errors can be detected easily including speed, conveyor and recipe loading and editing errors.
• It can be used to capture a benchmark for multiple lines – a must for high production volumes

All these benefits help to give a true picture of the process capability and result in higher quality soldering within the end product. Platforms like this can be used once a temperature profile is captured from a real test PCB. The ongoing process monitoring will then be achieved by measuring the difference from an established process baseline. The software used with such products also includes advanced SPC tools which create charts for ongoing process control measurement, trend evaluation and corrective action. This process, as you can see, far outshines traditional profiling methods.
Continuous Oven Monitoring - How can we outperform the periodic profiling technology of today?

Safety critical or high value assemblies, combined with tighter processing constraints, and the need for complete process documentation has driven the development of profiling systems that can monitor every electronic assembly produced on the manufacturing line. The pinnacle of profiling systems today are those that can record and provide traceability of the process conditions within the oven for every electronic assembly. For this reason the SolderStar APS (Automatic Profiling Systems) was developed.

The platform measures the stability of the process parameters within a thermal process, combined with assembly position tracking, to produce the most representative virtual profile possible for every PCB passing through the machine. Such platforms can continuously track PCB movements through the machine and monitor process fluctuations at product level. These changes are then used by a mathematical model to calculate what the resulting PCB profile or ‘virtual profile’ would be. These process parameters can then be calculated and tested within limits.

The APS uses a novel technique to reduce the number of thermocouple conductors required to make the product level measurements needed, allowing for a much smaller probe diameter to be achieved. For example on a 14 zone machine a probe diameter of typically 6mm could be used. This results in robust yet fast response probe design essential for achieving the detection of machine faults quickly and easily so they can be rectified, saving both time and money.

Faults that can be detected on APS platforms include checking if the zone temperatures and speed are set incorrectly from a defined reference, rapid feedback on thermocouple and conveyor and fan failures. Also the oven recipes are monitored to finally ensure they are inputted correctly and there is no overloading of the oven.

SolderStar APS can continuously com-
pare each new set of measurements with the reference and evaluate any differences. If the difference between the current process and the reference exceed user defined limits, then further boards are prevented from entering the oven by way of the SMEMA (Surface Mount Equipment Manufacturer’s Association) interface.

Special temperature probes are mounted along the heated length on both sides of the machine to monitor actual product level temperatures in real time. In addition to this, the system keeps track of the current speed and position of each assembly in the process.

The temperature probes have been designed to be smaller, and can be positioned closer to the PCB providing a much more accurate temperature measurement in the vicinity of the electronic assembly during soldering. The smaller size also reduces the danger of the probe shadowing the product. Such a system also measures the product level zone temperatures and conveyor speed independently of the oven stopping the machine from malfunctioning if for example, a heater or fan is ineffective, or an operator error loading the wrong recipe for the board being produced.

The continuous nature of the APS means that the thermal process no longer runs blind. The profile for every single PCB is modelled and verified to meet the requirements of that particular assembly. It is also designed specifically to meet the strict requirements of the manufacturer lowering the cost of production by reducing production downtime due to rework and labour. The age old problem of ‘you can’t manage what you can’t measure’ is no longer a problem with this state-of-the-art profiling technology.

All these benefits have improved manufacture and saved in time and money as it is a permanent and immediate method of profiling. Because of these obvious advantages manufacturers of military, automotive and medical devices are moving towards this technology as their preferred method of profiling as it is consistent, accurate and provides 100% traceability through advanced software.

In a nutshell the APS system can discover ‘problems’ as they happen which can be rectified easily and efficiently reducing down-time and man hours and is a fail safe way to ensure that PCB assembly and manufacture is correct with guaranteed traceability.

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What’s New in Japan?

A total of 85,924 visitors attended Internepcon Japan, an increase of 38.8% over last year! The increase was largely through the high level of interest in wearable technologies. The Japanese appetite to learn more about this emerging tech area attracted such a large crowd, it was difficult to navigate the aisles at times.

Yamaha had an extremely strong presence at the show. Flanked by its sister company iPulse for small to medium-sized manufacturers and following the recent acquisition of Hitachi, which services the high volume end of the industry, Yamaha can now offer a pick and place system to fit any budget, size or technical requirement.

Fuelling their aggressive growth strategy, Yamaha released a full range of machines to offer turnkey systems that communicate and auto-correct the printers prior to a defect occurring. The new products include mounters (pick and place), a new printer, 2D and 3D AOI and in-line x-ray.

SAKI introduced a new THT inspection system that rounds out their portfolio that comprises 2D and 3D AOI, SPI and 3D inline x-ray.

Martin Hart from Topline Components introduced a novel system for creating column grid arrays, which is attracting major interest from hi-rel companies due to the improved shock resistance compared to BGAs.

Cosmic Corporation launch a robotic soldering system using ceramic heater tips to reflow the solder. This offers a number of benefits including containing the flux from flowing out across the board, fast ramp-up and recovery of the solder tip. The ceramic tips also last for more than one year, regardless of the number of cycles.

In 2016, the show management plan to move the wearable technology sector to the end of the east halls and move the test and measurement part of the show closer to the assembly equipment area in Internepcon. This makes a lot of sense and will enhance the traffic flow at this expanding event.

—TREVOR GALBRAITH

On the manufacturing side we spoke to a couple of companies that are working with sintered solder pastes. Alent has a well-defined product called Argomax that offer significant reliability and performance characteristics, while offering a large reduction in capital equipment, floor space and labor.

Nihon Superior has just announced their SN100 CV material, which also uses Type 4 paste and is targeted towards the automotive, aerospace and other hi-rel industries.

The Japanese appetite to learn more about this emerging tech area attracted such a large crowd, it was difficult to navigate the aisles at times.
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Visit the Mentor Graphics Valor booth #3733 at IPC APEX 2015
IPC APEX Expo 2015

APEX moves back to San Diego this year after a two year absence. The event is firmly established as the leading trade show in the United States where many of the industry’s top suppliers unveil their latest production equipment and materials. This is a preview of the new technologies that will be on display...

Ace Production Technologies

BOOTH # 3146
Ace will exhibit a complete range of standalone selective soldering systems including the popular KISS-100, KISS-101 and KISS-103 models and in-line systems such as the KISS-102IL. Also on display will be the new high-speed selective soldering work cell consisting of an infeed conveyor, component inseration stations, in-line fluxing, preheating, multiple selective soldering modules and an out-feed conveyor forming a complete work cell. www.ace-protech.com

Acculogic

BOOTH # 1601
Acculogic will exhibit the FLS980 Series III with the Ultimate Accuracy Package Option along with high throughput features such as the latest version Flying Bed of Nails (FBON). The new ThermoScan thermal imaging test solution and MicroScan miniature image observation and testing solutions will be unveiled at the show for the first time. www.acculogic.com

Alpha

BOOTH # 3749
Alpha’s product line is ideal for a multitude of market technologies, including Automotive, Advanced Sintering, LED, Preforms and Computing. Information will be available on the following products:
• ALPHA Exactalloy Tape & Reel Preforms with low-temperature SnBiAg alloy
• ALPHA EF-8800HF halogen-free, alcohol-based no-clean wave soldering flux
• ALPHA SnCX Plus 07 lead-free wave solder and rework alloy
• ALPHA Telecore HF-850 halogen & halide-free, fast-wetting and low-spattering cored wire
• ALPHA OM-535 zero-halogen, low-melting point lead-free alloy
www.alpha.alent.com

Balver Zinn

BOOTH # 332
The Balver Zinn Group announces that Cobar Solder Products Inc. will highlight the Bi Rework Solder Paste (de-soldering paste). The de-soldering paste has been designed for de-soldering Pb-free components and is ideal for LED removal. The new RoHS compliant paste reduces the risk of board damage during the de-soldering process. With a de-soldering temperature of 180°C, Bi Rework Solder Paste reduces de-soldering temperatures and times. The no-clean, halide free flux features easy dispensing and clean-up. Additionally, it provides excellent removal of through hole and SMT components. www.balverzinn.com

ASC International

BOOTH # 912
ASC will demonstrate the new LineMaster DM platform, VisionPro AP500 and VisionPro M Series (SP3D / M500) SPI systems. The new LineMaster DM incorporates SPI and AOI into one platform for “Dual Mode” performance. The solid AOI / SPI platform validates the overall variables associated with component placement and solder paste printing. Combining both inspection capabilities within one platform, the LineMaster DM detects absence/presence, polarity, OCV, misalignment, RDI and solder joint inspection for AOI and the most accurate and repeatable true 3D volumetric measurements for SPI. www.ascinternational.com

Count on Tools

BOOTH # 3625
COT will debut the new StripFeeder Mini that features the same award-winning design of the StripFeeder in a smaller package (134mm x 152mm). The StripFeeder Mini is better equipped to handle shorter strips of components, such as 2-4” of tape. It offers increased lane capacity with the ability to run two StripFeeder Minis in the same
space as one original StripFeeder. The Mini is a lower cost option than OEM feeders, both standard and custom, for small strips of components. Additionally, it is designed for both prototyping and low-volume, high-mix applications.

Data I/O

BOOTH # 2839

Data I/O will feature the PSV7000 automated programming system. The PSV7000 delivers unprecedented velocity, versatility and value while exceeding the most demanding programming requirements for the lowest total cost of programming. Engineered for speed, the PSV7000 is capable of programming up to 2000 devices/hour with tray, tape or tube input even with large file size. Designed for ultimate flexibility, the PSV7000’s provides the greatest socket density with up to 96 programming sockets. With zero mechanical changeover between jobs, media options are concurrently installed inside the work envelope including tape, tube, dual tray feeder, fiber laser marking and 3D coplanarity.

www.dataio.com/PSV7000

Digitaltest

BOOTH # 3025

Digitaltest plan to show significant new developments on their MTS 500 Condor system to include faster programming and improved measurement technologies, and some significant updates to their In-Circuit and Functional test systems. On the ICT site they will be showing their latest test program migration tools. These quickly and easily allow customers to take GenRad, Teradyne, and Agilent program and fixtures across to Digitaltest’s MTS 300 or MTS 888 platforms.

www.digitaltest.net

Essemtec

BOOTH # 1211

Essemtec will demonstrate the multi-functional SMT center Paraquda, Cubus SMT storage device and the new Lynx highly flexible and accurate pick-and-place system. The Cubus – the next-generation SMT storage device – innovates how SMT components are stored and provisioned for electronic manufacturing. For the first time, a storage device is fully user configurable and thus adapts to the ever-changing manufacturing needs. There are no limitations in terms of reel sizes, reel widths or JEDEC trays. The Lynx bridges the gap between the Pantera X-plus and Paraquda SMT placers. It is ideally suited for high-mix SMT production. With 180 feeder lanes on 0.85 sqm it offers the highest feeder density on the market.

www.essemtec.com

Europlacer

BOOTH # 901

Europlacer will be demonstrating their new ii-Feed system, which highlights a 15 second unit load-time, along with sub-$300 unit price for fully ‘intelligent’ assembly planning and production. Additionally, company representatives will showcase the iineo I and XIIII-IIT SMT pick-and-place platforms along with the LZERO3 Automatic Storage Tower and EP710 Automatic Screen Printer with EP covers.

www.europlacer.com

Fancort Industries

BOOTH # 3424

Fancort’s new floor mounted routers program the cutting path with easy-to-use controls. Cutting paths can be saved, edited and copied. A built-in high resolution color CCD camera with 20x magnification assists programming and allows the operator to watch the operation. The routers also feature a vision system to check fiducials and prevent cutting errors. Three models are available (SM332OS-S Single Table, SM335OS-D Twin Table and SM4520L-D Twin Table) for varying production requirements.

www.fancort.com

Indium Corporation

BOOTH #1027

Indium Corporation will feature its new solder paste, Indium10.1 is a Pb-free halogen-containing solder paste with the lowest levels of voiding for QFNs, BGAs, and pads with large ground planes. The oxidation-inhibiting properties of Indium10.1 provide industry-leading head-in-pillow and grabbing resistance, with complete coalescence, even after long reflow profiles. The exceptional soldering ability of Indium10.1 makes it the best solution for components with less-than-ideal solderability and challenging RF shield metallizations.

www.indium.com

Inovaxe

BOOTH # 1417

Inovaxe will showcase its new Smart Two Bay InoAuto Storage System, which stores more than 1,100 7” SMT reels, and is equipped with sensors and LED indicator lights, along with its InoView Locator soft-
ware, and responds as if the reels have RFID on them. The operator will simply barcode scan a reel into an empty Single Package Single Location slot. The InoAuto will report the position of the part to its computer automatically and then to a server via a WiFi connection.

**ITW Electronics Assembly Group**

**BOOTH # 2341**

ITW Electronic Assembly group companies will come together in one large booth, making the innovative technologies of Speedline, Electrovert, Vitronics Soltec and Kester conveniently available in a single location. Products showcased will include the Electrovert AquaStorm AS100 cleaner, VectraElite wave soldering machine and OmniES S reflow soldering system, MPM Momentum Elite, Momentum BTB (Back-to-Back) printers, and two Camalot Prodigy dispensers. The new space-saving Momentum BTB (Back to Back) is a revolutionary printer configuration that allows you to nearly double your throughput without increasing the length of your manufacturing line. ITW will also introduce PrinTrack, MPM's new verification and tracking technology that helps cut costs, improve quality, and eliminate human errors. PrinTrack was co-developed with Speedline's technology partner, vision leader Cogiscan.

**JUKI**

**BOOTH # 918**

Juki will display three complete lines; a high-speed line, a high-mix line, and an LED / odd-form advanced technology line that will feature through-hole placement and selective soldering. The high-speed line will feature the RX-6 Flexible Mounter/TR7 and RX-7 Chipshooter that have vastly improved speed and flexibility in a very compact footprint. The line also will feature a new RP-1 Screen Printer, RV-1 SPI / AOI machines and an RS-800 Reflow Oven, and will be supported by StorageSolutions' ISM2000. The high-mix line will feature the GL Fully Automatic Screen Printer, KE3020 Flexible Mounter, and the RS-600 Six Zone Reflow Oven, and will be supported by StorageSolutions’ ISM400. The LED / odd form advanced technology line will feature the JX-300 LED Mounter that can build boards up to 60” in length. Additionally, the line will include the JM-20 Hybrid (Through-Hole) machine, iCube Inline Selective Solder and PMAxiII Screen Printer. The LED line will be supported by StorageSolutions’ ISM400.

**KIC**

**BOOTH # 3032**

Correctly guessing the first oven recipe is serious business. Companies that manufacture expensive parts may not be able to sacrifice even a single product to profiling. This is also true of companies that manufacture a very high mix of products or who are constantly setting up the oven for new boards. The KIC AutoFocus Power eliminates the need to ‘guess’ at an initial oven recipe, and instead calculates the ideal oven recipe, quickly directing the user to an in-spec oven setup. The KIC AutoFocus Power also will automatically recommend the oven set up that uses the least amount of electricity – without running a profile, simply by entering the product length, width and weight into the software.

**Koh Young**

**BOOTH # 301**

Koh Young will exhibit the company’s full lineup of total 3D inspection systems (SPI, AOI) and quality assurance solutions. With its authentic 3D measurement capability, Koh Young’s Zenith AOI system can detect all types of defects with real measurement values, allowing much easier defect evaluation and process control. The KSMART software solution connects inspection results from Koh Young’s 3D SPI system and 3D AOI systems so that the defect root cause can be traced, analyzed, and removed as early as possible in the process.

**Kurtz Ersa**

**BOOTH # 2601**

Kurtz Ersa will display the new Smartflow 2020 selective soldering system and HOTFLOW 3/20 third generation reflow oven. The Smartflow 2020 selective soldering system requires less than 3 ml of space, thus fitting optimally into cell production environments. In all process steps the automatic Smartflow system uses the same successful and proven Ersa Selective
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Soldering Technology as the large Ersa VERSAFLOW systems without compromising quality and accuracy. The HOTFLOW 3/20 is based on the proven and proprietary Multijet Ersa heating technology. The R&D of the HOTFLOW series was focused on improved heat transfer via a complete re-design of the process tunnel, reduced energy and N2 consumption, improved cooling, as well as optimized process control.

www.ersa.com

KYZEN

BOOTH # 1011

KYZEN’s new AQUANOX A4708 rapidly cleans under densely populated, low-gap PWB assemblies and is effective on all flux types, including no-clean and water soluble residues. A4708 is specifically formulated for enhanced metal compatibility and is safe for delicate gold and aluminum bonding pads. The specialized pH chemistry provides bright solder joints, even after multiple wash exposures.

www.kyzen.com

LPKF

BOOTH # 2007

LPKF will debut two new laser systems: The Fusion 3D 1200 Laser Direct Structuring system, and the MicroLine 2820P Laser Depaneling system. The new LPKF Fusion3D 1200 laser structuring system features a rotary indexing table and a vision system. Its flexibility allows for small, medium, and large scale production of MiDs. The MicroLine 2820P was developed for cutting PCB panels and cover layers. It reduces lead times and eliminates tooling costs of layout changes.

www.lpkfusa.com

Metcal

BOOTH # 627

The new Metcal SCS-1000 Site Cleaning System will be displayed for the first time, along with the new Solder Ball Replacement Kit and MX-HPDC dual cartridge hand-piece. The Site Cleaning System (SCS-1000) ensures accurate and repeatable cleaning of the component pad in one user-friendly system. The Site Cleaning System redefines performance and addresses the technical demands presented by component manufacturers today. It addresses the industry needs with an automated system capable of cleaning components pads without contact. Reworking small chip components such as 01005, 0201, 0402 and 0602s can be difficult and require specialized tools.

www.metcal.com

Microcare

BOOTH # 2733

MicroCare will introduce the newly-improved VOC-free TidyPen ‘60-second sticky stuff remover’, a time-saving tool for electronics manufacturing, repair shops, medical facilities, and any place where sticky labels are used. Another important introduction at the show is the unique VOC-Free Flux Remover-UltraClean, which meets the market’s need for high performance PCB cleaners. It is particularly effective at removing lead-free no-clean fluxes and pastes, and also is successful in removing silicone-based coatings and adhesives.

www.microcare.com

MIRTEC

BOOTH # 2333

MIRTEC will feature three distinct lines of inspection equipment specifically designed to address the full spectrum of inspection requirements associated with the electronics manufacturing industry. MIRTEC’s PRECISION SERIES consists of the NEW MV-9-QHD 3D AOI Machine, paired with an MS-15 3D SPI Machine. These high-end inspection systems are designed to address the inspection speed and defect detection requirements associated with the manufacturing of PCBs used in Smartphones, Tablet PCs and automotive systems. MIRTEC’s PERFORMANCE SERIES consists of the NEW M7 OMNI-QHD 3D AOI Machine paired with an MS-11 3D SPI Machine. These advanced inspection systems are designed to address Intermediate inspection requirements associated with more than 90 percent of electronics manufacturers throughout the world. NEW to APEX 2015, MIRTEC’s ADVANTAGE SERIES consists of the MV-6E AOI Machine paired with an MS-11E 3D SPI Machine. These cost effective inspection systems are designed to provide customers with a much needed competitive edge in the highly demanding electronics manufacturing industry.

www.mirtec.com
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**SHOW FLOOR PREVIEW**

**Nihon Superior**  
**BOOTH # 739**

SN100C P506 D4 is a lead-free (Sn-Cu-Ni-Ge) no-clean solder paste that can be stored at room temperature for more than 150 days without deterioration. This new material will not only simplify stock management, but also improve productivity with excellent consecutive printability. Alconano Nano-Silver Paste is based on a patented technology that makes it possible to effectively join most metals as well as Si and SiC at low sintering temperatures, if necessary in Nitrogen, without the nitrous or sulphurous residues that are the by-products of the sintering of conventional nano-silver pastes. The highly active surface of the nano-silver particles and the consequent strong capillary forces makes it possible to achieve strong bonds with high electrical and thermal conductivity at low temperatures without the need for external pressure.

[www.nihonsuperior.co.jp/english](http://www.nihonsuperior.co.jp/english)

**Nordson DAGE**  
**BOOTH # 1201**

The Nordson DAGE XD7600NT Ruby X-ray inspection system is the benchmark system for the most demanding production applications. The unique Nordson DAGE NT maintenance-free, sealed-transmissive X-ray tube, providing 0.5 Qm feature recognition and up to 10 W of power, together with the 2 Mpixel XiDAT3 digital image intensifier covers all the failure analysis and manufacturing tasks required in the production environment. The Nordson DAGE XD7600NT Diamond X-ray inspection system provides 0.1 Qm feature recognition and up to 10 W of power, together with the 2 Mpixel XiDAT3 digital image detector, thus making it the system of choice for the highest performance and highest magnification imaging tasks. Nordson DAGE will also showcase its Computerized Tomography (CT) and X-Plane functionality.

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

**Nordson YESTECH**  
**BOOTH # 1101**

The new Nordson YESTECH FX-940 offers the latest multi-dimensional technology for the inspection of solder defects, lead defects / lifted leads, component presence and position, correct part / polarity, through-hole parts, and co-planarity of chips, BGAs and other height sensitive devices. Offering advanced Fusion Lighting and a comprehensive set of inspection tools, including angled cameras, 3D height sensors, full color digital image processing, and both image- and rule-based algorithms, the FX-940 is unsurpassed in defect detection.

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

**RAMPF Group**  
**BOOTH # 2941**

RAMPF Group, Inc. is presenting high-tech low-pressure mixing and dispensing systems and innovative electro casting resins. RAKU-PUR and RAKU-POX electro casting resins provide a wide range of mechanical, thermal, and chemical properties such as: high thermal and mechanical strength, high flame retardant (UL-listed), manual or mechanical processing capabilities, precisely adapted flow properties, from low viscosity to highly thixotropic, settings precisely matched to process conditions, variable hardness. The new RTI range of electro casting resins with high thermal endurance will also be presented.

[www.rampf-gruppe.de](http://www.rampf-gruppe.de)

**SEHO**  
**BOOTH # 3533**

SEHO will showcase the new SEHO SelectLine and SEHO SmartSelect selective soldering systems. The Synchro concept is an intelligent software feature that coordinates the soldering process with two soldering units in such a way that the total throughput is nearly doubled without the need for significant investment. The SelectLine machine concept is consistently modular, thus ensuring clear cost benefits. The new SmartSelect is a new selective soldering system that is particularly designed for lean production manufacturing environments that features high flexibility and outstanding ROI.

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

**Seica Inc.**  
**BOOTH # 1127**

Seica Inc. will be exhibiting our new line of flying prober, the Pilot 4D line which will be represented at the show by the Pilot 4DV8 and Pilot FX. The Pilot 4D line represents the latest in technology in flying probe testing for both ICT, functional testing and data regeneration applications. The Pilot 4DV8 will show the latest features for automotive and LED light testing applications. Seica’s LED option will be show testing all key parameters of LEDs, such as the lumens, and intensity of several board mounted LEDs.
Discover the most comprehensive toolset for optimal line performance. Viscom’s TrueYield ensures the best defect detection and lowest false alarms. Unique Quality Uplink, automatic Integrated Verification and intelligent Total 3D Inspection.

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www.viscom.com
analyzed by Seica’s Viva software. In addition, Seica has also incorporated a sophisticated laser scanner for quick and accurate measurements of “bow and twist” and board topologies. The Pilot FX is Seica’s recently introduced full “bed of nails” (BON), flying grid tester. This system is set up for easy panel testing of circuits for high throughput with very easy swap out of test pins on an individual probe head assembly.

Seika Machinery

Seika Machinery will debut the RD-500V Rework Station from DEN-ON INSTRUMENTS CO., LTD. The all-in-one advanced technology SMT rework station is compatible with all kinds of rework and SMT component types, including 01005s. The RD-500V features a two mega pixel full HD camera with a 19” LCD display for easy visual alignment. Seika will also highlight the UNITECH UC-250M-CV PCB Board Cleaner. The UC-250M-CV takes all the features of the UC-250M and adds a dual cleaning feature using a combination of a brush roller with the silicone/adhesive cleaning rollers.

VI TECHNOLOGY

Vi TECHNOLOGY will demonstrate complete inspection solutions: PI series (SPI), K series (AOI) and Sigma Link software suite. PI’s 360° Moiré technology, offers a unique review image and outstanding performance through unambiguous Z referencing and compensation. PI is the only inspection system to program automatically. Inspection quality is therefore independent of programmers’ training. Sigma Review is a new web-based multi-step multi-line review software. By displaying & correlating both SPI and AOI data and images, including reference images, Sigma Review opens the way to defect root cause analysis.

Viscom

The proven X7056 in-line automatic X-ray inspection system has been completely redesigned, resulting in a 300 percent improvement in X-ray image quality. New digital flat panel detectors and X/Y stages allow highly accurate planar CT for 3D analysis of hidden fine-pitch solder joints such as QBGA, QFNs and stacked packages (PoP). The optional simultaneous AOI inspection now uses the new 3D XM camera module with up to 8 angular views and fast shadow-free 3D inspection. Viscom will also introduce its unique approach to maximize yields with best defect detection and lowest false alarms. TrueYield, with the combination of integrated verification to check programs with verified known defects, known good sample data, process uplink with process data analysis from several test gates and TCM, the automatic machine health check tool provides superior true yield improvement capabilities.

VJ Electronix

VJ Electronix will debut the new low cost Summit IIe and XQuik II with AccuCount for counting 15” reels. The new Summit IIe is the latest affordable rework system that offers the performance and functionality found on high priced systems. Improved ergonomics combined with next-generation controls and proven heating technology provide the greatest performance for the price. With the XQuik II with AccuCount Technology, maintaining inventory control of component reels has never been faster or easier. The XQuik with AccuCount system automatically counts components as small as 01005 with better than 99 percent accuracy.
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www.lectronics.net
Once a two-component has been identified as the solution to an application, the next step is to evaluate the most suitable method of dispensing it, taking into consideration factors such as cost, accuracy, efficiency, productivity and the elimination of waste. We asked dispensing equipment manufacturer, Fisnar Europe to share its expertise on this subject matter, examining the differences between automated and manual meter, mixing and dispensing equipment and which applications they are best suited to.

Manufacturers are seeking ever more robust and cost-effective solutions when facing challenges in bonding, potting, and form-in-place gaskets. As a result, two-part fluids are increasingly being specified to provide higher quality, consistency and endurance.

The requirement for quality and performance during the working life of a product extends not only to durable goods, but also to consumer products that have a life expectancy of just a few years — and where competition is fierce. As a result, multiple compound fluids that can provide superior controlled performance are being selected by many industrial sectors.

The diversity of industrial activity requires a similarly broad range of automation options. For example an automated meter/mix solution will consider the necessary output and fluid characteristics and dispensing the final mixed fluid will take into account positioning accuracy, flow rate, volume consistency, repeatability and the appropriate safety precautions.

As a rule, two-part fluids require an automated process whenever possible. Due to their nature, this type of material must be carefully mixed following the manufacturer’s recommendations - any deviation will result in probable catastrophic failure or degradation of the product's integrity and performance over its intended life. If an automated solution is considered too costly, or its relevancy is in question, the manual meter/mix of the fluid is no less critical than the conditions applied with an automated system.

Low-Volume Manual Meter/Mix Operations

At a minimum, low-volume manual mixing of fluids should be limited to prefilled and separated cartridges or burst-bag kits that can adequately mix the fluid components. Two-part cartridges are preferred, as they use an internal mixing rod and blending head.
New AXI from the Market Leaders in X-ray

The Xi3400 is the latest member of Nordson’s comprehensive portfolio of Test and Inspection equipment.

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that thoroughly mix the two components in the correct ratio. The mixed fluid can be dispensed directly from the cartridge using a manual gun or a time-shot dispensing system.

Burst-bag kits separating the two fluid components require a careful manual mixing process, and any instructions that are provided with the kit should be strictly followed. Once the two components are mixed, the fluid is poured into a cartridge or syringe, and dispensed using a time-shot dispense system. This is a less favourable method than using a cartridge kit, as air can be introduced in the pouring process.

Low- and Moderate-Volume Meter/Mix Automation

Bench-mounted meter/mix/dispense stations such as the DP200-1 and the DP400-1 from Fisnar, provide a solution for automating low to moderate volume dispensing. These machines are viable alternatives to fully-automatic bulk metering and mix systems, providing the fluid components are available in a dual cartridge. The cartridge package is inserted into a dual-cylinder pneumatic ram, which is mounted onto a tower to become a dispensing station and the rams are profiled to suit the ratio of the cartridge (e.g., 2:1, 4:1, etc.). Final mixing is then performed by a static mixer. The system is usually foot-pedal controlled, but control options include a digital shot timer, air logic and pinch-
tube valve installation. Dual cartridges of 200 ml and 400 ml can also be accommodated.

Low-volume applications can require highly accurate positioning and precise volume control. A common installation would involve an automated robot equipped with a valve head and static mixer fed from a metering system. In miniature semiconductor and surface-mount component processes, premixed syringes are used to dispense into the confined spaces between components.

For automated, low-volume, micro-shot applications, a meter/mix system that includes cartridge reservoirs can be mounted on a robot, though the system must be installed on a machine that is capable of handling the necessary load.

A number of applications in durable goods, such as the defence and transport sectors, require sophisticated fluid conditioning and process monitoring. Metering and mixing solutions in these sectors are dictated by rigorous standards and require careful planning and custom proposals.

**High-Volume Meter/Mix Automation**

High-volume, two-part metering and mixing require an automated and systemized solution. The dispensing process can be manual or automatic. Consideration should be given to fluid storage, fluid delivery, and the possible installation of level alarms and sensors. The dispensing method is determined by decisions similar to those in low-volume dispensing, including positioning accuracy and volume control.

**Fluid Supply Options**

Automated production and low-cycle, high-volume dispensing requires a sufficient fluid supply that is available at all times. The appropriate fluid supply to the metering system is determined by the type of fluid containers available, container size, viscosity, and conditioning specified by the manufacturer's technical data sheet (TDS). The fluid supply options will include direct delivery from supplier containers, gravity and pressure-assisted reservoirs, or secondary holding tanks.

Medium- to high-viscosity fluid is commonly supplied in 3kg and 20 litre pails or 200 litre drums. Extruder-pump systems are used to deliver the fluid directly to the metering pumps or to secondary holding tanks that are controlled by sensors.

Fluid conditioning processes (e.g., thermal management, environmental control, agitation and degassing) are possible. Low- and high-level triggers in fully automatic systems ensure an adequate supply of fluid. Low- and high-level sensors in non-automatic supply systems can signal when to change a container or refill a reservoir.

A number of two-part fluids used in automatic metering and mixing require automatic or manual flushing of the system periodically. Personnel safety and relevant procedures need to be followed when working with and discarding hazardous materials.

Depending on the fluid and the process, the conditioning and control of the fluid can extend to the metering system, hoses and mix head. Conditioning requirements are generally
installed on large-scale systems and also require heavy-duty robots for automated dispensing.

**Variations in Meter/Mix Machines**

A variety of metering and mixing technologies are available. They include piston-pump, gear-pump, solid rod and progressive-cavity machines, all of which provide volumetric metering with a high level of accuracy and repeatability.

Piston-pump technology is the most common and less costly solution for high-viscosity fluids requiring high pressure. However, the technology is not tolerant to fluids containing solid content, since particulate can become trapped within the seals, eventually causing damage to the integrity and performance of the machine. In a few cases, the frequent maintenance schedule required can be tolerated.

Single-acting, fixed-ratio, piston-pump machines are recommended over variable-ratio models. The reasons include, but are not limited to, prevention of contamination, ease of set-up, calibration and cost.

The single-acting metering principle in a piston-pump machine configures the two metering pumps for an exact ratio. Fluid is drawn into the cylinder when the pump rod retracts to its recharge position and is dispensed as the pump rod displaces the fluid. A single-acting, piston-pump machine like the Fisnar LC50FR needs to recharge at the end of a pump cycle. This is an important consideration in automatic dispensing.

An alternative to a single-acting model is a double-acting system, which is primarily used to provide continuous metering by dual-rod, reciprocating piston pumps. Double-acting systems also reduce the frequency of recharge, thereby extending the life of the pump seals.

Progressive-cavity pump technology is an efficient solution for fluids with a high content of solids and abrasive fillers, such as silica or aluminium. The system uses a rotor/stator design to meter, mix and dispense high-viscosity fluid. They are also continuous in operation and therefore pulse free.

Low-pressure, gear-pump metering systems are widely used for low- to medium-viscosity fluids. These pumps...
provide pulse-free, continuous dispensing. In general, gear pumps cannot be used with fluids containing abrasive fillers. The machines operate when fluid enters the pump under pressure. As the gear rotates, fluid is sealed between the spur-mesh contacts and thereby flows around the perimeter of the gear-pump housing. In this manner, the fluid is volumetrically controlled and delivered to the dispensing valve head.

**Mixing Options for Two-Part Fluids**

A static mixer is the most commonly used mixing method. This plastic mixer comprises an outside tube and inner mixing elements. The metered fluid is fed to a dispensing valve head with a static mixer attached. Two valves within the valve head are opened simultaneously, thereby allowing the two fluids to enter the mixer under pressure. The correct number of mixing elements is required in a static mixer to properly and efficiently mix the metered fluid. The fluid supplier should be consulted to determine the optimal static mixer for a specific application.

Another mixing method is to use a dynamic mixer, which can be described as a dispense valve head with a rotating mechanical blender. A dynamic mixer is usually only necessary when there is a wide disparity in the mix ratio. Dynamic mixing is costly and usually requires a fluid-flushing circuit. A compromise may be to use a disposable rotary static mixer that may provide more thorough mixing than obtained from a standard static mixer.

**Automated Dispensing**

Bench-mounted fluid dispensers are an option when dispensing pre-mixed fluid from a syringe or cartridge. Two important factors need to be considered: the working life of the mixed material, and the increasing air space as the fluid level decreases within the syringe or cartridge. Both of these variables affect the accuracy of the dispensed shot. Costly compensatory and mechanical dispensers are available, but they need careful monitoring and adjustments. Valve controllers that are similar to fluid dispensers can provide a four-way, timed signal to a valve head for automatic dispensing.

Any automatic metering and mix system can be interfaced to a stand-alone, batch-production dispensing robot or integrated into an in-line conveyor facility. In an automatic dispensing application, the metering system is in a steady state of readiness to receive a signal from the robot, which carries the remote mixing valve head. The robot controls the dispense path and also controls the volume by controlling the speed. In the case of potting and encapsulation, the metering system can also control the volume, but the process is always a union between the robot and

---

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Other factors in dispensing a shot or a bead are the mixer orifice and the size of the dispensing needle, if one is used. The common method of controlling a small bead is to use a pinch-tube valve at the end of a static mixer. The components of a pinch-tube valve are disposable.

Automated dispensing robots with multiple axes are available with a range of working platforms selected for the application. Most common is a three-axis machine, in either a gantry or cantilever design. Selective compliance assembly robot arms (SCARAs) can carry heavy loads and perform within a greater range of axes. These installations can be seen in large-scale industrial assembly. Smaller robots with three or four axes can handle syringes and cartridges containing pre-mixed fluids, such as pre-mixed and frozen materials.

**Safety**

Safety is a necessary consideration, particularly with large robots. It is important to protect personnel from accidentally coming into contact with the robot. In addition, care should be taken to protect against any hazards deriving from thermal management installations and chemical contamination.

Thermally managed metering and mix systems include insulated hoses and, wherever possible, insulated components. Thorough precautions to prevent personnel coming into contact with a heated system should be taken. Protective clothing, gloves, eye wear and masks should always be used when handling any bulk material or when setting up and changing an empty container. When a solvent or other cleaning agent is employed in the system, personnel responsible for operation and maintenance must be fully trained and familiar with HAZMAT and regional regulations regarding disposal. At a minimum, face masks should be worn and materials handled in a ventilated area away from the electrical apparatus.

In any instance involving toxic or potentially toxic fluids, a fully-enclosed automated robot for batch or in-line assembly should include a connection gland to accept a fume-extraction system. The fume-extraction system will process the exhaust gases and safely vent them to the outside of the building.

**Final Thoughts**

To conclude, both automated and manual dispensing and meter mix equipment have a valuable purpose to serve and are able to meet user’s two-component dispensing requirements. However the choice of which is better, is very much down to the kind of application in question as well as the purchaser’s budget and expectations. The technical team at Fisnar Europe welcome any questions that readers may have on this subject. Simply send an email to: infoeurope@fisnar.com

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Strong Finish in 2014; Mixed Messages for 2015

2014 ended on an upbeat tone. For some industries (semiconductors) and regions it was especially good. While Europe and Japan struggled, the USA expanded and the China/Taiwan electronics industry finished the year on a very positive note. Based upon 3/12 growth rates (Chart 1) global semiconductor shipments were up 9.1% in September to November 2014 vs. the same months in 2013. PCBs (up 1.5% in 4Q14) and electronic equipment (up about 3% in the fourth quarter) closed the year in positive territory but their growth was over shadowed by semiconductors. And, looking forward (gold line in Chart 1), the global PMI points to a general slowing in early 2015.

Despite a number of encouraging industry signs some markets are in chaos. Oil prices have plummeted and copper prices have dropped sharply (Chart 2). The dollar has strengthened and gasoline is cheap but petroleum based economies are struggling. Russia’s ruble (Chart 3) plunged from 34/US$ in June 2014 to about 66/US$ in mid-January.

On a more positive note China/Taiwan’s electronic industry had a good year end. A group of 101 Taiwan listed OEMs (most of which manufacture in China) set an all-time revenue record with their December 2014 sales up 5.6% compared to December 2013 (Chart 4). The nine largest ODMs (Chart 5) were up a similar 5.6% for 2014 vs. 2013 with the largest one Foxconn’s 2014 annual revenues up about 6% in 3Q14 and their set an all-time revenue record with their December 2014 sales up 5.6% compared to December 2013 (Chart 4). The nine largest ODMs (Chart 5) were up a similar 5.6% for 2014 vs. 2013 with the largest one Foxconn’s 2014 annual revenues up about 6% in 3Q14 and their.

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Looking forward normal seasonality will play a big part in the 2015 outlook. We see global PCB shipments (Chart 6) bottoming in early spring and them climbing through the fall “busy season” to finish 2015 with low to mid-single digit annual growth. World semiconductor shipments are forecast to grow 5.4% in 2015 by Gartner but semiconductor capital equipment spending is expected to expand only 1% (Chart 7), following a robust year in 2014.

2015 will have its opportunities and pitfalls. Watch the monthly numbers as a lot is happening!

**End Markets**

**TELECOM/ DATACOM/MOBILE COMMUNICATIONS**

Data center blade server market to grow at a 10.25% CAGR from $9.73 billion in 2014 to $15.84 billion in 2019. –MarketsandMarkets

Integrated infrastructure and platforms market revenue increased 28.1% y/y to $2.3 billion in 3Q14. –IDC

Smartphones sales to end users grew 20.3% y/y to 301 million units in 3Q14 while total y/y mobile phone sales remained flat at 456 million units. –Gartner

**COMPUTERS & PERIPHERALS**

PC market is forecast to grow 1% y/y to 321 million units in 2015 and tablet sales will expand 8% y/y to 233 million units. –Gartner

Storage market will grow from US$38 billion in 2014 to US$42 billion in 2015. –Western Digital

Purpose-built backup appliance market revenue increased 11.2% y/y to $789.2 million in 3Q14. –IDC

Flash-based array market reached $11.3 billion in 2014. –IDC

**3D PRINTING**

3D printing market will grow at 22% CAGR from $1bn in revenues during 2012 to $20bn by 2025. –IDTechEx

3D printing materials market to grow at an 18% CAGR from US$450 million in 2013 to US$1,432 million by 2020. –Transparency Market Research

**FLAT PANELS/ TOUCH SCREENS**

LCD TV shipments grew more than 7% y/y to 223 million units in 2014. –DisplaySearch

LED-backlit LCD TVs decreased 14.3% y/y to US$2.39 billion in 2014 and LED-backlit tablet production values fell 21.7%, y/y to US$476 million. –LEDinside

Quantum dot LCD TV shipments are forecast to grow from 1.3 million in 2015 to 18.7 million in 2018; curved TV shipments are expected to peak at 8.2 million in 2016. –DisplaySearch

Vehicles with touch screen interfaces will grow from 16.7 million units in 2015 to more than 61 million units in 2021. –IHS

**MILITARY**

Man-portable military electronics market to grow at a 3.8% CAGR from US$15,100 million in 2012 to US$19,674.5 Million by 2019. –Transparency Market Research

**CONSUMER ELECTRONICS**

Consumer electronics industry revenues are forecast to grow 3% y/y to $223.2 billion in 2015. –CEA

Camera module market is expected to grow at a 19.7% CAGR from nearly $12 billion in 2012 to $43 billion in 2019. –Transparency Market Research

Sensors for wearable electronics will grow from 67 million units in 2013 to 466 million units by 2019. –IHS

Wearable technology formulations and intermediate materials spending are expected to reach over $25 billion in 2025. –IDTechEx

**LIGHTING APPLICATIONS**

Automotive-use LED market value will grow at 9% CAGR to US$2.5 billion by 2018. –LEDinside

High-brightness LED shipments are expected to grow 32.6% y/y to over 186
billion chips in 2015. –Digitimes Research

LED light bulb shipments increased 59.9% y/y to 1.81 billion units in 2015.
–Digitimes Research

LED lighting market value will achieve an estimated US$29.90 billion in 2015.
–Digitimes Research

Residential lighting control shipments are expected to total nearly 1.1 billion from 2014 through 2023. –Navigant Research

EMS, ODM & Related Assembly Activity

Aerospace and Defense EMS provider market is expected to grow from $16.64 billion in 2014 to $25.23 billion by 2019. –Frost & Sullivan

Argo Transdata was acquired by The Eastern Company.

Beyonics Technology is investing MYR33.8 million (US$10 million) to build new 26,750 M2 facility in Johor, Malaysia.

Briton EMS (Bedford, England) added a Gen3 Systems’ MBTech NC25 PCB cleaning system.

Compal Electronics
...plans to resume production at its Hanoi, Vietnam factory in 2Q’15 to compensate for rising wages in China.
...increased ODM prices by 5-15% to reflect wage hikes in China.

Connect Group laid-off 83 workers in Poperinge, Belgium due to mass production being moved to lower cost regions in Eastern Europe.

Epec Engineered Technologies added an additional 4,000 SF of manufacturing space in New Bedford, Massachusetts to its existing 20,000 SF.

Flextronics opened its Silicon Valley Product Innovation Center in Milpitas, California.

Foxconn/Hon Hai
...closed its Sriperumbudur, India plant.
...invested NT$4 billion (US$126 million) and designated a team of 200 technicians to develop 5G communication technology.
...plans to roll out flexible OLED panels in 2016.
...spent HK$608 million (US$78 million) to acquire 128.734 million shares in China Harmony Auto Holding.

Javad EMS added a large board line, which includes a Juki K3 screen printer, CyberOptics SE500-X 3D solder paste inspection system, Juki RX-6 flexible placement system and a ViTrox 800 XXL 3D X-ray system.

Kingfield Electronics installed a Europacer AX8200 X-Ray machine.

Lark Engineering (Anaheim, CA) expanded its manufacturing capacity for wire, cable and harness assemblies.
Strong Finish in 2014; Mixed Messages for 2015

**Russian Ruble vs. U.S. Dollar**

- Weak Ruble: 23% weaker in 2014 vs 2013
- Strong Ruble

![Chart 3](www.usforex.com/forex-tools/historical-rate-tools/historical-exchange-rates)

**Taiwan/China Electronic Equipment Producers Composite of 101 Manufacturers Consolidated Revenue**

- Dec 2014 up 5.6% compared to Dec 2013 and up 0.1% compared to Nov 2014
- Chart 4

![Chart 4](www.usforex.com/forex-tools/historical-rate-tools/historical-exchange-rates)

**Microart Services** added a new production line and a 3D AOI machine to its 40,000 SF facility in Markham, Ontario.

**PKC Group** leased a 20,000 M2 production facility in Smederevo, Serbia for manufacturing wiring systems and electronics.

**Salcomp** expanded its Chennai, India operations by 17,000 M2.

**Sanmina** appointed Mario Kramer, Director of Interconnect Sales for the EMEA region.

**SIIX EMS** added four selective soldering machines from ACE.

**Sparton** acquired **Industrial Electronic Devices**.

**STACI Corporation** merged with **EPM Global Services**.

**SVI** relocated its production from Pathumtani to Chaengwattana after a fire damaged its facility in the Bangkadi Industrial Park.

**PCB Fabrication**

Flexible printed circuit board market grew 4.8% y/y to USD12.6 billion in 2014.  
–Reportlinker

PCB manufacturing companies’ fully burdened wages in 2014 were about $850 per month in China, $1,500 in Singapore, $600 in Thailand and $300 in Vietnam.  
–Dr. Hayao Nakahara

Printed circuit board and multichip module electronic design automation revenue increased 20.3% y/y to $178.4 million in 2Q’14.  
–EDAC

**Aaron PCB** purchased a MY100LXe-10 pick & place machine from Mycronic.

**Alba Electronics** is celebrating 25 years in PCB production.

**Apex International** added its second phase production lines at its new plant in Thailand.

**Calumet Electronics**...invested close to $3 million in capital equipment, infrastructure improvements, and technology upgrades over the past two years.

...recruited nine technical business development firms with a total of 48 sales representatives to expand U.S., Mexico and Canada markets.

**Elekonta Marek** added an Orbotech Nuvogo 800 Direct Imaging system.

**Elvia PCB**’s main plant in Coutances, France achieved Nadcap certification (SAE Aerospace Standard AS7003) renewal.

**GSPK Circuits** acquired the ** Boroughbridge PCB** facility.

**ICAPE Group** moved its European HQ to a new 1,500 M2 office in Fontenay Aux Roses, France.

**Lenthor Engineering** opened a rigid-flex and flexible printed circuit board manufacturing and assembly facility in Milpitas, California.

**Oki Printed Circuits** established mass production technology for 0.35 mm pitch 1,000 pin 30-layer PCBs.

**Panasonic** plans to sell its PCB factory in Yamanashi prefecture, Japan in spring 2015 and completely phase out its PCB business.
Quadcept introduced a subscription model for circuit board design tools.

Tripod Technology’s factory in Taoyuan, Taiwan had a fire on December 29, 2014.

Unimicron approved a NT$10.67 billion capex budget for 2015.

Unimicron Technology, Kinsus Interconnect Technology and Nanya PCB are increasing their production capacities for flip-chip chip scale package substrates in 2015.

Unitech expanded its HDI board production capacity by about 10% in 2014.

Würth Elektronik had a fire that destroyed parts of its PCB plant in Niedernhall, Germany.

Yan Tat Group conducted an IPO on the Hong Kong Stock Exchange.

Materials and Application, Process & Test Equipment

Conformal coating materials and equipment market is expected to grow at a 6.3% CAGR from $9 billion in 2014 to $12.2 billion in 2019. –BCC Research

Copper clad laminate output increased 17.9% y/y to 720 million SM in 2013. –RnRMarketResearch

Datest introduced its PCB reverse engineering service.

Direct imaging equipment global cumulative total reached roughly 2,500 units with addition of an estimated 400+ units sold in 2014. –Dr. Hayao Nakahara

Photoresists and photoresist ancillaries market will grow at a 6.2% CAGR from US$3.02 billion in 2013 to US$4.60 billion by 2020. –Transparency Market Research

BASF plans to build an electronics-grade sulphuric acid (H2SO4EG) facility at Zhipu in Zhejiang Province, China, in partnership with Jiahua Energy Chemical.

Blakell Europlacer International opened an office near Frankfurt, Germany.

CoorsTek acquired Covalent Materials.

DonXtra received ISO 9001:2008 certification.

Dow Chemical began providing cadmium-free quantum dot technology for LG Electronics’ Ultra HD TVs.
North American semiconductor equipment industry 3-month average worldwide bookings were $1.22 billion and billings were $1.19 billion in November 2014.

Bluetooth smart & smart ready market will grow from $2.3 billion in 2013 to $3.9 billion by 2020. –MarketsandMarkets

DRAM chip revenues are expected to climb 14% y/y to US$52.8 billion in 2015. –DocMemory

Industrial IoT equipment MEMS market revenues will rise from US$16 million in 2013 to US$120 million in 2018. –IHS

IoT-related semiconductor sales are forecast to grow by a 24.3% CAGR from US$5.6 billion in 2015 to US$11.5 billion in 2018. –IC Insights

LED chipset demand is expected to increase from 35.8 million units in 2013 to 1.4 billion units in 2018. –DisplaySearch

Graphene electronics market will grow at an estimated 46.8% CAGR to $1512 million by 2020. –MarketsandMarkets
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Early in the New Year, Kulicke & Soffa made the surprise announcement that they were acquiring the Dutch company Assembleon from Philips N.V. The acquisition is inline with the stated aim of Jeroen de Groot, Assembleon’s CEO to transition more into the advanced packaging space. In a recent interview with Editor-in-Chief, Trevor Galbraith, the K&S team gave their views on the strengths and benefits of the new partnership.

The sale price ($98 million) is compelling and K&S expect it to be accretive within one year. Did you deliberately set the price low to attract the right partner?

We determined a sale price of $98 million to be largely in-line with the market and highly relevant, however taking a broader view of the transaction and looking beyond the sale price we found the transaction compelling for several reasons. First, we share a similar history of technology leadership with a focus on performance and innovation. Additionally, our team competencies are highly complementary and will enable us to bring innovations to the market much more rapidly while significantly enhancing our service and support levels for our customers. The additional benefits created for all of our stakeholders—employees, customers and suppliers alike—added significant value beyond the purchase price and was strongly considered in our decision.

What specific technology advancements attracted K&S? Is it the sub 10 Qm placement accuracy?

Assembléon’s advanced packaging technology platform has superior speed and placement quality. The flexibility of the Assembleon solution to address the various advanced packaging markets (WLP, FOWLP, FC, PoP, module and SiP) is a major attraction to K&S. It strengthens and broadens the K&S advanced packaging solutions. Another key differentiator of the Assembleon solution is the ability to place both passive and active component with a single machine.

K&S refer to expanding their market reach. Presumably this means exposure to your EMS customer base, but is Assembléon not trying to move out of that space and more towards the backend semiconductor area?

Assembléon’s success in migrating its business from traditional SMT to advanced packaging and advanced SMT is a key attraction to K&S. Assembléon’s advanced packaging solutions strengthen and broaden the the K&S advanced packaging solutions, enabling K&S to address a bigger share of the advanced packaging market. Assembléon’s success in the advanced SMT in the automotive, industrial and medical markets will enable K&S to strengthen its participation in these markets.

When you look at the geographical footprint of both companies, K&S has locations in each of the four centres where Assembléon is operating. Do you expect to benefit from some consolidation of facilities?

We do not anticipate consolidation across our collective lean and efficient geographical footprint. In the near term our vision and focus will remain on identifying synergies and leveraging complementary strengths to grow our business and further enable our customers’ success. For example, we will take a closer look at our respective sales, service and support networks to identify areas in which we can provide more comprehensive and substantive levels of support to our customers. Additionally, from a
product development perspective, we will explore opportunities to leverage our respective R&D strengths into co-development initiatives, particularly in areas where potentially disruptive technologies exist. One area we’ve specifically identified is semiconductor advanced packaging—where speed, accuracy and process improvements in backend semiconductor and advanced SMT equipment are converging to drive new and innovative solutions that address specific segments of the market.

Regarding sales opportunities are there any products in the K&S stable that would be attractive to your EMS customer base?

Assembleon’s advanced SMT solutions focus on the automotive and industrial markets. These are markets that K&S wedge bonder addresses, and potentially there are complementary solutions between K&S wedge bonder and Assembleon’s advanced SMT that will be attractive to the EMS customer base.

Do you expect to see some consolidation of the workforce at Assembleon as you begin to share resources?

While we expect to share resources and leverage each organization’s respective strengths, we do not anticipate consolidation of Assembleon’s resources. Our highly-specialized team is comprised of industry leading expertise and world class talent that our customers rely on. Together, K&S and Assembleon share a consistent appreciation and respect for each other’s employees and are looking forward to working together.

What changes will be made to your branding? Will you be called K&S Assembleon?

The Assembleon brand will begin a progressive transition fully to the K&S brand. Assembleon will be a K&S business line. However, the product brand such as iFlex, Hybrid and Flexline will be kept.

K&S mentioned that one benefit would be an “enhanced time-to-market of potentially disruptive solutions”. Can you give us some indication of when you would expect to see the first of these products being released?

There is still a significant amount of work ahead so it is too soon to say, however from an initial review there are several exciting advantages that we share which could advance disruptive technology development. First, at a high level we are both performance driven organizations passionate about bringing the most technologically advanced solutions to the market. More specifically, we share similarities in our system design, development and deployment processes. For example, we both follow a derivative approach to product design with a focus on areas such as incremental process improvements, subsystem modularity and cross-platform commonality. In addition, we both rely heavily on customer engagement to drive decision making throughout product development cycles to ensure we are clearly aligned with their roadmaps. Finally, by fostering similar cultures of technology innovation, we have both been successful in building and retaining world-class teams comprised of industry leaders and superior talent that we rely on to continue fueling our organizations success.

– TREVOR GALBRAITH
Averna completes first DOCSIS 3.1 Interop

Averna, a developer of test solutions and services for communications and electronics device-makers worldwide, announced it successfully participated in the first Interoperability test of DOCSIS 3.1 products organized by CableLabs.

In combination with other vendors’ DOCSIS 3.1 equipment, Averna’s DP-1000 DOCSIS Protocol Analyzer successfully performed OFDM downstream capture at the event.

This DOCSIS 3.1 interoperability event included providers of early implementations of cable modems, CCAPs, and test and measurement equipment. The goals of the event were to test product interoperability and successfully demonstrate both higher efficiency and wider channels, which combine to make multi-Gbps speeds possible.

www.averna.com

Metcal develops new hand-piece to meet higher thermal demands

Metcal is pleased to introduce the new MX-HPDC dual cartridge hand-piece and MX-WHPDC work-stand. Designed to meet higher thermal demands, five new SMTC dual-shaft cartridge geometries also are available in two temperature series.

The success of conduction soldering depends on the availability and controlled flow of thermal energy into the connection during two critical phases – flux activation and intermetallic bond formation. Higher thermal demand applications such as microwave shields, heavy block type housing and tabbing, preheat applications, BGA removal as an alternative to convection, cell phone shields, and industrial lugs and leads require additional thermal energy during these critical phases.

www.metcal.com

ESCATEC solves challenge of removing markings without stressing the components

The laser-marking machine companies often want to have the markings on components removed to make it hard for rivals to easily find out what parts are used on the PCB. Similarly, military and security products without product part codes make them hard to reverse engineer or hack. The problem is that this is usually done after the PCB assembly otherwise it is difficult to ensure that the board is made correctly but, the usual technique of manually grinding the markings off, is time consuming and can often damage the component and stress the solder joints.

ESCATEC has solved this problem by using its existing CO2 laser marker that was installed to change the surface structure of the solder resist to give a clear and permanent marking on the surface of PCBs. The marking can be for machine-readable codes as well as text, graphics and logos, which show up as white areas on the PCB.

www.escatec.com

GOEPEL electronics introduces new test and programming strategies for Bay Trail processors from Intel

GOEPEL electronics announces the development of specific model libraries for testing and programming of Intel® Bay Trail processors, which are part of the Intel Atom family. The libraries called VarioTAP models allow flexible execution of processor emulation tests using the native debug port. Users are now able to use the processor as an instrument for hardware design validation of prototypes as well as programming of Flash devices.

Intel Bay Trail is a series of multi-core SoC (System-on-Chip) solutions based on the Silvermont architecture. Manufactured in a 22nm process, the Chips offer optimized performance with
low energy consumption. Main application fields of the Bay Trail processors are mainly mobile applications such as tablets and notebooks, but also hybrid and embedded devices. There are various Intel Bay Trail series with up to four processor cores and clock speeds up to 2GHz.

www.goepel.com

Two part, room temperature curing epoxy features ultra-low coefficient of thermal expansion

Master Bond EP42HT-2LTE is often chosen for a variety of bonding, sealing, coating and select casting applications in the electronic, aerospace, optical and specialty OEM industries. This two component epoxy has a flowable paste consistency that enables precise alignment with minimal fixturing. It cures at room temperature or more quickly with the addition of heat.

This system is notable for having a low coefficient of thermal expansion of 9-12 x 10^-6 in/in/°C. With a tensile lap shear strength of over 1,200 psi, it bonds well to a wide variety of similar and dissimilar substrates, including metals, composites, ceramics, glass and many plastics. EP42HT-2LTE features superior electrical insulation properties, chemical resistance and dimensional stability over the wide service temperature range of -60°F to +300°F. It also offers low linear (<0.01%) and volumetric (<0.1%) shrinkage upon curing, which is useful for potting and encapsulation applications.

masterbond.com

Dymax to Increase production and cut costs with new gasketing resin

Dymax Corporation has introduced GA-201, a UV/Visible light-curable, tack free, moisture- and chemical-resistant FIP/CIP gasket for sealing heat-sensitive substrates such as plastic enclosures. Used as an alternative to tapes, PSA die-cut gaskets, 2K epoxies, silicone rope, or RTV sealants, it helps reduce labor costs and part handling while increasing production throughput. GA-201 can be easily dispensed into intricate and complex configurations and can accommodate design changes without investment in additional tooling. The material cures on demand, eliminating the need for racking and the waste associated with poorly fitting or improperly aligned die-cut gaskets.

www.dymax.com

HAMmond launches EGGciting new bareboard computer enclosure platform

Hammond Electronics has announced its new 1593HAMEGG enclosures, board-specific designs for the Arduino and Raspberry Pi bareboard computers, www.hammondmfg.com/1593HAMEGG.htm. Available in translucent blue, translucent purple or translucent black, they have been designed in response to user feedback, providing an alternative to traditional base and lid designs where the bareboard is mounted inside an enclosure. In the innovative HAMEGG design the board is screwed into moulded studs located on the top of an egg-shaped base, giving EGGcellent stability and all-round unrestricted access to I/O connectors, often used controls, indicators and expansion boards; it also allows easy installation of EMC shields if required.

Initially, the new platforms are configured for the Raspberry Pi A, A+, B and B+ and the Arduino Uno, Due, Ethernet, Leonardo, Mega ADK, Mega 2560 and Yún. Board-specific versions for designs from other manufacturers active in this fast moving sector are in development and will be available in the near future.

www.hammondmfg.com

Everett Charles Technologies enhances LFRE product line

Everett Charles Technologies (ECT) extended the probe offerings (LFRE probes) for lead free PCB in-circuit and functional test applications to include long-travel probes (LFLT probes). ECT LFLT probes have almost twice the compliance as standard length probes. The new long-travel probes meet the need for reliable contact solutions for lead free dual-stage in-circuit test fixtures.

Long-travel probes are coated with ECT’s proprietary hard plating alloy called LFRE. LFRE plating has a hardness of about 600 Knoop which is approximately 5 times harder than Gold plating. In addition to improved tip wear, LFRE plated probes are less prone to solder transfer.

www.ectinfo.com/cpg
Designing SAFE Assemblies

In this continuing series provided to examine solderless assembly for electronics (SAFE) and its many benefits, it has thus far focused primarily on how to make such products and outside of some brief discussion of some of the prospective benefits of designing on grid, there has been limited discussion on design opportunities and benefits. We now begin a look at some of those opportunities and benefits.

First as has hopefully been appreciated by readers of past columns on this topic, the elimination of solder offers some significant advantages in both the design process and in the finished product. While SAFE assembly technology can improve density, improve yield, improve performance, reduce layer counts, such advantages come at the price of greater attention to detail and greater discipline and this requires some discussion to appreciate.

First, any assembly can be reduced in size by placing components closer together, however, with solder, DFM rules prohibit such because, rework is considered an inevitability so components are normally spaced apart to allow removal and replacement of parts damaged in the soldering process or repair of those with defective solder joints. In contrast, SAFE design protocols do not have such strictures. However, such tight placements can cause thermal management problems especially when higher power (i.e. hotter) components, in the range of 1-3 watts, are employed in a design. Thus shrinking an electronic assembly increases the thermal management challenge. On the bright side, SAFE assemblies designed using aluminum as their base substrate can overcome the challenge. Presently used PCB laminates are good electrical insulators but poor thermal conductors making hot spots and potential localized thermal degradation of the laminate a real possibility.

Another reason components are normally placed further apart than need be in a design is because room must be left to facilitate flux removal and cleaning beneath the components after soldering. In addition, there is need to provide space for the removal and replacement and/or rework the components when problems related to the soldering process inevitably arise. This is largely obviated with a properly designed SAFE assembly. In contrast, any attempt at using normal lead free solders with an aluminum circuit board would likely yield poorly with many cold joints and/or thermally damaged components.

Layer count reduction is another easily achieved benefit with a safe assembly. There are a number of reasons for this. First, there are no solder lands required. Interconnection to component terminations can be achieved by a simple plated microvia. Moreover, when the designer uses components which have all of their terminations on a common grid pitch, the routing of circuits can get much simpler. In this regard, one can look to the work of scientists and engineers at the University of Arkansas in there development of their Integrated Mesh Power System (IMPS). The technology developed for multichip modules in the 1990s. The patented approach allows for the designer to create the equivalent of 4 metal layers using just 2 metal layers. It is illustrated in Figure 1.

As alluded to earlier, such an approach benefits significantly from the use of a common grid pitch. While the pitch can be arbitrary, 0.5mm pitch is recommend because it is the lowest practical pitch for most SMT assembly. As for component types, two types stand out as being best suited to the technology, fully tested and burned in land grid arrays (LGA) and quad, flat, no lead (QFN) devices. These type devices are also among the favorites for designers. The QFN and LGA devices have added advantage of having no solder balls making them inherently very planar and nominally more reliable because they have bypassed the high temperatures required for solder ball attachment. Moreover no solderability protective coating is required. One addition benefit bestowed to the designer is the ability to make his product board thinner. This is because solder balls often account for as much as half of the thickness of ball grid array components. This is true regardless of their lead pitch. This is illustrated in Figure 2.

By way of analogy it is suggested that the designer approach the design with a “graph paper” mentality. That is that he or she place all component pins on a grid which is a multiple of five – 0.1mm, 0.5mm, 1.0mm, etc – and always routing with appropriately sized vias. This allows for an increased usage of real estate which climbs to asymptotically approach “full utilization” of available real estate. In contrast with the current design approach and methodology, employing random device pitches & oddly numbered via geometries & design rules, then layering in routing & placement grids in inches rather than staying metric, much real estate is wasted due to “white space” generated by constantly adjusting to grids & pitches that have no mathematical relationship to each other.

![Figure 1. The patented Integrated Mesh Power System (IMPS) developed at the University of Arkansas allows a designer to interconnect in 2 metal layers that which would normally require 4 metal layers.](image1)

![Figure 2.](image2)
To illustrate the potential efficacy of SAFE assembly a demonstration design effort was undertaken. It was decided to use a current product board which had been laid out using best current practices. The centerpiece of the design was a 442 pin FPGA at 0.8mm ball pitch. The dimensions were 140mm X 100mm. The redesign carried out according to the precepts of Occam and SAFE protocols and using a 0.5mm lead pitch LGA resulted in an assembly 30mm X 40mm overall footprint. The actual area required was significantly less. which required just 6 metal layers for routing. This added flexibility in routing compliments the trend toward the dominance of ASICs & other System-On-Chip devices. That is it offers more flexibility for more signal pairs, more accordion routes (length matching), shielding, wave guides, etc. Note also that solder balls often makes up half of the overall height of a mounted package, thus a much thinner assembly is possible.

SAFE Design Demonstration Exercise

To illustrate the potential efficacy of SAFE assembly a demonstration design effort was undertaken. It was decided to use a current product board which had been laid out using best current practices. The centerpiece of the design was a 442 pin FPGA at 0.8mm ball pitch. The dimensions were 140mm X 100mm. The redesign carried out according to the precepts of Occam and SAFE protocols and using a 0.5mm lead pitch LGA resulted in an assembly 30mm X 40mm overall footprint. The actual area required was significantly less. which required just 6 metal layers for routing. The redesign yielded a 6 layer rigid flex circuit is ~70% smaller in terms of total area and capable of being folded into an assembly which can occupy a footprint which is less than 20% of the original design with minimal increase in assembly height. Though the density of aluminum is higher than FR4, (FR4=1.8 gr/cm³, Al=2.7 gr/cm³) the total weight of the assembly is projected to be ~55-65% less than the original. Moreover, the rigid flex structure is amenable to the separation of digital and analog circuitry and thus the potential for better control of the energy created by analog devices and power supplies. Interestingly, the design rules for layout do not in any way challenge current manufacturing practices. Minimum lines and spaces were held to 50 micrometer (2 mils) and only two via diameters were employed. This is illustrated in Figure 3.

A primary objective of the SAFE layout approach is to use exclusively internal layers for component placement. Components may assume either a right-side-up or an up-side-down orientation Most CAD tools construct PCB footprints (decals, patterns, etc) to reside on either the top or bottom of the PCB. Flipping a part from top to bottom creates a mirror image of the pattern with CAD objects assigned to the bottom layer.

What is required for efficient component placement & manipulation are CAD parts & commands which change the placement layer, with a switch to indicate whether a mirrored version is being implemented or not; often referred to as Live Bug vs. Dead Bug orientation.

In summary, the design of an electronic assembly using Occam design principles and SAFE manufacturing approach can provide powerful advantages where there is desire to reduce the size of an electronic assembly while creating a more reliable assembly and one which can provide many additional benefits. It is believed that it has been arguably shown that there are clear benefits from solderless assembly in terms of making designs smaller. Such designs, it is also believed, will prove much more reliable than current approaches using solder for assembly. In the next of this series, additional design “tricks” and advantages will be examined.

1. US Patent No. 6,388,200
ASSOCIATION & INSTITUTE NEWS

IPC expands communications industry-wide with introduction of New E-Publication IPC Outlook

In January 2012, IPC - Association Connecting Electronics Industries’ will launch IPC Outlook, an electronic newsletter and Web portal for multimedia information about technology, standards, best practices and industry research. The new e-publication will focus on information that helps engineers and managers succeed in their jobs.

Based on feedback from a major communications study conducted by IPC in 2011, the distribution of IPC Outlook will be weekly and open to all individuals working in the electronics manufacturing industry. Regular features will include sections on cleaning; new product innovations; expert Q & A; defect analysis; materials; production floor; supply chain and IPC updates.

“This is a major step for IPC,” says IPC Vice President of Marketing & Communications Kim Sterling. “Broadening our communications within the industry will reinforce IPC’s already-strong position as ‘the most trusted’ outlet for supporting the needs of industry companies, with critical and reliable information.”

IPC Outlook is available in preview version at www.IPCOutlook.org. The Web portal and newsletter will be advertiser-supported with sponsorships available at various levels, including discounts for IPC members.

www.ipc.org

Make Connections at IPC APEX EXPO 2015 with Complimentary Networking Events

Connections can be made everywhere — in educational sessions, on the show floor, at receptions and during many networking events, including: Global Welcome (by invitation); First-Timers’ Welcome Meeting; show floor reception; Women in Electronics Networking Meeting; awards luncheons, and more.

Among the highly anticipated special events is a complimentary opening keynote by Robbie Bach, former President of Entertainment & Devices at Microsoft, Xbox visionary and civic activist. On Tuesday, February 24, Bach will present, ”The Xbox Story: Lessons in Strategy, Team Management and Entrepreneurship.” On Wednesday, February 25, Stanton Friedman, nuclear physicist, lecturer, UFO researcher, will present, “Flying Saucers and Science/Science was Wrong.”

In addition, tackling the hot topics that have the electronics industry buzzing, six complimentary BUZZ sessions will be offered. The industry’s top technical experts on subjects ranging from advanced fabrication and lead-free issues to U.S. federal funding opportunities, California chemicals regulations and technology roadmaps will provide insights into timely issues surrounding each of these BUZZ-worthy topics.

“The special events at the show add tremendous value for attendees,” says Alicia Balonek, IPC senior director of trade shows and events. “Most of the events are complimentary with pre-registration — whether you pre-register for complimentary exhibit hall admission or sign up for our most comprehensive educational package, the All-Access Package.

www.ICAPEXEXPO.org

IPC names Japan Unix as exclusive representative in Japan

Japan Unix Co., a world leader in the development and distribution of soldering robots, announced that it has signed a contract with the IPC — Association Connecting Electronics Industries that names it as the exclusive distributor of IPC products and knowledge to Japanese customers.

The first step in this endeavor is distributing IPC standards, IPC-600, IPC-A-610, IPC J-STD-001 and working to translate the others into Japanese. Japan Unix also hopes to begin a training program for Japanese customers in the near future. The company already has opened a micro-soldering training program, and these opportunities will be of great use and advantage to Japanese engineers.

Japan Unix will promote IPC’s well-developed “global” quality standards to a wide variety of manufacturers in Japan. IPC has industry-driven standards developed by many kinds of manufacturers and in today’s global business each market requirement must be followed. However, today’s manufacturing business is becoming more and more “cross-border.” Thus, we need to both understand and follow both government-driven requirements and industrial standards. The manufacturing market is a key and there are large numbers of manufacturers in Japan. There are many local manufacturers that are keen on moving into the global market. For them, understanding IPC’s standards are one of the key elements to be accepted by worldwide customers. The goal is to support these companies through distributing IPC standards.

Japan Unix has successfully globalized its business in the US, Europe, China and other Asian areas. “We are seeing more and more of our global customers utilize and ask to follow IPC standards for their production today,” noted Hirofumi Kono, Executive Director of Japan Unix.

“Therefore, we, as a global soldering robot manufacturer, must know and track IPC’s standards. Otherwise we may lose our global competitiveness in the future. Japan Unix believes that our competitive advantage is differentiated quality in soldering technology and products. In order to maintain this, IPC is one of the key quality standards to grow in global markets for us too.”

“IPC has long recognized the importance of Japan in electronics manufacturing,” said David Bergman, IPC Vice President of International Relations. “We are pleased to now have a strong new partner that can help bring IPC standards to support manufacturers in Japan.”

www.japanunix.com/en
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