Innovations FORUM

Competitiveness of electronics production in Eastern Europe

EPP EUROPE Electronics Production and Test

emsnow

Automation for Competitiveness

1. InnovationsForum Hungary EPP/EMSNow
Academy of Sciences, Budapest
16. June 2016

Market leaders present their innovations

1. InnovationsForum Hungary

Automation in Electronics Production

Building a competitive advantage in the Region

The electronics production environment is changing at an unprecedented rate - the driving force behind this transformation of industrial manufacturing is automation with a clear and overriding vision for ‚smart manufacturing' - and automation is set to lead transformation trends throughout the electronics manufacturing industry for the foreseeable future. The EMS industry moves fast and those that do not move at similar speeds are likely to be left behind.

Welcome to the first InnovationsForum Hungary. The event brings together leading industry professionals who will present on key industry topics which explore and examine how automation in the electronics production industry is set to drive competitiveness in the region.

The conference will open with a Keynote by Dan Copocean from Kimball Electronics Rumania who will share his extensive experience with establishing an EMS facility in a competitive environment and will provide considerations for automation strategies and give examples of how such measures can be implemented successfully.

Industry leaders from Aegis Software, ASM Assembly Systems, Christian Koenen, Fuji, Kimball Electronics (Keynote), Kurtz Ersa, Koh Young, Indium and Vi TECHNOLOGY will give concise technology focussed talks, on many topics, including:

- Low cost manufacturing – is it sustainable?
- What role does Industry 4.0 play?
- Mass-customization – challenges for the future
- Supply-Chain Transparency – tools & trends
- Manufacturing trend: Wearables
- Miniaturization & complexity – requirements for manufacturing equipment

Kim Sauer
EMSNow Contributor

On behalf of EPP and EMSNow, I would like to thank all who have helped to organize the event including our sponsors, The Academy of Sciences and our local Media Partner Elektronet Hungary. I wish all our delegates a rewarding experience and am confident you will be inspired by what you will learn and the conversations you will have.

About InnovationsForum:

InnovationsForum Hungary is one of three global events in the EPP/EMSNow InnovationsForum Series focusing on competitiveness in electronics production in key regions of the world.

InnovationsForum Budapest, Hungary	Jun. 16. 2016
InnovationsForum Guadalajara, Mexico	Sept 21. 2016
InnovationsForum Böblingen, Germany	Mar. 9. 2017

Academy of Sciences, Budapest

Keynote:

Dan Copocean, General Manager at Kimball Electronics - Rumania, will open the conference with his Keynote presentation which will set the scene for maintaining and increasing competitiveness in the Eastern European region. He will share his extensive experience with establishing an EMS facility in a competitive environment and will provide considerations for automation strategies and give examples of how such measures can be implemented successfully.

Kimball Electronics

InnovationsForum Hungary Program*

From 08:30	**Kodaly & Vorosmarty Halls:** **Registration / Exhibition / Networking**
09:30 - 09:40	**Ceremony Hall:** **Welcome & Introduction**
09:40- 10:30	**Keynote:** **Automation for Competitiveness - Strategies for successful implementation** Dan Copocean, General Manager, Kimball Electronics, Romania
10:30 - 11:00	**Roundtable** Discussion with Industry Experts
11:00 - 11:30	**Coffee Break & Exhibition**
11:30 - 12:00	**Controlled Process flow even for small lot sizes – How can the NPI team meet these challenges?!** Dr.-Ing. Friedrich W. Nolting, Aegis Software
12:00 - 12:30	**Maximizing uptime with 100% visibility -** **The role of material management in the Smart #1 SMT Factory** András Kozma, Account Manager, ASM Assembly Systems
12:30 - 13:00	**Economy despite of small volumes for high componentry mix** Claus Schulz, General Sales Manager, Christian Koenen
13:00 - 14:00	**Lunch Break & Exhibition**
14:00 - 14:30	**High Mix – Low Volume: Succeeding with flexible production equipment** Tom Berx, Area Sales Manager, Ersa GmbH
14:30 - 15:00	**The right setup concept saves money and time** Jonas Ernst, Sales Engineer, Fuji
15:00 - 15:30	**Automotive Electronics - Dendritic Growth and Corrosion Under Low-Standoff Components: A Flux Solution** Karthik Vijay, Technical Manager EMEA, Indium Corporation
15:30 - 16:00	**Coffee Break & Exhibition**
16:00 - 16:30	**Title to be announced** Koh Young
16:30 - 17:00	**Leveraging inspection data in the industry 4.0 era** François Amblard, Chief Executive Officer, Vi TECHNOLOGY
From 17:00	**Closing statements**

* Program is correct at time of printing, but may be subject to change.

Controlled process flow even for small lot sizes

How can the NPI team meet these challenges?!

The only way to achieve a truly flexible manufacturing environment is through complete digital data management of design data, revision control, work instructions, bill of materials and shipping, whilst also monitoring revisions and technical adjustments. It's also a solution during planning, that leads to quality improvements, reduces engineering and management overheads and achieves reliable repeatable manufacturing processes. Only a holistic data- & document-management approach, including version control and change management will achieve all these benefits.

The requirements for work-flow preparation are all about the delivery of information, or data, and in a paperless environment that is delivered digitally. But we need to consider more than just the method of delivery, we need to envisage the type of data, the interactivity of that data, its revision control and its adaptability. When a truly paperless system is put in place that addresses all of these issues the benefits can be substantial. When documents are merely replaced with a digital version, the benefits are much more limited.

Take for example cost. Top of the agenda for many companies, particularly those that find themselves in the competitive space that is the EMS (Electronics Manufacturing Services) industry, where quarterly calls for cost reduction from OEMs (Original Equipment Manufacturers) are commonplace. In a paperless environment customer audits, quality audits and regulatory audits can all be done via a digital terminal and via a single system, with all revision control and document management visible. This could even be done remotely in some cases further reducing costs. And the obvious cost saving of any paperless system is paper and the costs associated with printing and distributing that paper around the shop floor.

Dr.-Ing. Friedrich W. Nolting is a shareholder and Managing Director of Aegis Software GmbH. Before he founded diplan, which later became Aegis in Germany, he was head of the engineering department of the Institute FAPS at the University Erlangen-Nürnberg. There, Dr. Nolting established the first lab equipped with electronic manufacturing solutions and received industry recognition for his concepts and designs which are still used by many vendors today, e.g. optimized handling of the LED binning problem and setup optimization by using the cluster algorithm method. Dr. Nolting is an active member of ZVEI.

It's not like the work instructions are static. They change constantly and in a paper driven world that means reprinting numerous versions, distributing them around the shop floor, making sure everyone has seen them and doesn't use old instructions. This is time consuming and risky.

Aegis Repair Station

And risk reduction is the second benefit worth highlighting in the paperless environment. The potential presence of down-revision documents on the shop floor is eliminated in a well-ordered paperless system; audits become risk free and operators are not in danger of building to the wrong document, which could lead to costly rework and/or scrapped assemblies.

Beyond reduction of cost and risk, there are the improvements in performance and quality to consider. Optimizing the performance of an operator is about having them spend as much time as possible making, testing and shipping product, not searching for or through documents to find an instruction or procedure. In a CAD (Computer Aided Design) driven paperless environment test and diagnostic data can accelerate the resolution of quality issues or the data required to expedite a repair function.

A paperless system also allows the operator to become part of the process improvement feedback loop. Feedback systems allow for fast and effective improvements in the documentation and more importantly in the process and multiple operators on multiple lines and/or shifts can impact upon any improvement initiative.

Paperless processes also provide interactive visual data that can guarantee the current and proper parts list and CAD information is available improving quality, increasing inspections reliability as well as raising the accuracy of diagnostics and repair.

The path to truly flexible manufacturing environment

The path to success requires a holistic approach that fully embraces many factors. As mentioned before digital delivery is fundamental and this needs to be available to each operator on his or her own terminal. The shop floor portals should be capable of presenting interactive operator visuals, CAD and BOM (Bill of Materials) information, revision control data, analytics regarding processes, as well as supporting secondary, less regularly used documents like preventative maintenance or user manuals or standard practice manuals.

All of these documents need to be more than just flat representations. They need to be interactive allowing data to be visually queried by the operator via a simple user interface that allows for a deeper dive into data by simply clicking or touching the item in question. Visual documents that are grounded in both the CAD and the BOM and that are interactive can be queried for rich, always current data that refers back to the central manufacturing database.

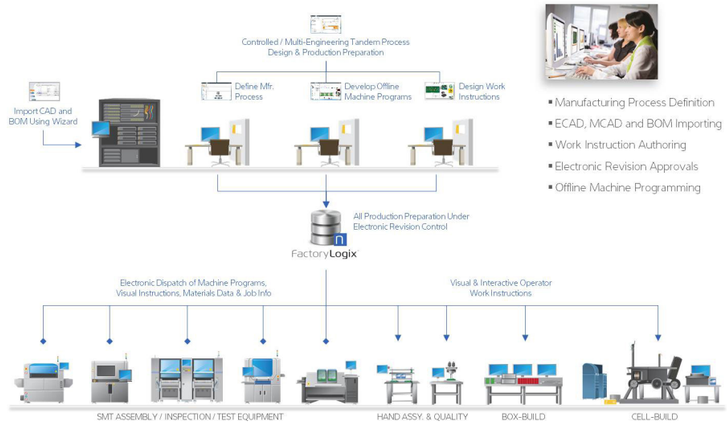
The final part of the interactivity puzzle is the ability of the operator to redline and provide improvement feedback. Revision control is a cornerstone of any system, be it with or without paper. The system must control and be fully aware of process version, design version and the stations where documents are to be deployed. The paperless system should be capable of automatically ensuring that the right documents and analytics are presented to an operator in a single scan with zero risk of displaying the wrong revision of any data.

No system can work without a degree of built-in flexibility or adaptability. The system will need to allow engineers to 'cut in' an emergency engineering change or a process change if it is required on the shop floor. This will need to occur digitally, simply and seamlessly, with the proper documentation and recording procedure supporting it.

The results speak for themselves

The positive results of such an endeavour speak for themselves and can be seen from the experiences of all those vested in the process. From the operators' point of view, they can bring up the correct revision assembly instructions, dynamic video assistance, CAD images, BOM information and all associated documentation and work instructions with a single scan of the unit in production. This can be done immediately and at any point in the manufacturing process. The operator also enjoys the ability to interrogate the data provided, rotating or zooming into CAD data or digging deeper into a BOM to query a particular part. First article assembly and inspection become simpler as the operator can receive adapted and dynamic information. And finally the operator can close the feedback loop by sending suggestions to the engineering team from their own terminal instantly, supporting their value and the continuous improvement of the product and process.

There is plenty of evidence supporting the tenant that operator satisfaction is much higher when the data provided to do their job is unambiguous and when their voice is heard. All lean manufacturing principles completely support the concept of operator involvement and the paperless environment simplifies this process. New product introduction becomes faster, simpler and more reliable with a paperless system. Digital review and approval procedures, using electronic signatures, are simplified and are more reliable, ensuring that improper data never reaches the shop floor, and traceability is absolute in all product documentation and data.



NPI Engineering workflows and tasks.

Statement

The only way to achieve a truly flexible manufacturing environment is through complete digital data management of design data, revision control, work instructions, bill of materials and shipping, whilst also monitoring revisions and technical adjustments. It's also a solution during planning, that leads to quality improvements, reduces engineering and management overheads and achieves reliable repeatable manufacturing processes.

Only a holistic data- & document-management approach, including version control and change management will achieve all these benefits.

Profile

AEGIS SOFTWARE

Aegis Software is the leading provider of innovative software solutions to improve speed, control and visibility throughout manufacturing operations. Founded in 1997 by two manufacturing engineers, Aegis has over 17 years of experience providing world-class software to customers around the globe. Our install base spans more than 1700 factory sites across the electronics, medical, automotive, military and aerospace industries. Aegis is your turn-key solution provider with direct staff and operations in China, Germany, Japan, UK and the US. Our organization develops, deploys and supports our solutions in-house, eliminating third-parties and providing customers with faster support and a better solution, in less time and at a lower cost. For over a decade, Aegis has maintained more resale and technology integration partnerships with leading machine vendors than any other software provider. Today Aegis is partner to 36 machine vendors. These partnerships provide customers the best offline programming and real-time data acquisition systems possible.

www.aiscorp.com

Maximizing uptime with 100% visibility

The role of material management in the Smart #1 SMT Factory

The Smart #1 SMT Factory, does not just need inventory data, but intelligent control of material flows and all material-related processes – from material receiving and storage to pick processes, withdrawals and innovative, highly flexible setup processes to special procedures for MSDs or customer-supplied materials.

High-mix electronics production requires new material logistics systems that meet the special needs of SMT production environments. New solutions like the SIPLACE Material Manager link material-related processes and raise material logistics to a new level.
The SIPLACE Material Manager represents the new generation of SMT-specific material management systems. It uses no paper, but works with mobile scanners and handheld devices to link all material-related process steps in electronics manufacturing – from receiving to warehousing and setup processes to track-and-trace.
Component packages are labeled with unique IDs featuring clear text and a machine-readable barcode as soon as they enter the plant. Via these UIDs, the system assigns additional properties to each package, such as MSD data, manufacturer and batch information for track-and-trace applications, production or delivery dates for FIFO-based removal from stock, brightness classes for LEDs, and a whole lot more.
This metadata is then used and updated in all process steps. Examples the tracking and tracing of reels and/or packages across each station on the production floor, and MSD components are automatically blocked as soon as they exceed their exposure time.

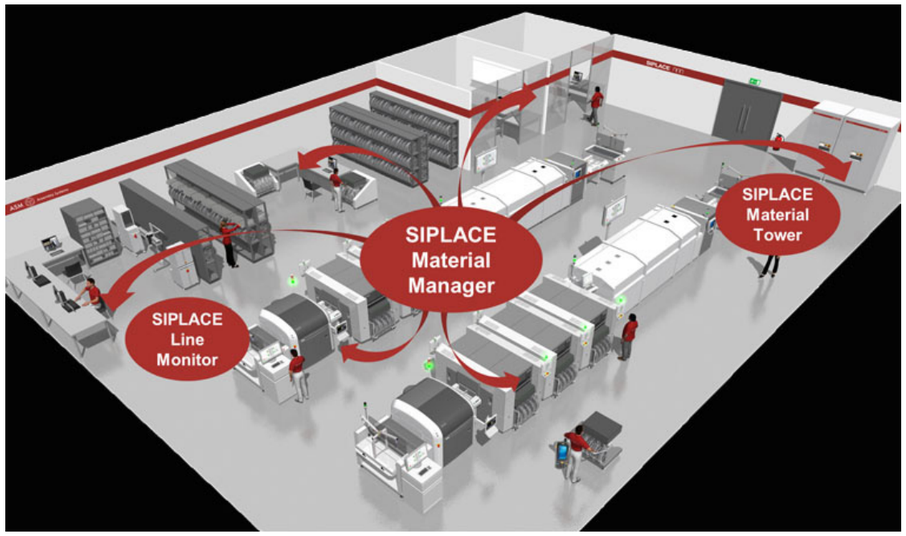
With 15 years of experience in the electronics industry, András Kozma (born in 1980) has been an account manager of ASM Assembly Systems in Hungary for six years, responsible for the sales of SMT production systems, such as DEK screen printers, SIPLACE placement systems, process control as well as material management solutions. He has collected extensive experience and knows the daily challenges of electronics manufacturers, such as the implementation of Industry 4.0., Big Data Management or Material Logistics, which have a huge impact on productivity. András supports Industry 4.0 aspiring customers to develop their smart SMT factory by creating innovative and user friendly solutions serving today´s and future industry needs.

More room in automated storage systems
The UID changes the inventory management processes radically. For example, it makes "chaotic warehousing" possible, because employees can place component packages in any coded shuttle or lift bin. As soon as the UID and the bin code are scanned, the system knows what is where. This speeds up transfers from and to the warehouse, prevents errors, and puts the rack systems to more efficient use.

SIPLACE Material Tower: Fully integrated into the SIPLACE Material Manager – the smart System for component reels

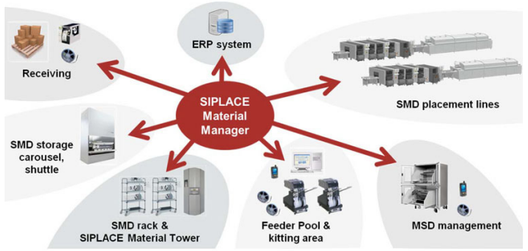
Flexible setup concepts
The transparent material management system reduces the amount of "parts tourism" and actively supports modern, flexible setup concepts. For example, the SIPLACE Active Feeder Pool in the setup preparation area indicates with blinking LEDs which feeders and components will be needed in upcoming production jobs. As a result, many components don't have to be returned to the main storage site because the material management system treats the setup preparation areas as storage locations. Another benefit: By interfacing directly with the placement machines, the system records the component consumption instantly and accurately, including rejects. This minimizes discrepancies between target and actual inventory numbers and makes the planning process much more reliable.

Inserting rush jobs
Squeezing in rush jobs in traditional environments is expensive and risky. It requires lists to be reprinted and jobs to be rearranged. The SIPLACE Material Manager, on the other hand, operates in real time. As a result, all changes are re-sequenced correctly and reassigned automatically to the appropriate workstations.



#1 in Material Logistics: SIPLACE Material Manager - full control over all materials on your shop floor.

Maximizing uptime with 100% visibility: The role of material management in flexible electronics production.



Centralized material management and optimized material flows in SMD production.

SIPLACE Material Tower: the compact, fully automated storage system
Additional benefit offers the compact SIPLACE Material Tower, an automatic and MSD-capable system for storing components next to the line, which is totally integrated into the SIPLACE Material Manager and optimizes the component supply system for SMT lines and kitting areas.

Conclusion
Paperless, real-time-capable and networked – the SIPLACE Material Manager raises SMT-specific material management to a new level and significantly enhances the process support at each workstation.

Statement
ASM's presentation explains how to provide transparency in your production and to open the door to new opportunities, by supporting your production processes with modern material management systems. These systems are vital for Industry 4.0 factories by introducing more efficient warehousing processes and the minimization of material-related downtimes. Gains in flow of material, flexibility and process reliability on the shop floor will be even greater.

Profile

ASM Assembly Systems

ASM Assembly Systems GmbH is, with its business divisions SIPLACE Placement Solutions and DEK Printing Solutions, the SMT Solutions segment of ASM Pacific Technologies (ASMPT). Other group units of ASM Pacific Technology include the Lead Frame and Back-End Equipment segments. This makes the ASM Group the world's only equipment manufacturer that is able to offer its customers a unique combination of solutions and skills for the entire electronics production chain from wafer to SMT production with hardware, software and services in all regions of the world. The ASM SMT Solutions segment develops and sells best-in-class DEK printers for the SMT, semiconductor and solar markets as well as best-in-class SIPLACE SMT placement solutions. ASMPT's SMT Solutions segment shares and expands its expertise with electronics manufacturers and partners all over the world. Its goal is to improve its customers' workflows and use new technologies to advance process integration in the industry. Based on this approach, we strive to become the world's No. 1 in the electronics industry.

www.asm-smt.com

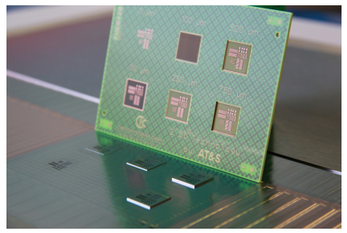
Economy despite small Volumes for a high Componentry Mix

Stencil printing allows for the efficient production of any batch size provided the aperture layout has been adapted to the requirements of the product. For small and large product volumes, it is vital to choose aperture ranges that ensure a constantly high print quality from the first to the last substrate. The right stencil options help achieve this goal. The new Application Center with integrated printer line permits practical tests in the line cycle.

When using a good aperture layout, the stencil print can adapt to the current requirements of different designs. Modern stencil options, such as the stepped stencil technology or surface coatings, make it possible to print complex products with a wide range of designs in only one squeegee pass. Cycle and set-up times in stencil printing are low and permit economic production of small and large volumes. The minimum dimensions of dwarfs like the design 0201 (metric) – not to be confused with the 0201 inch variant that has been known since the late 1990s – place high demands on the stencil quality, the PCB evenness and the cleanness of the print environment (including cleaning of stencil bottom side in the printer).

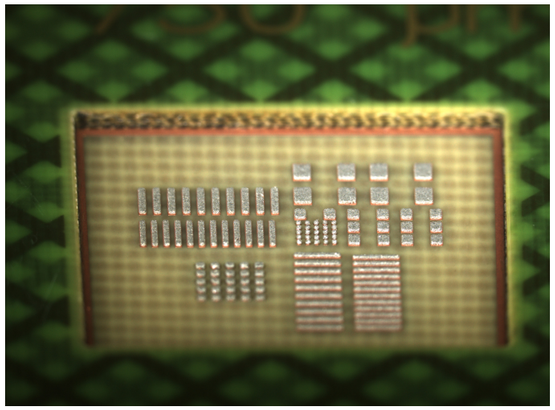
Claus Schulz has been employed with KOENEN GmbH since 2010.
After completing his school education, he started an apprenticeship as draughtsman in civil engineering in 1996, which he completed in 1998. Subsequently, he attended the Higher Technical Vocational School and passed the advanced technical college entrance qualification (1998). In 2000, he completed the basic studies in food technology, and in the following year, he successfully qualified as a Certified Fitness Manager at the BSA Academy. Mr Schulz held senior sales positions at several companies in the consumer electronics industry: From 1999 to 2001, he worked as Account Manager at Siemens/MMS, from 2001 to 2006, he held the position of Key Account Manager at Sagem Communications, and from 2006 to 2010, he headed the Key Account Management and Product Management department at Sky Deutschland. In 2010, Mr Schulz joined KOENEN GmbH where he initially held the position of responsible Director of Sales, Marketing, Purchasing and IT. In addition, he was a member of the Management Team. In January 2015, following the takeover of KOENEN GmbH by Christian Koenen GmbH, he took over functions in the business development area of Christian Koenen GmbH and has since then held the position of Director of Sales of KOENEN GmbH. In December 2015, he was promoted to General Sales Manager of Christian Koenen GmbH.
Claus Schulz's areas of expertise include process optimization and traceability.

Depending on the selected pad dimensions, stencil thicknesses of approx. 40 µm are used for these dwarfs. In this regard, it must be considered that, in the normal environment of surface-mounting technology, these sizes can already be achieved by unfavourable solder mask application, the population print or particles present on the substrate. This means that only one piece of lint on the PCB might potentially double the paste application at that spot.

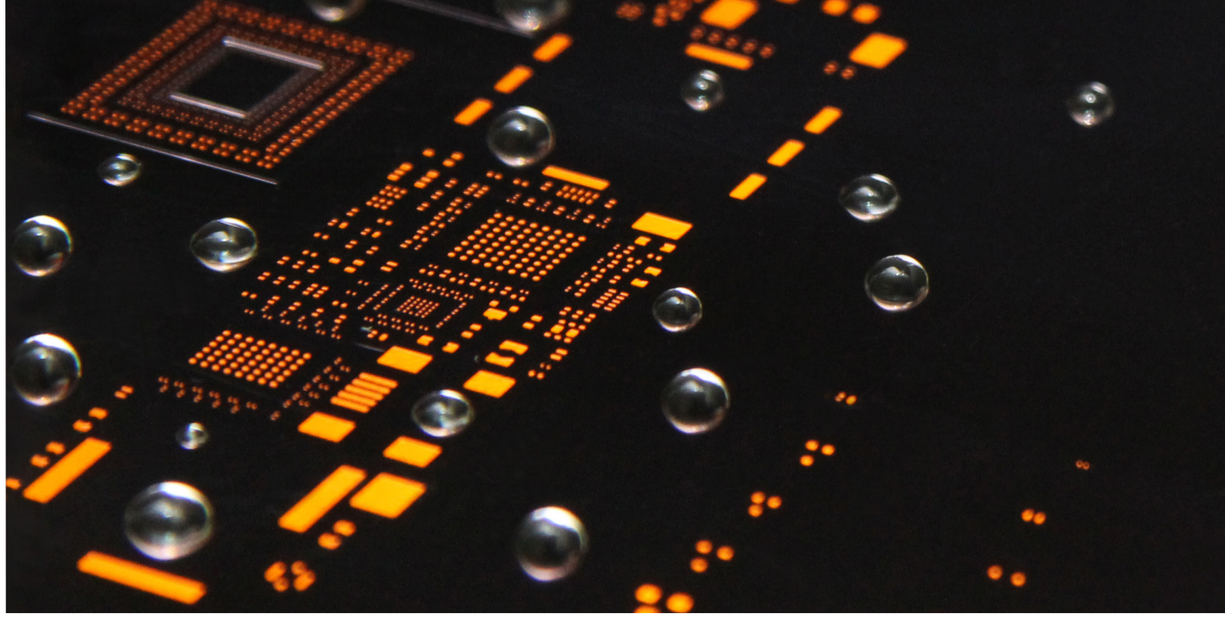


3D stencil technology allows for printing on different levels, here up to 750 µm into the PCB

In addition, the high paste requirement of large components, such as connector pins, arranged on the same componentry must be taken into account. With increasing functionality of the componentry, the number of pins of the connector pins and thus the dimension of the component will also increase. This, in turn, will result in additional challenges in respect of coplanarity and contour accuracy. Here, an increase in paste volume helps to avoid faults.



On the printer line in the new Application Center of Christian Koenen GmbH, printing tests can be carried out in production conditions.



The PLASMA coating changes the surface energy thus helping to reduce the start-up time of the stencil

The stepped stencil addresses these requirements by providing the right paste amount for every component. Combined with the right surface finish, such as for example the PLASMA coating, it is possible to directly produce even small volumes without having to run several proofs. Optimal preparation prior to production is crucial in this context. A stable printing process requires a layout that is adapted to the product-specific conditions, and a high stencil quality.
Optimal preparation prior to production is crucial in this context. A stable printing process requires a layout that is adapted to the product-specific conditions, and a high stencil quality. Normally, the pad geometry is used as the basis for determining the aperture layout. Current designs without connecting pins or balls, on the other hand, produce solder connections that require a precisely defined solder volume. In these cases, it is no longer sufficient to reduce the circumference of the pad. Often, the right solder volume must be calculated to ensure a secure process. This process requires additional information exchange and an accurate calculation of the paste volume to be used for printing.
Relevant parameters in this regard include: Connection sizes on the component, pad sizes on the substrate, evenness of the substrate surface and additional requirements of the total process. These variables can be used as the basis for the calculation to work out a suggested layout, which will then be implemented in the concrete product. For example, vias in pads should not be printed, meaning that no paste is deposited in these to reduce any problems in the process to a minimum.
The 3D stencil represents the extreme application of the stepped stencil as it permits printing of solder paste on different levels with height differences in the millimetre range. These processes are used where components are countersunk in the substrate, or where PCBs of different thicknesses must be processed together, as these are interconnected by flexible connections.

Statement
With proper prior planning, stencil printing offers a stable and accurate solder paste application. It is independent of the volume of the manufactured products and guarantees minimum cycle times. While alternative contract manufacture processes, such as dispensing, offer a better flexibility than solder paste printing, they place high demands on the process knowledge of the system setter. Comparatively low order speeds decelerate the line cycle, high material cost prohibit production of large volumes, and the possible minimum dot sizes make its use for very small designs impossible.
Meticulous prior planning is required to fully exploit the advantages that stencil printing offers. Especially for substrates, it is advisable to analyse the evenness beforehand to ensure that the printing process can be completed without any restrictions. Solder resist, via pluggings or other elevations on the surface may significantly restrict the printing process. If the critical areas are known, these can be left blank in the substrate side in order to minimise, or even completely compensate any effects.
On the printer line of the new Application Center of Christian Koenen GmbH, production conditions can accurately be simulated, permitting precise assessment of the printability. Comparative studies can be carried out in order to assess the effects on the printability of layout changes directly.

Profile

CHRISTIAN KOENEN GMBH
HIGHTECH STENCILS

Since late 2014, Christian Koenen GmbH and Koenen GmbH share one Managing Director: Christian Koenen. With the reconstruction in Otto-Hahn-Straße 24, the two companies have moved closer to each other under one roof. This has resulted in numerous synergy potentials for both companies. The main beneficiaries are the customers of both companies who can now rely on an even broader process know-how in the area of screen and stencil printing and a strengthened employee base. The Application Center, for instance, is used by the staff of both companies. The laboratory includes three screen and stencil printers. Two of these have been integrated inline with a paste inspection system so that tests can be carried out in production conditions. The process team comprised of customer service consultants and application experts offers assistance and advice in all questions concerning process and stencil.

www.christian-koenen.de



High Mix – Low Volume:

Succeeding with flexible production equipment

Local industry producing electronic products faces ever more global competition. While mass production of electronic products takes place in Asia, Europe focuses on high-quality industrial products – often in low volumes and many versions. This calls for flexible production systems, which can handle frequent changes and still economically produce small batch sizes with high quality.

Despite apparently equal demands, optimal solutions substantially differ in their details. To approach the subject "high mix, low volume" manufacturing, it is best to look at different solder processes – on these it is possible to demonstrate how important flexible production technologies which satisfy the specific demands are for gaining a competitive advantage leading to economic success.
The leading processes such as selective -, wave - and reflow soldering will be rated – with a particular view on the widely varying customer demands. For suppliers to the automotive industry, "high mix, low volume" could mean a product change every 600 assemblies, whereas an industrial supplier changes after every 50 and up to 1,000 assemblies and, for a contract assembler, batch sizes of 1 to 250 are not uncommon. This flexibility which is called for is Ersa's daily business: More than 80% of the 600 systems built annually by Ersa are considered "customized", so as to conform to a customer's specific demands. This flexibility applies to the complete product range of Ersa, starting with soldering stations, rework systems and right up to the high-end soldering systems.

Since 2006 Tom Berx has worked as key account manager for Ersa. He is responsible for the sales to the most important markets in Europe. In close cooperation with our local sales representatives, Berx supports the distribution of our premium and high-performance soldering systems and screen printers on site at the customer's. His process expertise is highly acknowledged, as is his extensive experience in total production solutions. Tom Berx has over 20 years of experience in the sales of machines and systems for the electronics production industry.

Even though today's electronic manufacturers cannot really predict the demands called for in 10 years, fact is: a manufacturing line in 2016 will need flexibility, both in order to maintain the unit costs at a low level and to be able, for a manageable period of time, to produce all future products. At the same time the system needs to be of modular design to allow for easy future expansion, without incurring a long downtime or an excessive amount of manpower.

Ersa i-CON VARIO 4 soldering station

How does a manufacturing tool for "batch size 1 to infinity" actually look like? With the VERSASCAN bad-board recognition feature, defects are recognized already prior to soldering – even if each assembly looks different. Multi- or Miniwave, if wanted with the "on the fly" set-up option, variability on the x-, y- and z-axes, up to ten system modules… all is possible; each configuration is justified by its application and is mirrored in the Ersa product world. Continuing with wave soldering: Two different solders with 60 to 80 °C temperature difference are to be used, and up to ten board assemblies should be soldered in mixed production, one after the other.
No problem for Ersa!
On a recurring basis, one or two assemblies are to be manually soldered – on the Ersa i-CON VARIO work station up to 4 tools can be operated in parallel and an additional 6 tools need to be only connected. This manual soldering process should now be elevated to the next step and be replaced by an automated soldering process. With Ersa, this transition is easy – whether it is batch size 1 or a multitude of assemblies which needs to be processed one after the other. Regardless of whether a high degree of flexibility is called for, or a high throughput rate or both – with its broad range of selective soldering systems (there are the SMARTFLOW, the ECOSELECT, the VERSAFLOW and the ECOCELL systems), Ersa always offers an optimal solution. Being the common theme, this encompassing range of products can be found also in the other soldering processes, from reflow soldering right up to rework & inspection.

Compact without compromise: Ersa SMARTFLOW 2020 with its comfortable infeed module for boards of up to 20 x 20"

Lived flexibility is our most important product. As of today, Ersa offers more than 1,000 possibilities to configure systems to suit individual needs. The extensive process knowledge of the contact partner and the singular Ersa i-CCS System Configurator ideally support the customer in selecting the correct production system. Clearly arranged, this multi-lingual tool shows the optimal system configuration, which can then be printed out.

Statement
The development of the industrial landscape in Europe is substantially dependent on the competitiveness of the companies. Regardless of whether acting locally or globally – considering today's situation on the world market, anticipatory planning and innovative strength are essential. Only with continuous innovations will it be possible to ensure, in the medium to long term, a company's success.
As a medium-sized company of the equipment manufacturing industry with a longstanding tradition, we put our technological advantages and our capacity to innovate at the disposal of our customers, to sustainably optimize their production processes in regard to quality, cost and delivery services. While flexibility and profitable manufacturing of "High Mix, Low Volume" will be different for every enterprise – in the final result it is comparable. We look forward to interesting discussions, a lively exchange of information and hope that the participants will find productive contacts to experts, in order to successfully advance those projects that will ensure the future of their company. If the subject is soldering, we have the solutions for your challenges!

Profile

kurtz ersa

As Europe's largest manufacturer of soldering systems we supply our equipment worldwide to the electronic industry. Whether manual soldering, stencil printing, rework & inspection or highly flexible, modular high-end soldering systems: As the no. 1 equipment supplier Ersa continuously sets new standards in electronic manufacturing, advancing the technology into new dimensions.
The complete product range is oriented on the factors highest productivity, highest efficiency and highest quality. With an annual turnover of more than €100 million, Ersa has obtained, for the second year in a row, a record result which contributed substantially to the historically best total turnover of €235 million of the Kurtz Ersa Group. Also for the future, Ersa will do all that is necessary to further strengthen and to extend its technologies and innovative strength – always keeping in line with the goal: to offer a competitive advantage in the market for our customers.

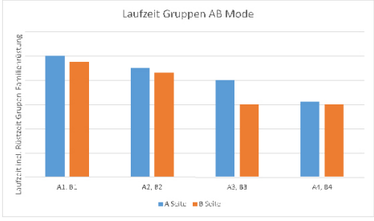
www.ersa.com

Fuji Multi Job Line Balancer AB Mode

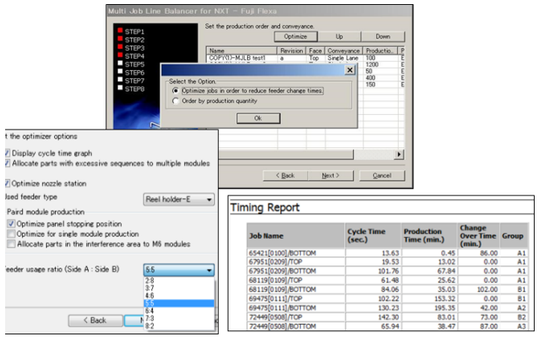
The right Setup concept saves Money and time

The electronics manufacturing characterized more by small to medium-sized quantities with frequent product changes. Short changeover times and flexibility are the most important requirement in the foreground. Machine stoppages caused by setup changeovers like the pallet exchange affecting the performance of the whole line negatively. Complicate setup plans stealing flexibility. Producing quicker, cheaper, in smaller lot size with same quality - this is part of Industry 4.0 and target of every manufacturer. The right tools to achieve that target is delivered with Fuji's NXT and the Software Flexa Multi Job Line Balancer.

If you have a look at a SMD production line, you see a lot of machines working in line. These are set up to the requirements of the job they are producing. If you change the jobs on the production line, settings have to be changed in most cases. The printer becomes a new stencil, the oven a new profile. New materials have to be loaded on the pick and placing machine. These operations take time in which the line is not producing. This lead to the long-time goal, to minimize stoppages affected by changing settings. There are already existing ways to achieve this goals. For example, through standardisation, using the same oven profile for multiple jobs, or through better handling like fast changeable stencil frames and automated conveyors. Don't forget the smd mounter, especially here intelligent set up solutions have led to a shortening of stoppages.
An important example is the usage of the so called family set up where more jobs mostly with similar parts are put together on a feeder pallet. By doing this, the benefit is that more jobs can be produced without stopping the machine.



Mr. Jonas Ernst is Sales Engineer and expert for set up concepts within the Fuji Team. After the study of electrical engineering, he works as a Technical Sales for active Parts like microcontroller. With four years Fuji affiliation still relatively new in the industry, he is responsible for completely West Germany as well as key accounts in the EMS and semiconductor sector.



The MJLB guides through an easy and understandable menu, allows customization and builds tailored reports.

If the change of the pallet is then done by movable feederunits, you can minimize the downtime of the machine down to a few minutes per pallet. The concept changing feeder pallet unfortunately comes along with some negative points. Pallets have to be set up in advance. It also means that additional pallets, feeders and parts are needed. High cost for dead capital. The feeder pallets have to be set up by additional persons.
If you take a closer look to the arrangement of the individual feeders, you can see that the optimal performance will be reduced because of not optimised feeder positions in order to use family set up. Another negative point is that you will lose flexibility because the set-up have to be prepared in advance. What happens when unscheduled orders arrive or prototypes have to be produced? Especially with the rise of high mix low volume production, set up concepts like family set up and changing feeder pallet with family set up show dramatically how less flexibility is given. There is a demand for a new concept.

It is the aim to deliver a set-up concepts which provides following requirements:

a) Non-stop production. ->No stoppage caused by feeder-exchange for setup.
b) Absolut high flexibility. -> Prototypes and sudden orders should be able to be produced efficient without stopping the machine.
c) Lowest invest. ->Eliminate the use of additional feeders and parts and total saving of additional pallets.

Since the generation of NXT, it is possible to set up Feeders on Machine during running production.

Since the NXT series, Fuji Machine provides a concepts which allows the operators a production without stoppages. The software and the concept behind this enormous time saving method is called multi job line balancer. The MJLB provides unlimited flexibility and eliminates additional pallets, feeders and parts because pallet preparation is not needed.

Multi Job Line Balancer AB Mode
The idea behind the set up concept of ab mode is to separate the feeder pallet in two areas, the area A and the area B. The kind of separation can be chosen freely, for example 50:50. First task is to load parts on area A. By doing this, jobs are put together in a family set up based on production time. As soon as to the family belonging parts are loaded to the machine, the production begins. While the machine is production, the area B is set up. As soon as the programs on side A are produced finish, the machine starts with producing the jobs on side B. the changeover works with almost no stoppage. In the upcoming time, it's the responsible of the operator to empty side A and reload it with new feeders. When side B is finished, the machine then switches back to side A production. The construction of side A, B, A2, B2 is made by the Multi Job Line Balancer. And moreover the software is able to help the user to consider special wishes when creating the AB Set-ups.

Statement
There are several points which cause doubts when thinking about the AB Mode. Is there enough feeder space? How does it work with prototypes? Is there enough time for side A or side B. is the printer fast enough….
Jonas Ernst, Sales Engineer at Fuji Machine explains the secrets behind the AB mode, gives detail information how the software supports the operator, says where is potential to save money and what else needs to be considered.

Profile

Fuji now looks back on more than 50 years of experience in mechanical engineering and more than 30 years in the field of electronics assembly systems. Thus Fuji became one of the most important suppliers of machines. As a full-line supplier from adhesive dispenser Board handling and paste printers Fuji now offers a total program for all needs. Permanent innovation, guarantee perfection and excellent machines are the basis for the long-term market leadership.

www.fuji-euro.de

Automotive Electronics - Dendritic Growth and Corrosion Under Low-Standoff Components:

A Flux Solution

Low-standoff components, such as double-MOSFETs and power QFNs in automotive electronics, are proliferating in automotive electronics for reasons of cost and functionality – soldering them with solder paste is the most cost-effective option in high-volume PCB assembly. However, due to poor venting, no-clean flux volatiles are not able to outgas sufficiently and dry off. This wet flux residue causes dendritic growth and corrosion for demanding electrical reliability requirements in harsh conditions such as (a) high heat exposure at 120°C for 500 hrs, 140°C for 500 hours, 30V bias (transmission control); and (b) exposure to heated oil at 85°C for 500 hrs (braking unit).

For a no-clean system where the flux residue is benign, the low standoff entraps solvents, the flux residue becomes liquid or semi-liquid, and activators can move around resulting in a corrosive reaction – particularly with humidity and bias conditions.

Experiment

To prevent dendritic growth, one option is to remove the flux residue post reflow. However, this can be challenging since small venting spaces are barriers for cleaners to remove the flux residue. In addition, a cleaning step adds costs (equipment and cleaners) and extra process steps. The second option is to use a flux that is non-corrosive and non-conductive, even if drying of flux residue is not possible. In other words, develop a flux that is benign, regardless of whether it is wet or dry.

Flux	Characteristics
A	Halogenated, no-clean, T4
B	Halogenated, no-clean, T4.5
C	Halogen-free, no-clean, T4
D	Halogen-free, no-clean, T4
E	Halogenated, no-clean
Indium	Halogen-free, no-clean, T4

Table 1. Characteristics of solder pastes evaluated.

Karthik Vijay is based in the UK and manages Indium Corporation's technology programs and technical support throughout Europe. His expertise is focused on solder paste, engineered solders, thermal interface materials, and semiconductor-grade electronics assembly materials. Karthik is active in several industry organizations, including IMAPS and the Surface Mount Technology Association (SMTA), and has presented at industry forums and conferences internationally. He earned his master's degree in systems science and industrial engineering from Binghamton University, State University of New York.

A wet flux residue that is non-corrosive and non-conductive should contain very low amounts of activators and exhibit very low activity. However, this type of flux would be poor in wetting, which in turn would be poor in voiding [1, 2] and HIP performance [3], hence not be adequate for SMT assembly applications. After extensive research and development efforts, Indium Corporation's halogen-free, no-clean flux was developed to eliminate dendritic growth and corrosion, and at the same time achieve good wetting, low voiding and eliminate HIP.

Figure 1. Example of reflowed SIR board with glass slide; three comb patterns printed with flux; two of these three comb patterns were further covered with glass slides.

To prove its effectiveness, six solder pastes were tested, including Indium Corporation's solder paste and five conventional solder pastes as controls. The characteristics of those six solder pastes are shown in Table 1. All solder pastes employed 96.5Sn/3.0Ag/0.5Cu (SAC305), type 4 (20-37 microns) or type 4.5 solder powder. Pastes A, B, and C are standard products well-received by the market as SMT no-clean lead-free solder pastes. Pastes D and E are commercially-available materials; the powder size of E was not available.

Karthik Vijay, Indium Corporation's Technical Manager, Europe, Africa, and the Middle East will be on hand at Innovations Forum on June 16th in Budpaest, Hungary. Among the topics that Karthik will cover are the results of testing.

Surface Insulation Resistance (SIR) Test

A standard IPC B-24 SIR board was used for this experiment. The flux vehicle of each of the solder pastes was printed onto three of four comb patterns in the SIR comb pattern using a 0.10 mm (4 mil) thickness stencil. A 10 mm × 10 mm glass slide was placed onto a part of the comb pattern printed with flux. Two comb patterns received this glass slide coverage treatment, as shown in Figure 1. Each of the glass slides was further secured onto the SIR coupon with 3M high-temperature tape to avoid slide movement during subsequent air reflow. The reflow was conducted via a convection oven with a peak temperature of 244oC, with the profile shown in Figure 2. Other than the coupon preparation, the SIR testing was performed in accordance with J-STD-004B.

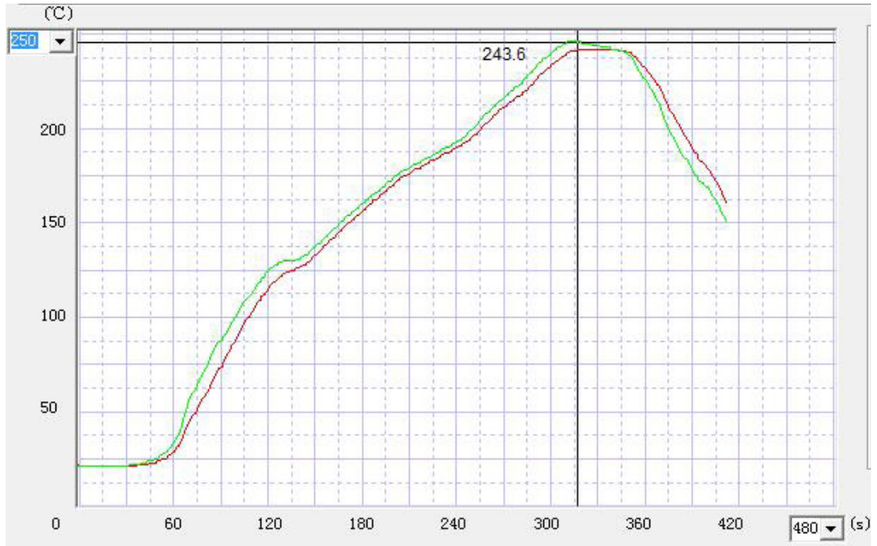


Figure 2. Reflow profile used for fluxed SIR boards with or without glass slides attached.

The SIR performance of the fluxes on SIR coupons without glass slide coverage (standard SIR test) was also evaluated for comparison purposes. Here, all flux fumes vaporized with dry flux residue left behind on the comb pattern.

It should be noted that during the preliminary trials, solder paste was printed onto comb patterns followed by placing glass slides. After reflow, the flux residue under the glass slide was found to be dry, despite the glass slide coverage. This was caused by too high a standoff when the solder rim formed on the comb pattern. In order to mimic the hampered venting of flux fumes, printing the flux vehicle instead of solder paste was found to be effective and resulted in wet flux residue.

Statement

SIR test using glass slides best mimics electrical reliability of fluxes for low-standoff components. Of all the fluxes tested, only Indium Corporation's flux passed SIR requirements. This solder paste exhibited a SIR value well above the IPC spec 100 MΩ without any dendrite formation, even with a wet flux residue on the comb pattern.

Indium Corporation's flux also achieved very good wetting, low voiding, and HIP resistance. Achieving enhanced electrical reliability without compromising on other key SMT metrics requires unique flux technologies.

References

[1] Wanda Hance and Ning-Cheng Lee, "Voiding Mechanisms in SMT," China Lake's 17th Annual Electronics Manufacturing Seminar, 1993.

[2] Ning-Cheng Lee, "Reflow soldering processing and trouble-shooting SMT, BGA, CSP, and Flip Chip Technologies," Newnes, pp. 288, 2001.

[3] Yan Liu, Pamela Fiacco, and Ning-Cheng Lee, "Testing and Prevention of Head-In-Pillow." Surface Mount Technology Association (SMTA) China South Conference at NEPCON Shenzhen, August, 2010.

Profile

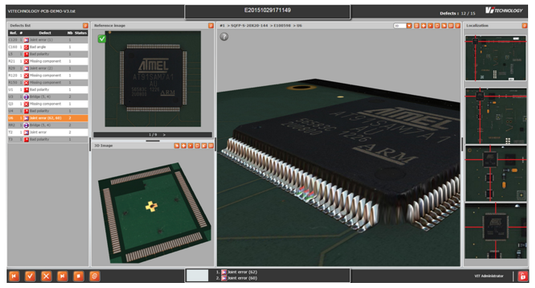
Indium Corporation is a premier materials manufacturer and supplier to the global electronics, semiconductor, thin-film, thermal management, and solar markets. Products include solders and fluxes; brazes; thermal interface materials; sputtering targets; indium, gallium, germanium, and tin metals and inorganic compounds; and NanoFoil®. Founded in 1934, Indium has global technical support and factories located in China, Malaysia, Singapore, South Korea, the United Kingdom, and the USA.

www.indium.com

Leveraging inspection data in the industry 4.0 era

Evolutions in computing power, data access and storage make it possible for Giga bytes of data/images to be shared and analyzed through simple web access. Connected, inspection equipment are now the eyes of smart process improvement solutions for industry 4.0. Vi TECHNOLOGY developed a continuous process improvement solution to translate inspection data into smart actionable process information and drive quality to new levels.

During first era (1990-2004) of In-line SMT inspection equipment, equipment manufacturers were focused on demonstrating efficiency and capability of their "sensors" compared to visual inspection done by operator. This first step leads the industry to successfully sustain a high level of quality in a high mix and high variability environment.



■ Sigma Analysis user interface

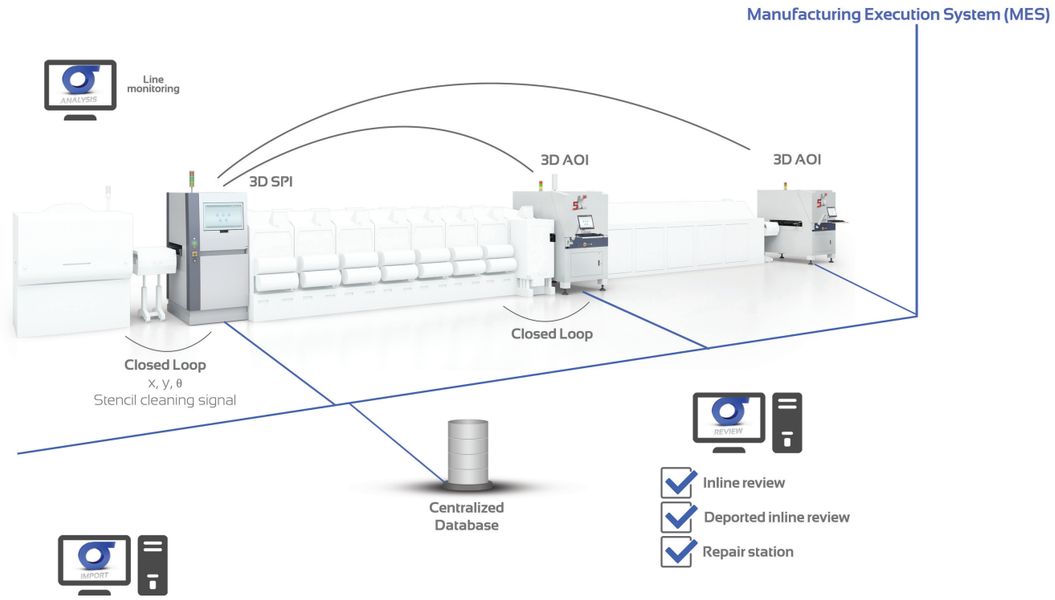
François Amblard began his career in Silicon Valley and held various positions, from R&D to strategic planning, at KLA-TENCOR from 1987 to 1992. He holds several patents in image processing. Prior to joining Vi TECHNOLOGY in 2010, as Chief Executive Officer, François worked in finance and corporate development at Neptune Technologies after several years in strategy consulting at Corporate Value Associates (CVA). He holds an MBA from INSEAD (1993) and a M.Sc. in Electrical Engineering from Brown University (1987).

Now, SMT industry look for improving quality to the next level and it implies:

1. In-depth understanding of the process
   a. Technical prerequisites
      i. Traceability
      ii. Obtain accurate data and images
      iii. Capacity to store data & images for several weeks
   b. Ability to identify the source of problems
      i. Data correlation between AOI and SPI (data and images)
      ii. Capability to steer operator behavior in front of problems
      iii. Locate source of problems: print, placement, reflow
      iv. Check occurrence : random issue or drift
   c. Plan corrective action
      i. Refine tolerance in SPI to try to catch potential defect sooner (for those that has been located in print process)
      ii. Define corrective action with engineering team: process redesign, etc
      iii. Check disappearance of problem

2. Anticipate rather than undergo problems
   a. Correlate data to refine tolerance in SPI to try to catch potential defect sooner
   b. Optimize quality vs productivity
   c. Educate production team with fact and accumulated process knowledge

■ Sigma review user interface



■ Sigma link framework

Product complexity, miniaturization, SiP (system in package) leads SMT industry to really focus on understanding process issue rather than undergo problems. Data correlation is key to succeed to establish winning strategy to sustain manufacturing efficiency.

Delivering high quality levels in manufacturing environments requires in-depth process understanding.
Industry 4.0 also means connecting inspection equipment and sharing data/images on a web-based solution. Sigma Link enables process engineers to reveal the actionable process information contained in the overwhelming inspection data. Built around a powerful web-based software suite, a unified SPI and AOI database, correlation of inspection data and images, SIGMA Link provides in-line monitoring, easy diagnosis of the entire PCB assembly process and full traceability of data and images.

Statement

In-line SMT inspection equipment (AOI, SPI, ...) have long been considered a necessary evil to filter out defects.
Filtering defects is no longer sufficient to drive quality to new industry levels. Process understanding and control are essential to deliver quality while production time decreases, miniaturization increases and automation wide-spreads.
Recent technologies enable sharing or correlation of data/images and equipment interoperability. These evolutions make it possible to transform data into smart actionable process information to improve quality.

Profile

Vi TECHNOLOGY®

We are innovators creating state-of-the-art solutions to meet electronics' industry SMT inspection requirements for simplicity and performance.
We help customers, big and small, original equipment manufacturers and electronic manufacturing services, solve the challenge of inspecting efficiently PCB during assembly process.
We serve demanding markets such as Automotive, Aeronautics and Space, Defense, Industrial, Medical…
We build our sustainable growth on two pillars: Innovation and Customer satisfaction.
Accuracy and reliability are the DNA of all our metrology systems for solder paste inspection and automated optical inspection.

www.vitechnology.com

You say IoT… I say Industry 4.0!

One of the many things I enjoy about my work, is the opportunity to meet companies, people and key players in the electronics manufacturing industry around the world - often at events and tradeshows, but also through the projects I'm directly working on for my clients. Having such close interaction offers a direct insight into the key trends that are shaping the industry through discussion, collaboration, R&D, thought leadership and innovation. The language and key words used may be very different depending on which region of the world I happen to be in, however they are all pointing in one very decisive direction: everyone is working towards increased productivity and flexibility driven by a demand from customers for fully traceable customized solutions & products when & where they want them at a price they are willing to pay. The goal is clear and despite the differences in terminology used, we're all striving towards what some refer to as the fourth industrial revolution!

Of course I'm talking about 'Industry 4.0' or 'IoT' (Internet of Things) or 'IoM' (Internet of Manufacturing) or 'Smart Factory' or 'Made in China 2025' or whatever other terms and synonyms are being added to the topic daily as it gains momentum. If you're still resisting joining the revolution, then just look around and you'll notice very quickly that there is nowhere to escape anymore. The topic is omnipresent, companies are already and increasingly launching 'SMART' solutions, R&D is focused on 'intelligent' systems, collaborations are forming along the supply chain to offer solutions that can seamlessly communicate up and down the line, and automation and robotics are enjoying lots of attention – that's just scratching the surface!

Still not convinced? Just visit Productronica this year, where their new cluster concept includes a dedicated 'Future Market Cluster' which covers the entire spectrum of current trends in electronics production and aims to show what Industry 4.0 means in electronics manufacturing, what capabilities cyber-physical systems and printed electronics have and where trends in the electronics industry are going.

Personally I like that there are different terms in different regions of the world for the same or similar concepts, processes and solutions. Just like language in general it's what defines us culturally and offers a unique opportunity of varied interpretation without the danger of being blind-sighted by a single term. But just like it's useful to know 'ein Bier bitte' or 'avez–vous un menu en anglais?', understanding some of the terminology used around the world for what I call in my language 'Industry 4.0' will come in handy. So here's a little intro:

Your ideal dinner date, being experienced in the fine art of journalism, Kim Sauer can start, lead and hold the conversation, ensuring that everyone feels involved. Kim is regularly published in leading industry publications, including EMSNow and EPP.

Industry 4.0

Industry 4.0, also referred to as 'i4', started out as a German vision of a system of manufacturing that uses a batch size of one philosophy where each product communicates with the manufacturing process and the entire supply chain to bring everything together to build and fulfil that product. It also suggests that the manufacturing process has some elements of self-learning as a result of cyber physical systems. It is now a term more widely adopted beyond the German borders, mainly in Europe and some Asian countries, particularly in China where Industry 4.0 is getting a lot of attention through their 'Made in China 2025' initiative.

IoT (Internet of Things)

IoT, a global term with its origins in the USA, is a network of connected things as the name suggests. Analysts believe we are headed to a world where fifty billion ‚things' will be connected to the Internet. These devices will identify themselves uniquely and may have some level of sensing or actuation. This ability to sense, communicate, identify and actuate are all part of the IoT and i4 puzzle.

IoM (Internet of Manufacturing)

IoM is the term used for a connected approach used in a manufacturing environment or supply chain, which may be connected externally using cloud storage, but could equally be a closed environment where data is stored securely and locally.

Big Data

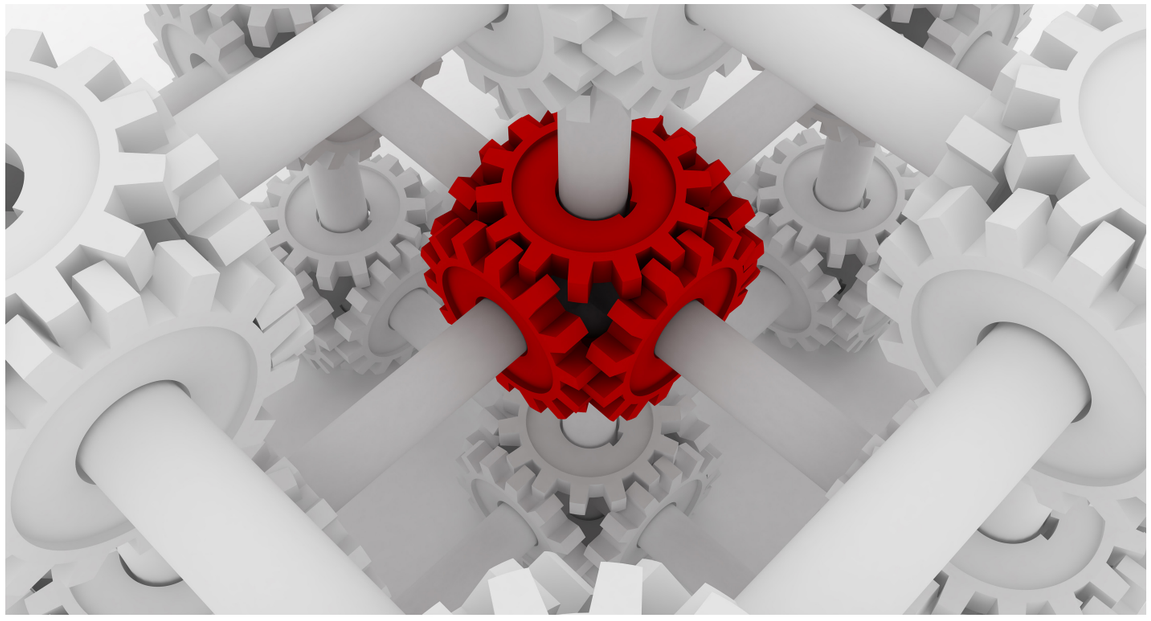
Terms around big data and the cloud are tools used to talk about how we might manage the data driven ecosystem that we are moving towards.

The Cloud

The cloud is simply off site storage of data communicated through the Internet.

Closed loops

Closed loops are systems that connect and inform. They may or may not learn and are an example of a Cyber Physical System.



Industry 4.0 Ready and IoM Ready or IoM Compliant

Increasingly the words 'Ready' or 'Compliant' are being added as an extension to key terms to indicate that a particular solution or service is capable of fulfilling specific requirements. As an example, an IoM Ready system is capable of reading, recording and communicating. That is to say it is able to ‚read' every input to the machine, be that a component, a consumable or a tool like a stencil or a feeder. It is able to ‚record' every process that it carries out, including every parameter including the operator. And it is able to communicate that data in an open readable protocol or language.

Cyber Physical Systems

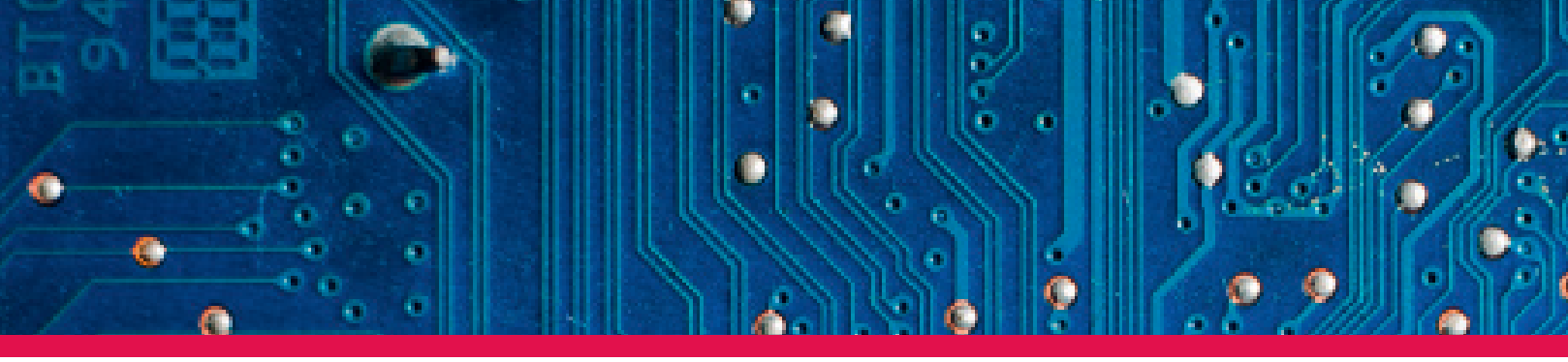
Cyber Physical Systems are closed manufacturing or supply chain loops that sense the impact of processes and use that data to adjust processes, learning as they go and providing some degree of process self-improvement.

Collaborative Robotics

Collaborative robotics are simply robots that can operate in the same environment as humans and as such collaborate or support the operator doing heavy lifting, fine work or repetitive operations at greater speed. These robots sense operator input and are able to take action on that data or on a change in their environment.

Statement

The Industry 4.0 language will evolve and many dialects will develop. It's an exciting phase for the industry. One that offers huge scope for advancement and innovation. And what I find most exciting is that simply by its very nature it demands collaboration and dialogue.



InnovationsForum Hungary: Industry-leading advice and collected expertise

The first InnovationsForum Hungary will gather industry professionals who will present on key industry topics which explore and examine how automation in the electronics production industry is set to drive competitiveness in the region.

Held at the prestigious Academy of Sciences in Budapest, it is set to be the must-attend-event that enables manufacturers, suppliers and supply chain executives to gather, explore and network.

Partner

ASM Assembly Systems

AEGIS SOFTWARE

CHRISTIAN KOENEN GMBH HIGHTECH STENCILS

INDIUM CORPORATION®

FUJI innovative spirit

KOH YOUNG EUROPE

kurtz ersa

TECHNOLOGY®

Kimball® Electronics

Local Media Partner

ELEKTRONET BUSINESS & ELECTRONICS IN HUNGARY

Organiser

EPP EUROPE Electronics Production and Test

Konradin-Verlag Robert Kohlhammer GmbH
Ernst-Mey-Str. 8, 70771 Leinfelden-Echterdingen
andreas.hugel@konradin.de
www.epp-europe.eu

emsnow the global source for the electronic manufacturing services industry

EMSNow, 30 Mill Lane, Stetchworth,
Cambridgeshire, CB8 9TR
pstoten@emsnow.com
www.emsnow.com