NEWS FROM THE UK

THE INSTITUTE OF CIRCUIT TECHNOLOGY
39th Annual Symposium
5th June 2013

The 39th Annual Conference of the Institute of Circuit Technology was held this year at the Motor Heritage Museum, formerly RAF Gaydon and once home to the Victors and Valiants who flew from the air base that now hosts a lot of new cars outside, and a lot of very old cars inside. Talking of age, the membership of ICT has now exceeded 300, and the collective éminence grise of the PCB industry in the UK had gathered in strength on June 5th to listen to some excellent speakers.

A welcome from ICT President Professor Martin Goosey opened the day, with news on forthcoming events which include evening seminars on Hayling Island in October and another one in Darlington in November, and the increasingly popular Foundation Course will be held in Loughborough in 2014. ICT are project coordinating an EU-funded project called ASPIS, involving nickel-gold finishes, with 10 other companies and organisations. Martin reminded the delegates that the PCB industry is valued at $60 billion world-wide, of which 5% comes from Europe, and £135 million coming from the UK. The forecasts for the coming years look bullish.

The first speaker was Ian Mayoh, the technical support manager of Ventec, and insulated metal substrates were the theme of his presentation. The substrate is usually aluminium, and it is the miniaturisation of multilayer boards, and the growth of LED lighting, with more exotic designs, which has led to the needs thermally conductive base material. This means that components can be kept cooler, with 7W/mK as a standard, and costs reduced. Thermal conductivity and electrical insulation are key to performance, and the constructions of the IMS were illustrated. Ian described the production process for the manufacture of IMS, as well as some testing criteria, and the advantages and disadvantages of glass-reinforced and non-glass-reinforced were listed, ceramics being far too expensive, and higher thermal conductivity tends to translate to higher costs, helped sometimes by a thinner dielectric. Use Data Sheet Values as a guide only, he advised, and his graph of the IMS roadmap was clear; it is clear that thermally conductive printed circuit substrates have become the solution of choice for many applications.
Stuart Hayton of MutraX knows about an innovators dilemma. When well-respected companies such as Kodak, Digital, Nokia, fail through the arrival of new technologies, the cause might just be that the market is not telling them what is wanted. Change can creep up out of nowhere, and this this has a massive impact of the way a company is run. Most new technologies encourage further product development, and in a thoughtful argument, Stuart described the difference between disruptive technologies, and sustaining technologies, the former coming along once in a blue moon. Sustaining technologies progress faster than the market demands, and companies find it very difficult to invest adequate resources into disruptive technologies, an example being the digital camera which was developed by a man at Kodak, but not taken up; the results of this decision are now well-known.

95% of pcbs are imaged in the traditional way, and only 5% with LDI. Even after 15 years LDI only has 5% of the market. It is silver-halide film that is used for 95% of all PCB imaging, and this is a £260 million market. However, change is about to happen. The need to have a very fast response to the demand for prototypes is the driver here, and as a result a new disruptive technology has appeared, and it is called Lunaris. It started life as a system developed by Oce, then owned by Canon; it is an ink-jet system that has a 25micron line and space capability, and one can proceed from CAM to etch in less than 5 minutes. An additive process, you can apply resist wherever it is needed. Ink jet application has all the hallmarks of a disruptive technology, and at MutraX they have discovered that out-innovating yourself also beats being out-innovated by someone else. It would seem that someone else would be foolish to try.

Dr. Karl Ryder from the University of Leicester went into the latest situation with the ASPIS project. ENIG has a problem, and it’s called black pad, a corrosive process in between the nickel and the gold, caused by the gold plating process. The interface between the nickel and the gold was the Achilles heel, and here they used ionic liquids for immersion coating, which showed very different performances between gold cyanide salt and gold chloride salt. Wanting to get away from cyanides, for obvious reasons, they found that by varying the resonant frequency of the deposition plating rate, the gold chloride salt proved acceptable. It showed less evidence of mud cracking, and aqueous AuCN gives bright uniform coatings. He and his team are also working on another project to do with solder fluxes from novel ionic liquids, which are greener, cheaper and cleaner.

Dr John Graves from Coventry University spoke about a project running between his university and Loughborough, which started in 2012, finishes in July 2014, is funded by iEmRc, and is working on the functionalization of copper nanoparticles to replace precious metals used in PCB manufacture. No less than 56 tonnes of gold are used in the production of mobile ‘phones, and now palladium too is a precious and expensive metal, becoming more and scarce, so that replacing them with cheaper and more abundant metals such as copper is most attractive. The current electroless copper plating bath uses Pd/Sn based catalyst for activation, and by taking a commercially available copper powder, Dr. Graves and his team are working on the use of copper nanoparticles as a seed layer and this technique works, the
copper particles have to be coated to prevent oxidation, to improve dispersion stability, and this enhances the adhesion to the substrate. The coatings are called SAMs, (Self-Assembled Monolayers) and are applied by ultrasonic dispersion. Dr. John said that the project is just one year into a two-year programme, and initial trails have been carried out and further work is underway.

**Dennis Price of Merlin Circuit Technology** spoke about ASPECT, a project in which megasonic agitation is employed to fabricate high aspect ratio PCB micro-vias. Working with Heriot-Watt University and the University of Greenwich, his company have taken a 26-layer build as the model, with both laser-drilled micro-vias, and CNC drilled, with the latter giving dielectric separation below stop-pad layer. The depth drilling trials were illustrated, and the ASPECT project was all about looking at the flow of etch into the micro-via, and how electrosonic flow could help, especially with closing at the mouth of the hole. Acoustic streaming in a through via was good, and by using a green dye in the solution they could see exactly how effective the process was, with megasonic agitation giving good results. An aspect ratio of 1.7:1 is quite available. It is the resonant micro-bubbles that do the work, they are sources of micro-streaming, which is what is wanted.

**Martyn Gaudion of Polar Instruments** had high-frequency designs as a subject, and the considerations for signal integrity. An excellent paper, superbly delivered, clearly illustrated, and fully comprehensible to those who know about such things.

**Chris Serre** is the MD of **Union Tool** based in Switzerland, and his company is one of the leading suppliers to the world’s PCB industry. They are working on the tool geometry and the development of new coatings and carbide materials, and the development of new composite techniques.

The latest technology from his company is a single-flute drill, which has many advantages. It has one cutting edge, has less diameter wear, works well with halogen free material and high Tg materials. Diameters range from 0.2mm to 0.65 and they can be re-pointed; they also have ULF coating, which offers lower friction, high hardness, and is adhesion-proof, which is very good for IMS. A coated drill will out-perform a non-coated drill by a factor of 4 xs. They also have a new stainless steel shank design which minimises run-out, Chris also touched on traceability which would be useful on the rare occasion when there is a problem.

In routing, ULF coating has also been added, with a major improvement in performance, in breakage resistance and stable machining accuracy. For aluminium boards, a problem for drill manufacturers, this is a coating which will prevent the aluminium sticking to the carbide, making life easier for all and leading to smoother production cycles.

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ICT run such events with certain deftness, and this industry body offers exactly what is wanted to its members. Their next gathering will be on 3rd October, will take place at a fine hotel on Hayling Island, and doubtless will, as usual, be a spirited occasion.

*JHL*
**Spirit Invest In Artificial Intelligence Software**

Spirit Circuits has recently invested in a High technology CCD camera AOI system from equipment provider, Viking Test.

The system, Optima AOI, which was installed this May, uses high-resolution CCD camera systems and a unique software algorithm. This enables the system to scan almost any PCB with any material or surface finish.

Optima AOI uses new technologies for detecting very fine isolation errors in very complex circuitry. It uses breaking new technologies to minimise false alarms and to give accurate results even with flexible circuits and polyimides. The combination of hardware and software give a truly excellent scan result.

As well as giving Spirit Circuits the lowest possible "cost per scan", the system is built with extremely high precision and quality components.

Steve Driver, Managing Director of Spirit Circuits, says:

“We continually invest in the quality control department at Spirit Circuits. Spirit has enjoyed significant growth over the last year and our continued commitment to investment will enable lead times to reduce, further ensuring that the UK PCB supply chain remains reliable and supports the needs of our customers. This new system compliments the purchase of the CNC Auto Vision Measuring Machine from Viking test earlier in the year.”

**Invotec Group Receives Nadcap Merit Status for Electronics**

Invotec Group announces that its Tamworth Facility has been awarded Nadcap Merit status for Electronics covering Rigid, Flex-Rigid & HDI products.

Invotec Group has held Nadcap accreditation since 2011. Having demonstrated their ongoing commitment to quality by satisfying customer requirements and industry specifications, the Nadcap Task Group has determined that Invotec Group has earned special recognition. This means that, instead of having their next Nadcap audit in twelve months, Invotec Group has been granted an accreditation at its Tamworth facility that lasts until 31st October 2014.

**Tim Tatton, Managing Director of Invotec Group said:** “As the leading UK and European PCB manufacturer to the aerospace and defence industries, merit status demonstrates the ongoing commitment of the company and its people to the highest standards of reliability and quality in our product and our passion to satisfy stringent customer requirements.”

**Joe Pinto, Vice President and Chief Operating Officer at the Performance Review Institute said:** “Achieving Nadcap accreditation is not easy, it is one of the ways in which the aerospace industry identifies those who excel at manufacturing quality product through superior special processes. Companies such as Invotec Group go above and beyond achieving Nadcap accreditation to obtain Merit status and they should be justifiably proud of it.”
Benefiting from a less frequent audit schedule reduces audit costs and associated pressures and demonstrates the trust that the aerospace industry has in Invotec Group, based on their past performance in Nadcap audits. PRI is proud to support continual improvement in the aerospace industry by helping companies such as Invotec Group be successful and we look forward to continuing to assist the industry moving forward.”

About Invotec Group
www.invotecgroup.com

Operating from facilities in Tamworth and Telford, Invotec Group is one of Europe’s leading manufacturers of time critical, high technology printed circuit boards, with an annual turnover in excess of €30 million.

The company manufactures a wide range of PTH, Multilayer, HDI, Backplane and Flexi-Rigid PCBs using a variety of advanced materials, finishes and technologies to meet specific customer specifications.

Invotec’s key markets include the aerospace, defence, avionics, industrial, medical, telecommunications infrastructure and security sectors.

About Nadcap
Created in 1990 by SAE Inc., Nadcap is administered by the not-for-profit Performance Review Institute. PRI exists to advance the interests of the mobility and related industries through development of performance standards and administration of quality assurance, accreditation, and certification programs as well as related activities for the benefit of industry, government, and the general public. PRI works closely with industry to understand their emerging needs and offers customized solutions in response. Learn more at www.pri-network.org or contact PRI at PRINadcap@saeg.org

IMAPS-UK Call-for-Presentations
"R2i2 - Research to Industry" Event
Loughborough University - 3 July 2013

Call for Academic Submissions: R2i2 - Research to Industry

Following the success of last year’s event, IMAPS-UK, in collaboration with the IEEE and the ESP-KTN, are organising a second Research to Industry event, on July the 3rd at Loughborough

If you are an academic researcher looking to meet potential industrial collaborators, please send your abstracts now (deadline 7th of June) to Darren Cadman: d.a.cadman@lboro.ac.uk

You will find more information on the event (including a review of last year’s event) on our website: www.imaps.org.uk
Event Registration is now open.

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