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PRESS RELEASE

New developments in printed electronics announced at IMI ink jet conference

IDTechEx, the independent analyst on RFID, smart labels, smart packaging and printed electronics, forecasts that the opportunity for printed electronics will reach \$300bn by 2025. IT Strategies estimates that \$250m has already been invested by ink jet companies in developing the technology required to meet the needs of this huge new potential market.

Printheads for printed electronics and three development projects were highlighted at the IMI European Ink Jet conference in Lisbon in November, where presentations from Ricoh, Xaar, CIT and PCB manufacturers Circatex and AT&S revealed a bold vision for the future.

Xaar's HSS printhead offers new opportunities in PCB manufacture

2005 has been a year of many highlights for Xaar, including a record first six month's turnover, 100,000 printheads shipped over that period, the announcement of a new manufacturing facility in the UK and the successful development of a new printhead platform - the HSS, or Hybrid Side Shooter printhead.

Speaking at the IMI European Ink Jet Printing Conference, Steve Temple, Xaar's Technical Director, explained the principles behind this major new platform technology and described HSS as "a radical new approach to ink jet, creating a new paradigm for single pass printing."

HSS offers the image performance of greyscale technology with added functionality designed for single pass applications, such as self-recovery of jet-outs, easy fill, wide ink and fluid capability and a self-aligning mechanism for stitching heads into wide arrays.

HSS is not yet commercially available, but test units have been shipped to a number of Xaar customers. One enthusiastic early developer is the PCB manufacturer Circatex, based in South Shields, UK, whose Chairman, Steve Jones, also spoke at the IMI conference.

With all high volume PCB manufacture already lost in Europe and the US, the remaining suppliers must find ways to differentiate their production. As Steve Jones explained, "most European OEMs would like



to have local service, shorter lead times and also be able to procure locally – especially during prototyping and start-up situations.” If Europe cannot compete on price, then the key to future survival is to offer added value services.

Circatex believes that ink jet technology and Xaar’s HSS printhead will enable the company to offer the service model they are aiming to provide to their customers and Circatex has won substantial funding to support the project.

The key is making the production process more efficient and flexible. The attraction of digital printing technology is that it eliminates many steps required by traditional methods. The PCB manufacturing process is “too long and too complicated. I need to reduce the length, the number of steps and eliminate scrap,” explains Jones, adding “we have identified that ink jet printing offers the potential.”

The basic machine configuration is granite based with a 3,000Kg beam and a 12,000Kg base and a ‘print area’ of 3.8m x 2.6m. The first proof of concept machine is expected to incorporate 40 HSS printheads, with up to 100 printheads in the final machine.

Jones believes that PCB production using ink jet could be just the beginning of what the technology could offer, “the PCB is the foundation upon which electronic systems are built, so why should I stop when I have made the board? Ink jet technology is capable of adding value to my product...such as OLED inks for displays, photocell arrays, photonic circuits, resistors, capacitors and RFID.” And he concluded by asserting “our future is only limited by our imagination and ambition...we have to partner with other innovative people and companies.”

Europe’s largest PCB manufacturer working with Spectra

While Circatex is focusing on standard size PCBs, Europe’s largest PCB manufacturer AT&S, based in Austria, is working on further miniaturisation of circuits for compact mobile applications such as phones. This means printing components, such as resistors and capacitors, directly on the inner layer of PCBs, integrating them into a multilayer board. Using ink jet technology from Spectra, the development project started in 2003 and production of resistors began in 2005, with screenprinting expected to be phased out next year.

The production equipment produces 45 panels an hour and ink jet technology has been proved to be reliable and requiring low maintenance – critical features in a manufacturing environment.

AT&S also acknowledge the need for expert partners and are working closely with Spectra, the Christian-Doppler Laboratory and Tetenal in Germany for the development of inks for printed resistors.

Ricoh developing ink jet technology for printed electronics applications

Mark Elsbernd, Vice President Ink Jet Technology Division at Ricoh Printing Systems of America revealed at the IMI conference that they have been working on printed electronics applications for some time, starting with an evaluation system for direct patterning in 2002. Working in partnership with Harima Chemicals, Japan and Tokyo University, Ricoh completed trial manufacture of 5-layered PWBs in early 2004. Ricoh has successfully used Ag NanoPaste to ink jet print circuits on PI film achieving high fidelity printing without any distortion.

In a detailed presentation, Mark Elsbernd discussed the effect of surface treatment on dot size and the ink jet patterning algorithm required to produce tracks of sufficient smoothness, density and coverage. To demonstrate the success of their work, Elsbernd showed a working FM radio with a total thickness of 100µm, printed with Ag NanoPaste onto a Polyimide insulation layer and with a circuit layer thickness of 3µm.

First ink jet printed RFID tags?

Conductive Inkjet Technology (CIT) established in 2002 is a joint venture between Carclo and Xennia Technology. CIT's unique UV cure technology deposits copper on and around a polymeric honeycomb or sponge. The characteristics of the technology include excellent adhesion onto a wide range of non-porous substrates and a high level of conductivity.

Alan Hudd of Xennia Technology explained that, aside from being able to print the RFID antenna, one of the key strengths of ink jet is printing connectors. CIT's Print2Chip technology enables direct connections to chip pads to be printed and so offers an alternative to existing flip chip processes.

CIT has now moved from being a development project to product commercialisation – the technology was on display at the Productronica exhibition in Germany in November, with a device printing RFID tags.

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PHOTOS

High-resolution images are available for download from the Press Centre on the IMI web site www.imieurope.com



Steve Temple, Technical Director – Xaar plc



Steve Jones, Chairman – Circatex Group



Mark Elsbernd, Vice President Ink Jet Technology Division of Ricoh Printing Systems America Inc holding the sample FM radio circuits printed with Ricoh ink jet technology



Example of FM radios printed using Ricoh printheads and Ag NanoPaste – Ricoh Printing Systems America Inc



Erik Moderegger, Project Leader – AT&S AG

About IMI

The Information Management Institute runs the largest and most comprehensive conference and seminar programme in the digital printing industry. Each year over 2,000 industry technical and management personnel from over 600 companies attend around 20 events covering all forms of digital printing.

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