



It's not electronics as you know it, Jim,

- it may be the end of the PCB !

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Event report .... The “Packaging for IoT” Workshop

This IMAPS workshop featured tutorials and case studies covering the developing technology of Flexible circuits, reel to reel processing and printed electronics. A lot to take in for the 20 people who attended the workshop which took place on 7<sup>th</sup> February 2019 at the CPI facility in Darlington. The day also included a visit/tour to the new CPI facility at Newton Aycliffe to see real time production and development of these emerging technologies.



Host for the day Dr Simon Johnson of CPI, welcomed the delegates and presented the keynote tutorial addressing the 3 topics of Flex, Printed and reel to reel electronics. Along with many examples of the applications using these technologies Simon showed how “Smart Packaging” was the enabler of the IoT revolution and how this technology set could become part of the next generation electronics tool box

Professor Andrew Holmes of Imperial College, presented an overview of 2 of the Flex Hybrid Electronics (FHE) projects underway at ICU. ITTAPE and SIPEM. These projects have adopted novel approaches to assembly of the electronics using Thermosonic welding and laser (photonic) soldering techniques for bonding of components into multilayer flex assemblies. He showed some samples of the project results, including functional demonstrators fabricated with up to 10 circuit layers demonstrating very low joint resistances and good reliability.



A reality viewpoint and a discussion relating to some of the myths of what is termed IoT, was the essence of the M-Connected presentation from Peter Johnson. This presentation offered a complimentary but very different approach to the understanding of what IoT really is and how it will address future requirements. He gave an overview of what is needed in terms of using IoT devices for tracking and how data management is key to enabling the information to generate the required knowledge platform.

This morning session was completed with a breakout into 3 discussion groups who were asked to look at what the barriers to take up of IoT might be and to consider what might be the drivers enabling the take up of flexible hybrid electronics.

After a short lunch break, the 3 groups were transported to the CPI Newton Aycliffe facility which is now the CPI manufacturing centre for printable electronics and reel to reel assembly. The equipment had been recently transferred from the Sedgefield facility and had been added to, with a new High Tech, assembly line from Muhlbauer.

This tour was a highlight of the event, as it demonstrated the capability to manufacture high volume, low cost IoT type sensors as well as novel printed electronic display solutions. The equipment was



also demonstrating the assembly of hybrid large area printed electronics including assembly from wafer. Further it showed the capability for very high speed printing of conductive ink applications onto a range of substrates from Paper to PET.

The afternoon session began with a look at wearable electronics and the technologies for these that are in development at the University of Southampton. Dr Russel Torah showed images of the new £100 million cleanroom facility that houses the Printed Electronics Lab, which is where the work on E-Textiles is being undertaken. His presentation demonstrated materials fabrication methods with a number of applications demonstrated.



The final presentation of the day was a novel case study involving the use of a "smart" printed electronic sensor system to detect potential failure modes in the water industry infrastructure. Suhayl Zulfiquar, the CEO of Datatecnics showed a current application of monitoring water mains under pressure to predict where potential failure will occur. A unique and clear IoT application.

Finally, the 3 groups reconvened for a breakout session to discuss what the key takeaways were from this look at IoT applications and processes. These were reported back as:

- Group 1: Applications are the technology drivers, and interfacing with the application owner is important. Process development kits would be a great help for the design engineers behind these.
- Group 2: Considered that the cost of Flex electronics related to the application is the key driver. Factors holding back development were the battery sizes required not yet being small enough. For these technologies to succeed, a number of standards and tests need to be established. The problem of both sustainability and recycling of these IoT materials will possibly be a big issue in the near future.
- Group 3: The infancy of the Flex/Plastic Electronics was thought to be an issue as costs were likely to be similar to the existing PCB manufacturing industry. There are a number of barriers to be overcome to enable more applications however, the need for industry buy-in was crucial and more effort was required to create an awareness of these technologies.



Overall the workshop appeared to meet the expectations of the delegates and the presenters. IMAPS-UK extends its thanks to the CPI for hosting the event and to all the speakers for their time and support in making it a very successful workshop.