

Innovate UK

Project Lead:  JIVA

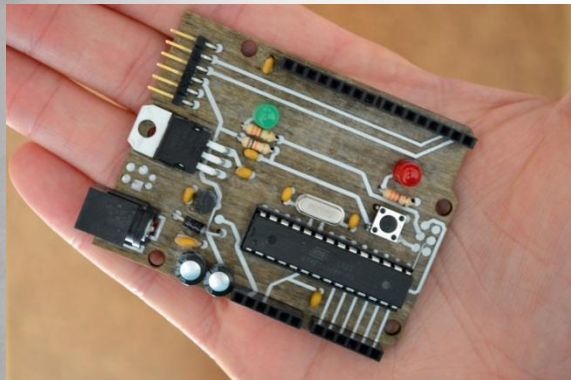
ReCollect

Efficient Manufacturing of Recyclable Composite Laminates for Electrical Goods



**Institute of Circuit
Technology**

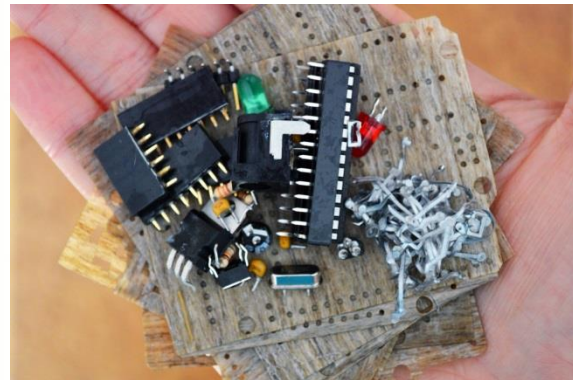
- A start-up whose aim is to reduce the impact of the fastest growing waste stream in the world using naturally derived products.
- The inventor of Soluboard® – a patented, competitively priced and fully recyclable printed circuit board substrate to rival the industry standard.
- Jiva will lead the specification and development of the thermoplastic input materials, as well as the conversion of the substrates into working circuit boards.
- An independent provider of services relating to composite materials.
- They offer a comprehensive range of capabilities that include materials & process development, pilot-scale manufacturing and prototyping.
- Coventive Composites will focus on the development of commercially-viable, scalable manufacturing processes for converting raw materials into substrates. They will also provide support for the testing of the substrates.
- The Institute of Circuit Technology (ICT), which promotes the technical aspects of PCB manufacture, will support dissemination and stimulate wider UK industry feedback on the developments.



Start Date: 1st October 2019

Duration: 30 months

Budget: £800,000



Partners: Jiva Materials

Coventive Composites

Institute of Circuit Technology

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- The project focuses on an alternative way of managing end-of-life circuit boards by removing PCBs made from difficult-to-recycle fibreglass-epoxy from the supply chain.
 - The primary aim of this project is to demonstrate the feasibility of producing Soluboard® in high volumes within the UK and show that Soluboard® can match the performance of CEM-1 and FR-4.
 - This will be completed using a novel process in development by Coventive Composites which allows the continuous production of sheet material.
 - The secondary aim of the project is to investigate the ability to chemically protect Soluboard® and allow it to be used in the existing aqueous processes of PCB manufacture.



■ **WP1 - Commercialisation**

Primary Focus – steering of technical , commercial and environmental regulatory requirements

Specifications from potential white goods customer have defined the properties required –

Electrical

Flammability

Mechanical

Several domestic goods manufacturers have shared the PCB designs for products

Matrix of tests designed to optimise formulation against requirements above



- **WP2 - Raw Materials**

Optimisation of the natural fibre reinforcements to meet processing and performance requirements for Soluboard manufacture.

- **WP3 - Substrate Manufacture**

Evaluation of thermoplastic sheet extrusion and fabric impregnation process and testing of the resulting substrates against FR-4.

- **WP4 - PCB Production**

Assessment of circuitry application to the substrate produced using the conventional copper etching process and silver printing.

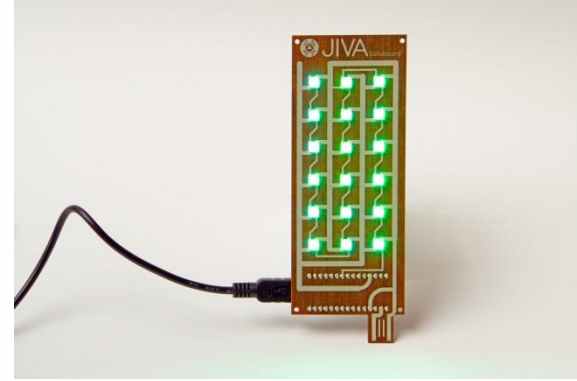
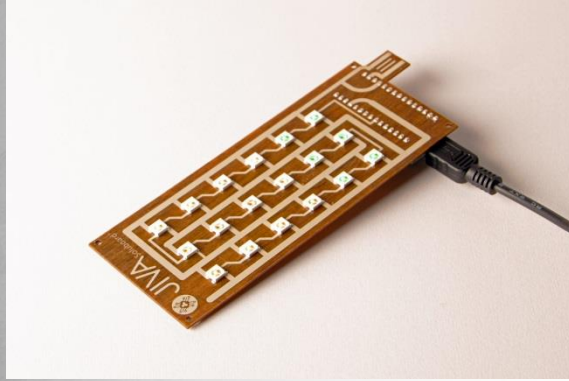


- **WP5 - Case Studies**

Design, manufacturing and evaluation of fully functioning populated PCBs as specified by the end customer.

- **WP6 - Project Management**

Overall coordination, administration, monitoring and planning of the project.



- Annual demand for FR-4 glass-epoxy circuit boards is 18.8 billion m², growing at 4.5% per annum.
- The FR-4 market can be segmented into 2.8 billion m² of single/double-sided boards – Jiva’s target market.
- 485 million household appliances were sold globally in 2017. This represents 14.6 million m² of laminates with a value of £220M.
- Jiva will target the markets of Europe and the US. This represents a market of 140 million appliances a year, translating to 4.2 million m² of laminates worth £60 million.
- Jiva predicts a realistic addressable market of 17 million m² (£250 million). This estimate is based on:
 - The overall market opportunity for single/double-sided FR-4 boards;
 - The obligations, willingness and capability to manage white goods at end-of-life;
 - Territorial accessibility considerations;
 - Market inertia in transitioning from an incumbent technology.
- Jiva is targeting a 5% share by 2027, translating to 0.85 million m² of Soluboard worth £13 million.



Environmental & Social

- The UK generates around 1 million tonnes of e-waste annually. Analysis has shown that large household appliances i.e. white goods are the largest contributor at 320 kt.
- PCBs will only be a small proportion of this tonnage, the electronic components they are populated with often contain toxins, such as lead, cadmium and mercury.
- The Global E-Waste Monitor 2016 report states that of the 44.7 Mt of e-waste generated globally, only 8.9 Mt was documented as collected and recycled - less than 20%.
- Jiva will push for the safe recovery of e-waste and address directly the environmental issues it can cause.

Economic

- The current cost of landfill is £91.35 per tonne. This is a significant non-productive cost to the UK economy when dealing with e-waste.
- The UK is now far behind Europe for natural fibre production, with minimal flax grown and only 800 hectares of hemp grown compared to 33,000 hectares in Europe.
- A demand for natural fibre reinforcements for use in PCBs could help invigorate the UK rural economy.

