TFI Confirmed Pitches 21st January 2021

Torftech Project

High temperature microwave processes have the potential to provide step changes in energy and resource efficiency across the foundation industries including cement, paper, and ceramics. These applications have significant promise at laboratory scale with 2000 journal papers published annually. However, few if any, applications of microwave technology exist at a commercial scale above 200°C. Attempts to date have failed due to the range and complexity of a number of multidisciplinary challenges which must all be addressed to reliably scale up. Our work has shown that solutions to these challenges relate to integration of expertise around materials, microwave and process engineering.

We have developed a platform technology at TRL5 which addresses these challenges and this project will prove the technical and economic business case for the implementation of these technologies in the foundation industries.

We are looking for partners who are end users with challenges in these industries particularly around process heating, efficiency and process control, heat transfer, productivity, and product yield / quality and would look to work with these end users to develop and validate this business case for their specific needs in each scenario and market.

Adaptavate Project

Adaptavate have a patented non gypsum based alternative to plasterboard. We use Lime, low carbon cementitious binders, paper and cement as materials, as well as agricultural waste, to deliver a high performance, biodegradable, low carbon alternative to plasterboard. Plasterboard is currently responsible for 3% of GHG emissions in the UK, a greater amount than air travel. We have a current innovateUK co-funded project that is developing accelerated carbonation of our binder through capturing waste CO2 from industrial processes. We have identified some technology from the glass sector that can use waste to enable us to develop an insulation backed version of our plasterboard using similar carbon capture technology as we use in our plasterboard. We are intending to lead the project, we have some good academic and industrial partnerships but we are looking for collaborators from the lime or cement industries, we currently don't have a collaborator from the paper industry, and we would be interested in talking to more people from the glass industry.

Turation Project

We are an AI startup from Cambridge working on industrial applications and, particularly, automated real-time inspection and monitoring to improve productivity and efficiency, reduce waste and machine downtime.

Currently, we are developing an AIoT system with a Generalised AI engine for automated online detection and classification of manufacturing defects. AIoT stands for AI-of-Thins and combines AI and IoT technologies in the way that AI is located on the Edge next to the interconnected sensors and IoT devices to enable real-time sensor feed processing and on-time response without human intervention. Our key innovation in this project is Generalised AI to overcome the limitations of today's Narrow AI usually performing a single narrow task and having lack of generalisation capabilities. For example, this technology enables automated recognition of rare and even previously unseen defects by detecting anomaly and predicting its roots based on its similarities to known defects. Overall, this technology is more adaptable to new, evolving or highly variable data. It also allows AI agent to share, transfer and reuse previously gained knowledge across applications or even idustries, e.g. detection of manufacturing defects for several different products or using knowledge of manufacturing defects to detect exploitation failures of products.

We, as a solution provider, are ready to lead the project but it is also totally fine for us to join other's project which can incorporate our solution. We are looking for partners from the foundation industries who own the challenge we can address with our solution.

This competition has a requirement of two manufacturing companies from different foundation industries in a single consortium. As our Generalised AI technology is specifically designed to adapt to different applications or industries, it may be a good fit for multi-industry consortium project. That's why we are interested in this competition and want to reach out to potential partners to create such a consortium.

Carbon Re Project

Carbon Re is a UK-based early stage technology start-up focussed on developing AI-powered solutions to help Foundation Industries reduce their costs and carbon emissions.

Using AI to leverage unexploited process efficiencies, we can cut manufacturing fuel and electricity costs by up to 8% and fuel-derived emissions by up to 20% today.

Our solution is based on a unique Zero Loss framework developed through EPSRC funded Cambridge University research by our co-founder, Daniel Summerbell, and cutting-edge R&D on AI applications for energy efficiency at UCL by our co-founder Aidan O'Sullivan.

We would like to lead a collaborative proposal, and are looking to lead a for R&D partners from two foundation industries to collaborate on applying AI forecasting and optimisation tools on real time data in order to:

- Develop sector specific Zero Loss AI solutions
- Understand and leverage cross-sector commonalities for efficiency gains
- Validate financial saving assumptions
- Test the scalability of our solution

TWI

TWI has recently invented a highly disruptive, new sub-surface machining technique called CoreFlow™. This solid state process is a development of friction stir welding (FSW) and friction stir channelling (FSC) which allows for sub-surface networks of channels to be integrated into two-dimensional or three-dimensional monolithic parts in a single manufacturing step. These channels could then be used for heat exchange or other applications. TWI has recently invented and patented a new stationary shoulder variant of FSC (SSFSC) that has overcome many drawbacks of conventional FSC.

CoreFlow™ already looks set to find revolutionary applications in the manufacture of heat exchangers, cooling systems, integrated fluid management and the general light-weighting of structures (https://www.twi-global.com/media-and-events/insights/coreflow-a-sub-surface-machining-process).

We have two ideas as potential applications of CoreFlow in the Foundation Industries:

- Integration of water cooling channels in mould for the metal and glass industry: copper moulds for continuous casting could be produced with CoreFlow and integrate cooling channel directly into their structure without needing complicated manufacturing processes or multi-component moulds.
- Integration of heat recovery structure into metallic pipes and sheets. This concept can be applied to any of the foundation industry. We think about cement where a lot of heat is actually wasted in transportation and storage of the cement.

We plan to be partner in a bid, not to lead. We could consider leading in case no other partner has the experience, or in general if our leading role would bring any other benefit.

We are looking mainly at partners from the foundation industries interested in adopting CoreFlow for the manufacturing of casting or moulds. Moreover, we are looking for direct supply chain companies

for the foundation industries that could adopt CoreFlow for the creation of innovative heat recovery systems.