

Libertine and Productiv to collaborate on modular Smart Engines



13 March 2019, Sheffield, UK: Libertine FPE (“Libertine”), the creator of Smart Engine technology for electric vehicles (EVs), has joined forces with Productiv, a provider of venture engineering services for cleantech businesses, to accelerate and de-risk commercialisation of a range of modular Smart Engines using Libertine’s intelliGEN platform.

The collaboration will focus on delivering electric vehicle and lab-based prototype power generator systems to showcase Libertine’s modular Smart Engine packaging concept, and demonstrating the Smart Engine performance made possible by Libertine’s linear e-machine and controls technologies.

In addition, Libertine and Productiv are planning to establish pilot manufacturing systems at Productiv’s facility at The Proving Factory in Coventry to support Smart Engine client product developments with pre-production prototype systems including full vehicle demonstrations.

Smart Engines at a glance

A Smart Engine has the crankshaft replaced by software-controlled linear electrical machines that generate electrical power and govern piston motion to optimise the combustion process. In addition, advanced data logging, analytics and diagnostics functions in Smart Engines will reduce maintenance costs and improve demand response. Libertine’s real-time electronic piston motion control and adaptive control algorithms will help make Smart Engines that are far more efficient, cleaner and more flexible than conventional engines.

Smart Engines are a key technology in the acceleration of global automotive electrification. Libertine’s modular Smart Engine technology platform permits complete power generator systems ranging from 20-60kWe to be integrated within the envelope of an existing EV battery pack enclosure, alongside a smaller stack of battery cells. This approach allows EV manufacturers to offer a single vehicle platform with different combinations of battery cell and fuel energy capacity, according to user needs, charging infrastructure and regulations in different markets.

Productiv boasts deep expertise and an enviable track record in commercialising low carbon powertrain technologies for emerging vehicle applications. This will enable Libertine to manufacture and commercialise Smart Engines fuelled by a range of renewable and low

carbon fuels over next three years. The collaboration exemplifies the strength of the UK's innovation leadership in low carbon automotive technologies.

Says Anand Lakhani, Managing Director of Productiv: "Productiv and Libertine have a strong shared vision for the role of innovative UK businesses in the global electrification of transport. We believe that the strength of Libertine's technology and team, complemented by Productiv's capabilities, will address the key remaining challenges for Smart Engines."

Says Sam Cockerill, CEO of Libertine: "Taking complex technology to market requires strong strategic partners – a lesson we have learned from other technology IP businesses such as Arm. Productiv's facility at the 'Proving Factory' provides a path to start volume manufacturing earlier than we could do alone, and will enable our customers and partners to gain access to production grade Smart Engine technology, shortening their time to market."



About Productiv

Productiv is the UK's only single access point supplier of Venture Engineering services: combining the financial support of venture capitalists with the practical capabilities of experienced engineers to help inventors and technology developers to transform their ideas and prototypes into profitable products and businesses, while retaining control of their Intellectual Property (IP). Working with rather than for, its clients, Productiv works across a variety of projects but all have one thing in common: they involve clean technologies, whether for the energy, power or transport sectors. Productiv's services include:

- ! **Production Oriented Prototyping™ (POP)**: a prototype manufacturing approach which ensures development prototypes go together 'right first time', saving development time and rework costs.
- ! **The Green Staircase™**: a product and market development methodology, based on automotive Advanced Product Quality Planning (APQP), but much more agile and adapted to the needs of small companies.
- ! **The Proving Factory®** is the building in which Productiv operates. It offers purpose-designed facilities to take technologies from prototype to low volume production.
- ! **Product Development Companies (PDCs)** are the businesses Productiv creates as joint ventures with technology developers to enable Productiv to invest money and expertise in turning their technologies into products and taking them to market - sharing the investment, risk and reward!

See: www.productiv.co.uk

About Libertine

Libertine makes Smart Engines for Electric Vehicles and distributed power generation. In future, most vehicles will require an on-board electrical power generator. Smart Engines running on a variety of cleaner and sustainable fuels are an essential part of this future – not only on board electric vehicles, but also in a wide variety of distributed power applications. Smart Engines could produce at least 30% more power from the same fuel input, whilst being cleaner, quieter and easier to use and maintain than today's power generators. Libertine is enabling this revolution in internal combustion engine performance with its proprietary electronic piston motion control and high-performance linear machines. Smart Engines using this technology will play a major role in global transport and power generation for decades to come. The addressable market for Libertine's technology is estimated to be in excess of US\$100 billion by 2025. See: www.libertine.co.uk

About intelliGEN

intelliGEN is a 20-60kWe modular Smart Engine development platform for OEMs targeting series hybrid vehicles and distributed power applications. It represents the shortest path to market for any manufacturer planning to develop a Smart Engine product.

The same platform also forms the basis for a uniquely flexible research platform for academic research and low temperature combustion development activities. See: www.intelli-GEN.com