Innovate UK

Results of Competition: IDP13 OLEV Ultra Low Emissions Stream 2 CRD2
Competition Code: 1609_CRD2_TRANS_IDP13ST2

Total available funding is £13.2m from OLEV

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Equipmake Ltd	Cost Effective Electric Bus (CELEB)	£1,764,313	£1,235,019
Potenza Technology Ltd		£430,211	£301,148
CSA Group Testing UK Ltd		£300,966	£150,483
Semikron Ltd		£50,565	£25,282
DEPE Gear Company Ltd		£115,790	£81,053

Project description - provided by applicants

Cities globally are under pressure to improve local air quality and reduce CO2 emissions. This has created a market pull for zero emission buses.However market adoption has been slow as current solutions are too expensive and heavy, mainly due to the cost and size of the battery pack required. The heating, cooling and ventilation (HVAC) of an electric bus can use as much energy as for traction. By novel integration of the HVAC the energy required and therefore battery capacity can be reduced by 30%. This project will deliver a truly cost effective electric bus via novel integration of the HVAC, and will incorporate a new novel vehicle wiring solution from Potenza Technologies which will simplify the wiring loom significantly. The project is a collaboration which also includes leading traction battery manufacturer Nissan, one of the largest bus manufacturers in Brazil, Agrale, leading power electronics supplier Semikron, UK gear manufacturing company DePe, and bus testing experts CSA Testing.The projects collaborative and specialist sub-contract partners will enable the consortium to get to market with a relaible product in the shortest possible time.

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Wrightbus Limited	Next Generation Hybrid Bus (NexGenHyBus)	£2,229,285	£1,114,643
The Queen's University of Belfast		£703,919	£703,919
London General Transport Services		£80,108	£40,054
Project description - provided by applicants			
NexGenHyBus will develop a mild hybrid architecture for fuel efficient buses. Wrightbus has successfully developed three generations of "micro-hybrid" architecture. These systems recuperate braking energy and use it to power ancillary systems rather than vehicle propulsion. NexGenHyBus will build on previous micro hybrid architectures. Retaining those system features of extensive ancillary electrification, drive assist will be added at a fraction of the cost of a full (high voltage) hybrid system. The project will examine a range of possible mild hybrid architectures with specific provision made for vehicle systems with a significant air-conditioning load to be provide by electrically driven compressors. A dual battery system will be developed with battery storage and electric motor/generators. Extensive modelling simulation and testing activities will be undertaken by Queen's University Belfast. Vehicle trials will be undertaken by Go-Ahead Group.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Ford Motor Company Ltd	CHASSIS (Composite Hybrid Automotive Suspension System Innovative Structures)	£974,634	£487,317
Autotech Engineering R&D UK Ltd		£879,832	£439,916
NCC Operations Ltd		£599,500	£599,500
University of Nottingham		£164,998	£164,998

Project description - provided by applicants

The automotive industry is heaviliy being driven towards weight reduction as a means of achieving ever more demanding emissions (CO2 and fuel economy) requirements. Lower weight solutions for traditional steel and aluminium chassis components are failing to deliver the step improvements required to give lighter LCVs or the required weight reductions for Hybrid Vehicle Architectures. This project focuses on the development of hybrid composite/steel material solutions; used in a optimised way to save weight via step reductions in material weight but also via reduction of parts and interfaces across a full Transit van chassis. This will be done by using some of the latest Design and Process optimisation tools available on the market today.
An essential part of the project is the selection and development of a reliable, robust and cost effective composite manufacturing process since rapid, repeatible and productive processese are key to accelerate the use of composites for mass production vehicles. The aim of the project is to achieve a 37% weight saving (circa 25Kg) over the existing full steel Transit Van chassis without reducing any of the vehicles perfomance attributes

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Romax Technology Limited	EDISON: Electric Drivetrain Integration by Simulation and OptimisatioN	£840,506	£504,304
Jaguar Land Rover Ltd		£463,342	£231,671
Chelton Limited		£492,716	£246,358
GRM Consulting Ltd.		£412,986	£289,090
National Physical Laboratory		£100,527	£100,527
University of Sheffield		£494,180	£494,180

Project description - provided by applicants

This project will reduce vehicle emissions by developing (i) a novel ferrite motor technology for a passenger vehicle application, and (ii) electro-mechanical analysis tools enabling high levels of system integration. Permanent magnet (PM) machines are most common for EV/HEV due to superior efficiency and power density. Rare-earth types are prevalent but suffer from supply chain issues, which can be removed by using ferrite PMs. Initial studies show that significant increase in efficiency and power density is possible, achieving values similar to rare-earth machines. The project will develop analysis tools to optimise system performance - efficiency, NVH, durability, thermal performance, cost, and lightweighting. The structural design of a ferrite motor is challenging, hence this topology will form the basis for the analysis tool development, with results transferable to other topologies. Co-simulation of state of the art electromagnetic, thermal and structural physics will be used to derive novel, faster, yet accurate, reduced order models which capture electro-mechanical interactions as early as possible to improve process efficiency and achieve true system optimisation. Testing of material properties (laminations and magnets) will improve the structural and electromagnetic models. The prototype drivetrain will be tested to demonstrate system interactions and vehicle-level efficiency improvements.

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Results of Competition: **IDP13 OLEV Ultra Low Emissions Stream 2 CRD2**
Competition Code: **1609_CRD2_TRANS_IDP13ST2**

Total available funding is £13.2m from OLEV

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Jaguar Land Rover Limited	Combining brake & propulsion systems into Integrated Torque Actuators Module	£1,824,686	£912,343
Williams Advanced Engineering Limited		£1,358,857	£679,429
Sevcon Ltd		£200,155	£120,093
Xtrac Limited		£580,288	£290,144
HORIBA MIRA Ltd		£152,307	£76,154
Alcon Components Limited		£205,740	£123,444
University of Birmingham		£60,868	£60,868
University College London		£210,802	£210,802
University of Lancaster		£59,001	£59,001
University of Leeds		£138,616	£138,616

Project description - provided by applicants
Energy capture through re-gen braking reduces the duty on a conventional friction brake system. However the ultimate energy storage capacity, weight & residual drag of the friction brake systems have remained unchanged. This is because emergency duty cycles (e.g. ABS) require independent control of the tyre contact patch. A single electric machine (EM) per axle mechanically couples both wheels and cannot offer the level of control required. Consequently significant friction brake downsizing or integration has not been realised to date. That said, multiple independent EMs (1 per corner) do offer the opportunity for integration with the friction brake. This consortium aims to integrate the brake and propulsion systems together into “Integrated Torque Actuator Modules” (ITAMs). It is anticipated these modules would be smaller, lighter and lower cost, yet realise significant vehicle attribute enhancements. The consortium will design, develop and prototype the ITAMs and establish whether they are capable of; 1. All duty cycles including ABS and dynamic stability control (DSC), 2. Zero residual drag torque, 3. Brake emissions capture and storage. 4. zero servicing.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Great British Sports Cars Ltd (GBS)	LowCarbonCar – Low Carbon emission EV/HEV carbon fibre sports Car	£1,457,609	£1,020,326
Far-UK		£355,384	£248,769
Rockfort Engineering Ltd		£1,182,564	£827,795
Project description - provided by applicants			
The LowCarbonCar (Low Carbon emission EV/HEV carbon fibre sports Car) project focuses on a modular zero emission, high performance sports car. It will feature a four wheel drive electric system fitted into a lightweight carbon fibre chassis offering zero emissions over shorter journeys (100 miles) and low emissions over longer journeys when fitted with the range extender module (REM).			

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