



News release

Flybus to start testing first flywheel hybrid bus

Completed prototype system appears at Low Carbon Vehicle exhibition

6 September 2011 The Flybus consortium has reached a significant milestone with the successful integration of prototype hardware into an Optare Solo Midibus. The Flybus system, which should cost significantly less than current electric hybrids, uses a Ricardo Kinergy flywheel as the energy storage medium and a Torotrak continuously variable transmission (CVT) as the means of transferring energy between the wheels and the flywheel. The entire installation is mounted on the existing transmission's Power Take Off facility.

“The recovery and reuse of kinetic energy during stop-start drive cycles is a priority for bus operators, not just because of the positive impact on emissions but also because it reduces fuel costs and brake wear,” says John Fuller, Product Leader for Kinetic Energy Recovery Systems (KERS) at Torotrak. “Electric hybrid systems are expensive, often doubling the transaction cost of a bus. Initial cost estimates suggest that the Flybus system could be available at a fraction of the cost of an electric hybrid, whilst simulation results indicate fuel savings comfortably in excess of 10%. With the completion of the mechanical design and installation phase of the programme, we are now ready to start evaluating the fuel economy benefits on the vehicle itself.”

Flywheel hybrids, just like electric hybrids, recycle the kinetic energy that would otherwise be wasted when the vehicle brakes. As the bus decelerates, the CVT transfers energy from the vehicle wheels to the flywheel, spinning it up to speeds of around 60,000rpm. As the vehicle pulls away from rest, the CVT returns energy from the flywheel to the wheels, reducing the engine power requirement and hence lowering fuel consumption.

A key enabler of this technology is the Torotrak CVT, which can transfer in excess of 60kW of power in a package weighing less than 10Kg. High levels of efficiency, together with ‘torque control’ – in which torque rather than ratio is controlled – make the technology an ideal fit for a flywheel drive. The second key enabler is Ricardo’s Kinergy flywheel, which uses a compact and low cost magnetic coupling to transmit torque to the flywheel whilst providing the required step-up gearing. Furthermore, use of a magnetic drive facilitates flywheel operation within a sealed vacuum, whilst eliminating the need for inefficient mechanical gearing and rotating seals. The result is a system which exhibits very low levels of power loss.

”The commercial vehicle industry has a real appetite for an affordable and packagable hybrid system,” says Fuller. “The continued advances in flywheel hybrids make them an increasingly attractive alternative to conventional hybrid systems. This next stage of the programme will begin to show their capability in the real world.”

Part-funded by the UK’s Technology Strategy Board as part of its Low Carbon Vehicles initiative, the Flybus consortium brings together engineers from bus maker Optare, engineering consultancy Ricardo and traction drive technology specialist Torotrak. Automatic transmission supplier Allison Transmission Inc is also participating in the project on a self-funded basis.

The consortium will present the prototype flywheel hybrid transmission at this year’s Low Carbon Vehicle event on 7-8 September at Rockingham Motor Speedway in Corby, Northamptonshire.

ABOUT TOROTRAK

Torotrak is the global innovator in gearless traction drive technology which increases efficiency and reduces CO₂ emissions in vehicles. The company’s variable-drive technology is also being developed for superchargers, engine auxiliary applications and enables energy to be recovered efficiently through flywheels, substantially improving fuel economy.

Torotrak is taking gearless traction drive technology from the test track to the road, putting its proven innovations into mass-production. The company has shown how its transmission technology can reduce CO₂ emissions, conserve energy, save costs and significantly boost efficiency.

The company’s engineers deliver world-class technology to its customers that include major vehicle manufacturers and tier-one suppliers. Development has led to customers working on production-ready designs for mass production. The company is fully listed on the London Stock Exchange (LSE: TRK).

www.torotrak.com.

ABOUT RICARDO:

Ricardo is a leading provider of innovative engineering solutions and strategic consulting to the world's automotive, transport and energy industries, combining business, product and process strategy with fundamental technical research and the implementation of large-scale new product development programmes. With a network of technical centres in the UK, North America, Germany, China, India, Japan and the Czech Republic, Ricardo serves a wide and balanced customer base in the automotive, transport and clean energy sectors.

For more information about Ricardo, go to www.ricardo.com

ABOUT OPTARE:

Optare plc is a leader in the UK bus and coach industry. The company specialises in the design, manufacture and supply of single and double-deck buses, coaches and smaller vehicles, and also offers a comprehensive after sales service.

For more information about Optare, please contact: Martin Hayes/David Rowlands at Automotive PR – 0207 494 8050 or go to www.optare.com

ABOUT ALLISON:

Allison Transmission, Inc. (Allison) is the premier global provider of commercial duty automatic transmissions and hybrid propulsion systems. Allison products are specified by over 250 of the world's leading vehicle manufacturers and are used in many market sectors including bus, refuse, fire, construction, distribution, military and specialty applications. Founded in 1915, the Allison business is headquartered in Indianapolis, Indiana, U.S.A. and employs approximately 3,000 people. Regional headquarters with dedicated support staff are located in China, The Netherlands, Brazil, India and Japan. With a global presence in 80 countries, Allison has over 1,550 distributor and dealer locations.

More information about Allison is available at www.allisontransmission.com

ABOUT THE TECHNOLOGY STRATEGY BOARD:

The Technology Strategy Board is a business-led executive non-departmental public body, established by the government. Its role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve the quality of life. It is sponsored by the Department for Business, Innovation and Skills (BIS). For further information please visit www.innovateuk.org

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The UK's Flybus consortium aims to demonstrate an affordable alternative to battery hybrid systems that can reduce buses' fuel consumption



The flywheel-CVT hybrid system bolts directly onto the vehicle's transmission, recycling the kinetic energy that would otherwise be wasted when the vehicle brakes



With successful integration of prototype hardware into an Optare Solo Midibus, the Flybus consortium will test the flywheel hybrid system's predicted fuel savings

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