Transport of the Future at Heathrow

New unmanned electric Personal Rapid Transit (PRT) vehicles being introduced to Heathrow Airport are set to revolutionise the transfer of passengers between two remote stations at the T5 Business Car Parking and the Terminal 5 Building. Running smoothly on rubber tyres over steel and concrete elevated guideways approx 2 metres wide, the 4-6 seater battery powered Urban Light Transport (ULTra) "pods" are ideal for transporting families and other groups. The service will provide an innovative, fast, safe and comfortable alternative to cramped airport buses.

The ULTra PRT system has been developed by Advanced Transport Systems Limited (ATS) who began the project in 1995 in association with the University of Bristol. The Heathrow pilot system is planned for introduction towards the end of 2009 and is a world first, offering an exciting vision for transport of the future. Its minimal environmental impact is also way ahead of its time, providing the required Kyoto Agreement's 60% reduction in carbon emissions over conventional automotive engines decades ahead of the 2050 target date.

As a global company specialising in the design and manufacture of embedded single board computers, Eurotech has been closely involved in this project with Arrowvale Electronics through the supply of the PROTEUS embedded computer for the communications system. The system, designed by Arrowvale Electronics, one of the UK's leading suppliers of rail safety equipment, provides:

- **Wireless communication for 2-way data and exchange of instructions from vehicle to control centre**
- **Microphone for passenger communication**
- **CCTV and video screen data passed to Communications Controller**

The communications system is a vital part of the PRT operation, delivering routing and scheduling instructions to the vehicles from a central control centre, and communicating their progress and status back to control.

Development to date

The ULTra PRT vehicles are the result of 14 years research and development by ATS from the concept stage, with the current technology the subject of 8 years developmental work. At present, the project is in the site testing phase. No system failures have been identified in four years of rigorous testing, which has included hazard analysis, failure modes and effect analysis undertaken in conjunction with industry safety specialists.

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This has shown that the system provides similar safety levels to trains and is about 10 times safer than motorcars. ATS has worked closely with HM Rail Inspectorate and in 2003 the company received a consent letter from HMRI approving the system for operating with the public. Safety features in each

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vehicle include smoke detector, emergency fire extinguisher and two internal CCTV cameras to monitor the cabin. Weight sensors are also included to stop the vehicle from operating if overloaded.

Manufactured by ARRK, the world's largest prototyping, tooling and moulding manufacturer, and with integration and key software development handled in-house by ATS, the vehicles offer non-stop travel between destinations and can carry a maximum 450kg payload. Measuring 3.7m long x 1.47m wide x 1.8m high, there is ample room for passengers and luggage. Wheelchairs and pushchairs are also well catered for within the spacious interiors and by excellent platform access at the stations. Travelling only with companions of your choice will also be very attractive for vehicle passengers.

It is planned that 21 vehicles will travel the 1.4 km between Airport T5 Business Parking near Longford Village and the Terminal 5 building. Maximum speed will be 25 mph and average waiting time is expected to be less than 15 seconds and never more than one minute. Power is provided by a battery pack supplying an average 2Kw of motive power, but adding only 8% to the gross weight of the vehicle. Travelling on segregated guideways means no congestion and a non-stop rapid transit service.

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The vehicles are air conditioned and also very quiet, with 45dB from 10m distance when travelling at 10m per second, about 20dB less than motorcars. As well as free passenger transfer to the Terminal, which handles over 90% of British Airways traffic, they will also be able to provide a useful service for the local community.

PROTEUS reliability

Eurotech's long experience in transportation and surveillance applications enables it to supply robust systems that maintain high reliability and precision. The PROTEUS single board embedded computer, which drives the ULTra communication system, is ideal for applications requiring high end performance in a fanless, rugged package.

Measuring 155mm x 110mm, the PROTEUS works off an 8.5 to 24V DC (+12V nominal) power supply and incorporates a low heat generation Intel® Atom™ Z530 Processor 1.6GHz (2.3W). Memory is up to 1GB (400/533MHz) DDR2 SDRAM. The ATMEL TPM provides TCG v1.2 compatible SMBUS interface.

Tim Taberner, Sales Manager of Eurotech commented: "The PROTEUS provides the performance, reliability and scalability to handle the requirements of the Heathrow PRT system. This is a very exciting project that will transform the passenger experience at the airport."

In addition to transportation, Eurotech's customer sectors include Communications, Defence, Security and Industrial Engineering. The company also specialises in the design and manufacture of application ready platforms, configurable systems and ready to use solutions.

PRT@LHR

In April this year, Heathrow's PRT system was showcased to an international audience of transport specialists from 16 countries. Sponsored by the Advanced Transit Association, which promotes the investigation and development of advanced transit technologies and strategies, the PRT@LHR Conference has been considered as a "milestone event" in the history of the PRT industry.

As well as viewing the ULTra vehicles in operation, touring stations and studying the interiors, ergonomic controls and emergency egress systems, delegates visited the ULTra control room. Supplementing information from the PROTEUS driven communications system, the controllers will be able to tap in to other key operating systems at Heathrow, including flight information and traffic conditions approaching the Airport. This will allow them to predict demand and position vehicles accordingly.

This sophisticated communications control facility will become increasingly necessary with the development of the PRT system. Potential expansion envisages a widespread network, with 30km of guideways, 350 vehicles and 50 stations servicing Terminals 1, 2, 3 and 5. Hotels and office blocks in the vicinity of the airport would also be linked in. This attractive, efficient and environmentally sound transport concept could provide a blueprint for many other driverless vehicle applications worldwide.