



Heathrow Tests Personal Rapid Transit System

By Robert Nordstrom

Driving into some major airports at peak arrival/departure times can be as frustrating as winding through a large city during rush hour. In addition to accommodating a high volume of traffic, however, airports also have to address security issues. Some are severely constrained by limited land availability as well.

London's Heathrow International Airport (LHR), one of the busiest airports in the world, saw the writing on the wall — or the traffic congestion around the terminals — early in the decade. The overcrowded tunnel system that provides the only access to its central terminal area had no capacity for expansion. Airport authority managers knew adding shuttles and more taxis would only make traffic snarls worse.



David Holdcroft

Heathrow's owner and operator, BAA Airports Ltd., took steps to remedy the situation in 2004 by contracting to have a personal rapid transit (PRT) system installed at the airport on a "proof-of-concept basis." The following year,

BAA believed enough in the concept as presented by Advanced Transport Systems Ltd. (ATS) that it purchased 25% of the company's stock.

BAA's PRT manager David Holdcroft describes the concept as a space efficient system that fits into areas that other systems cannot.

"We believe it will be a very good way to move people around," says Holdcroft. "Passenger services are very good with virtually no waiting time, passengers move nonstop to their destination and journey times are greatly reduced."

With construction of the 2.4-mile PRT system complete in June, operational testing is slated to begin in July. The system is scheduled to open to the public in late 2009.

Rapid Transit Gets Personal

ATS' ULTra (urban light transport) PRT system consists of driverless pod-like vehicles that run on a dedicated single-direction guideway. Each battery-driven vehicle carries up to four adults plus baggage. Passengers will board the vehicles at one of three stations (two at a car park and one in Terminal 5) after selecting their destination on a touch screen. The programmed vehicle transports passengers nonstop to their chosen destination at a speed of up to 25 miles per hour.

According to ATS, the system creates zero local emissions and is typically 50% more energy efficient than airport buses. Supported on a

► Facts and Figures

Project: Personal Rapid Transit System

Location: London Heathrow International Airport

Airport Operator: BAA Airports Ltd.

PRT Vendor: Advanced Transport Systems

Cost: Approximately \$41 million (£25 million)

System Details: 21 driverless vehicles, each capable of carrying four passengers plus baggage, travel a 2.1 meter-wide guideway between a car park and Terminal 5. The battery-operated vehicles travel at 25 mph, with a transit time of 5 minutes.

Project Initiated: 2004

Operational Testing: July 2009

Passenger-Ready (projected): Late 2009

Key Players:

Structural Design: Arup

Architect: Gebler Tooth Associates

Cost Managers: Doig and Smith

Vehicle Manufacturer: Arrk

Vehicle Protection System: Redpath

Human Factors: Gary Davies Associates



space-efficient steel structure, the vehicles are guided by sensors embedded in the vehicle. Their lead acid batteries recharge while the vehicles are stationary.

The system's environmentally friendly features helped the airport secure permission to build a portion of its guideway on leased green-belt land — a difficult task for any entity, according to Holdcroft.

"You can't just keep putting more buses on the road," he explains. "All that does is slow down the buses that are already there and put more fumes and emissions into the air."

The entire system is overseen by a central control system managed by ATS software. The 21-pod fleet of vehicles is controlled via a synchronous control system similar to that used in air traffic control. Vehicles are launched from their berth only when a slot is free, which reduces passenger wait time and ensures lower environmental impact.

Transport and waiting time from the car park to the terminal has been decreased from approximately 20 minutes by bus to 6 minutes via PRT, with virtually no wait time for a vehicle. Up to 500,000 passengers are expected to ride the system each year.



Martin Lawson

A staff of 21 people working three shifts currently manages the system. ATS founder and deputy chairman Martin Lawson highlights the company's experience managing similar transportation systems, noting that its project operations director at Heathrow previously ran Manchester's large light rail system.

Holdcroft concedes that the system is slightly overstaffed now, but an economy of scale kicks in as the system grows. "This system can be expanded to four or five times its current size and still be managed by the same number of staff," he explains.

Minimal Infrastructure

As with many airports, space restrictions for constructing a transport system was a major consideration at Heathrow. Positioned at the end of the runways, the guideways had to be designed in a way to avoid building structures and meet height restrictions.

The ULTra system's vehicles run on a guideway that's just more than 2 meters wide — compact dimensions that suited Heathrow's space constraints. The lightweight modular infrastructure uses between one-third and one-tenth of the resources necessary for other transportation infrastructures, which offers additional benefits in cost and construction time.

"What we've done," notes Holdcroft, "is basically layer a new transport system on top of all of our existing transport systems at the airport without any disturbance."

Although alignment was challenging because of constraints at that end of the airport, only a bit of airside fencing needed to be moved during installation.

"All the services and buildings remained in operation, and even road closures were very short — basically overnight," he reports. "So there were no disruptions for travelers."

In preliminary studies for the project, planners determined that a PRT system could be installed in one of the airport's smaller tunnels and could carry more people to and from the terminal area than one of the two-lane tunnels.

"We decided that we would close the outbound taxi tunnel and put in two lanes of PRT," Holdcroft explains. "Our simulation modeling told us that this would work, but when we actually closed it down, we found out that the simulations were not correct for the evening peak hours. If there were any traffic problems such as a breakdown or lane closure, there was no slack in the system."



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Back at the drawing board, PRT planners determined that they would instead install the PRT system between a 1,500-space car park and the new Terminal 5, which would open in 2008. With the new terminal projected to service 30 million passengers annually and add approximately 50% more airport capacity, a sufficient amount of traffic has now been transferred from the other terminals to Terminal 5 to allow closure of the side bore tunnel for PRT, if required in the future.

The Sky's the Limit


Although Heathrow's PRT is just beginning operational testing and BAA has no official plans for expanding the system until data are analyzed, management is nevertheless optimistic about the future of system at the airport. If test data pan out as expected, Holdcroft explains, the PRT could be connected to other terminals and car parks as well as with car rental agencies, office blocks and hotels.

In addition to easing traffic congestion and controlling emissions around the airport, the system could also include "smart" capabilities that could change the way travelers interact with the airport environment.

"The system can be developed to the point where travelers don't need to know where they are going but just need to know what they are doing," Holdcroft explains.



It could, for instance, potentially act as a wayfinding system. "You park your car, tell the system your flight number, and the system knows where you're departing from, whether the flight is delayed and takes you there," he describes. "Passengers get to their flights on time, which is good for the airlines, and staffing can be reduced."

Travelers arriving at Heathrow can use the system to remember where they parked their car or take them to rent a car, providing rate information en route. "All of these things are quite easy to add as long as the base transport system is in place," notes Holdcroft. 

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