Robot inevitability: autonomous solutions are here to stay

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From terminal to ramp, more uses are being explored for semi-autonomous and fully robotic technology. *Kylie Bull* **and** *Ramon Lopez* **report**

Autonomous vehicle technology has the potential to change the way airports function. Given the myriad vehicle operations on the runway, taxiway, and ramp, the aviation sector is ripe for an autonomous revolution. From passenger shuttle buses to snow clearing, ramp operations, and baggage and cargo logistics, the applications vary considerably.

The technology can even be used for applications beyond the confines of an airport, to improve passenger flow on arrival without sacrificing passenger experience. California-based autonomous vehicle start-up NEXT Future Transportation Inc has developed a system that enables passengers to complete most of the check-in process during their journey to the airport.

Working prototype of the NEXT pod vehicle. (NEXT Future Transportation Inc)

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The solution is based on a patented modular vehicle platform, which allows individual autonomous pods to connect in motion and form a fleet which carries passengers. The pods travel at about 20 km/h, and they are designed to travel short and medium distances. NEXT pods will operate on public roadways, so they will be able to reach an airport in a similar way to a bus or minivan. Once the pods are connected, the internal space of the fleet is utilised, just as a train comprises a series of carriages.

While on route, various security technologies are applied in combination to ensure a layered approach to security. The passenger authentication solution in NEXT uses artificial intelligence and facial recognition to accelerate the check-in process, while a comprehensive range of detection systems screens passengers and their baggage. Passengers catch a pod by using an app which calls the autonomous pod to their location, and each one can carry up to ten passengers. NEXT hopes the pods will be on the road by 2020.

Sven Hackmann, executive vice-president of NEXT, told *Jane's* that the company is in advanced discussions with two large international airlines for their ground operations, initially focusing on the ramp.

"We see our collaborations expanding, as there is a need to co-ordinate requirements between existing and planned systems to facilitate information and traffic flows between an airport's system, its local cargo community, clearance authorities where appropriate, and ultimately systems at other hubs," he explained.

Hackmann explained that such a solution will initially be applied within the boundaries of an airport. "In the constrained environment of an airport, autonomous technology represents a lever for optimising infrastructure for new mobility offers. Today, most large airport operators have at least contemplated testing one of the many autonomous electric shuttles. From our perspective, airport operators must first establish a clear overall automation strategy prior to testing individual e-shuttles. The leading airports are co-ordinating efforts to develop an inter-operable backbone for all airport autonomous systems.

"The development and implementation of the above will require changes in current processes and infrastructure. As a result, our own development objectives focus on co-development and integration, while not merely emphasising vehicle deployment at an airport in the near-term.

"NEXT plans on close alignment with airport operators and government authorities that ensure technological solutions and standards are developed in accordance with international standards. At the same time, we require such stakeholders to ensure that the necessary communications infrastructure is provided to facilitate broad automation," said Hackmann.

In Germany, a new project funded with EUR3.3 million from the Federal Ministry of Economic Affairs and Energy (BMWi) is developing autonomous vehicles for ramp operations. Five project partners launched the three-year AirPortMover project to create a base platform that addresses the specific challenges of airports, such as positioning and localisation on the ramp, encounters and collision avoidance with aircraft, high safety requirements, restricted areas, and integration into existing airport operations. The project will test various autonomous transports in three application scenarios.

Ibeo Automotive Systems is leading the project with partners Fraport, Christian Albrecht University Kiel, Airbus Operations, and Hanseatische Fahrzeug Manufaktur.

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(621 of 1804 words)

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