

Leading Edge

# Canada Creates Passenger Experience Research Facility

**Passenger behavior in flight will come under the microscope in new cabin lab**

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## **National Research Council of Canada**

Billions have been spent developing new technologies for aircraft aerodynamics, structures, systems and engines, but relatively little seems to have been invested in scientifically researching how passengers experience their flights and how cabins could be improved.

Canada's National Research Council (NRC) Aerospace is completing construction of a facility at its **Ottawa** campus that will enable large-scale studies to improve passenger comfort and cabin-crew performance and accelerate the development of new cabin concepts.

The Cabin Comfort and Environment Research (CCER) facility is being funded under NRC's Working and Traveling on Aircraft program and will simulate the entire passenger experience, from check-in to the gate area through boarding to inflight services and deboarding.

In Europe, meanwhile, the Clean Sky 2 public-private research program is planning a flexible demonstration platform to evaluate novel cabin technologies that will look at areas including passenger infotainment and cabin operations, wireless communications, and interior design and materials.

The NRC facility will provide the ability to control cabin lighting, climate, noise and vibration over simulated short- and long-haul flights, and evaluate the impact on passenger comfort and crew performance of cabin services and amenities including lavatories and galleys, living space and storage concepts.

“The facility provides realism without risk, avoiding certification costs, and is quite ambitious, as it will recreate the flight from end to end for passengers so we can assess comfort and how to improve it,” says Alexandra Thompson, NRC research officer in intelligent building operations. “We are able to manipulate the passenger terminal to see the impact. Onboard, passengers will feel they are really flying, for an hour to 15 hr., and we will be able to track their comfort throughout the flight as we change lighting, sound, etc.”

Areas of advanced research include windowless cabins, transparent ceilings and virtual-reality technology—“to provide a window at every seat,” she says—as well as personalized ventilation systems, modularized design concepts, and automated maintenance for quicker turnarounds. Other ideas include a virtual doctor for inflight wellness, new cabin services and targeted passenger advertising. “Some of our customers are airlines, but also manufacturers such as [Airbus](#) and [Boeing](#),” she says.

The flagship of the CCER is the Flexible Cabin Laboratory (see photo), a reconfigurable section of an Airbus [A330/Boeing 777](#)-size fuselage able to seat up to 40 passengers, complete with laboratories, galleys and inflight Wi-Fi, able to replicate cabin noise by emitting sound through the wall panels, and equipped with a 3-D camera system to record and track passenger movements throughout a simulated flight. “We will break ground in June, and it will be operational in about a year,” says Thompson.

The facility will also be able to accommodate actual aircraft fuselages for specific customers. The first fuselage lab will be a decommissioned [Boeing 737](#), and NRC plans to acquire an Airbus [A320](#) fuselage for tests where a full-length cabin is required. Future plans, if demand requires, include mounting this fuselage on a motion platform to increase the fidelity of the simulation, she says.

NRC believes a better understanding of the effects of cabin environments will lead to a significant improvement in cabin comfort and passenger experience by enabling new cabin layouts, personalized controls, new inflight entertainment options and cabin services, as well as better interaction between passengers and crew and individualization of pre- and postflight services at the airport.

Europe’s research under Clean Sky 2, rather than passenger comfort, is more focused on innovative physical integration of the cabin and cargo systems and structures in large passenger aircraft to save weight, time and cost. Three demonstrators are planned. One is for the cabin and cargo systems and will look at different customization scenarios, new acoustic treatments and robotic manufacturing.

But the project will look at many aspects that affect passengers including new cabin materials, acoustic treatments, lighting and ventilation systems, as well as wireless communications and power and data distribution systems that enable rapid reconfiguration including overnight changes in layout.

Airbus is also interested in the potential for windowless cabins, or at least fuselages with fewer apertures that would be lighter and easier to manufacture than today's airliners. While research suggests few passengers ever look out the window, it is important they do not feel trapped in a flying tube, Jens Koenig, Airbus coordinator for the Large Passenger Aircraft program, told a conference in London in September. "We need to find something in between."