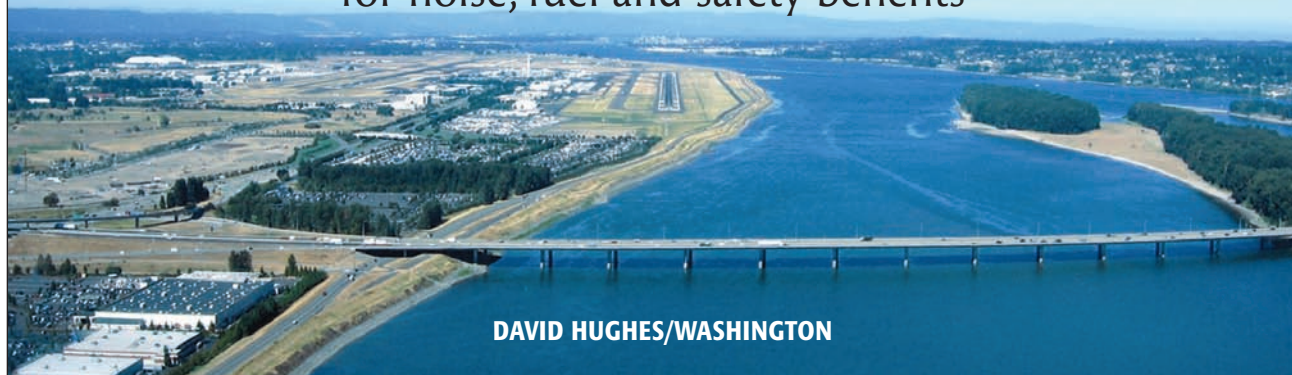


AVIATION WEEK

& SPACE TECHNOLOGY

Turboprop RNP Arrives

Horizon pursues Required Navigation Performance for noise, fuel and safety benefits



DAVID HUGHES/WASHINGTON

HORIZON AIR

Horizon Air has flown more than 130 RNAV RNP approaches at Portland, Ore. This view is from a Q400 at 500 ft. on final to Runway 28R.

Horizon Air plans to capitalize on lessons learned with Required Navigation Performance procedures in Oregon to start RNP operations with its Dash 8 turboprops at nearly a dozen other airports.

Like its larger affiliate, Alaska Airlines, Horizon pioneered the use of area navigation (RNAV), head-up guidance and other avionics innovations. And Alaska has shared its extensive expertise with Horizon to bring the benefits of RNP to the carrier's Bombardier Q400 Dash 8s (*AW&ST* June 13, 2005, p. 172).

Portland (Ore.) International is one of five airports targeted by the FAA and an industry working group for early implementation of RNP. The others are Reagan Washington National, New York JFK International, Palm Springs (Calif.) International and Harrisburg (Pa.) International. Because Horizon Air has 70 Q400 arrivals a day at Portland, operational experience can be gained quickly there.

As it embraces RNP, Horizon anticipates the day when the FAA may begin shutting down some ILS systems or asking airports and airlines to bear the cost of operating them. These new

procedures are also an insurance policy for flights into Portland in case the ILS equipment is out of service.

Horizon has been using RNP at Portland since last September and expects to begin Q400 RNP flights at Palm Springs by March. RNP will allow Horizon Q400s to serve Palm Springs with instrument approach minimums of 330-ft. ceiling and 1.25-naut.-mi. visibility, instead of the 1,800-ft./3-mi. minimums required with the VOR (VHF omni-range) approach in use today. Meanwhile, Alaska Airlines is using RNP with its 737NGs (-700s, -800s and -900s) plus the 737-400s at both Palm Springs and Portland.

RNP is a form of RNAV that employs GPS positioning, inertial reference systems and (in some cases) DME-DME (distance-measuring equipment) to contain an aircraft in a narrow corridor of airspace. It includes onboard navigation monitoring to alert the pilot if the tight tolerances can no longer be met. With RNP, aircraft can navigate through mountain valleys safely (*AW&ST* Sept. 25, 2006, p. 52), fly the same ground track with precise turns on each approach, and limit the impact of noise and emissions on communities because the flight

paths are more customized compared with straight-in ILS. RNP approaches are designated as "SAAR" procedures, which means that special aircraft and aircrew authorization is required.

Portland, unlike Palm Springs, is not a terrain-challenged airport. For example, Portland's RNP procedure to Runway 28R is designed to mimic existing VFR flight tracks that follow the path of the Columbia River to reduce noise and emission impact on the local community.

"This is really a powerful tool to minimize environmental impact," says Perry Solmonson, manager of flight operations (technical) at Horizon. Reducing the environmental effects of flight ops is a key reason why the Port of Portland Commission (the airport operator) was so eager to help Horizon Air implement RNP. FAA officials at the local terminal radar approach control (Tracon) facility also pitched in to help on the RNP project.

The Port of Portland also sees the potential for more environmental impact benefits in the future, since RNP will allow managers to tailor other arrival flight paths to mitigate noise. One objective is to create curved RNP paths to Runways 10L and 10R.

Horizon is only the second U.S. carrier, after Alaska Airlines, to be certified to fly RNP, adds Solmonson. Most of the RNP procedures being flown now in North America and Asia are being conducted with Boeing aircraft using Smiths and Rockwell Collins flight management systems. Qantas and Air China, for example, are pushing ahead aggressively with RNP, and Air New Zealand has certified its Airbus A320s to operate into Queenstown, a ski resort with a terrain-challenged airport.

But Horizon is flying the procedures on Q400s with Universal Avionics UNS-1E flight management systems, dual GPS sensors and Litton LTN-101 "Flagship" inertial reference units. The Universal FMS is coupled to a Thales electronic flight instrument system on the Dash 8. Scott Campbell, Universal's director of airline and military marketing, notes that his company's FMS equipment is used most often in retrofitting airliners and in new corporate jets.

The UNS-1E has a feature that's helping Horizon feed lots of data to the FAA on actual approaches flown. The required information can be downloaded by pilots after a flight onto Zip disk using the FMS's data-transfer unit. This way, Horizon and FAA specialists can look at the error data associated with curved-path approaches and any deviation on vertical navigation during RNP procedures. If better performance than the FAA expected is shown, it might be possible to lower the RNP minimums in the future, Solmonson notes.

A Q400 operates a lot like a jet, he says. It cruises at a little more than 360 kt. and can be flying this fast at top-of-descent, then slow down while making a steep descent to the runway. Descent at near-zero thrust on an RNP approach saves about \$24 in fuel per arrival at Portland, he says. In contrast,

