



Winglets Save Billions of Dollars in Fuel Costs

**Langley Research Center
Dryden Flight Research Center**

**Aviation Partners Boeing (APB)
Seattle, Washington**

Originating Technology/NASA Contribution

- ◆ Research and testing by Langley engineer Richard Whitcomb demonstrated the effectiveness of winglets in reducing performance-inhibiting drag
- ◆ Further flight tests conducted at Dryden validated Whitcomb's findings



Partnership

- ◆ Aviation Partners Inc. and The Boeing Company collaborated to form Aviation Partners Boeing and apply a new form of the NASA-proven technology to Boeing aircraft
- ◆ The Blended Winglet technology improves winglet aerodynamics

Product Outcome

- ◆ Blended Winglets are now featured on thousands of Boeing aircraft around the world
- ◆ APB estimates the technology saved more than 2 billion gallons of jet fuel as of 2010, reducing costs by \$4 billion and carbon dioxide emissions by 21.5 million tons