# The Future of General Aviation

General Aviation
Manufacturers Association
**Peter Bunce, President & CEO**

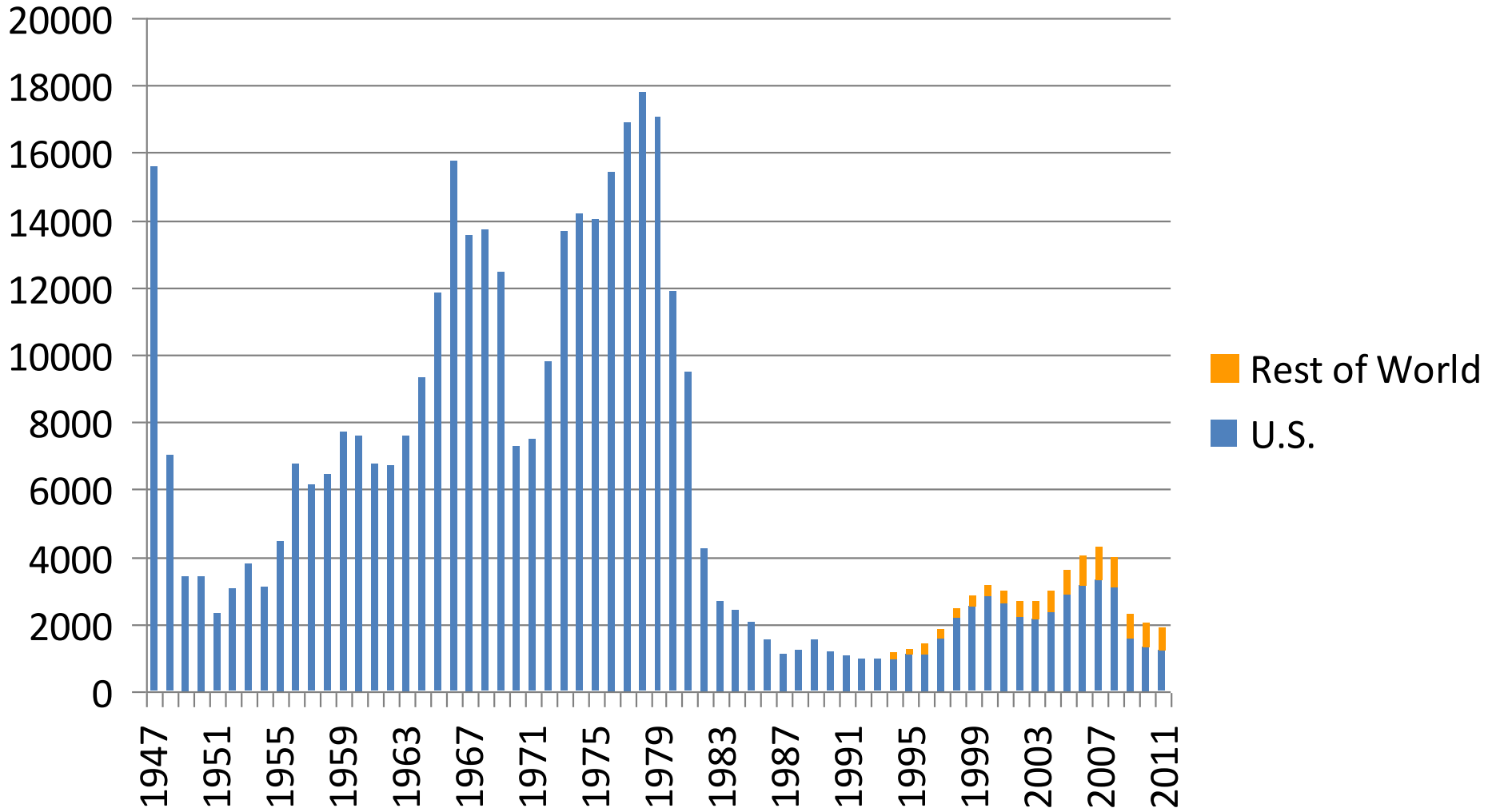
# The Future of General Aviation

- GAMA Mission
- State of the Industry
- CS-23/Part 23 Redesign
- Transition to Unleaded AvGas
- Innovation in Light Airplanes, Engines, Avionics
- Part 25 Business Jets
- Advanced Navigation

# GAMA

- Purpose: “To Foster and Advance the General Welfare, Safety, Interests and Activities of General Aviation Worldwide.”
- GAMA Has a Broad View of Its Role
  - From BBJ to VLA and LSA
  - From Certification to Licensing, Training, Operations, Environment, ATC Modernization, Airport Access, Market Barriers

# Deliveries 1994-2011



# First Nine Months Shipments 2011

| | 2010 | 2011 | Change |
|---|---|---|---|
| Pistons | 633 | 577 | -8.8% |
| Turboprops | 237 | 223 | -5.9% |
| Business Jets | 491 | 427 | -13.0% |
| **Total Shipments** | **1,361** | **1,227** | **-9.8%** |
| **Total Billings** | **$13.5B** | **$12.1B** | **-10.2%** |

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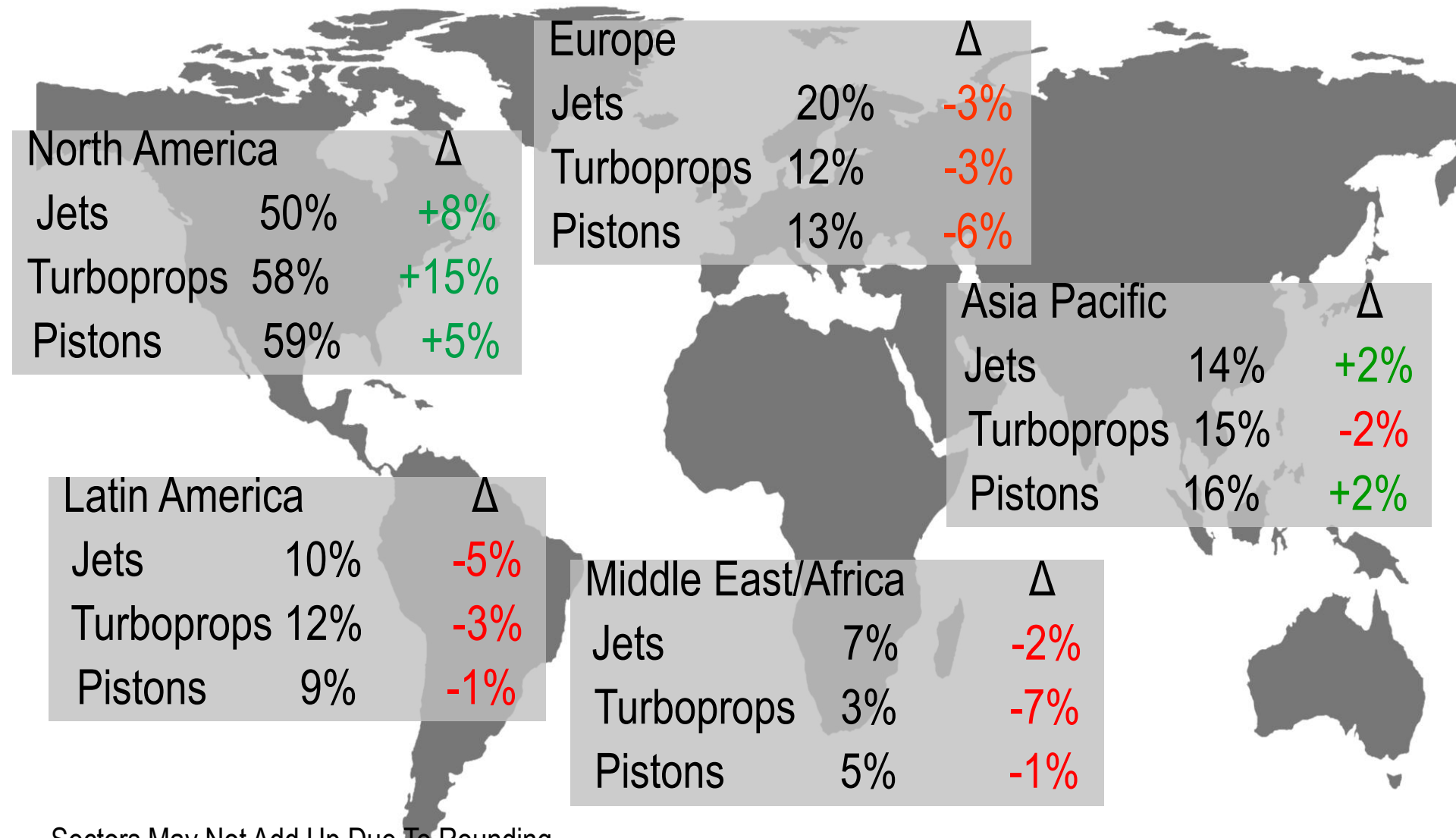
# 2011 Global Market Distribution



| North America | | Δ |
|---|---|---|
| Jets | 50% | +8% |
| Turboprops | 58% | +15% |
| Pistons | 59% | +5% |

| Europe | | Δ |
|---|---|---|
| Jets | 20% | -3% |
| Turboprops | 12% | -3% |
| Pistons | 13% | -6% |

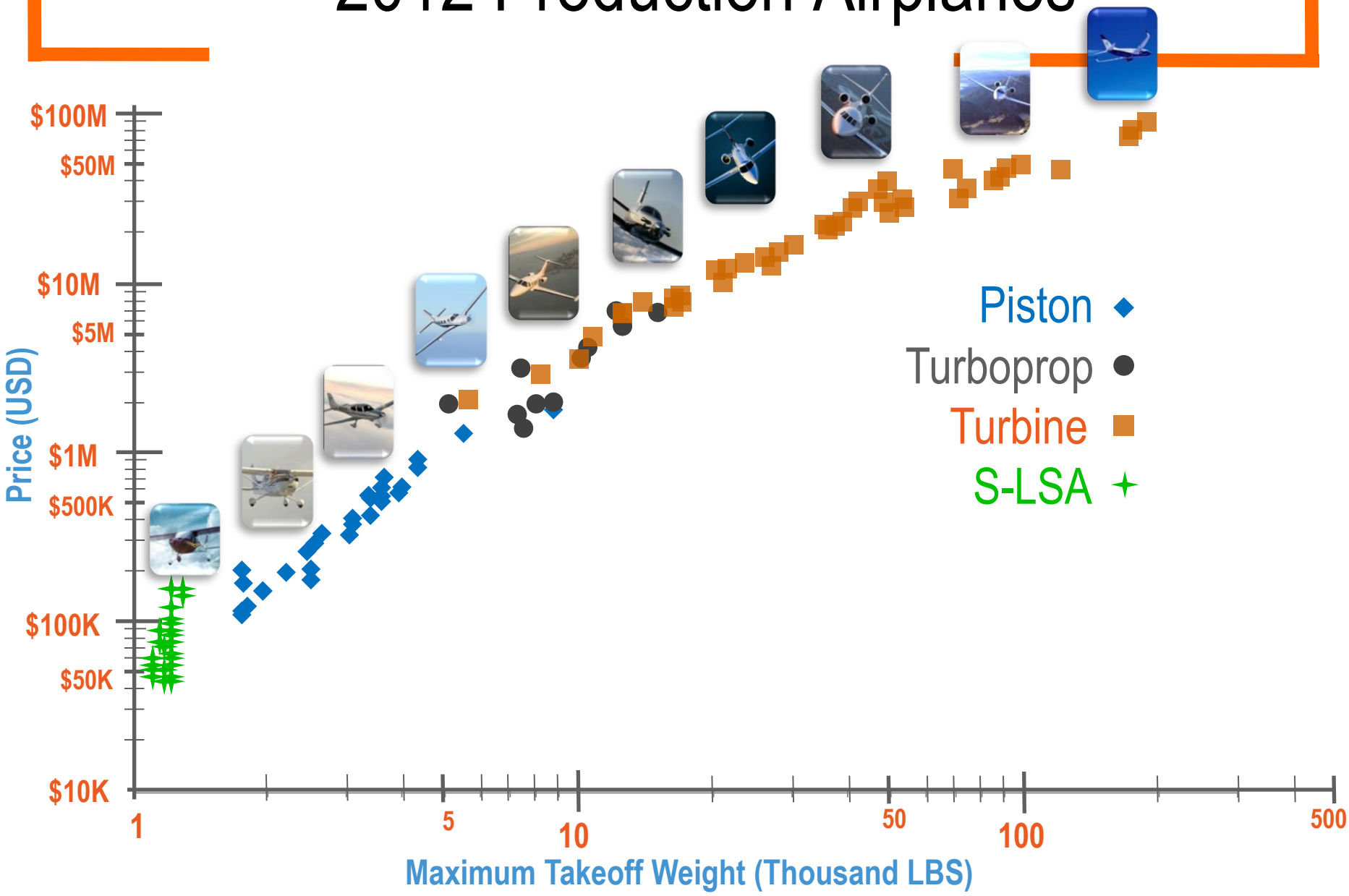
| Asia Pacific | | Δ |
|---|---|---|
| Jets | 14% | +2% |
| Turboprops | 15% | -2% |
| Pistons | 16% | +2% |

| Latin America | | Δ |
|---|---|---|
| Jets | 10% | -5% |
| Turboprops | 12% | -3% |
| Pistons | 9% | -1% |

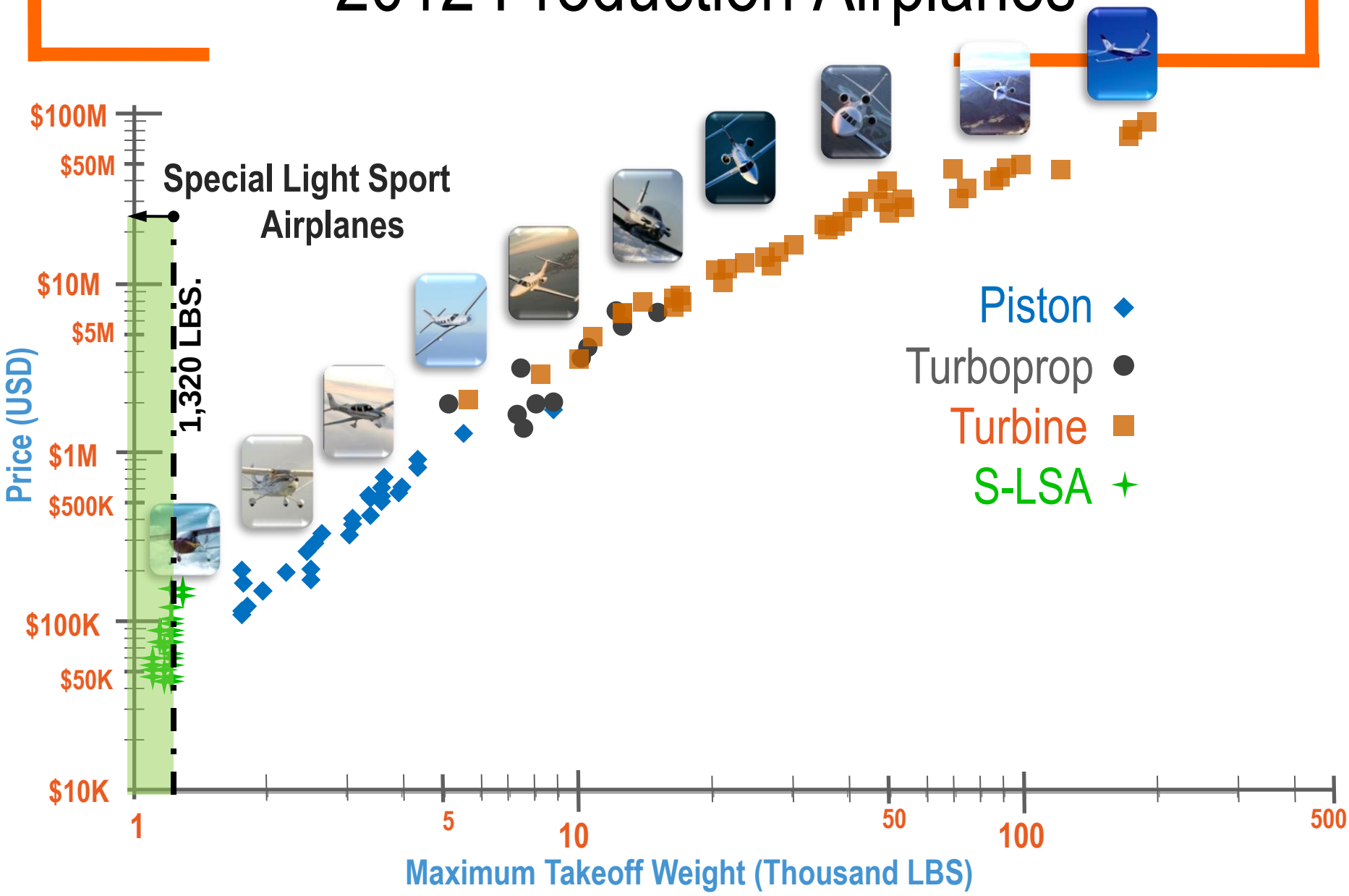
| Middle East/Africa | | Δ |
|---|---|---|
| Jets | 7% | -2% |
| Turboprops | 3% | -7% |
| Pistons | 5% | -1% |

Sectors May Not Add Up Due To Rounding

# 2012 Production Airplanes



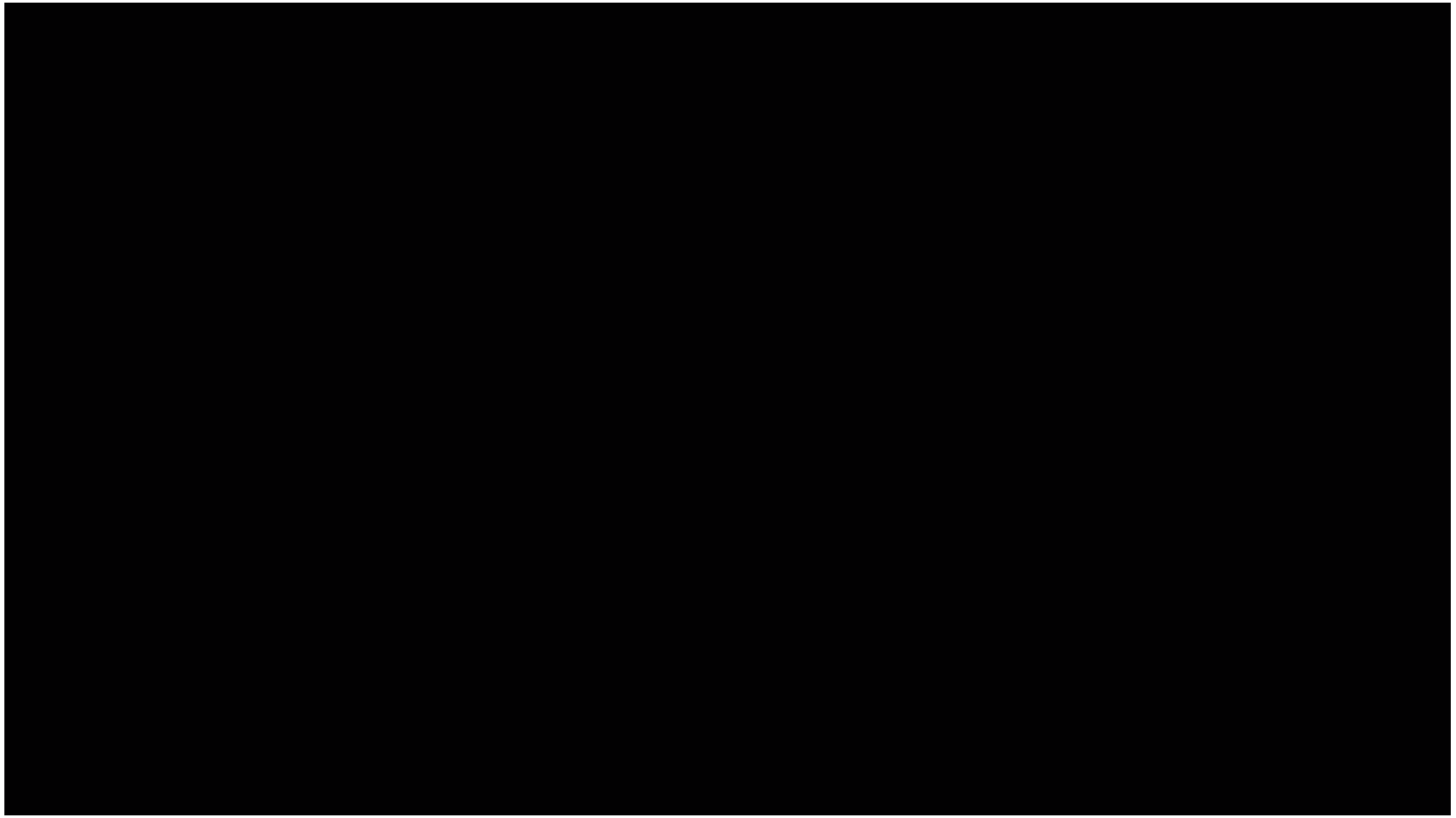
# 2012 Production Airplanes



# Special – Light Sport Aircraft

- Max Weight -1320 lbs. (1430 lbs. Seaplane)
- Max Pax - 2
- Max Speed – 120 KCAS
- Min Stall – 45 KCAS
- Gear – Fixed (Except Seaplane)
- Propeller – Fixed Pitch
- Engine – NonTurbine


# Special – Light Sport Aircraft



Icon – A5


# A5 Achieves Historic Safety Milestone

16 February 2012

Tags Engineering / Press Releases



February 16, 2012 – ICON is proud to announce that the A5 will be the first production aircraft in history to be designed to and completely comply with the Federal Aviation Administration's full-envelope Part 23 spin-resistance standards once production starts. This is a tremendous safety advancement that can significantly reduce the number of loss-of-control accidents resulting from stall/spin scenarios, which are the most significant cause of fatal General Aviation accidents.

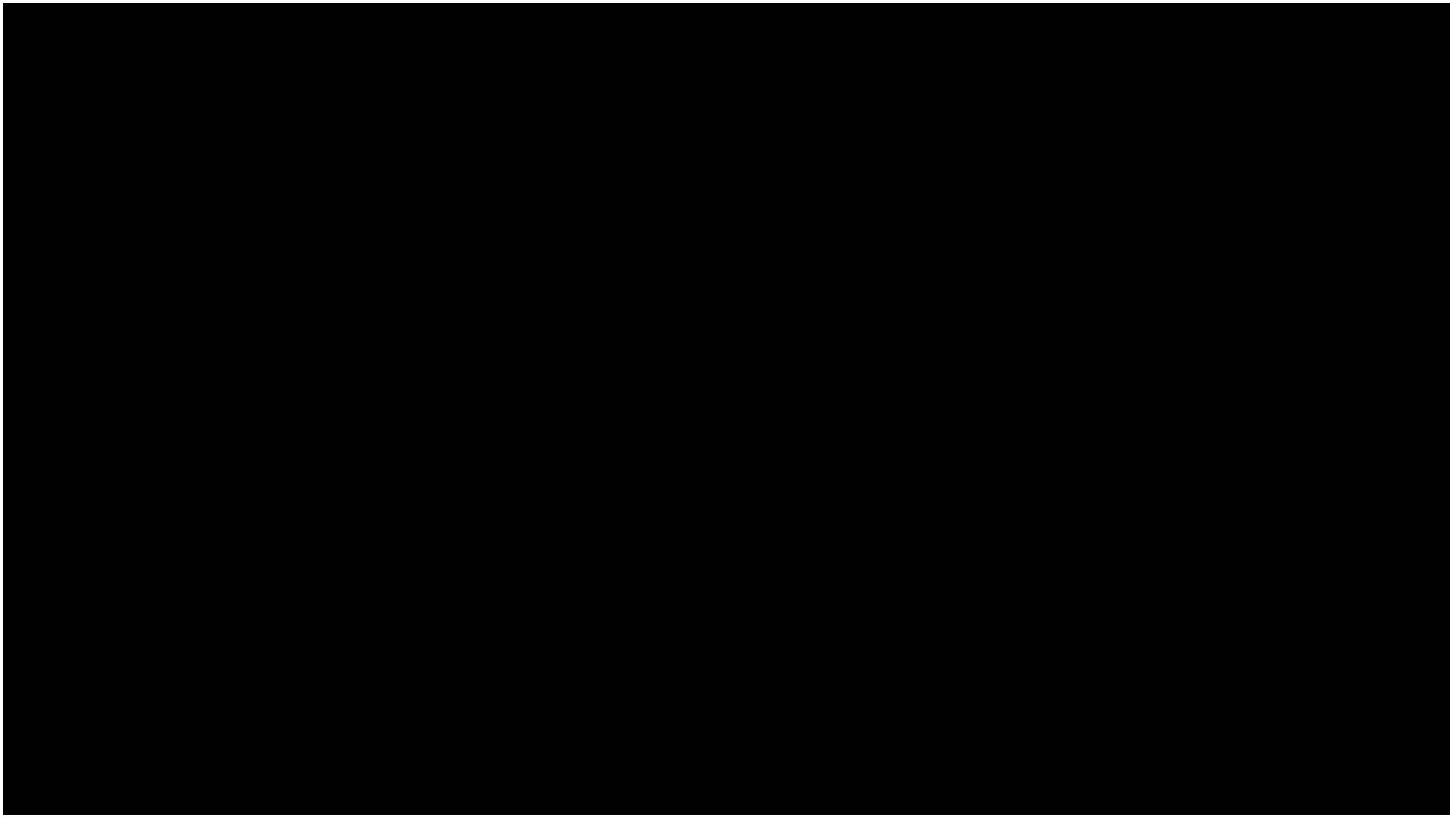
ICON is intensely focused on delivering an aircraft that is safe and fun to fly for sport pilots of all skill levels. Because sport flying typically occurs at low altitude where stalls/spins are most unforgiving and dangerous, ICON felt that it was particularly important to explore ways to minimize these types of accidents. Spin resistance has been an extremely challenging project and represents a historic achievement for the ICON team.

The rigorous flight-testing regimen validating this result was flown by Len Fox, a globally recognized test pilot and one of the world's leading experts on spin testing. Fox tested over 360 test cases with a wide range of control positions, power settings, and centers of gravity. The wing design is unique, with cuffs on the outboard panels and multiple proprietary airfoils across the span of the wing. Additionally, these specialized airfoils used for spin resistance were not suited to the no-flap wing design ICON had previously planned to use on the A5, so ICON engineers chose to reintroduce wing flaps to preserve takeoff performance on the water.

# Special – Light Sport Aircraft

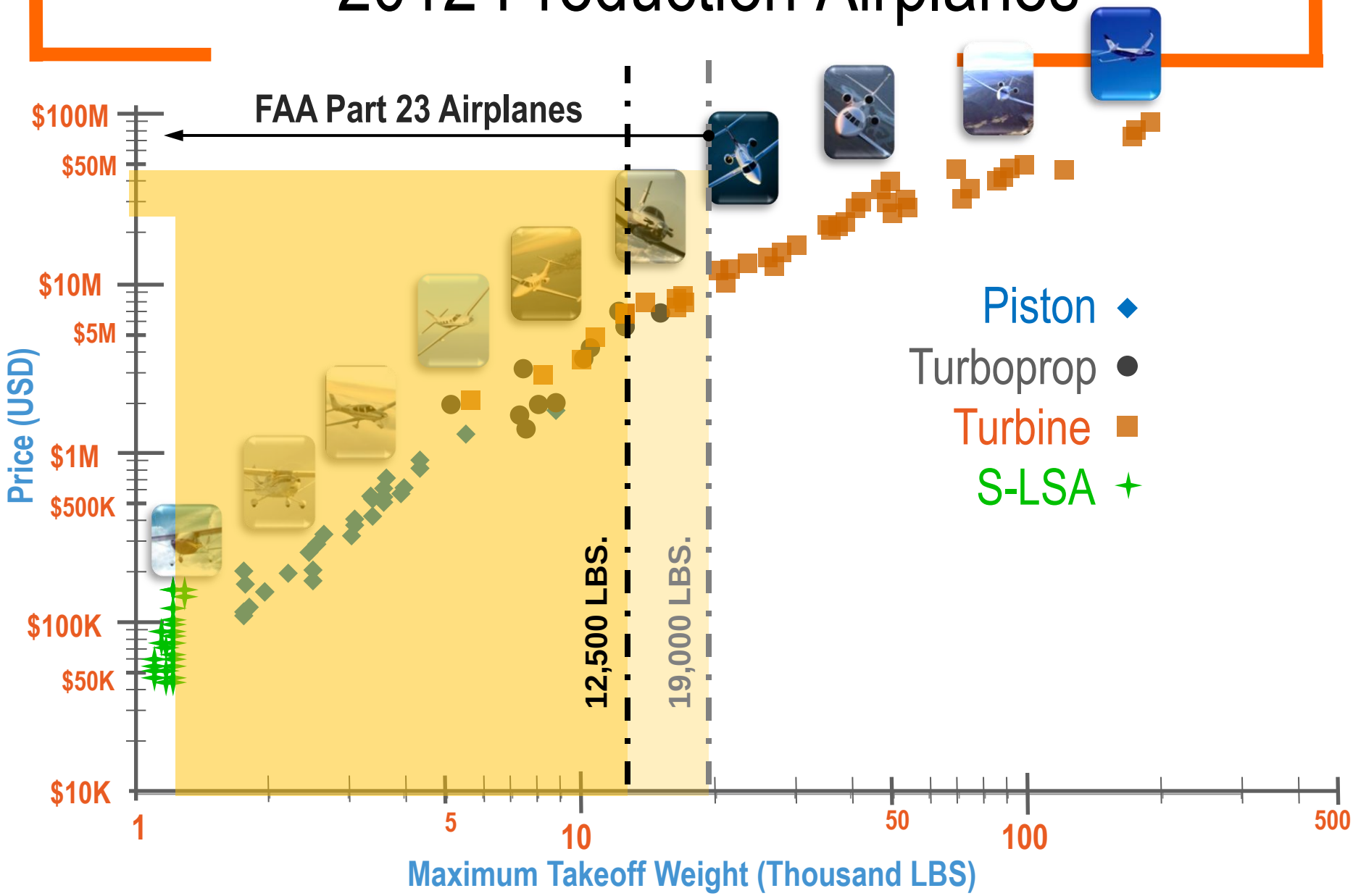
Terrafugia

# Special – Light Sport Aircraft



Sonex Electric Airplane

# 2012 Production Airplanes



# Part 23 – Small Airplanes

- Max Weight - 12500lbs. (19000lbs. Commuter)
- Max Pax – 9
- Max Speed – None
- Min Stall – 61* KCAS
- Gear – Unlimited
- Propeller – Unlimited
- Engine – Prop Driven*

# Part 23 Small Airplanes

- 157,000 Active Piston Airplanes in U.S.
- Primary Fuel is 100LL
- ≈30% Cannot Operate on Lower Octane Fuel

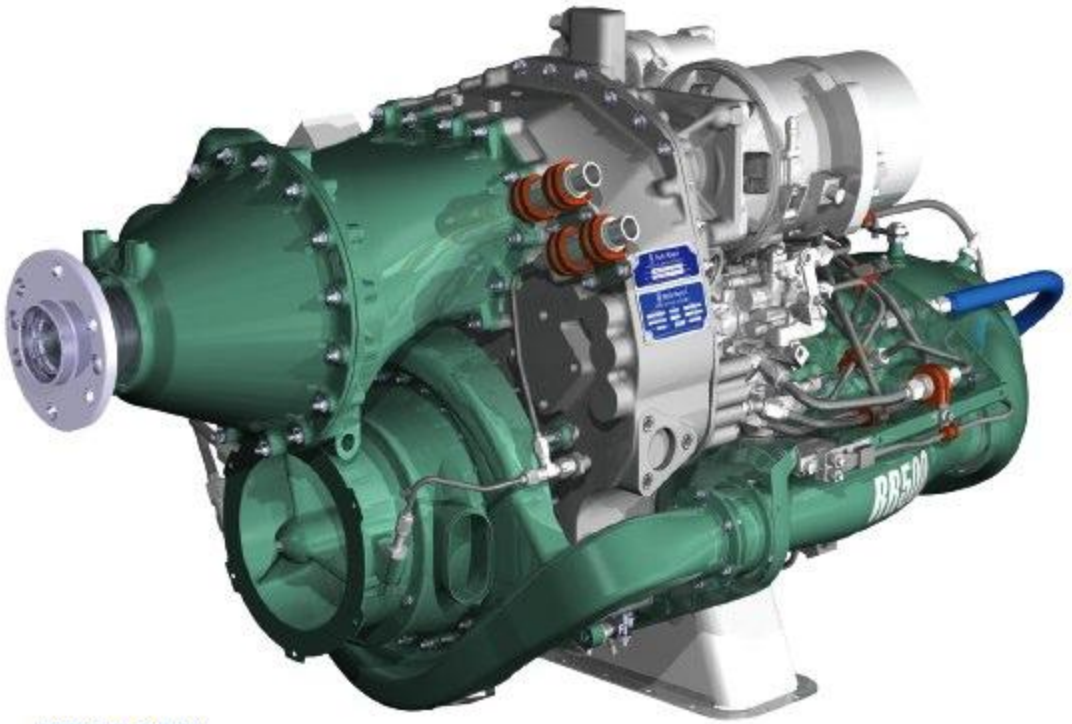
## 100LL to UL Transition

# Part 23 Small Airplanes

Power - 300+ HP

Weight - 220 lbs

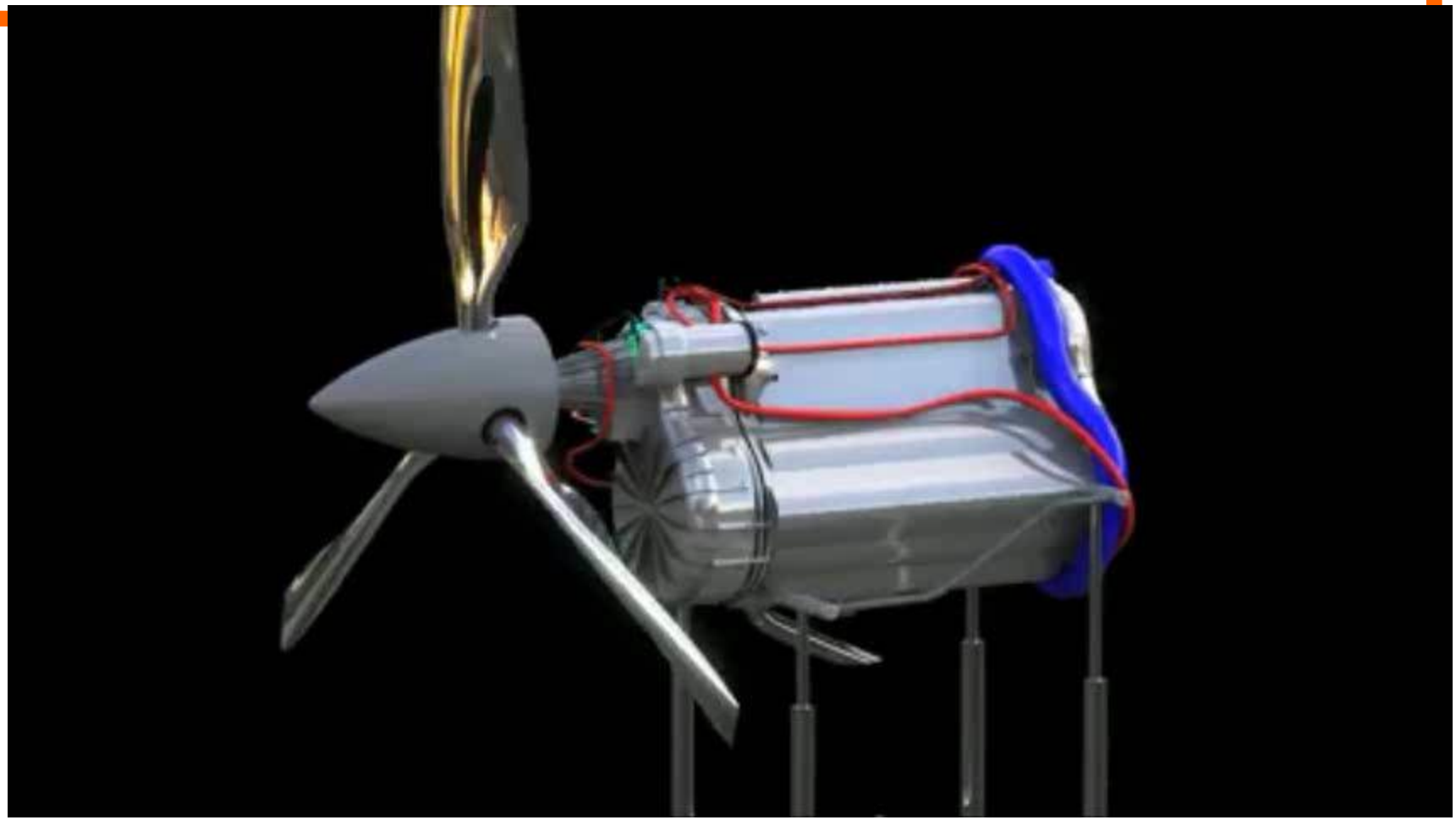
Fuel - Jet A




RR500TP

## Rolls Royce RR500 Turboprop

# Part 23 Small Airplanes

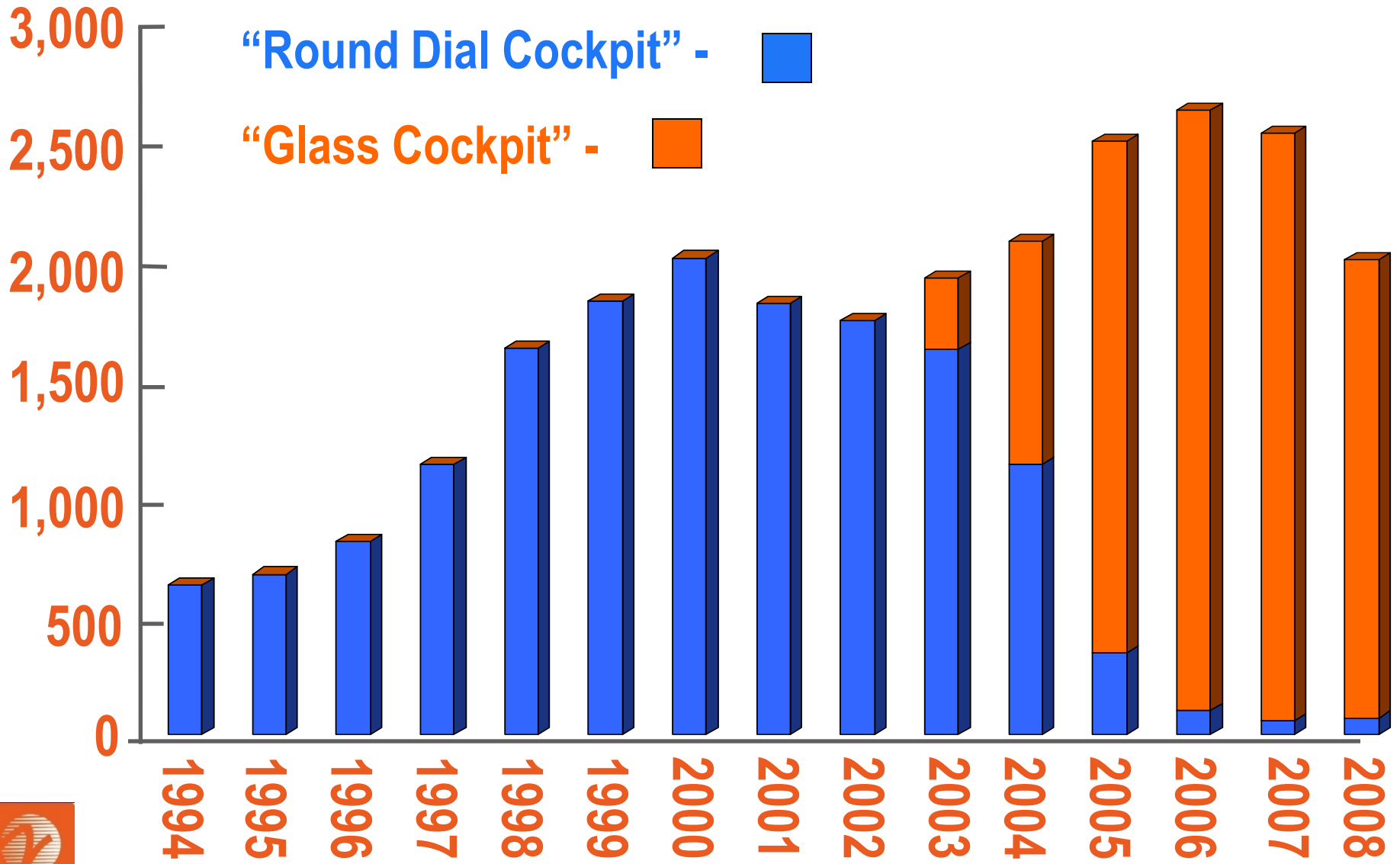


## Austro Diesel Compression Engine

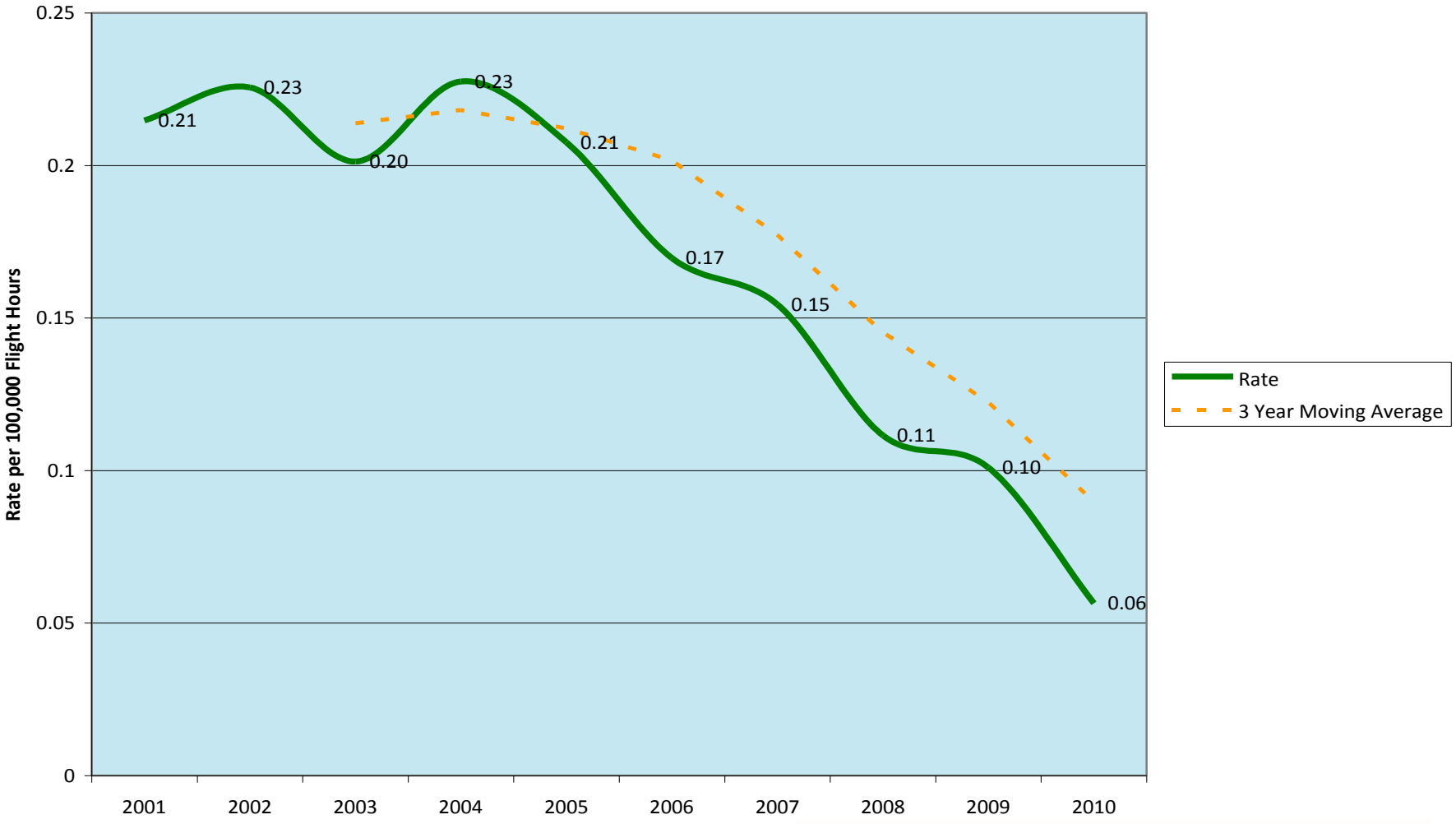
# Part 23 Small Airplanes

Electric Cessna 172 – Beyond Aviation

# Part 23 Avionics Revolution



# GAJSC GA Accident Rate 2001 – 2010 Controlled Flight Into Terrain (CFIT)




Source: NTSB Aviation Accident/Incident Database.

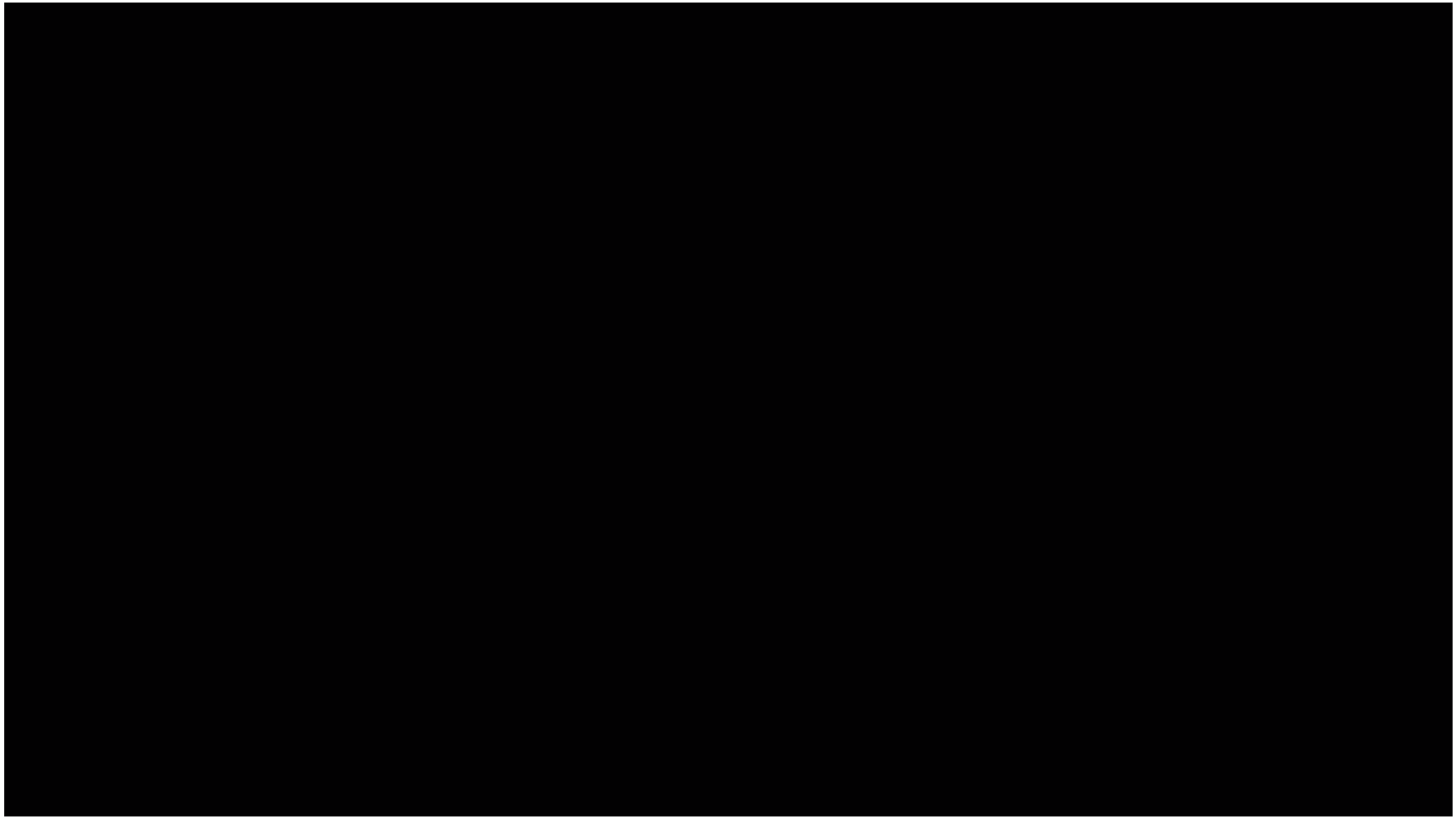
# Part 23 Small Airplanes

Aspen Avionics

# Part 23 Small Airplanes

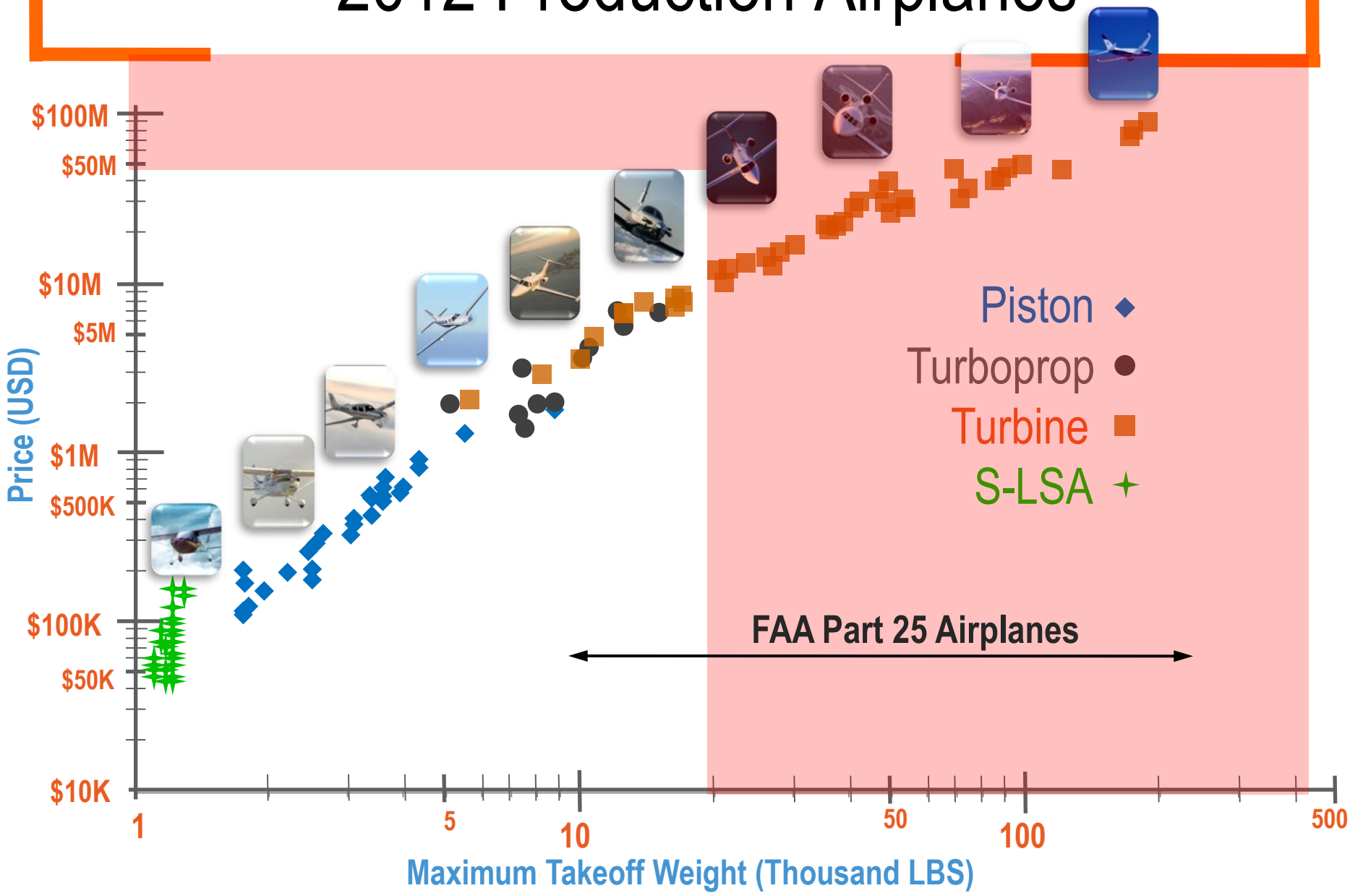

Garmin Synthetic Vision

# Part 23 Small Airplanes

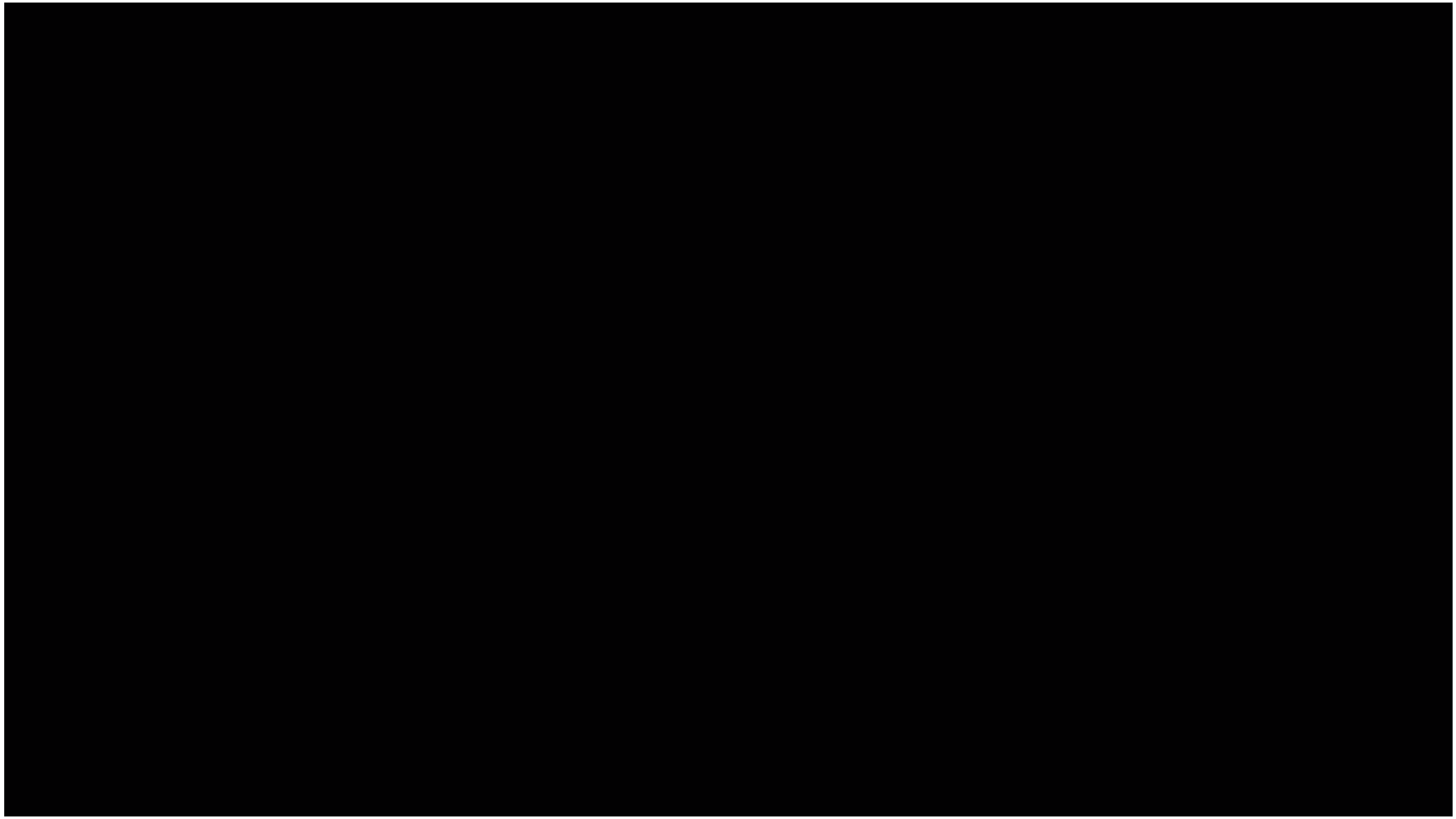


## Garmin Envelope Protection

# 2012 Production Airplanes

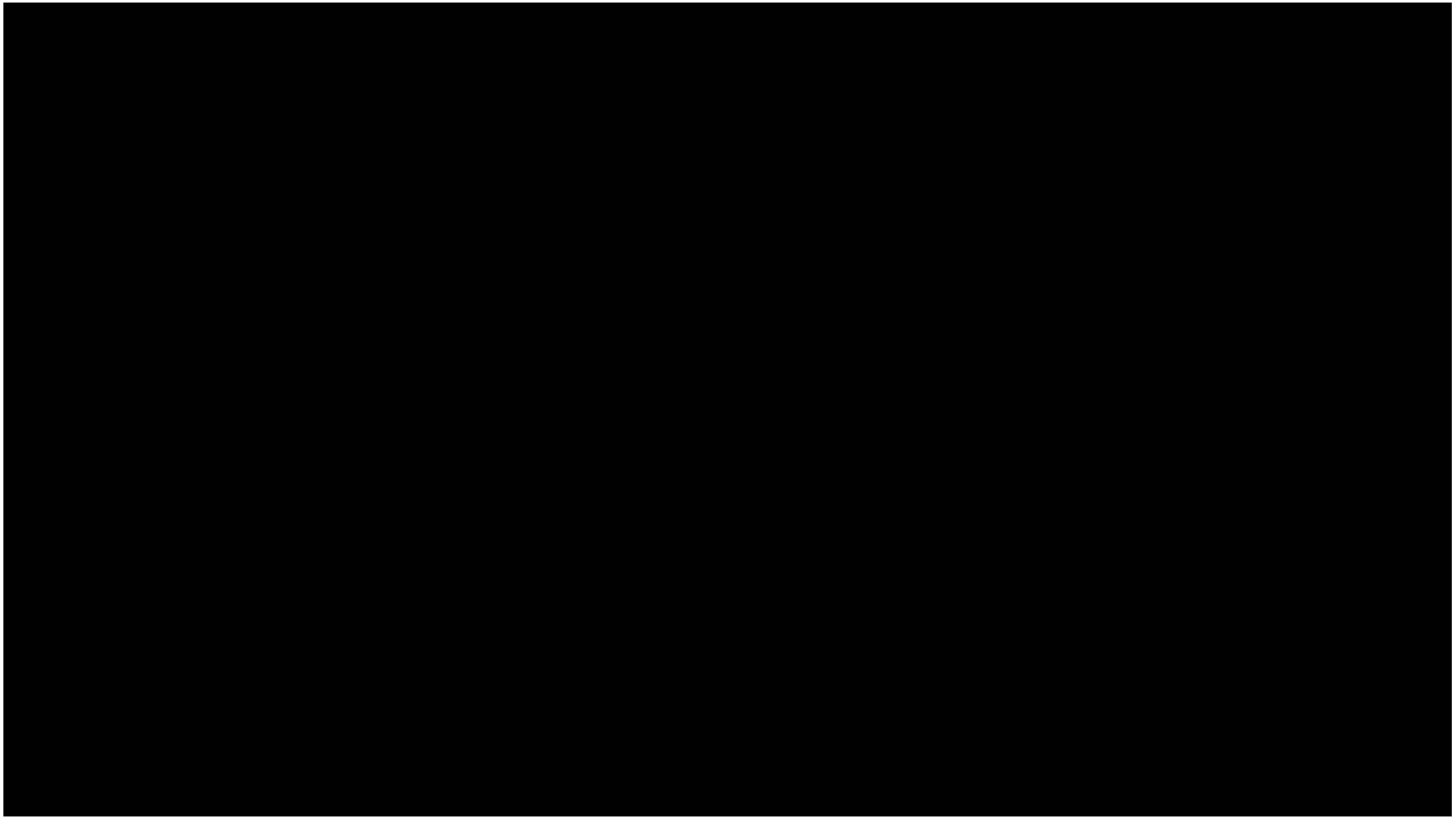


# Part 25 Business Jets



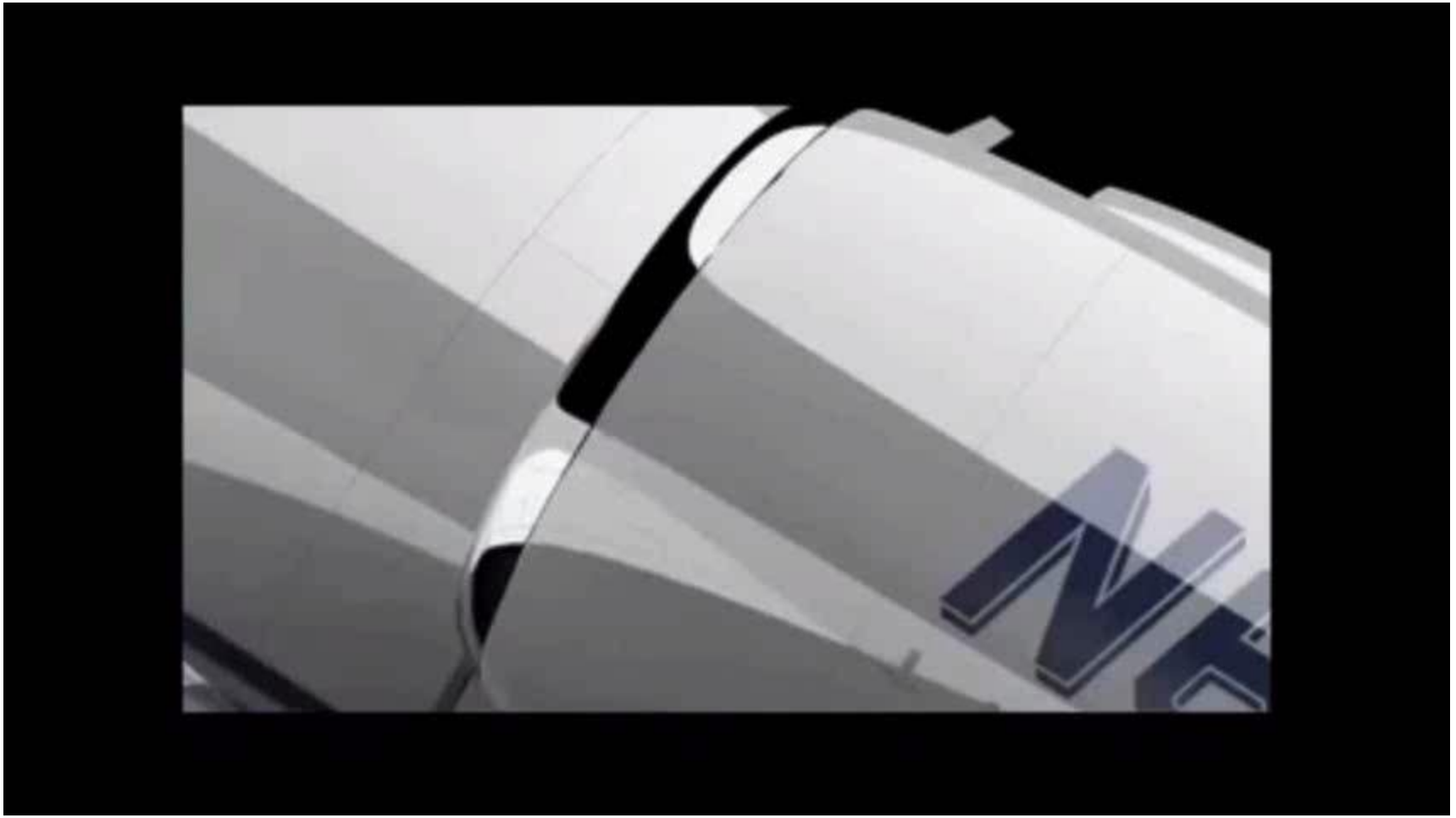
Rockwell Collins HUD – SVS & EVS

# Part 25 Business Jets



Fly By Wire – Dassault 7X

# Part 25 Business Jets



Gulfstream 650

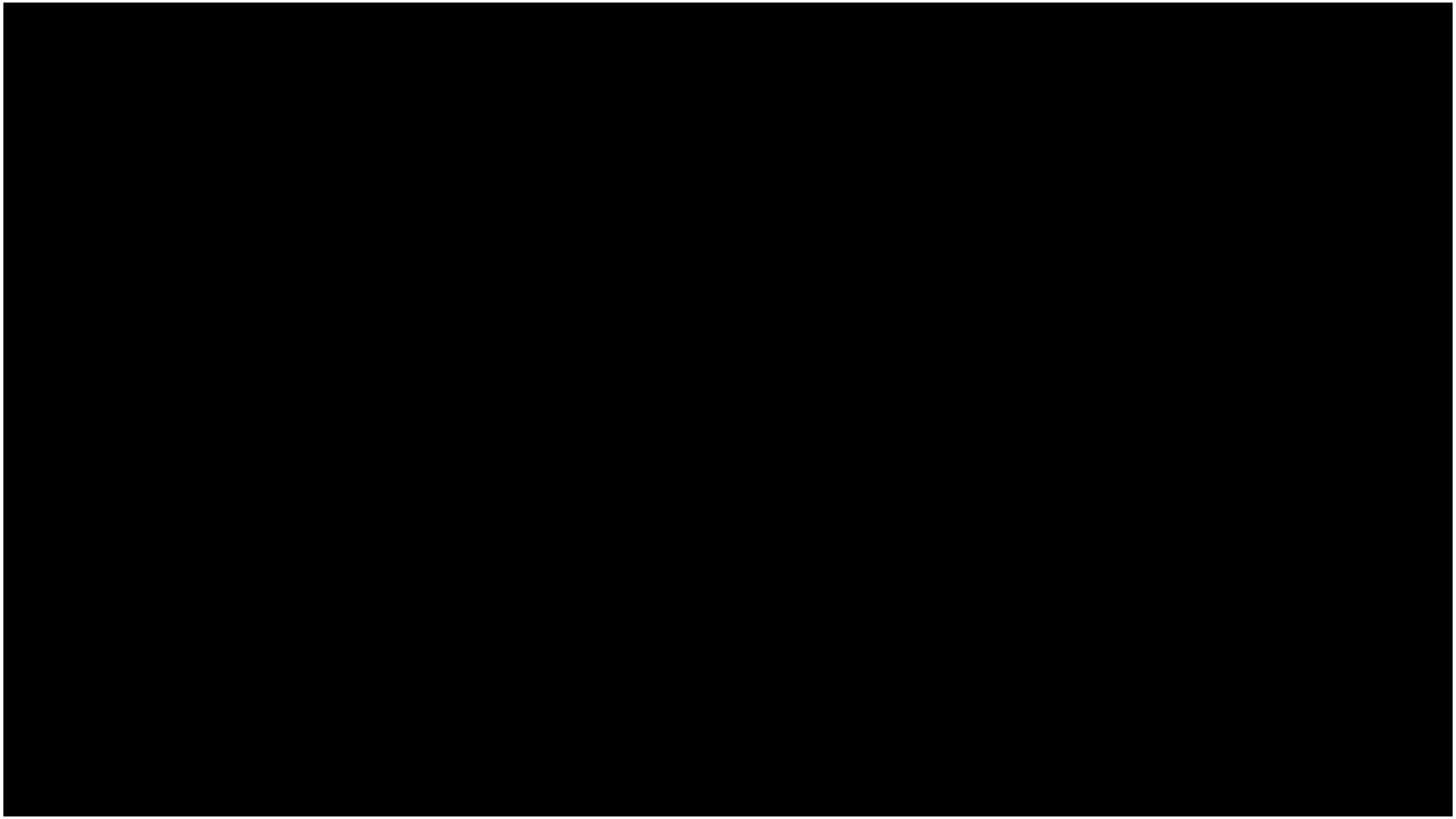
# Part 25 Business Jets

Cessna Citation Ten

# Advanced Navigation

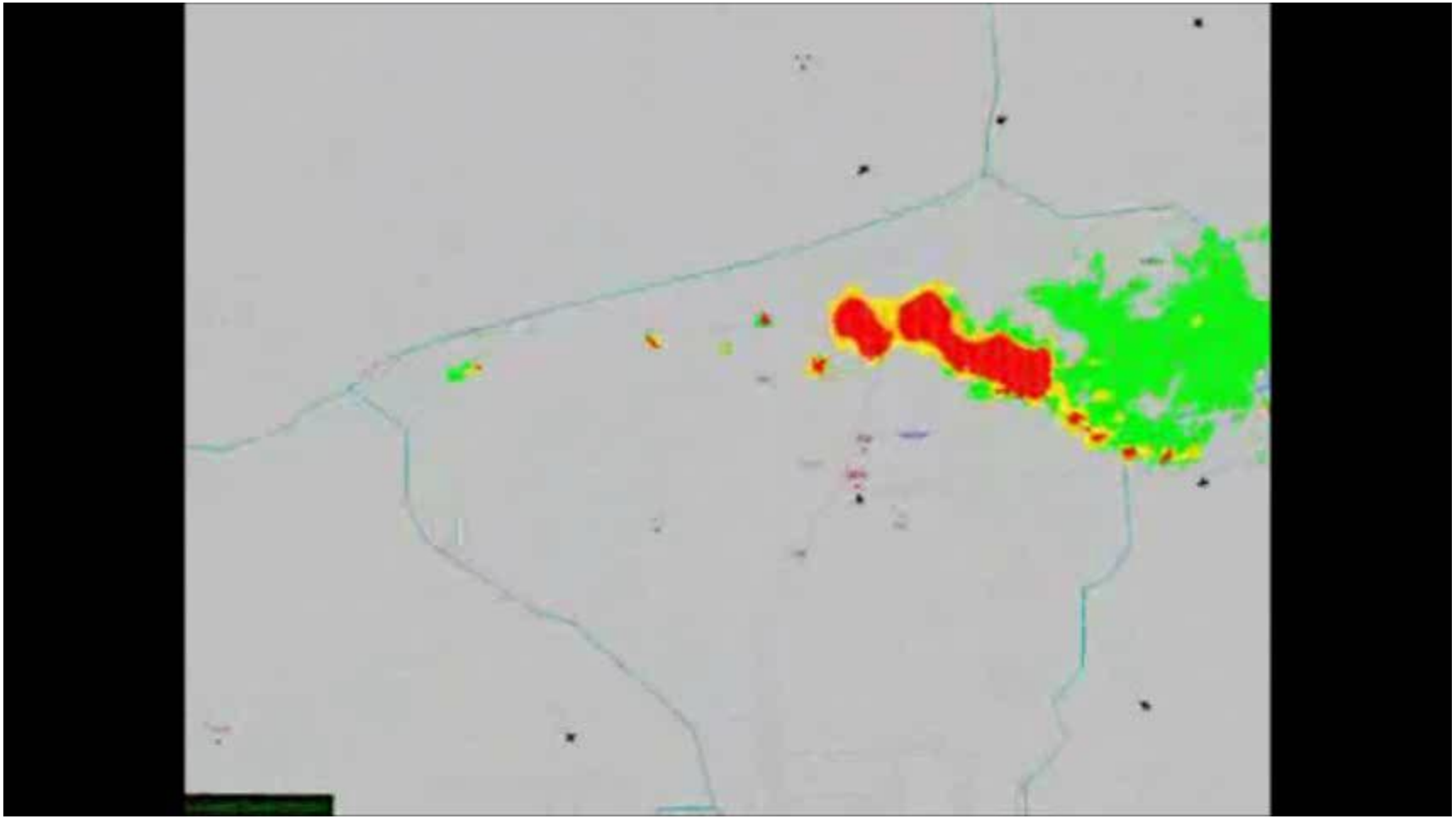
Growing Global IFR Traffic

# Advanced Navigation



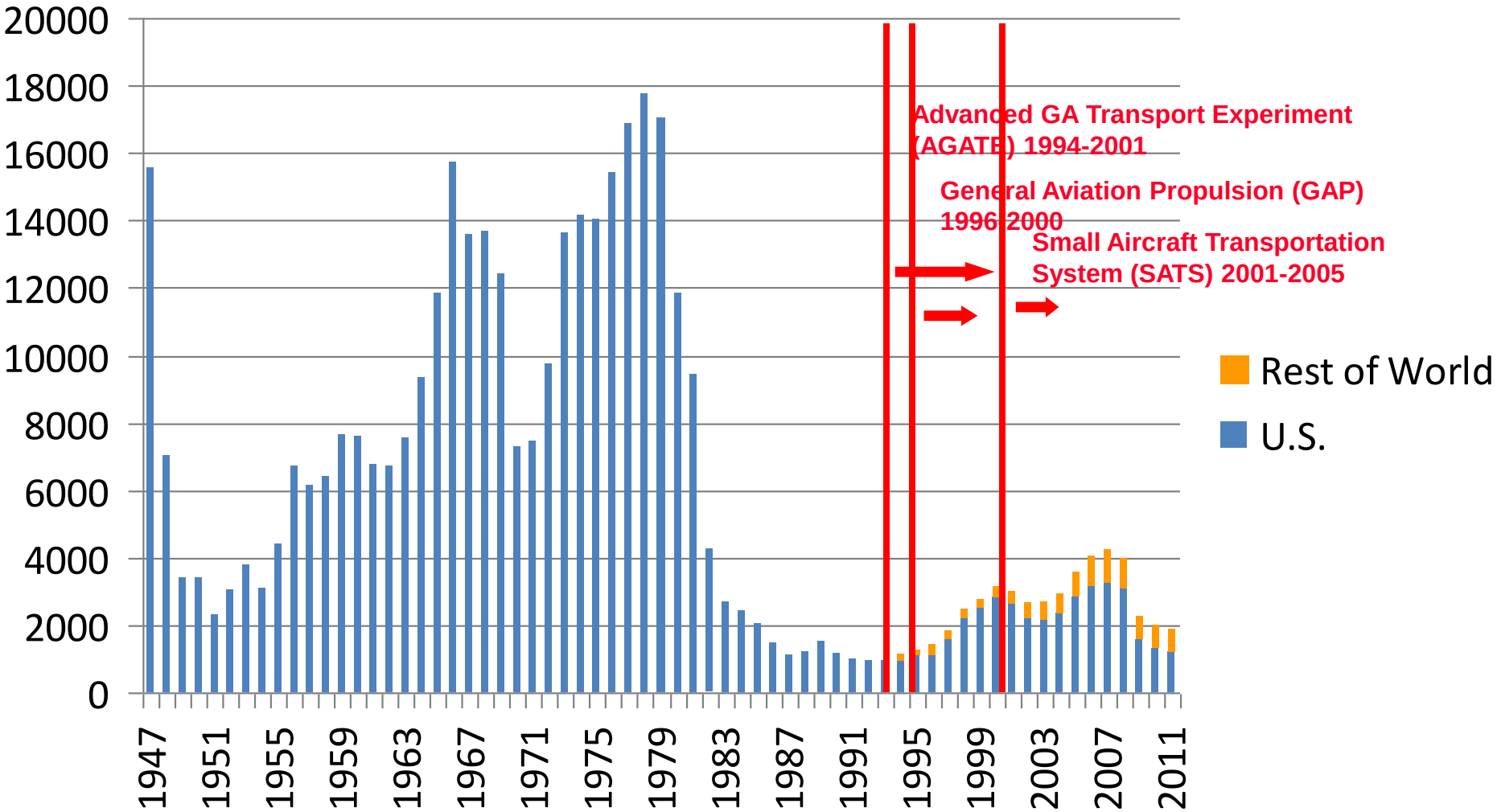
ADS-B

# Advanced Navigation



## Shared Weather Situational Awareness

# Deliveries 1994-2011; Including NASA GA Projects



# The New Part 23

- Part 23 Reorganization Aviation Rulemaking Committee (ARC)
  - 2 times the safety, half the cost
  - Regulations written so that new, safety related technology can be more easily certified
  - Must be flexible over time without needing lots of regulator maintenance
  - Basic minimum regulations that can be set for all types
  - Industry standards specify the finer design details
- International Participation
  - Brazil, Canada, China, Europe, New Zealand
- Timeline
  - 18-Month Timeline (Recommendation Finished in February 2013
  - Expedited international adoption into regulations

# Opportunities For NASA Focus On GA Revitalization

- Powerplant Technology
  - Batteries for electronic aircraft
  - Propeller noise
- Small Airplane Portfolio
  - Small airplane innovation driven by Part 23 ARC
  - Incorporating technology ≠ complexity
- Supersonic Aircraft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