Next in the Family: First of its Kind – AT-1002
Outline

• Reminder – Brain Rules!
• Air Tractor Family
• The At-1002 Specs
• Design Strategies
• Flight Test Considerations
Air Tractor Family

AT-401B

AT-602

AT-502A & AT-502B

AT-802F
Air Tractor Family (cont.)

<table>
<thead>
<tr>
<th></th>
<th>300</th>
<th>401B</th>
<th>402B</th>
<th>502A / 502B</th>
<th>602</th>
<th>802A / 802 / 802F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine S.H.P.:</td>
<td>450 @ 2300 RPM</td>
<td>600 @ 2250 RPM</td>
<td>680 @ 2200 RPM</td>
<td>1,100 @ 1,700 RPM</td>
<td>1,050 @ 1,700 RPM</td>
<td>1,424 @ 1,700 RPM</td>
</tr>
<tr>
<td>Take-Off Weight:</td>
<td>5000 lbs.</td>
<td>7,860 lbs.</td>
<td>9,170 lbs.</td>
<td>10,480 lbs.</td>
<td>12,500 lbs.</td>
<td>16,000 lbs.</td>
</tr>
</tbody>
</table>

SO WHAT’S NEXT?!
**THE AT-1002!**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Type</td>
<td>P&amp;W PT6A-67F</td>
</tr>
<tr>
<td>Engine S.H.P.</td>
<td>1,700</td>
</tr>
<tr>
<td>Take-Off Wt.</td>
<td>20,000 lbs.</td>
</tr>
<tr>
<td>Empty Wt.</td>
<td>9,000 lbs.</td>
</tr>
<tr>
<td>Hopper Cpty</td>
<td>1060 U.S. gal.</td>
</tr>
<tr>
<td>Fuel Cpty</td>
<td>450 U.S. gal.</td>
</tr>
</tbody>
</table>

2013 Flight Test Safety Workshop  
Presentation by: Eric Kinney, FAA Flight Test Pilot
AT-1002A Cockpit
Equipment

Production Pitot/Static Probe

Flight Test Probe
Design & Safety Strategies

• MISSION BASED DESIGN
  Spray ops
  Fire Bombing
  Aerial Patrol
  Fuel Tanker

• WEIGHT AND BALANCE
Design & Safety Strategies

• Missions…

Spray ops – Still Some Old School Operators, but the majority use:

- Target swath number
- Swath number closest to the aircraft
- Total number of swaths in the area
- Total swath length in the generated area
- The total acres/hectares in the area sprayed or spread
- Swath width
- Distance sprayed/spread in current swath
- Application rate: G/Ac. or L/Ha
- Flow rate: G/Min. or L/Min
- Ground speed
- Distance to go to the area boundary
- Optimal angle-of-intercept: best angle to the target swath without overshoot
- Spray time per pass
- Distance from/to waypoint
- Waypoint number destination
- Obstacle warning message
Design & Safety Strategies

- **Missions**…
  - Fire dump –
    - Retardant vs. Water Dumps
    - Fire Patrolling vs. Fire Fighting
    - Equipment Location & Usage
Design & Safety Strategies

- **Fire Dump Change in Weight and CG:**
  - Full Release of the Hopper Load equates to:
    - <9000 lbs.
    - 5 in CG shift (45%)
    - All in less than 8 seconds!
  - Design Considerations?
    - Hopper and Dump Gate Locations
    - Pitch Authority
    - Trim Settings
    - Procedures
    - Training
  - Video – 200 gallon max coverage rate
  - Video – 300 gallon min coverage rate
Design & Safety Strategies

- **Weight and Balance:**
  - If you load the airplane within the limits you will be within the allowable CG range (not necessarily weight range)
    - Hopper Load – 970 gal. (Ag) or 1057 gal. (Fire)
    - Baggage Compartment – 80 lbs.
    - Fuel – 454 gal (~3060 lbs)
    - 1 Pilot
  
  - RED = FWD CG
    - Light Weight pilot
    - Full Hopper
    - Full Rinse Tank
    - Full Fuel load
    - Empty Baggage
  
  - GREEN = AFT CG
    - Heavy Weight Pilot
    - Empty Hopper
    - Empty Rinse Tank
    - Full Fuel
    - Full Baggage
Flight Test Considerations

• BOTTOM LINE!
  Reduce the accidents / fatalities!

- CFIT
- STALL / SPIN
- IMC CFIT
- MID AIR
- LOSS OF ENGINE POWER
- LOSS OF CONTROL
- PHYSIOLOGICAL
- GND COLLISION
- MECHANICAL FAILURE
- OVER WEIGHT
- UNKNOWN
Flight Test Considerations

• **Flight Test Considerations:**
  The Regulations (discuss 21.25)
  Single Pilot (Experience, Proficiency, etc)
  Installed Equipment (Avionics, Spray Equipment, Fire gate, etc)
  No autopilot
  No Recording Instrumentation System (Proposed using: Audio, Video, Hand written notes)
  No Telemetry
  No Spin Chute (why?)
  Egress Ability / Procedures

• **How do the above considerations affect the overall risk assessments?**

• **Multiple Configurations**…(what will repeat??)
  Initial TC will be Single Seat, Ag Version, VFR Only
  Follow-on Versions: 2-Seat, Fire Bomber, **IFR**