Developing Standards for UAS Pilots

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Outline

- Why do we need standards?
- Background on standards organizations
- Background on ASTM F38
- F38 progress to date
- The Road Ahead

Standard: “Something established and generally accepted as a model, example, or test of excellence, attainment, etc.”

- Webster’s
Why do we need UAS pilot standards?

The U.S. Military Model: Non-standard
► Air Force Predator/Global Hawk Pilot
  ► Junior/mid-grade officer
  ► “Rated” pilot or navigator
► Army Hunter/Shadow Pilot
  ► Junior/mid-grade enlisted
  ► FAA ground school

Overseas Military Model: Similarly non-standard
Industry Model: Similarly non-standard

What’s the driving factor: Technology or Philosophy?
Why do we need UAS pilot standards? (cont)

The “test of excellence” for manned aviation

► Well defined medical standards
  ► Visual acuity, depth/color perception, height/weight (for ejection seat pilots), age (for commercial pilots)
  ► Specific list of disqualifying conditions

► Well defined written test standards
  ► FAA: Private pilot exam, Instrument exam, etc.
  ► Military: Aptitude test, emergency procedures, etc.

► Well defined psychomotor standards
  ► FAA: Traffic patterns, stalls, short field landing, etc.
  ► Carrier Navy: “OK, 3-wire”

What’s the UAV pilot “test”? 
“…all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments.”

Section 12(d), Public Law 104-113, 1996

“All federal agencies must use voluntary consensus standards in lieu of government-unique standards in their procurement and regulatory activities, except where inconsistent with law or otherwise impractical.”

OMB Circular A-119, 1998
Attributes of a Voluntary, Consensus Standards Body

- Openness
- Balance of interest
- Due process
- An appeals process
- Consensus (vice unanimity)
  - Must include a method for resolving negatives

What’s not:

- Company standards
- Government standards
- Standards mandated by law
- Market driven “de facto” standards
  - Examples: VHS, MS Windows
History
- 100+ year old organization
- Formed to address standards for burgeoning rail industry
  - Led to first standard for railroad steel

Legacy
- Tens of thousands of members
- Many hundreds of standards
  - Everyday examples:
    - Automotive and aviation fuel
    - Home and office construction materials

ANSI Certified
- One of only 206

Recent relevant activity
- Light Sport Aircraft (LSA) standards
  - Design and manufacture of manned acft <1320 lbs
  - FAA adoption
ASTM F38 Committee on UAV Standards

Scope

“The development of standards and guidance materials for unmanned air vehicle systems.”

Executive Committee

- Chairperson, Vice, Secretary, Membership

Subcommittees

- F38.01: Aircraft Certification
- F38.02: Flight Operations
- F38.03: Pilots and Maintainer Certification

Name change in work to unmanned *aircraft* systems (UAS).
What We’ve Accomplished So Far

F2395-05: Standard Terminology for Unmanned Air Vehicle Systems

- Identifies and defines important concepts and terms related to unmanned air vehicle systems.
- Intended to establish boundaries and characteristics that will guide the development of other standards.


- Applies to the design, performance and manufacturer of an appliance seeking civil aviation authority approval, in the form of flight certificates, flight permits, or other like documentation, as providing an equivalent level of safety to the see-and-avoid capability of a manned aircraft.
- Includes requirements to support detection of, and safe separation from, airborne objects such as manned or unmanned aircraft and air vehicles.
Review of Existing Pilot Regulations
Options for UAS Pilot Certification
Discussion
How can you help
Today: 14 CFR Part 61

- **Student**
- **Sport**
- **Recreational**
- **Private**
- **Commercial**
- **ATP**
- **Instructor**

- **Airplane**
  - SEL
  - MEL
  - SES
  - MES
- **Rotorcraft**
  - Helicopter
  - Gyroplane
- **Glider**
  - Airship
  - Balloon
- **LTA**
  - Land
  - Sea
- **Powered Lift**
  - Land
  - Sea
- **Powered Parachute**
  - Land
  - Sea
- **Weight Shift Control**

- **Instrument Rating**
  - Private or Commercial only
  - Airplane, Helo or Powered lift

- **Complex Rating**
  - Retract gear, constant speed prop

- **High Performance Rating**
  - > 200 HP engine

- **Turbojet Rating**

- **Type Rating as required**

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Assumptions

Wide Open Customer Base

- Focus on commercial applications in national airspace
- But also consider military and international adoption

Parallel the existing FAA system as much as possible

- Similar words should have similar meanings
- Don’t reinvent the wheel

Present a professional “look and feel”

- Use terms that imply standards, rigor, safety

Keep the administrators in mind

- Instructors, controllers, AMEs, etc.
- Don’t make their jobs too much harder

The word “Pilot” has beneficial implications

- Formal training, formal testing, adherence to standards
- A “Professional”
UAS Option #1 - Entirely New Structure

**Manned**

- Student
- Sport
- Recreational
- Private
- Commercial
- ATP
- Instructor

- Airplane
  - SEL
  - MEL
  - SES
  - MES
- Rotorcraft
  - Helicopter
- Glider
- LTA
- Powered Lift
- Powered Parachute
- Weight Shift Control

- Complex Rating
- Retract gear, constant speed prop
- High Performance Rating
- > 200 HP engine
- Turbojet Rating
- Type Rating as required

**Unmanned**

- Student
- Sport
- Recreational
- Private
- Commercial
- ATP
- Instructor

- Airplane
  - SEL
  - MEL
  - SES
  - MES
- Rotorcraft
  - Helicopter
- Glider
- LTA
- Powered Lift
- Powered Parachute
- Weight Shift Control

- Complex Rating
- Retract gear, constant speed prop
- High Performance Rating
- > 200 HP engine
- Turbojet Rating
- Type Rating as required
UAS Option #2 – Insert into Current Structure

Sub-options:
- Certificate level
- Category level
- Class level
Current Thinking: Category Level

- UAS
- Remote Control
- Autonomous
- Semi-Auto

Ratings & Limitations?
- External
- Internal
- Complex
- High Altitude
- Beyond Visual Range

Weight
Shift
Conveyor
GPS
LIDAR
Remote
Control
Autonomous
Semi-Auto

SEL
MEL
SES
MES

Airplane
Rotocraft
Glider
LTA
Powered Lift
Powered Parachute

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# Some Examples

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Certificate</th>
<th>Cat</th>
<th>Class</th>
<th>Rating</th>
<th>Type</th>
</tr>
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<tbody>
<tr>
<td>B-737</td>
<td>Commercial, ATP or Priv.</td>
<td>Airplane</td>
<td>MEL</td>
<td>Turbojet</td>
<td>737</td>
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<tr>
<td>Predator</td>
<td>Commercial w/Instrument</td>
<td>UAS</td>
<td>RC</td>
<td>Internal, BVR,</td>
<td>RQ-1</td>
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<tr>
<td>Global Hawk</td>
<td>Commercial w/Instrument</td>
<td>UAS</td>
<td>Auto</td>
<td>Internal, High</td>
<td>RQ-4</td>
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<tr>
<td>Pioneer Hunter</td>
<td>Private</td>
<td>UAS</td>
<td>RC</td>
<td>Internal, Complex</td>
<td>N/A</td>
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<tr>
<td>Shadow</td>
<td>Commercial or Private</td>
<td>UAS</td>
<td>Auto</td>
<td>Internal</td>
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<tr>
<td>Hermes</td>
<td>Commercial or Private</td>
<td>UAS</td>
<td>Auto</td>
<td>Internal, BVR</td>
<td>N/A</td>
</tr>
<tr>
<td>Pointer</td>
<td>License</td>
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</tr>
</tbody>
</table>
What Else? – UAS Pilot “Test of Excellence”

Eligibility

- Examples: Age, health, eyesight, language skills, etc.

Aeronautical Knowledge

- Ground school and written exam

Flight Proficiency

- Hands on flight training

Aeronautical Experience

- Hours, landings, distances flown, handoffs, modes, etc.
The Road Ahead

The ASTM Process

- Develop additional “Work Items”
  - Formal method of tracking inputs/changes
- Ballot the work items
  - Subcommittee and then committee level
- Publish the Standard

Diversify our membership

- 209 Total Members of F38
  - Reasonably balanced
  - Need to expand
    - Internationally
    - More government participation
- F38.03 only has 21 voting members

For more info:

- [www.astm.org](http://www.astm.org)
- Jeff Goldfinger, ASTM F38 Membership Secretary 😊
  - See me later or email [jgoldfinger@brandes-assoc.com](mailto:jgoldfinger@brandes-assoc.com)
Questions