Commercial Space Transportation

COMSTAC-STANDARDS WORKING GROUP (SWG)

APRIL 1ST, 2015

OBSERVATIONS, FINDINGS AND RECOMMENDATIONS (OFR’S)

Chair: Oscar S. Garcia
Vice-Chair: Livingston Holder
Agenda

1. Standards Working Group Intro and Rationale (Observation)
2. Industry Consensus Standards
   1) Process (Finding)
   2) Status Update- First Seven Standards (Finding)
   3) Industry-FAA/AST collaboration (Recommendation)
3. New Business-Next Steps
SWG Intro and Rationale

- Formed at COMSTAC September 17th, 2014
- Chair: Oscar Garcia, Vice-Chair: Livingston Holder

- SWG to enable COMSTAC’s on-going dialogue with FAA/AST regarding Commercial Spaceflight Industry Consensus Standards (Human spaceflight is main area of focus initially):
  
  1. Prioritization rationale and vetted lists (first 7, Sep 2014)
  2. Development, drafting, ratification and adoption processes

- SWG main focus is on US Standards and cross works with ISPWG for international standards issues and opportunities
SWG Intro and Rationale

• SWG industry standards development areas:

  1. Human Spaceflight Occupant Safety Standards
  2. Spaceports
  3. Airspace Integration

• SWG held two working teleconferences (Dec, 2014-Feb, 2015)

• SWG Chair Moderated Industry Standards Panel FAA/AST Conference Feb, 2014
  • Panelists were COMSTAC Members and SWG Participants
  • Industry “bandwidth” to produce new standards is a challenge

• Observation : “FAA AST Conference Standards Panel was helpful and valuable to industry stakeholders”
SWG Intro and Rationale

Finding: “FAA AST Conference Standards Panel was helpful and valuable to industry stakeholders”
Industry Consensus Standards Process

Industry prioritization rationale: *safety first, then, functionality, innovation and relevance to industry’s realities, experience and maturity*

- Industry-CSF Consensus Standards Process:
  1. PRIORITIZE-LIST  INDUSTRY- FAA/AST COLLABORATION TBD
  2. APPROVE  CSF
  3. DEVELOP-DRAFT  CSF, AIAA, SAE (TBD: AIA, ASTM), FAA/AST TBD
  4. RATIFY  CSF
  5. ADOPT  CSF- FAA/AST COLLABORATION TBD
Industry Consensus Standards Process

• Finding “Industry benefits from rigorous prioritization and subsequent selection and adoption of consensus standards”
Industry Consensus Standards Status

• Finding: SWG reports the status of industry’s first 7 prioritized standards as follows:

1. Risk Communications- Completed-Ratification May 2015
2. Propellant Handling- Completed
3. Hazardous Test Notification- Completed
4. Crew Imparted Loads- Development-Draft
5. Occupants Restraints and Acceleration Support- Draft
6. Breathable Atmosphere-Prioritized-Listed (FAA/AST/CAMI?)
7. Landing Gear-Prioritized-Listed
Industry Consensus Standards Status

- Detailed Status first 7 prioritized standards as follows (handout):

<table>
<thead>
<tr>
<th>STANDARD</th>
<th>DOMAIN</th>
<th>FAA/AST-COE REC PRACTICES</th>
<th>DEVELOPER-DRAFT</th>
<th>STATUS</th>
<th>EST COMPLETION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RISK COMMUNICATION</td>
<td>HUMAN SAFETY (ORBITAL AND SUBORBITAL)</td>
<td>AS PER FAA/AST 460 CSF</td>
<td>4 DRAFTED-PENDING CSF MEMBERS RATIFICATION</td>
<td>MAY, 2015</td>
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<td>2. PROPELLANT HANDLING</td>
<td>SPACEPORTS</td>
<td>AIRFIELD AND OPERATIONS GROUND SERVICES CSF</td>
<td>3 DEVELOPMENT-DRAFT</td>
<td>2015</td>
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<tr>
<td>3. HAZARDOUS TEST NOTIFICATION</td>
<td>SPACEPORTS (MIXED USE)</td>
<td>AIRFIELD AND OPERATIONS EMERGENCY RESPONSE CSF</td>
<td>3 DEVELOPMENT-DRAFT</td>
<td>2015</td>
<td></td>
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<tr>
<td>4. CREW IMPARTED LOADS</td>
<td>HUMAN SAFETY (SUBORBITAL)</td>
<td>1.4 HUMAN VEHICLE INTEGRATION 1.4.1 PHYSICAL CONSIDERATIONS CSF/AIAA</td>
<td>3 DEVELOPMENT-DRAFT</td>
<td>TBD</td>
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<td>5. OCCUPANT RESTRAINT AND ACCELERATION SUPPORT</td>
<td>HUMAN SAFETY (SUBORBITAL)</td>
<td>HUMAN VEHICLE INTEGRATION 1.4.1 PHYSICAL CONSIDERATIONS CSF/SAE</td>
<td>2 APPROVAL</td>
<td>TBD</td>
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<tr>
<td>6. LANDING GEAR</td>
<td>HUMAN SAFETY (SUBORBITAL)</td>
<td>N/A CSF</td>
<td>1 PRIORITIZED-LISTED</td>
<td>TBD</td>
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<tr>
<td>7. BREATHABLE ATMOSPHERE</td>
<td>HUMAN SAFETY (ORBITAL AND SUBORBITAL)</td>
<td>1.0 DESIGN 1.1. HUMAN NEEDS AND ACCOMODATION 1.1.1 ATMOSPHERIC CONDITIONS CSF/FAA CAMI-AST COLLABORATION TBD</td>
<td>1 PRIORITIZED-LISTED</td>
<td>TBD</td>
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Industry Consensus Standards Collaboration

- Recommendation: “Industry and SWG recommends to COMSTAC to meet from time to time with FAA/AST to jointly discuss standards prioritization, selection, rationale, drafting, timing and adoption. Consensus standards benefit industry-wide activities including but not limited to, the recommended practice areas for human space flight occupant safety”

- Possible frequency is 2 SWG/FAA/AST meetings/conf calls between COMSTAC’s (i.e. June and December)
Industry Consensus Standards Collaboration

- Industry and FAA/AST possible collaboration:
  - Specific Prioritized Standards Development:
    - Breathable Atmosphere- As per status chart item 7
    - Industry/CSF-FAA/AST-CAMI collaboration

- Standards inventories and maps to populate recommended practices (i.e. human occupant safety future versions)
  - Possible AST-COE support (drafting phase)
Industry Consensus Standards Collaboration

• Jointly prioritize, search for and identify required standards:

  • Existing “as is” AS9000 Series
  • Existing with modifications NASA human rating
  • New standards CSF List (7)

• Explore FAA successful industry consensus standardization models:
  • ASTM-GAMA and FAA LSA Aircraft
  • Flight Training and Testing (FITS)
Industry Consensus Standards Collaboration

- Explore CSF as FAA/AST partnership as consensus standardization “hub” (outside of COMSTAC)
  - Hub, to use expert organizations (AIA, AIAA, SAE, ASTM, AST/COE, etc) to draft, catalogue and publish standards
- Industry and FAA/AST to jointly define recommended practices by “grouping” joint consensus standards in prioritized areas, such as:
  - Medical Limits for participants
  - Ionizing radiations
  - Integration of Occupant and Public Safety
  - Manufacturing
New Business- Next Steps

- TBD at COMSTAC