* Commercial Aviation Safety Team
* Airplane State Awareness Study, LOC-I safety enhancements
* FAA Update on Stall and Upset Prevention, Recovery Training

Warren Randolph
U.S. Commercial Aviation Safety Team
FAA Office of Aviation Safety,
Accident Investigation & Prevention
RASG-MID Safety Summit, May 25 2016, Doha, Qatar
Commercial Aviation Safety Team (CAST)

Overview
CAST brings key stakeholders to cooperatively develop & implement a prioritized safety agenda

Industry

- AIA
- Airbus
- ALPA
- APA
- A4A
- IFALPA
- NACA
- Boeing
- GE*
- RAA
- FSF

Government

- DOD
- FAA
  - Aircraft Certification
  - Flight Standards
  - Accident Investigation
  - Air Traffic Operations
  - Airports
- NASA
- ICAO**
- IATA**
- AAPA**
- ATAC**
- APFA**
- ACI-NA**

* Representing P&W and RR
** Observer
Vision

* Key aviation stakeholders acting cooperatively to lead the world-wide aviation community to the highest levels of global commercial aviation safety by focusing on the right things.

Mission

* Enable a continuous improvement framework built on the proactive identification of current and future risks, developing mitigations as needed and monitoring the effectiveness of implemented actions.

Goal

* Reduce the U.S. commercial aviation fatality risk by at least 50% from 2010 to 2025

and

* Continue to work with our international partners to reduce fatality risk world-wide commercial aviation.
CAST Safety Strategy

Data Analysis

Set Safety Priorities

Implement Safety Enhancements - U.S.

Influence Safety Enhancements - Worldwide

Achieve consensus on priorities

Integrate into existing work and distribute

Agree on problems and interventions
CAST - Safety Enhancements

- 68 Complete - 71%
- 28 Underway - 29%

2025 Plan Risk Reduction Estimate
- 50%
Recent CAST Safety Enhancements Issued

**Airplane State Awareness**
- Previously completed JSIT
  - 19 new Safety Enhancements (SEs 192-211)

**RNAV-Departures and STARs**
- Recently completed JSAIT
  - 3 new Safety Enhancements (SEs 212-214)

**Runway Excursions**
- Recently Completed JSAIT
  - 8 new Safety Enhancements (SEs 215-222)

**Misconfiguration**
- Analysis Underway

Safety Enhancements available on Skybrary:
• Work with States or regional safety teams to introduce CAST to the regional aviation community.

• Work with interested parties to build momentum for safety initiatives.

• Provide detailed CAST safety plan information based on regional risk data at official meetings.

• Provide assistance in tailoring CAST safety enhancements to each regional environment.

• Work with States or regional safety teams to adopt Safety Enhancements (SE)

• Current formal sharing agreements with RASG Pan America and Asia-Pacific
OVERVIEW OF AIRPLANE STATE AWARENESS
JOINT SAFETY IMPLEMENTATION TEAM METHODOLOGY
Loss of Control (LOC) remains a primary contributor to commercial airplane accidents.

Roughly half of recent LOC events stem from airplane state awareness errors.

Airplane state defined by two main categories:

- Attitude (roll and pitch angles and rates)
- Energy (airspeed, vertical speed, altitude, power setting, and configuration)

In the events, information was available to the crew that was not used to prevent the accident / incident.
**APPICABILITY – U.S. AND WORLD OPERATIONS**

**RELEVANCE TO ASA ISSUE**

### Fatalities by CAST/ICAO Common Taxonomy Team (CICTT)

**Aviation Occurrence Categories**


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#### Events

- 7 Events
- 5 Events

#### Fatality Distribution

- **LOC-I**: 19
- **CFIT**: 18
- **RE (Landing) + ARC + USOS**: 15
- **UNK**: 2
- **MAC**: 2
- **SCF-NP**: 5
- **RE (Takeoff)**: 2
- **OTH R**: 1
- **WSTRW**: 1
- **FUEL**: 8
- **RAMP**: 2
- **F-NI**: 2
- **SCF-PP**: 2

**Note:** Principal categories as assigned by CAST.
## Safety Enhancements
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*Pre-decisional information subject to limitations of use under 14 CFR part 193. For CAST use only—not for distribution.*
CAST Safety Enhancements
Air Carrier Actions

- **SE 192 Low Airspeed Alerting**
  - Incorporate existing service bulletins to install low airspeed aural alerting in the U.S. fleet

- **SE 194 SOP Effectiveness and Adherence**
  - Review and update SOPs to align with latest CAST, manufacturer, and ATO recommendations
  - Assess and revise SOPs based on feedback from data monitoring programs

- **SE 193 Non-Standard Flight Operations**
  - Improve safety of non-revenue, non-standard flight operations

- **SE 195 Training Verification and Validation**
  - Improve air carrier oversight of training provided by third-party vendors
CAST Safety Enhancements
Flight Crew Training

- **SE 196 Enhanced Upset Recovery Training, Including Approach-to-Stall**
  - New approach-to-stall recovery procedures and realistic scenarios, including autoflight ON
  - Upset prevention & recovery, including unreliable airspeed

- **SE 198 Scenario-Based Training for Go-Arounds**
  - Go-arounds for other than decision height
  - Complicating factors (trim, light weight, entry into clouds)

- **SE 199 Enhanced Crew Resource Management**
  - Focus on pilot monitoring duties

- **SE 197 Training for Non-Normal Situations**
  - Focus on flying the airplane first
Recommended Safety Enhancements
Airplane Design

• For new airplanes:
  • Continue incorporating features currently delivered on latest type designs, plus:
    • SE 200 Virtual day-VMC displays with energy path guidance
    • SE 201 Advanced bank angle alerting with recovery guidance
    • SE 202 Bank angle protection on new fly-by-wire airplanes
Recommended Safety Enhancements
Airplane Design

• For existing in-production designs (SE 203, SE 204)
  • Study feasibility of production change and retrofit of:
    • Bank angle protection on fly-by-wire airplanes
    • Advanced bank angle alerting with recovery guidance
    • Virtual day-VMC displays with energy path guidance
    • Low airspeed alerting

• For existing out-of-production designs (SE 205)
  • Consider retrofit of feasible features based on results for in-production designs

17
Recommended Safety Enhancements

Research

• Flight Deck Systems (SE 207, 208)
  • Effectiveness of angle-of-attack indicators/displays
  • Low energy state monitoring and alerting
  • Spatial disorientation detection and alerting
  • Smart alerting schemes
  • Improved display of automation states

• Simulator Fidelity (SE 209)
  • Full stall modeling
  • In-flight validation of simulator-based training

• Human Performance (SE 210, 211)
  • Database of pilot responses to critical warnings and alerts
  • Training scenarios for attention issues
### Eleven new ASA Safety Enhancements

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# Eleven new ASA Safety Enhancements + Research & Development

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ASA JSAT RESULTS - SUMMARY

• Recently completed JSAT/JSIT
  • 11 new Safety Enhancements (SE 192 - 202)
  • 3 Manufacturer Feasibility Studies for Design (SE 203 - 205)
  • 5 R&D plans (SE 207 - 211)
• Safety Enhancements available on Skybrary:
  • Search Engine “skybrary CAST Safety Enhancements”
FAA UPRT Update

Manual on Aeroplane Upset Prevention and Recovery Training

Advisory Circular
Subject: Stall and Stick Pusher Training  Date: 8/6/12  AC No: 120-109
Initiated by: AFS-200  Change:

Advisory Circular
Subject: Upset Prevention and Recovery Training  Date: 4/14/15  AC No: 120-111
Initiated by: AFS-200  Change:
Stall and Upset Training

Timeline:

- 2009 Industry-FAA Stall/Stick-Pusher Working Group
- 2010 Public Law 111-216
- 2011 FAA Aviation Rulemaking Committee on Stick Pusher and Adverse Weather Event Training (208 ARC)
- 2011 AC 120-109, *Stall and Stick Pusher Training*
- 2012 FAA/EASA/ICAO LOCART (208 ARC)
- 2014 AC 120-109 Rev-1, AC 120-UPRT
Inspector Education:

* Briefings before the release of the final rule
* On line training sessions with field inspectors
* Release of inspector guidance/job aids
* Annual Principal Operations Inspector (POI) conference
* POI FSTD Training (Stall and Upset Training)
THANK YOU & Questions?