AVIATION RULEMAKING ADVISORY COMMITTEE (ARAC)

FEDERAL AVIATION ADMINISTRATION

September 20, 2018

ARAC MEETING 1:00 p.m.

- Welcome and Introductions
- Federal Advisory Committee Act (FACA) Statement
- Ratification of Minutes
- Status Reports:
    - ARAC
        - Airman Certification Systems Working Group – Mr. David Oord (Covering expanded tasks and proposed timelines. Interim Recommendations Due: 12/2019; ARAC Meeting: 9/2019)
            - Interim Recommendations – Private Pilot Rotorcraft Pilot Helicopter and Instrument Rating – Powered-Lift Airman Certification Standards (ACS), Aviation Instructor Handbook (FAA-H-8083-9B) and Helicopter Flying Handbook (FAA-H-8083-21B)
    - Transport Airplane and Engine (TAE) Subcommittee - Mr. Keith Morgan
        - Flight Test Harmonization Working Group - Transport Airplane Performance and Handling Characteristics, Phase 3 Tasking (Tasked: 11/1/17; Recommendations Due: 5/1/20; ARAC Meeting: 3/2020)
- Recommendation Reports:
    - ARAC
        - Rotorcraft Occupant Protection Working Group – Mr. Dennis Shanahan (Tasked: 11/5/15; Recommendations Due: Task 6 - 8/5/18; ARAC Meeting: 9/20/18)
    - Transport Airplane and Engine (TAE) Subcommittee – Mr. Keith Morgan
        - Transport Airplane Metallic and Composite Structures Working Group - Transport Airplane Damage-Tolerance and Fatigue Evaluation (Tasked: 1/26/15; Recommendations Due: 7/21/18; ARAC Meeting: 9/20/18)
        - Transport Airplane Crashworthiness and Ditching Evaluation Working Group (Tasked: 6/4/15; Recommendations Due: 3/4/18 ARAC Meeting: 9/20/18)
- Any Other Business
    - Status of ARAC Charter Renewal
    - Status of New Working Groups

Airman Certification System Working Group
Status Report to the Aviation Rulemaking Advisory Committee

David Oord
Working Group Chair

September 1, 2018

MEMBERS of ACSWG - INDUSTRY

- David Oord, AOPA
- Paul Alp, Jenner & Block
- Ken Baker, CAE
- Paul Cairns, ERAU
- Kevin Comstock, ALPA
- Mariellen Couppee, Honeywell
- Eric Crump, Polk State College
- David Dagenais, FSCJ
- Maryanne DeMarco, CAPA
- David Earl, Flight Safety
- Megan Eisenstein, NATA
- Lauren Haertlein, GAMA
- John Hazlet Jr., RACCA
- Jens Hennig, GAMA
- Chuck Horning, ERAU
- David Jones, Avotek
- John King, King Schools
- Janeen Kochan, ARTS Inc.
- Ken Lee, CAPA
- Kent Lovelace, UND
- John McGraw, NATA
- John “Mac” McWhinney, King Schools
- Crystal Maguire, ATEC
- Phillip Poynor, NAFI
- Jimmy Rollison, FedEx
- JR Russell, NBAA
- Mary Schu, Mary Schu Aviation
- Roger Sharp, Independent
- Jason Smith, CCAF
- Jackie Spanitz, ASA
- Burt Stevens, Oxford Flying Club, Inc.
- Robert Stewart, Independent
- Donna Wilt, SAFE
- Robert Wright, NBAA

MEMBERS of ACSWG – FAA SMEs

- Susan Parson
- Barbara Adams
- Bill Anderson
- Brianna Aragon
- Robert Burke
- Dennis Byrne
- James Ciccone
- Bryan Davis
- Joel Dickinson
- Troy Fields
- Ramona Fillmore
- Adam Giraldes
- Shawn Hayes
- Vanessa Jamison
- Laurin J. Kaasa
- Jeffrey Kerr
- Ricky Krietemeyer
- Mike Millard
- Anne Moore
- Kevin Morgan
- Margaret Morrison
- Kieran O'Farrell
- Richard Orentzel
- Katie Patrick
- Andrew Pierce
- Shelly Waddell Smith
- Jeff Spangler
- Robert Terry
- Matt Waldrop
- Larry West
- Stephanie Williams
- Jimmy Wynne

SUMMARY OF TASKING

- Provide recommendations regarding standards, training guidance, test management, and reference materials for airman certification purposes.
- Continuation of ATP, Instructor, and Aircraft Mechanic certificates.
- Revisions for Private, Commercial, Remote Pilot certificates and the Instrument Rating.
- Added Sport and Recreational Pilot certificates – airplane.
- Added Private, Commercial, ATP, and Instructor certificates and Instrument Rating in additional aircraft categories–
  - Rotorcraft, powered lift, lighter-than-air, glider, etc.

SCHEDULE

- Interim reports
  - PVT, COM, ATP, Instructor, and AMT certificates and Instrument Rating – no later than June, 2018 - complete
  - Covering expanded tasks and proposed timelines for completion – no later than December, 2019
- Final recommendation reports no later than June 12, 2020

SCHEDULE

- Future Meetings –
  - September 18-19, 2018
  - December 11-12, 2018
  - 2019 - TBD

STATUS OF TASKING

- Overall, with the expanded and new tasks, working group remains on track to meet its schedule.
  - New representatives recently approved and notified
    - Glider, Balloon, Sport, Rotorcraft, & Powered Lift subject matter expertise

AIRMAN CERTIFICATION SYSTEM

Statutes provide for the Administrator to determine qualifications and to use designees to examine/test/issue certificates.

49 USC 44703

The Administrator of the Federal Aviation Administration shall issue an airman certificate to an individual …qualified for…the position to be authorized by the certificate.

49 USC 44702

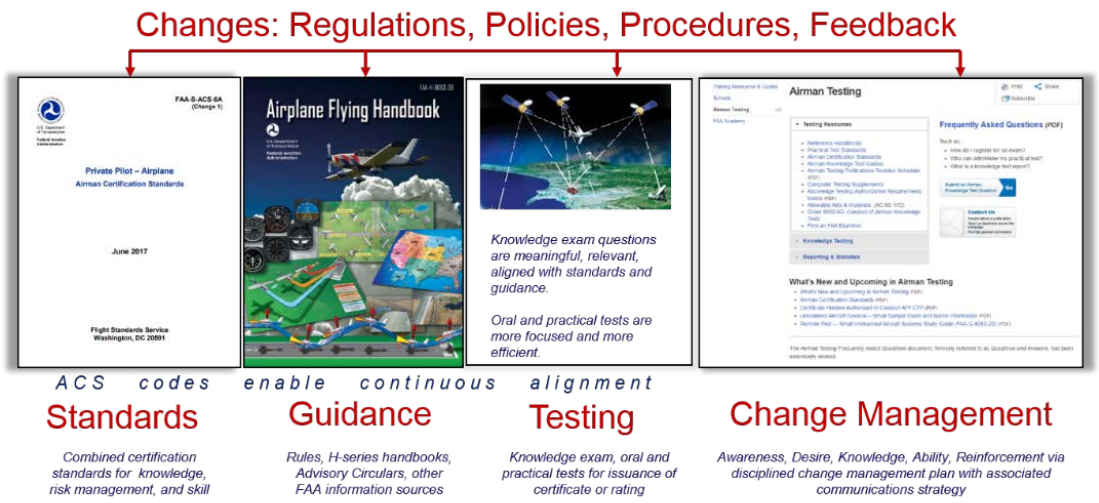
(d) DELEGATION The Administrator may delegate to a qualified private person …a matter related to—(A) the examination, testing, and inspection necessary to issue a certificate under this chapter; and (B) issuing the certificate

14 CFR part 61: ***FAA regulations set forth the requirements and conditions for issuance of pilot/instructor certificates & rating in terms of aeronautical experience and broad subject areas for aeronautical knowledge and flight proficiency (skill).***

Implementing Guidance

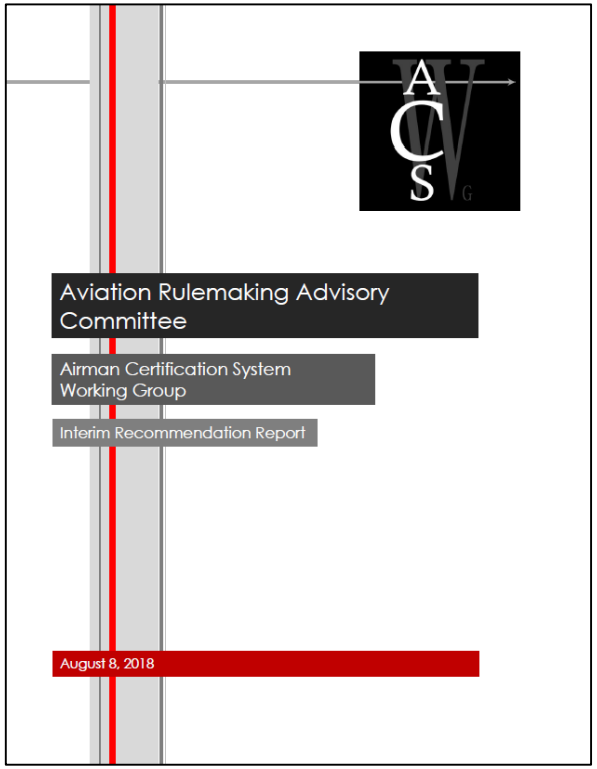
Through the Aviation Rulemaking Advisory Committee (ARAC), the FAA receives essential advice and recommendations from the aviation community on keeping all components of the airman certification system up to date in the context of constant change.

- *Specific guidance to designees via the Practical Test Standards or Airman Certification Standards for a given certificate or rating.*
- *Keeping FAA advisory handbooks up to date*
- *Best practices for effective testing*



AREAS of ARAC CONSIDERATION

- **Interim Recommendation Report – Dated August 8, 2018**
  - Private Pilot Rotorcraft Pilot Helicopter
    - Airman Certification Standards
  - Instrument Rating – Powered-Lift
    - Airman Certification Standards
  - Aviation Instructor Handbook FAA-H-8083-9B
    - Recommendations
  - Helicopter Flying Handbook FAA-H-8083-21B
    - Recommendations



Transport Aircraft and Engines Working Group Status Report to the Aviation Rulemaking Advisory Committee

Keith R. Morgan
Working Group Chair

20 September 2018

MEMBERS of the Transport Aircraft and Engines Working Group

Pratt & Whitney

ALPA

A4A

ASD

Airbus

Boeing

GAMA

AIA

Bombardier

NADA/F

Embraer

SCHEDULE

- Last Meetings:
  - May 10, 2018 Rosslyn, VA
  - Telecom July 25, 2018

- Next meeting:
  - November 15, 2018 Seattle

Flight Test Harmonization Working Group
Status Report to the
Aviation Rulemaking Advisory Committee

Brian P. Lee, Boeing
Christine Thibaudat, Airbus
Working Group Chairs

10 May, 2018

MEMBERS of Flight Test Harmonization Working Group

Authorities	OEM's		Operators	Observers
FAA Joe Jacobsen Bob Stoney Paul Giesman	Airbus Laurent Capra + SME's	Embraer Murilo Ribeiro + SME's	ALPA Rikki Gardonio Len Quiat	JCAB (Japan) Takahiro Suzuki Atsushi Fukui
EASA John Matthews Marco Locatelli	Boeing Darren Jens + SME's	Gulfstream Mike Watson +SME's		CAAI (Israel) Yshmael Bettoun
Transport Canada Lee Fasken	Bombardier Tony Spinelli +SME's	Textron Kurt Laurie +SME's		Norwegian Airlines John Lande
ANAC (Brazil) Pedro Donato	Dassault Philippe Eichel +SME's			

SUMMARY OF TASKING

- Transport Aircraft Performance and Handling Characteristics, Phase 3
- Long list of topics prioritized in Phase 1 (June, 2013 – June, 2014)
- Phase 2 Complete November, 2017; except
  - Wet Runway Stopping Performance: Report will be presented to TAE in May
- Phase 3:
  - 15 . Pilot Induced Oscillation
  - 16. Handling Qualities Rating Method (+17)
  - ~~17. Failure Assessment Methodology~~
  - 18. Go-Around Performance
  - ~~19. Use of Amber Band on Airspeed Tape~~ (Send to ASHWG with help from FTHWG)
  - 20. Return-to-Land
  - 30. Directional Control Below Vmc on Slippery Surfaces
  - 31. Definitions of Vdf/Mdf (esp. for limited airplanes)
- Strategic Considerations
  - Considered to be aggressive
  - FTHWG began work ahead of formal tasking

PHASE 3 SCHEDULE

	1	2	3	4	5	6	7	8	9	10
	Wichita	Cologne	Seattle	Paris	Montreal	Toulouse	Melbourne	Cologne	Savannah	Bordeaux/ Istres
	June 17	Sept 17	Dec 17	March18	Jun-18	September 18	December 18	March 19	June 19	September 19
15 PIO					H			H	H	H*
16 HQRM					H	H	H	H	H	H*
18 GAR		P	P	*P		Report 1 November				
20 Return to Land					P	P	P	*		
30 Yaw Control	H	H		H*	Report 1 June					
31 Vdf/Mdf	H		H	H		H	H	*		

(*) means voting on requirements and guidance; final report will follow

P = Aircraft Performance
H = Handling Qualities

30 month clock starts 1 November, 2017
(so we've had a head-start)
FTHWG intends to stay on this schedule as best we can
(as opposed to stretching to 30 months from this date)
Buffer at end of schedule for contingencies

STATUS OF TASKING

- Topic from Phase 2: Wet Runway Stopping Performance
  - Report accepted by ARAC June 21, 2018
- Phase 3: FTHWG considers activity on-track / on-schedule
  - Go-Around Performance (Topic 18)
    - OEI Requirements and Guidance complete by March Meeting
    - Desire to address EASA RMT 0647 activity (AEO, somatogravic illusion, etc.)
      - Anticipating NPA and CRD “early in 2018”, but have not seen indication of publication
    - Based on “early 2018” promise of NPA and CRD, we target 1 September, 2018 report date (subject to revision based on actual publication of NPA and CRD).
  - OEI directional control on slippery surfaces (Topic 30)
    - Requirements and Guidance for OEI conditions complete and accepted by TAE July 25, 2018
    - To be presented to ARAC at December 2018 meeting

STATUS OF TASKING

- →FTHWG-44 : 4-8 December 2017 Meeting Seattle (Boeing)
  - 12 December (WET)
  - 19 December (WET)
  - 9 January, 2018 (WET)
  - 16 January (Topic 30 - OEI Directional Control on Slippery Runways)
  - 23 January (WET)
  - 30 January (Go-Around)
  - 6 February (WET)
  - 13 February (Topic 30)
  - 20 February (Go Around)
  - 26 February (WET)
  - 27 February (Topic 30)
- →FTHWG-45 : 5-9 March 2018 Meeting Paris (Dassault)
  - 13 March (OEI Directional Control on Slippery Runways)
  - 20 March (Go Around OEI)
  - 29 March (OEI Directional Control on Slippery Runways)
  - 3 April (Vdf/Mdf)
  - 24 April (Go Around AEO)
  - 15 May (Vdf/Mdf)
  - 5 June (Go Around AEO)
- →FTHWG-46 : 11-15 June 2018 Meeting Montreal (Bombardier)
  - …plan weekly telecons (Tuesdays, 09:00 Eastern Time)
- →FTHWG-47 : 17-21 September 2018 Meeting Toulouse (Airbus)
  - …plan weekly telecons (Tuesdays, 09:00 Eastern Time)
- →FTHWG-48 : 3-7 December 2018 Meeting Melbourne (Embraer)

Activity since December, 2017

AREAS for ARAC CONSIDERATION

- No additional guidance needed from FAA or ARAC

Rotorcraft Occupant Protection Working Group
Task 6: Final Recommendation Report to the Aviation Rulemaking Advisory Committee

Dennis F. Shanahan, M.D., M.P.H.
Working Group Chair

September 20, 2018

ROPWG MEMBERS

- Dennis F. Shanahan (Chairman) - Injury Analysis, LLC
- Jonathan Archer - General Aviation Manufacturers Association (GAMA)
- John Becker - Papillon Airways Inc.
- Randall D. Fotinakes - Meggitt Polymers & Composites
- Joan Gregoire - MD Helicopters
- Christopher Hall - PHI Air Medical, LLC
- Krista Haugen - Survivors Network for the Air Medical Community
- John Heffernan - Air Evac Lifeteam
- Flavio Iurato - Leonardo Helicopters
- Chris Meinhardt - Air Methods
- Rohn Olson - Bell Helicopter Textron Inc.
- Matthew Pallatto - Sikorsky Aircraft Corporation
- Pierre Prudhomme-Lacroix - Airbus Helicopters
- Robert J. Rendzio - Safety Research Corporation of America (SRCA)
- Marv Richards - BAE Systems
- Daniel B. Schwarzbach - Airborne Public Safety Association
- David Shear - Robinson Helicopter Company
- Harold (Hal) L. Summers - Helicopter Association International (HAI)
- William Taylor - Enstrom Helicopter Corporation
- Bill York - Robertson Fuel Systems

Non-Voting Members

- Rémi Deletain - EASA, Powerplant & Fuel Engineer
- Laurent Pinsard - EASA, Structures Engineer

FAA Advisor

- Martin Crane - Rotorcraft Standards Branch, Policy & Innovation Division (AIR-681)

SUMMARY OF TASKING

- **Task 1 and 2** – Develop a cost-benefit analysis report for incorporating the existing occupant protection standards 14 CFR 27.561, 27.562, 27.785, 27.952, 29.561, 29.562, 29.785, and 29.952 via §§ 27.2 and 29.2 for newly manufactured rotorcraft.
- **Task 3** – Either make specific written recommendations on how all or part of 14 CFR 27/29.561, 27/29.562, 27/29.785, 27/29.952, should be made effective via §§ 27.2 and 29.2 for newly manufactured rotorcraft or propose new alternative performance-based occupant protection safety regulations for newly manufactured rotorcraft that will be effective via §§ 27.2 and 29.2.
- **Task 4 and 5** - Develop an initial report containing recommendations on the findings and results of the cost-benefit analysis if a new alternative performance based occupant protection safety regulations effective via §§ 27.2 and 29.2 are proposed.
- **Task 6** – Advise and make written recommendations on **incorporating rotorcraft occupant protection improvements and standards into the existing rotorcraft fleet and/or new alternative proposed performance-based regulations.** Occupant protection standards include either all or part of 14 CFR 27.561, 27.562, 27.785, 27.952, 29.561, 29.562, 29.785, and 29.952.

SCHEDULE

- Federal Register Announcement of ROPWG – November 5, 2015
- Meeting 1 – January 21 - 22, 2016
- Meeting 2 – March 1-2, 2016
- **Task 2 Interim Analysis Report** – submitted March 13, 2016
- Meeting 3 – July 26 -27, 2016
- **Task 2 Analysis Report** – submitted November 10, 2016
- Meeting 4 – February 8-9, 2017
- **Task 5 Interim CRFS Report** – May 11, 2017
- Meeting 5 – June 28-29, 2017
- Meeting 6 – September 12-13, 2017
- Meeting 7 – December 14-15, 2017
- **Task 5 Recommendation Report (CRFS)** – January 23, 2018
- **Task 5 Recommendation Report (CRSS)** – January 29, 2018
- Meeting 8 – February 14-15, 2018
- Meeting 9 – March 27-28, 2018
- Meeting 10 – May 10-11, 2018
- Meeting 11 – June 13-14, 2018
- **Task 6 Recommendation Report** – August 8, 2018

BASES FOR ROPWG RECOMMENDATIONS

- ROPWG was constituted to recommend means of implementing longstanding occupant protection rules into the majority of the existing U.S. helicopter fleet, which have been “grandfathered” from these requirements by virtue of having certification dates that preceded enactment of the current rules.
- Although studies have shown the current occupant protection standards to be extremely effective, by 2015, only 16% of the U.S. fleet met current CRFS requirements effective 20 years earlier and only 10% met the emergency landing requirements effective 25 years earlier.
- The poor compliance of the current US fleet is due to several factors, including:
  - Impracticality of making significant structural changes to existing rotorcraft
  - Monetary costs
  - Operational costs (performance penalties)

BASES FOR ROPWG RECOMMENDATIONS

- ROPWG considered all the following factors in developing its current recommendations and established guiding principles:
  - The status quo is unacceptable - significant changes must be made.
  - As many of the current regulations should be implemented into existing helicopters as practicable.
  - In general, rules that require significant structural changes to existing helicopters were considered impractical and were not recommended.
  - Costs were considered, but were not deemed an absolute impediment.
  - ROPWG recognizes that regulatory changes are the most effective means of implementing enhanced safety and that voluntary compliance is generally ineffective.

BASES FOR ROPWG RECOMMENDATIONS

- Summary:
  - Improvements with the greatest potential for increasing the crash performance of the fleet should be required, not voluntary.
  - Enhanced crash survivability and injury data is essential to developing effective occupant protection regulations.
  - Congress can play a very significant role in improving occupant protection.
  - Professional organizations within the industry can be an essential element in improving occupant protection in crashes.
  - Occupant protection in public aircraft operations should be considered, although this segment of aviation does not fall under FAA purview.

RECOMMENDATIONS

High Priority Recommendations to the FAA:
1. 27/29.952(a)(1)(2)(3)(5)(6), 27/29.952(f), and 27.963(g)/29.963(b): The FAA should **require**, in all rotorcraft, the installation (retrofit) of **crash resistant fuel bladders** that meet the requirements of the 50-foot fuel cell drop test in or out of structure, and that demonstrate a minimum of 250 lb puncture resistance. Note: Some potential exceptions to this rule are discussed in the main body of the report.
2. 27/29.785(c) and (g): The FAA should **require** installation (retrofit) and proper usage of **upper torso restraints (shoulder harnesses)** in all rotorcraft seating positions in all rotorcraft. Note: Some potential exceptions to this rule are discussed in the main body of the report.
3. 27/29.785: The FAA should **mandate the use of appropriate restraints for all occupants of rotorcraft, regardless of the age of the occupant**. "Lap Children" should not be permitted in rotorcraft.

RECOMMENDATIONS

High Priority Recommendations for Legislative Changes:
1. **Congress should require the NTSB and FAA to determine impact conditions, occupant injuries, and injury mechanisms in all aircraft accident investigations**. Adequate funding for this added requirement should also be provided.
2. **Congress** should offer **tax credits and/or other financial incentives** to operators for installing critical safety equipment and/or upgrading to helicopter models equipped with critical safety equipment.

RECOMMENDATIONS

Recommendations for Research/Safety Studies:
1. The **FAA should conduct a comprehensive injury study**, similar to that reported in FAA CT-85/11, to determine impact conditions, injuries sustained by all occupants, and occupant injury mechanisms for a large set of recent rotorcraft accidents.
2. The FAA should conduct a study to **determine the need for and the potential effectiveness of supplemental restraint systems.**
3. The FAA should study whether **adjustable weight energy absorbers and/or energy attenuating seat cushions** would provide a practicable and effective means of improving vertical energy attenuation.
4. The FAA should conduct a study to determine the appropriate capabilities for **flight and impact data recording systems** to enable collection of flight data as well as impact velocity, acceleration, and condition data.
5. The FAA should conduct a study to ascertain the extent to which **integrating Human Factors processes and education** (HRO, Just Culture, HFACS, CRM, etc.) into helicopter operations would reduce accidents and contribute to reduced injury rates in crashes.

RECOMMENDATIONS

Recommended Changes to Current Regulations/Guidance:
1. The FAA should change TSO-C80, 27/29.952(g), and 27.963(g)/29.963(b) to **require tear and cut resistance** as well as the presently required puncture resistance in CRFS flexible bladder constructions. Note that this recommended tear and cut resistance requirement should be limited in applicability to new designs.
2. The FAA should amend FAR 91.107 (and/or other applicable regulations) to **require a passenger briefing on egress procedures** in addition to the presently required briefing on the operation of restraint systems.

RECOMMENDATIONS

Recommendations to Industry:
1. Helicopter industry professional organizations should **encourage the use of Personal Protective Equipment (PPE)** by crew and passengers when practicable and when operational conditions indicate a potential benefit.
2. Helicopter Air Ambulance **(HAA)** operators should use **flame resistant wraps** on patients transported.
3. Insurance companies should implement **incentive programs** for the installation and utilization of safety enhancing equipment.

RECOMMENDATIONS

Recommendations for Near-Term Implementation by the FAA:
1. The FAA should work with existing **accreditation organizations to define common safety standards**.
2. The FAA and/or insurance industry should establish a **standardized safety rating system** for rotorcraft and rotorcraft components (e.g. Seat Systems, Fuel Systems) similar to that being used by NHTSA and IIHS for automobiles.
3. The FAA should develop a **centralized information exchange** to communicate rotorcraft safety and technology efforts.

RECOMMENDATIONS

Recommendations for Public Rotorcraft:
1. **Public Rotorcraft associations and the FAA** should use **education and industry standards** to **promote** the voluntary retrofit of Crash Resistant Fuel Systems **(CRFS)** and Crash Resistant Seat and Structure **(CRSS)** in helicopters performing Public Rotorcraft operations.
2. Public Rotorcraft associations and the FAA should use education and industry standards to **promote** the voluntary use of **Personal Protective Equipment (PPE)** in helicopters performing Public Rotorcraft operations.

DISSENT - SIKORSKY

- "…would rather the ROPWG **recommend, not require**, CRFS be retrofitted in Part 29 helicopters" and that "OEMs or operators could employ other means acceptable to the Administrator to address fuel system crash resistance, including consideration of qualitative methods and compensating features."
- This recommendation based on the fact that the ROPWG study of post-crash fires (PCF) did not contain sufficient numbers of Part 29 helicopter crashes to support the ROPWG recommendation for all Part 29 helicopters to be required to have crash resistant fuel bladders.
- In a ROPWG survey, OEMs categorized 75% of the existing Part 29 fleet without CRFS as having a "low feasibility" of "being able to have bladders retrofit into the aircraft."

REBUTTAL TO SIKORSKY DISSENT

- Although there was insufficient data in the ROPWG PCF study to indicate that survivable crashes of Part 29 helicopters without CRFS resulted in significant numbers of PCFs, the majority of ROPWG members voted that CRFS in Part 29 helicopters should, nevertheless, be required for the following reasons:
  - PCF is one of the most horrendous hazards in survivable crashes of helicopters w/o CRFS, but also one of the most preventable.
  - The lack of sufficient data in a single study does not support a conclusion that there is not a PCF problem in survivable crashes of Part 29 helicopters.
  - There is no data to support a conclusion that Part 29 helicopters, by virtue of their size, are less subject to PCF than Part 27 helicopters.

REBUTTAL TO SIKORSKY DISSENT (CONT.)

- Current FAA regulations relating to CRFS treat Part 27 and 29 rotorcraft identically.
- To make this rule optional in Part 29 helicopters will not advance crash safety since history has shown that most operators will not voluntarily subject themselves to the costs of retrofitting CRFS bladders, even when available.
- We expect that if the ROPWG recommendation is adopted by the FAA, that OEMs/operators would be granted an exemption from the rule if the FAA deems that it is either unnecessary or impracticable to install CRFS bladders in a particular model helicopter.
- It will be far more effective to make this recommendation mandatory and grant exemptions for particular models as warranted, than to merely recommend retrofit of CRFS when deemed practical.

DISSENT -AIRBUS

- “Airbus endorses the recommendation to incorporate CRFS features 27/29.952(a) and (f), and 27.963(g)/29.963(b), but feels the FAA should **strongly recommend**, rather than **require**, installation of crash resistant fuel bladders passing 50-foot drop test in or out of structure and with a minimum 250 lb puncture resistance.”
- Airbus supports actions such as the FAA’s publication of Safety Airworthiness Information Bulletin (SAIB) SW-17-31.
- Airbus recommends that all sections of 27/29.952 be included in the retrofit of CRFS if practical, rather than the more limited recommendation of the ROPWG.

REBUTTAL TO AIRBUS DISSENT

- Prevention of post-crash fires (PCF) is a critical element of occupant protection in survivable helicopter crashes and CRFS have proven to be close to 100% effective.
- Bell has offered CRFS retrofit kits to customers for many years, yet very few of these kits have been sold. Similarly, Robinson has found that a significant number of operators chose not to install CRFS kits even when sold at a deep discount and strongly recommended by a Service Bulletin.
- History has shown that the only way to achieve maximum compliance with CRFS or other safety enhancements is to require them.
- Making compliance voluntary will not result in enhanced helicopter crash safety since few operators will elect to incur the costs of retrofit on a voluntary basis.

Transport Airplane Metallic and Composite Structures Working Group

Recommendation Report Briefing to the Aviation Rulemaking Advisory Committee

Mike Gruber (Boeing)
Working Group Chair

September 20, 2018

Members of the Working Group

1.	Michael Gruber	(Boeing) – Chairperson
2.	Chantal Fualdes	(Airbus)
3.	Salamon Haravan	(Bombardier)
4.	Benoit Morlet	(Dassault Aviation)
5.	Antonio Fernando Barbosa	(Embraer)
6.	Kevin Jones	(Gulfstream)
7.	Toshiyasu Fukuoka	(Mitsubishi Aircraft)
8.	David Nelson	(Textron Aviation)
9.	Phil Ashwell	(British Airways)
10.	Doug Jury	(Delta Air Lines)
11.	Mark Boudreau	(FedEx)
12.	Eric Chesmar	(United Airlines)

SUMMARY OF TASKING

With the increased use of composite and hybrid structures provide recommendations regarding revision of the **fatigue and damage-tolerance requirements** & associated guidance material

Tasking was divided up into the following 12 focus areas:

1. Threat Assessment
2. Emerging material technology
3. Inspection Thresholds
4. **Structural Damage Capability – *Fail-safety***
5. Aging, WFD & LOV *(including ultimate strength & full-scale fatigue test evidence)*
6. Testing (related to composite and hybrid materials *including WFD test demonstration)*
7. Repairs (bonding / bolting)
8. Modifications
9. EASA aging aircraft rulemaking and harmonization
10. Rotorburst
11. Disposition of cracking during full-scale fatigue testing
12. Accidental damage inspections included in the ALS conflicts w/ MSG-3 program

Original 2 year tasking turning into a 3 year effort

SCHEDULE

#	Major Tasks/Deliverables	Date	Status	Comments
1	ARAC Tasking Published in Federal Register	1/26/15	Complete	
2	ARAC Working Group (WG) Chair and member selected & notified	5/5/15	Complete	
3	WG Plan accepted by TAE	11/4/15	Complete	
4	Face to Face WG Meetings	6/16/15 9/14/15 3/16/16 12/6/16 6/27/17	Complete Complete Complete Complete Complete	Kick-off meeting Everett, Wa . Montreal Canada Everett, Wa. (leverage AAWG mtg) Melbourne, Florida Everett, Wa.
5	Final Report accepted by TAE & provided to ARAC for review	7/25/2018	Complete	
6	Final Report Briefing to ARAC – (*acceptance vote)*	9/20/2018		

Recommendation Summary

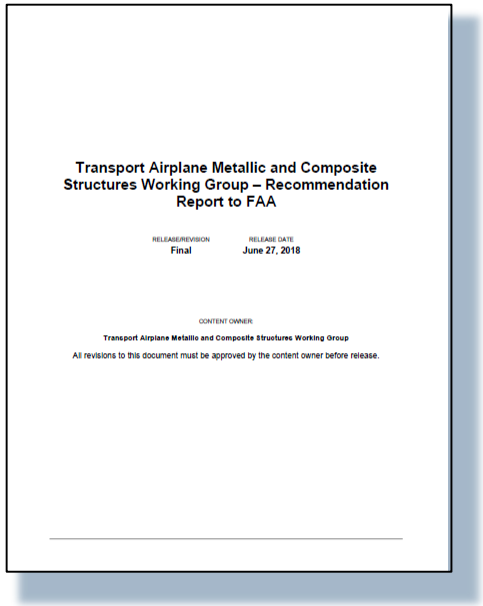
- Rule recommendations are *consistent with current industry practice*
- Associated guidance and policy material recommendations are *intended to ensure a common understanding consistent with industry practice*

    1. Generalize the environmental damage threat *(replace corrosion with environmental deterioration)*
    2. Require applicants to address all modes of damage *(add manufacturing defects to paragraph (b))*
    3. For metals – allow methods other than “rogue flaw” to establish thresholds
    4. Require applicants to establish a limit of validity (LOV) based on the “aging space”
    5. Allow analysis to substantiate thermal loads to show freedom from WFD

- Recommend additional effort beyond WG focusing on SDC of SLP structure

Report + Supporting Elements

TAMCSWG Report


Transport Airplane Metallic and Composite Structures Working Group – Recommendation Report to FAA

RELEASE/REVISION Final

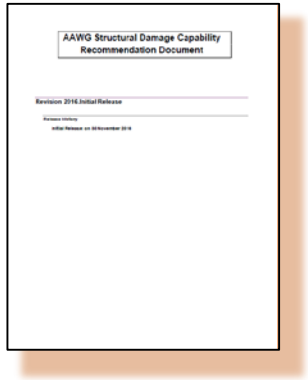
RELEASE DATE June 27, 2018

CONTENT OWNER:

Transport Airplane Metallic and Composite Structures Working Group

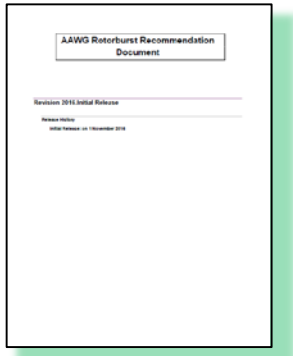
All revisions to this document must be approved by the content owner before release.

AAWG SDC Original Report


AAWG Structural Damage Capability Recommendation Document

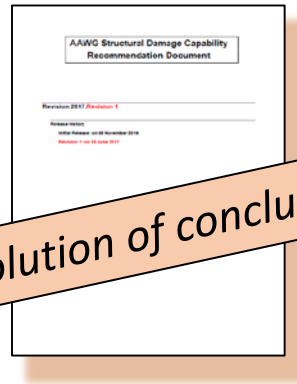
Revision 2016.Initial Release

AAWG Rotorburst Report


AAWG Rotorburst Recommendation Document

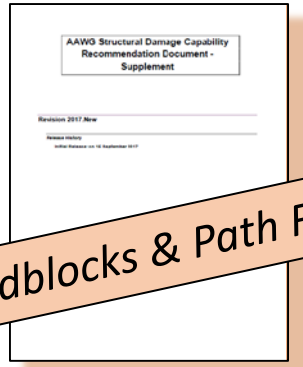
Revision 2016.Initial Release

AAWG SDC Report R1


AAWG Structural Damage Capability Recommendation Document

Evolution of conclusions

AAWG SDC Supplemental


AAWG Structural Damage Capability Recommendation Document - Supplement

Revision 2017.New

Roadblocks & Path Forward

Transport Aircraft Crashworthiness and Ditching Working Group Recommendation Report Briefing to the Aviation Rulemaking Advisory Committee

Kevin Davis
Working Group Chair

20 September 2018

TACDWG MEMBERS

Working group voting members

Kevin Davis	(Boeing Commercial) – Chairperson
John van Doeselaar	(Airbus)
Akif Bolukbasi	(Boeing Military Vertical Airlift)
Milenko Milekic	(Bombardier)
Clóvis Augusto Eça Ferreira	(Embraer)
Olena Zagoskina	(Cascade Aerospace)
Matthias Waimer	(German Aerospace Center (DLR))
Toru Sakagawa	(Mitsubishi Aircraft Corporation)
Vincent Jacques	(Dassault Aviation)
Dinkar Mokadam	(Association of Flight Attendants) (*replaced Candace Kolander, left AFA*)
Heidi R. Moore	(Naval Air Systems Command)
Justin Littell	(NASA) (*replaced Karen Jackson, retired*)
Jack Caughron	(Gulfstream Aerospace Corporation)
Gerardo Olivares Ph.D.	(National Institute of Aviation Research)
Dan Hoverson	(Textron Aviation)

SUMMARY OF TASKING

- Provide recommendations regarding the incorporation of airframe-level crashworthiness and ditching standards into Title 14, Code of Federal Regulations (14 CFR) part 25 and development of associated advisory material.
- Tasking was divided into 4 sub-teams:
  1. In-service data evaluation
  2. Crashworthiness
  3. Ditching
  4. Equipage and protocol

SCHEDULE

#	Major Tasks/Deliverables	Date	Status	Metric	Comments
1	ARAC Tasking Published in Federal Register	4 June ‘’15	Complete	Completed	
2	ARAC Working Group (WG) Chair and members selected & notified	October ‘15	Complete	Industry Representation	
3	WG Plan submitted to TAE	April ‘16	Complete	Plan Approved	
4	Face to Face WG Meetings	Dec. ’15 April ‘16 October ’16 March ’17 Sept ‘17	Complete Complete Complete Complete Complete		
5	Planned Date to submit Final Report to TAE	12/2017	Complete	Submitted 12/15/2017	Reflected in approved plan
6	Final Report Due to FAA	03/2018			Reflected in approved plan

RECOMMENDATIONS

- Crashworthiness:
  - Proposed **new airframe level crashworthiness rule** and associated guidance
    - Ability to use similarity to previous acceptable designs as MoC option
- Ditching:
  - Proposed **revised ditching rules**; sections 25.563, 25.801 and associated guidance
- Equipage and protocol:
  - Proposed **harmonization with EASA rules** and some reorganization of emergency equipage and evacuation rules; sections 25.785, 25.801, 25.809, 25.810, 25.811, 25.812, 25.1411, 25.1415
    - Includes additional guidance for section 25.801 for unplanned ditching incorporating means of compliance issue papers for flotation and evacuation.

DISSENT(S)

- Crashworthiness:
  - Association of Flight Attendants (AFA)
    - Regarding use of similarity as a MoC for crashworthiness and other minor points.
  - German Aerospace Center (DLR)
    - Regarding use of similarity as a MoC for crashworthiness based on composite designs with limited commercial service and other minor points.
  - NASA
    - Regarding impact velocities proposed. NASA believes they should be greater than proposed derived from existing test data and some of the OEM data.
  - Airbus, Boeing, Bombardier, Dassault, Embraer, Gulfstream, Textron
    - Do not believe that an airframe rule is necessary.
    - Concern regarding cost impact to derivative aircraft certification with improvement in safety not clear.
    - Concerns related to requirement in performing drop tests specifically for mid-size or small part 25 aircraft. Significant expense and potential impact to design with improvement in safety not clear.
    - Supported draft rule with ability to leverage similarity to previous acceptable designs as best option if a rule is deemed necessary and found financially viable for industry.
- Ditching:
  - Minor points provided by Dassault and EASA
- Equipage and protocol:
  - No dissenting positions