

**NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF AVIATION SAFETY
WASHINGTON, D.C. 20594**

**SOUTHWEST AIRLINES 1380
BOEING 737-700 with CFM56-7B ENGINES
PHILADELPHIA, PA
April 17, 2018**

**INVESTIGATIVE HEARING
WITNESS LIST**

All witnesses will be asked to state their full name, title, and organization after they are sworn in.

**Panel 1: CFM56-7B Fan Blades: Design and Certification, Consequences
of the Fan Blade Out, Inspection Intervals and Procedures.**

WITNESSES:

**Mr. Mark Habedank
Engineering Leader CFM56
CFM International
Cincinnati, OH**

**Mr. Torben Syberg
Technical Fellow
Propulsion Structures
The Boeing Company
Seattle, WA**

**Mr. Christopher Spinney
Engine Certification Office
Federal Aviation Administration
Burlington, MA**

**Mr. Mark Wibben
Senior Director, Aircraft and
Powerplant Engineering
Southwest Airlines
Dallas, TX**

Issues:

- *Design of CFM56-7B Fan Blade*
 - a. *Definition and explanation of wide-chord blades*
 - b. *History of design changes to blade root*
- *Certification of CFM56-7B*
 - a. *Criteria and Procedures for Fan Blade Out (FBO) testing*
 - b. *Differences between rig tests and certification tests*
 - c. *FBO test findings and resultant design changes*

- d. *Coordination with airframer*
 - e. *Certification criteria for FAA vs EASA, special conditions*
- *Failure sequence of accident blade*
 - a. *Compare/contrast to certification data and historical events*
 - b. *Examine initiating factors of fan blade failure*
- *Inspection Intervals and Procedures*
 - a. *Initial development of inspection program*
 - b. *Changes to inspections during 2016/2017*
 - c. *Inspection campaign at Southwest Airlines*
 - d. *Post-accident changes and findings*

Exhibits: 7A, 7B, 7D, 8A, 8B, 10A, 10B, 11A, 15A, 17A, 17B, 17C

Questioned by: Pierre Scarfo, Matt Fox, Brian Murphy, Bill English, Vincent Ecalle

Panel 2: B737/CFM56-7B Inlet and Fan Cowl: Design and Certification, Structural Capability following a Fan Blade Out Event.

WITNESSES:

Mr. Mark Habedank
Engineering Leader CFM56
CFM International
Cincinnati, OH

Mr. Torben Syberg
Technical Fellow
Propulsion Structures
The Boeing Company
Seattle, WA

Mr. Stan Minabe
Principal Project Engineer
United Technologies Aerospace
Systems
Chula Vista, CA

Mr. Victor Wicklund
Transport Standards Branch
Federal Aviation Administration
Seattle, WA

Issues:

- *Certification of the Inlet and Fan Cowl structure for an FBO event*
 - a. *Applicable FAA regulations*
 - b. *Acceptable means of compliance*
 - c. *FAR Part 33 (powerplants) and FAR Part 25 (structures) required design, analysis and test data exchange for an FBO event*

- *Design, analysis and testing of the Inlet and Fan Cowl structure for an FBO event*
 - a. *Purpose and function of the inlet and fan cowl structure*
 - b. *Information exchange between engine and airframe manufacturer in support of the inlet and fan cowl design*
 - c. *Determination of damage to the inlet and fan cowl structure following an FBO during certification*
 - d. *Differences in the design, analysis, testing and certification between 1995 and today*
- *Structural Capability of the Inlet and Fan Cowl structures following FBO*
 - a. *Accident sequence of events*
 - b. *Differences in the observed accident damage versus certification fan blade fragment damage to the inlet and fan cowl due to an FBO*
 - c. *Reasons for the differences between certification and accident events*
 - d. *Current status of damage documentation and analysis of the event*

Exhibits: 7A, 7B, 7C, 7D, 8A, 8B, 10A, 10B, 15A, 17A, 17B, 17C

Questioned by: Brian Murphy, Pierre Scarfo, Bill English, Vincent Ecalle