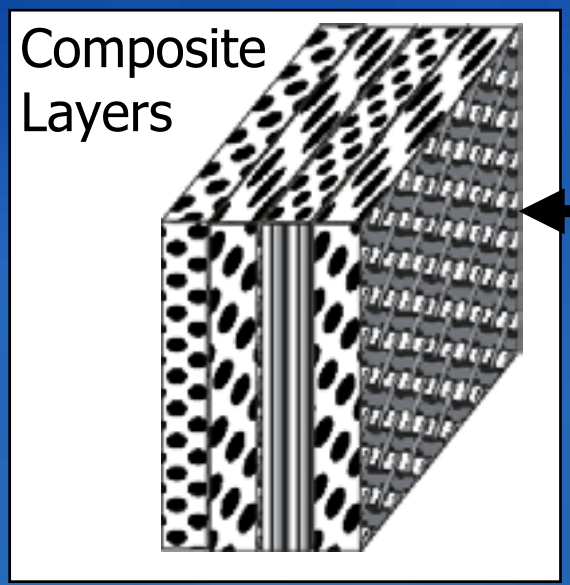
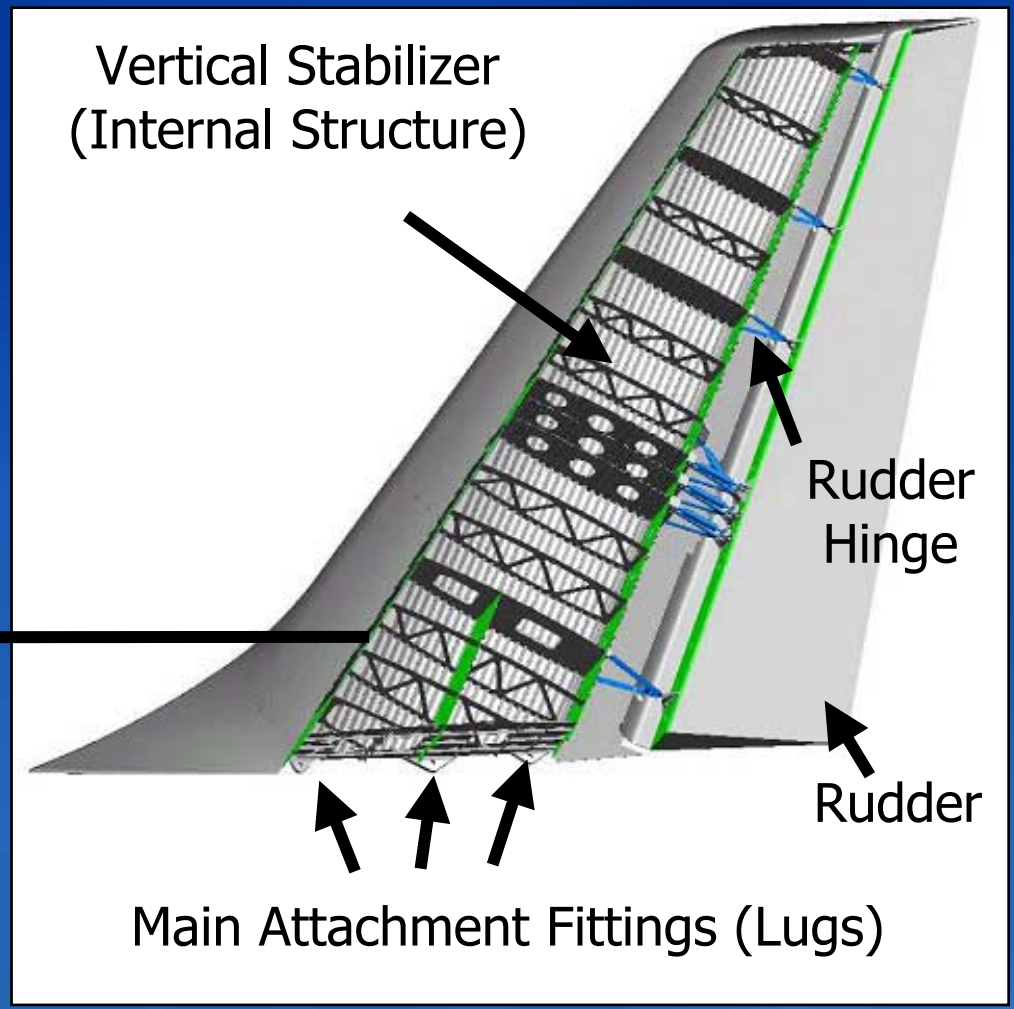
NTSB Board Meeting
AA Flight 587

Composite Materials and Wreckage Examination

Matthew R. Fox, Ph.D.

Vertical Stabilizer and Rudder

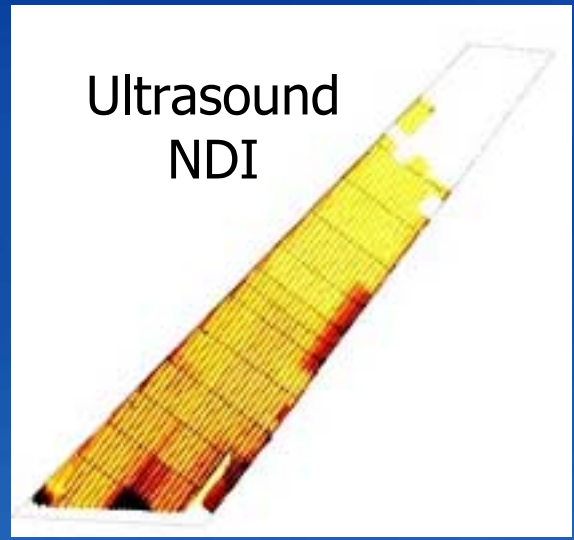


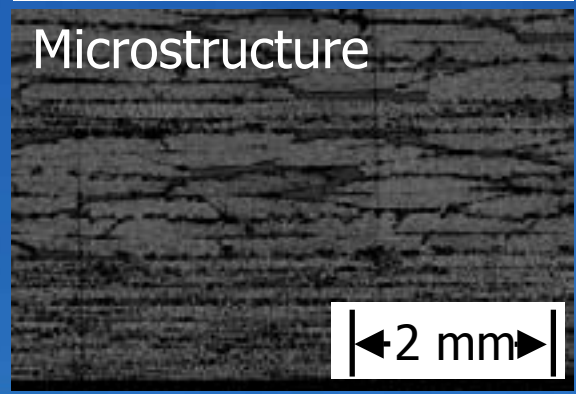


Examination

Methods

- Visual and Fractographic Examination
- Nondestructive Inspection (NDI)
- Materials Testing and Microstructural Examination
- Lug Tests





Visible Damage

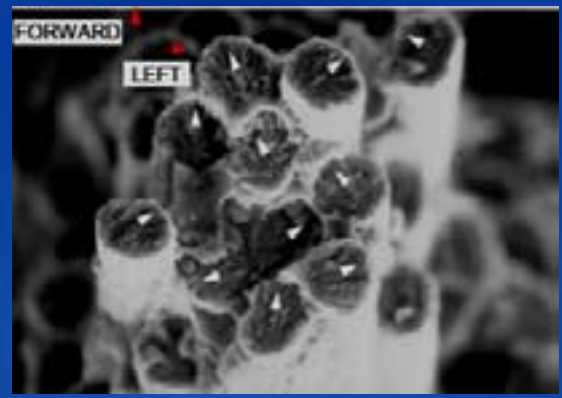
Visible damage observed at rudder hinge line and lug locations.

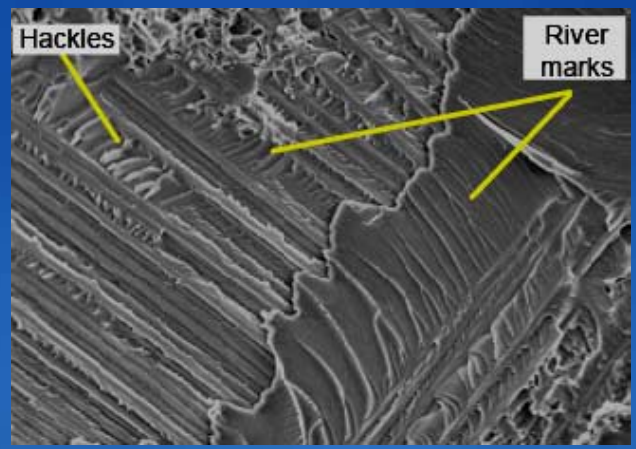
Some lug pieces remained attached to the fuselage.

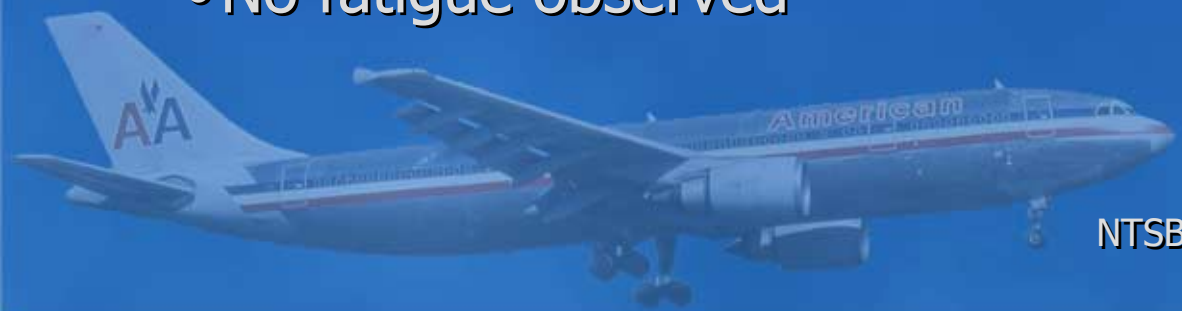
Fractographic Examination

Methods and Results

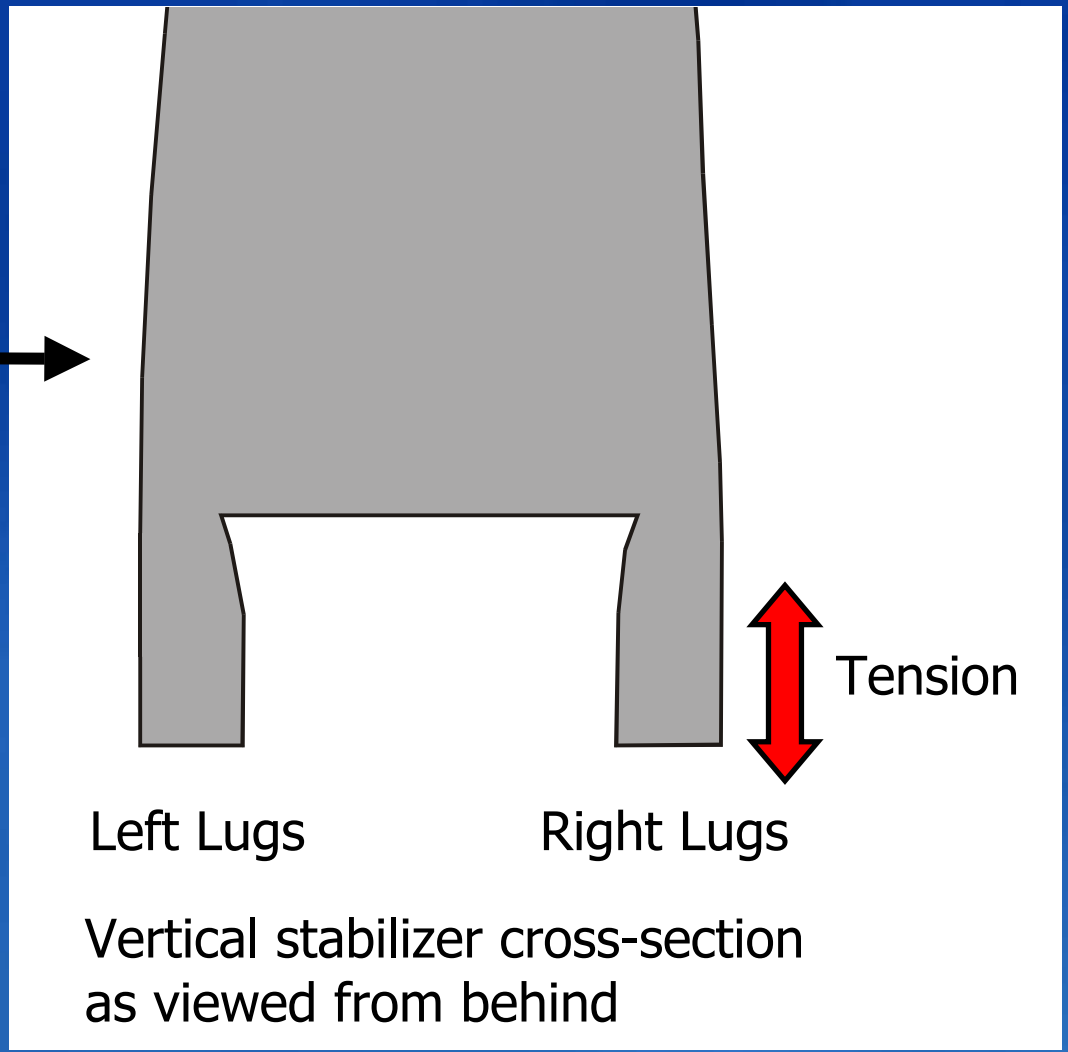
- Composite fractures examined at high magnification using scanning electron microscopy
- Lug area fractures photographed at more than 300 locations
- Over 500 square inches of crack surfaces examined at high magnification
- No fatigue observed





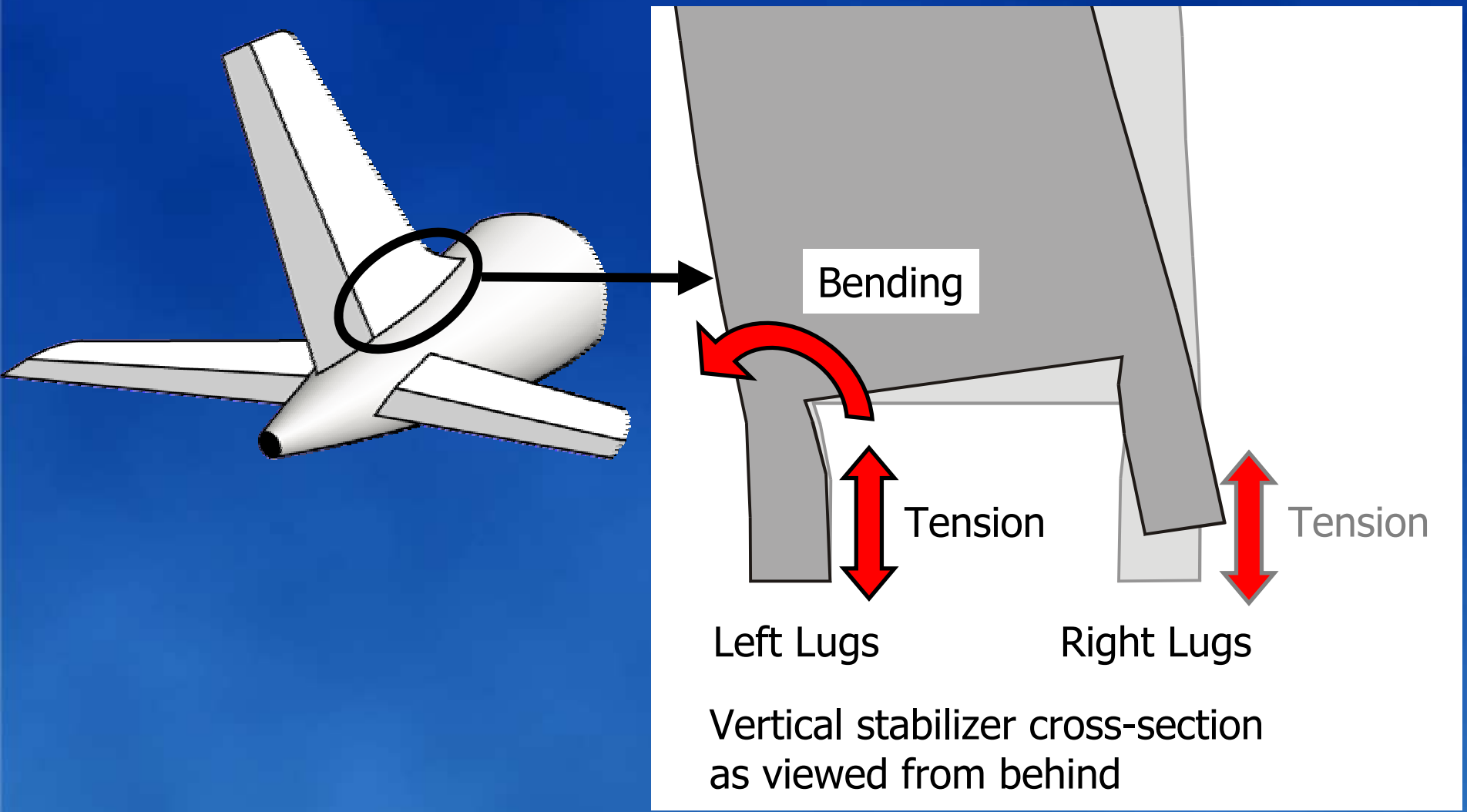


Fracture Pattern

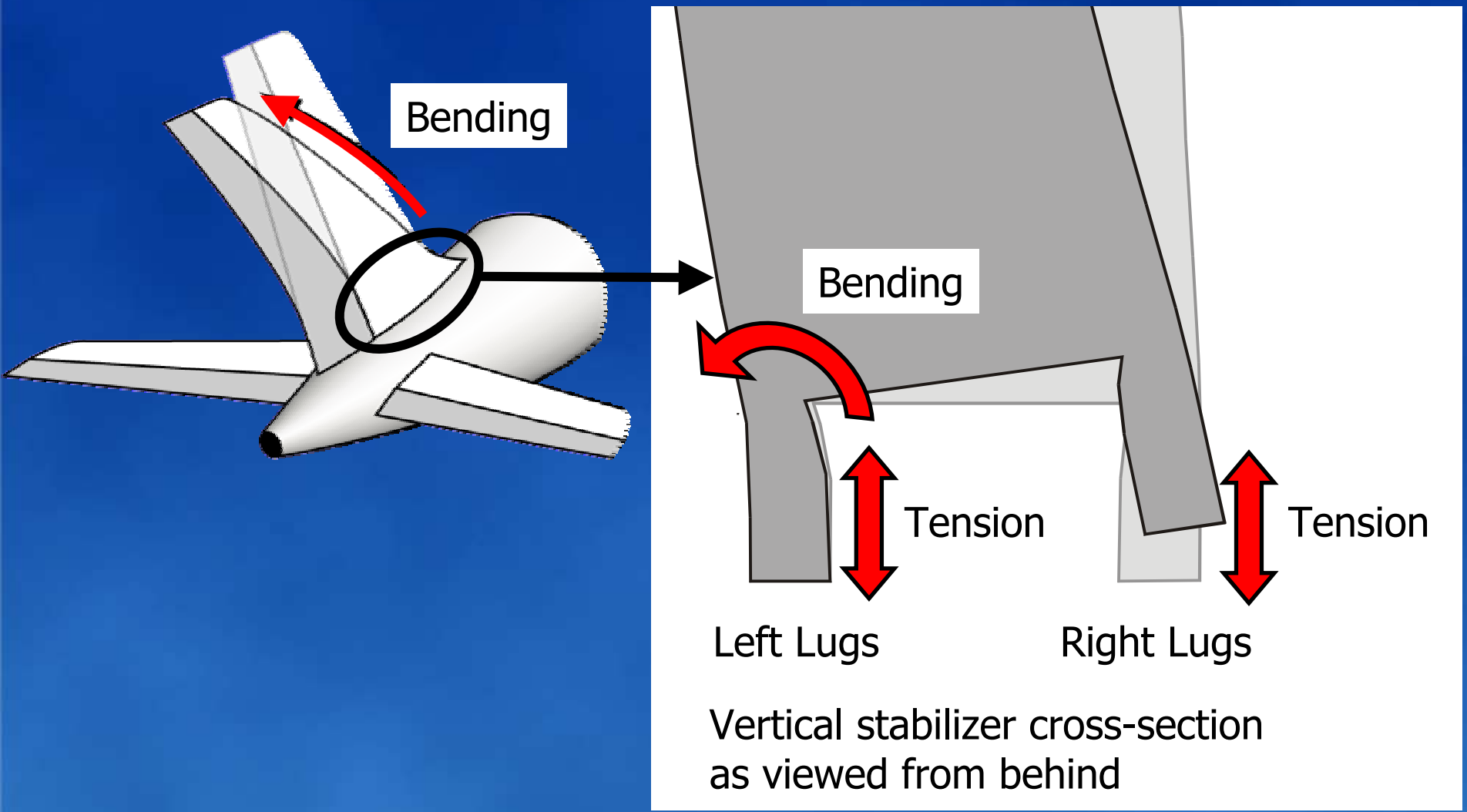


Vertical stabilizer cross-section
as viewed from behind

Fracture Pattern

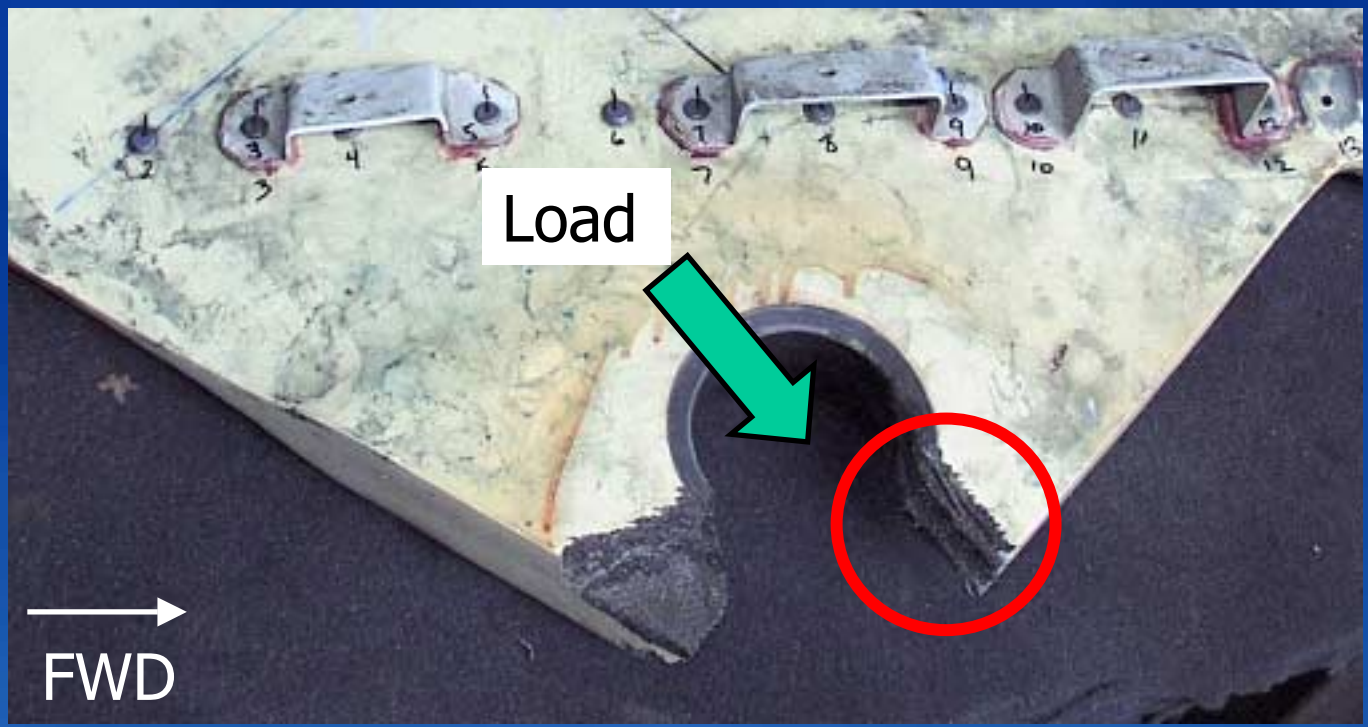


Fracture Pattern



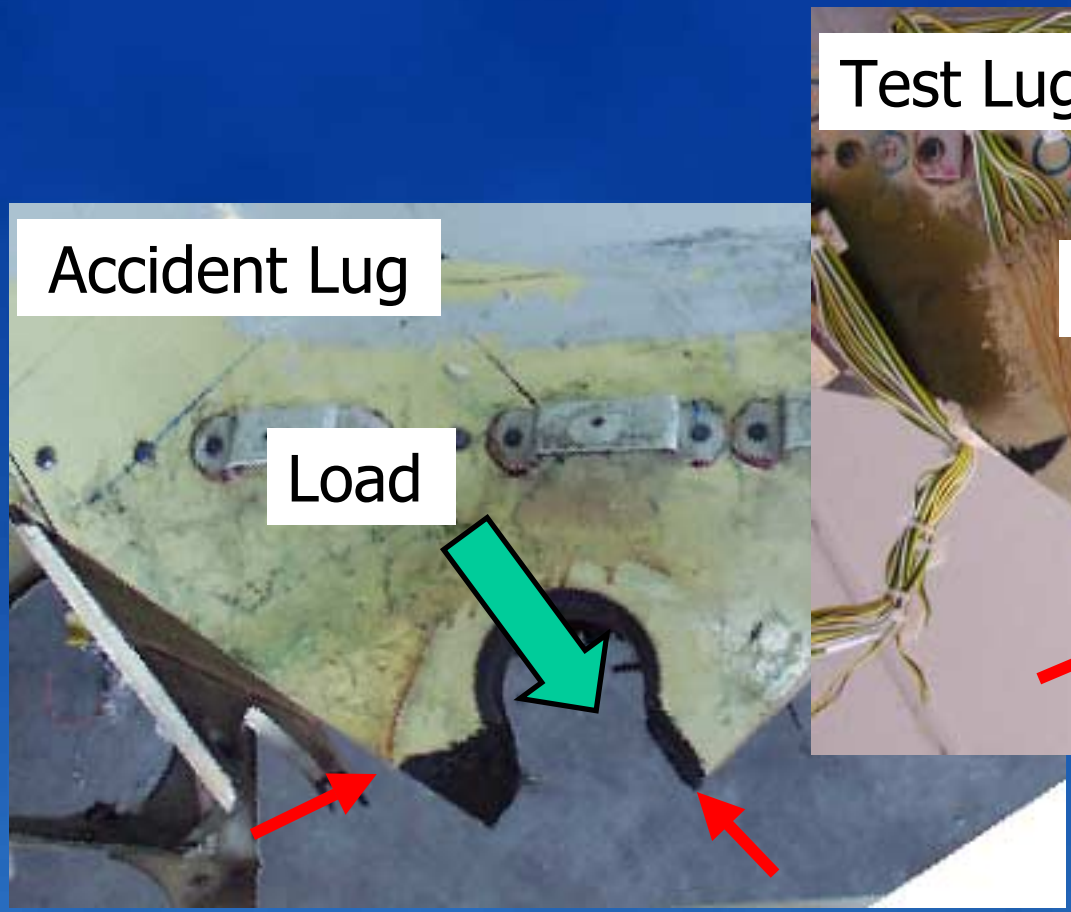
Consistent with overload bending to the left

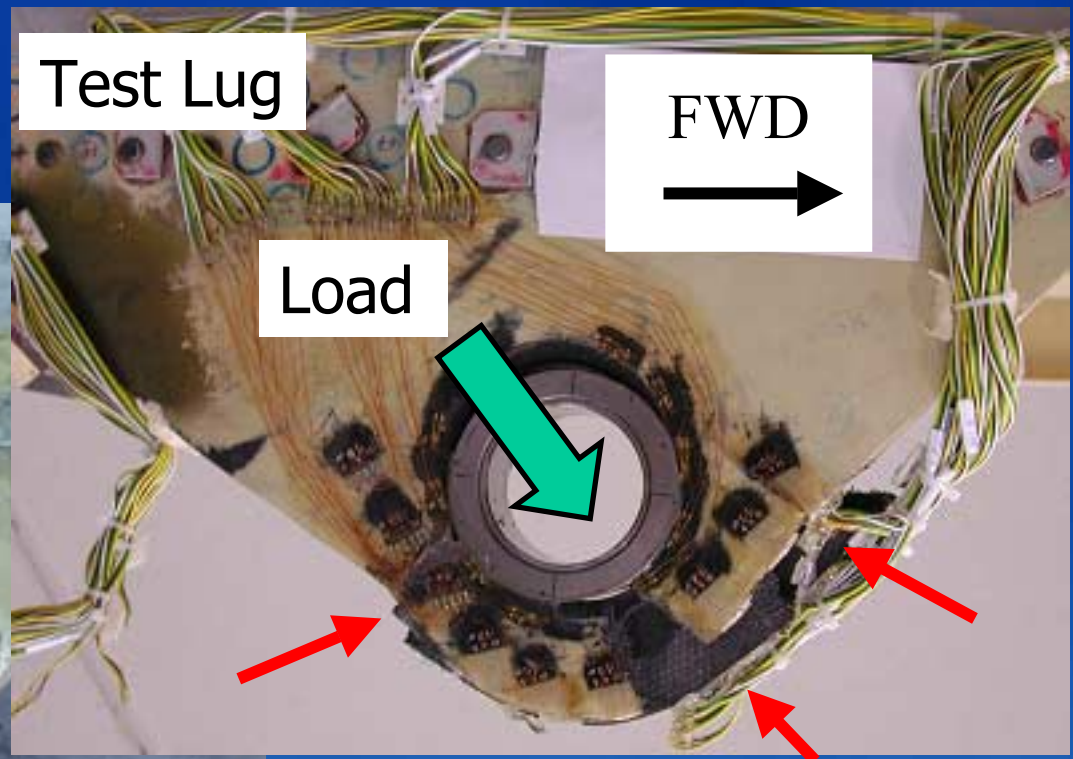
Right Rear Lug Fracture



- Structural analysis predicted fracture initiation at the location circled in red.
- Structural analysis was consistent with damage observed.

Lug Tests





Fracture pattern for the accident right rear lug was as expected given the accident loads.

Summary

- Composite structure was manufactured as expected.
- No evidence of preexisting damage was observed.
- Damage patterns were consistent with an overload failure in bending to the left.

National Transportation Safety Board

American Airlines Flight 587
Belle Harbor, New York
November 12, 2001

NTSB Board Meeting
October 26, 2004