

Context and Implications of the Boeing 787 Grounding

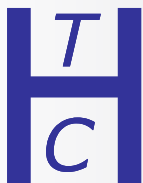
Presented at:

Business Advisory Committee Meeting

Northwestern University

Transportation Center

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**January 16, 2013:
AD Grounding U.S. 787s**

**April 19, 2013:
Approval Granted for
Resumption of Service**

Events Leading to the Grounding

- January 7 incident on JAL 787 after arrival at Boston; NTSB cites “heavy smoke and fire coming from the front of the APU battery case”
- January 16 ANA 787 main battery overheating and failure in flight; aircraft diversion

The Incident Aircraft

Airline	MSN	Line Number	Registration	Delivery
ANA	34486	9	JA804A	1-14-2012
JAL	34839	84	JA839J	12-20-2012

Source: AviationWeek.com/787battery

Background

- Development of the 787
- Certification Process of Li-ion battery system

787 Goals

- Lower operating costs
- Monolithic composite structure
- Fuel efficiency (20% better than similarly-sized jets)
- 30% maintenance cost savings vs. 767
- Greater range than existing medium-size widebodies

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787

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Li-ion Battery Certification

“When the FAA initially approved Boeing's lithium-ion battery system in 2007, it lacked rules to govern their use on planes, and set "special conditions" for Boeing to follow to ensure they would be safe.”

Source: “FAA sees lessons from Boeing 787 battery woes”, Thompson Reuters, April 13, 2013

Chronology

- April 2004 order by ANA (All Nippon Airways)
- Initial deliveries expected in 2008
- Rollout July 2007
- First flight December 2009
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- 
- A red arrow originates from the year '2008' in the second bullet point and points downwards to the year '2011' in the fifth bullet point. Both the year '2008' and the year '2011' are circled in red.

Implications for Airlines

- Availability of alternate aircraft
 - Existing services
 - Planned new services
- Possible passenger acceptance concerns
- Impact of 'fixes' on economic characteristics of the aircraft

Implications for Manufacturers

- Are there reasonable alternatives to Li-ion batteries, if needed?
- Airbus' reaction; smart move, or rush to judgment?
- Can this technology
 - Achieve required safety profile?
 - Demonstrate this in a reasonable time?
 - Maintain acceptable economics?

Historical Context

- Earlier aircraft type groundings
 - Piston era
 - Comet
 - DC-10
- A non-grounding: L-188 Electra
- On balance: groundings have been overcome





UNITED

UNITED

N37557

DC48 Mainliner

8551



4

B-0-A-1

G-APDF

BDFAL





ELECTRA II

AMERICAN

N6132A

AMERICAN

AAA

N6132

Fixing the Problem

Three Main Safety Layers:

- More safeguards to prevent cells from overheating
- More space and insulation to prevent a failed cell from damaging adjacent ones
- New containment system as well as venting system changes

Pressure to Resume Service

- Carriers already suffered through delays
- Expensive assets not being used
- Penalty payments?
- “Footsteps”; the A350XWB

“Question Time”

“The NTSB and Japan Safety Board (JTSB) continue to pursue their separate investigations into the Japan Airlines (JAL) and All Nippon Airways (ANA) battery incidents this month that prompted the FAA’s Emergency Airworthiness Directive.”

Source: *Aviation Week* January 28, 2013, page 30

Regulatory Issues

“Adding to the intensity are questions on the FAA’s original certification for the battery that were posed on Feb. 7 by U.S. National Transportation Safety Board Chairman Deborah Hersman. ...the NTSB is evaluating the validation methods used for certification of the battery as well as testing of field-replacement batteries.”

Requirements Get Tougher

“...since this time around the process will also involve testing to a far more stringent level than when the 787 was first certificated.”

Still True

“Yet since the last of the 50 in-service aircraft shut down its engines on Jan. 17, conclusive indicators of the problem’s cause and how to fix it remain elusive.”

A More Prudent Approach?

“Japan won’t make a final decision on allowing the resumption of 787 flights until after two-day National Transportation Safety Board hearing ends on April 24, Shigeru Takano, a director for air transportation in Japan’s Civil Aviation Bureau, says in telephone interview.”

Source: Bloomberg, April 22

Summary & Conclusion

- Desires of stakeholders (manufacturers, airlines) need to be balanced with assurance that problem will not recur
- The aviation community (Boeing, Airlines, Regulators) must get this right

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- Desires of stakeholders (manufacturers, airlines) need to be balanced with assurance that problem will not recur
- The aviation community (Boeing, Airlines, Regulators) must get this right
- The alternative is unthinkable

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