

JCAB Perspectives on Safe Composite Aircraft Structure

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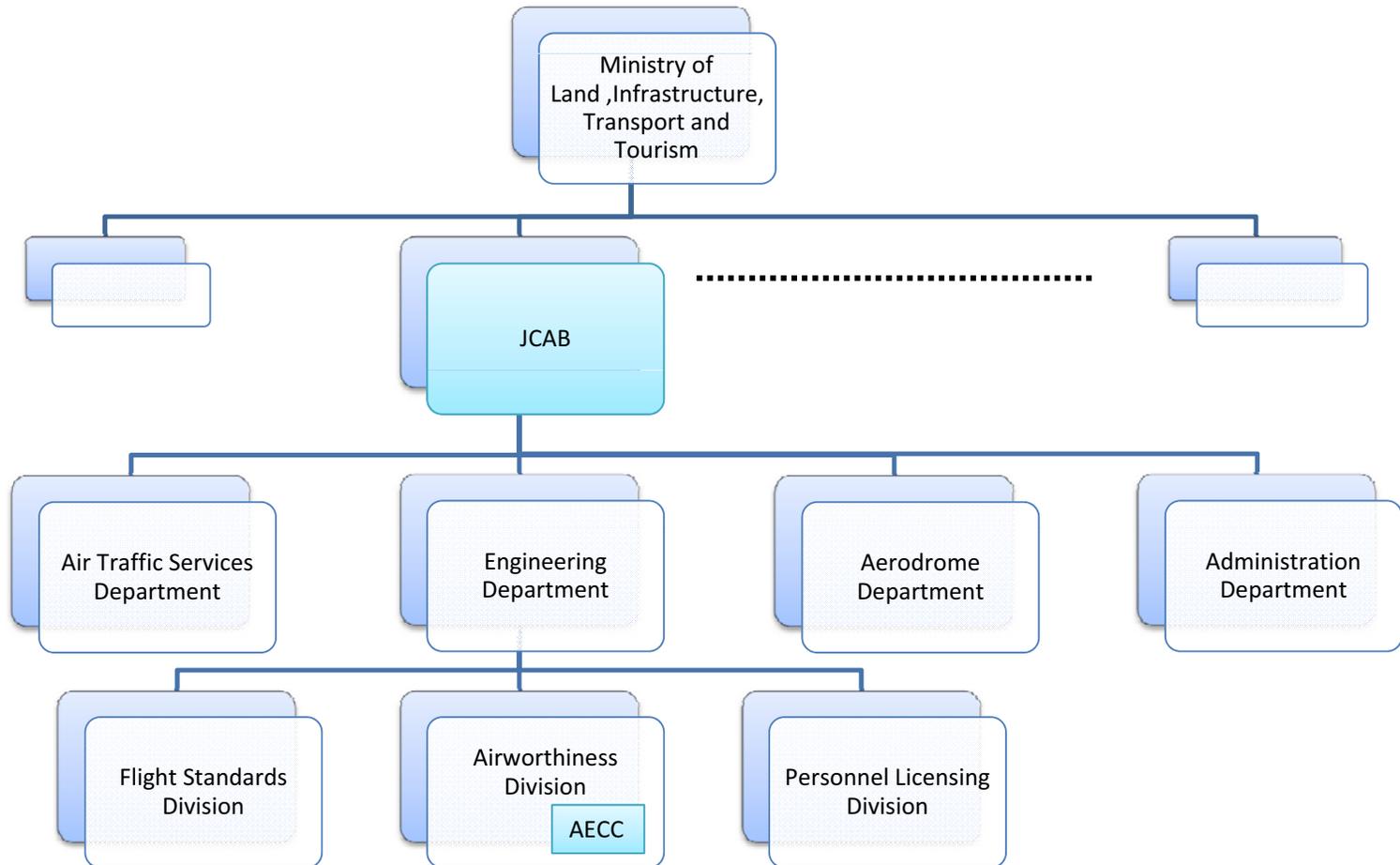
Part I

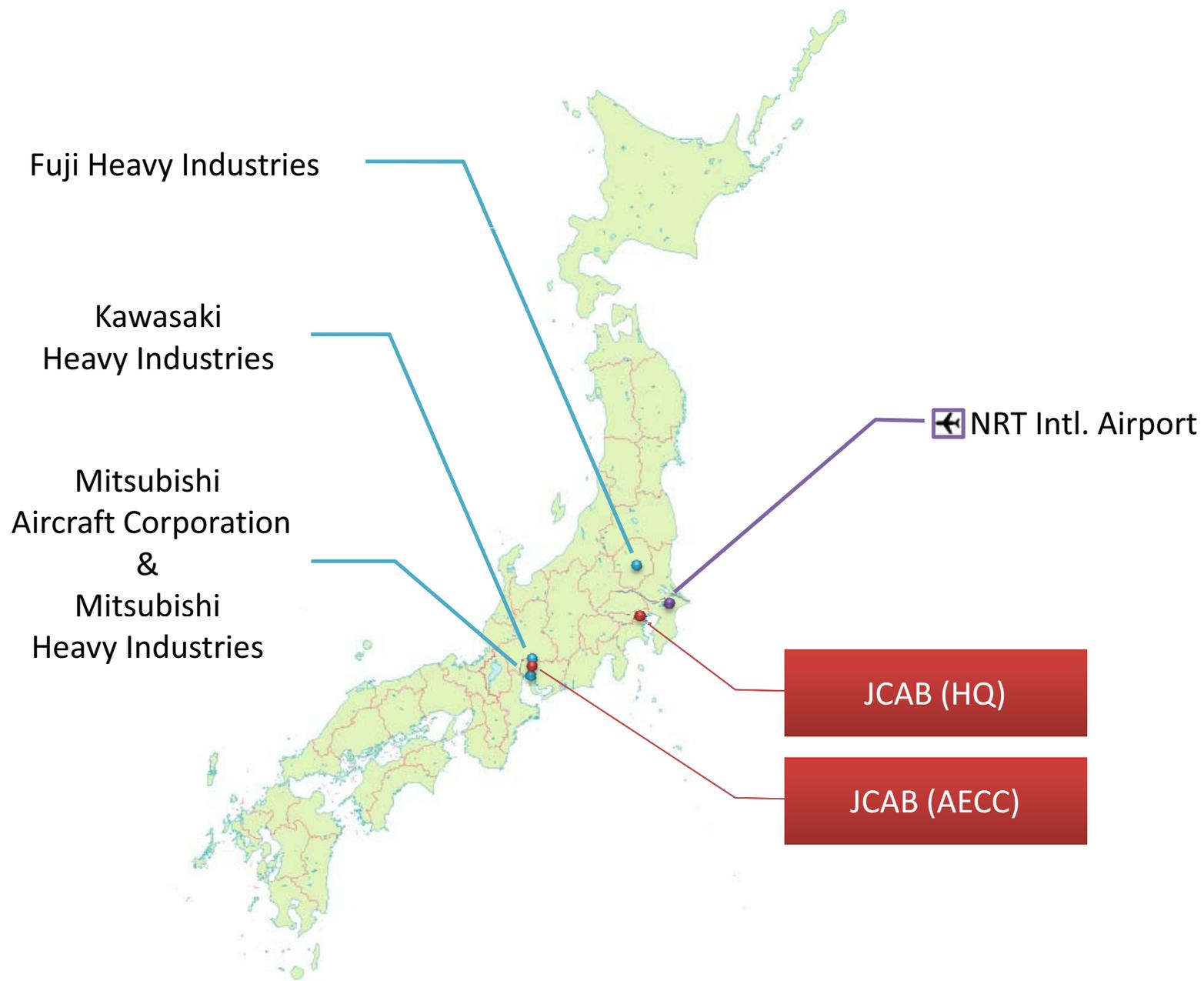
*Introduction of JCAB Certification Process
for New Composite Materials*

Part II

*Example for Application of Composite Material
to Aircraft Structure*

Japan Civil Aviation Bureau





Fuji Heavy Industries

Kawasaki
Heavy Industries

Mitsubishi
Aircraft Corporation
&
Mitsubishi
Heavy Industries

✈️ NRT Intl. Airport

JCAB (HQ)

JCAB (AECC)

JCAB Certification Standards

- Airworthiness Requirements

 - Annex 1 of the Civil Aeronautics Regulations (CAR)

 - *corresponds to ICAO Annex 8*

 - Airworthiness Inspection Manual (AIM)

 - *Airworthiness requirements for each aircraft category, equivalent to FAR 23, 25, 27, 29, 33 and 35 etc.*

- Environmental Requirements

 - Noise

 - Annex 2 of the Civil Aeronautics Regulations (CAR)

 - *corresponds to ICAO Annex 16, volume I*

 - Fuel Venting and Exhaust Emission

 - Annex 3 of the Civil Aeronautics Regulations (CAR)

 - *corresponds to ICAO Annex 16, volume II*

New Composite Material

- VARTM
 - Vacuum Assisted Resin Transfer Molding
 - Autoclave is not required

(Pictures have been intentionally deleted)

Review Approach

- Certification documents by applicants
- Question: What kind of characteristics should be defined for VARTM material and process specifications ?
 - No experience
 - Not enough guidance
 - Contract research to JAXA

JAXA

- Japan Aerospace Exploration Agency
 - Independent administrative institution
 - Aerospace research and development
 - Rocket launch
 - Satellite operation
- Worker: 1600
- Budget: 2.5 billion dollars

Contract Research to JAXA

- Term: 3 years (2005-2007)
- Investigation of certification issue and guidance for new technology
 - VARTM is one of investigation item
 - Based on
 - JAXA's original research and development
 - Existing guidance

Existing Guidance

- AC25.613
 - MATERIAL STRENGTH PROPERTIES AND MATERIAL DESIGN VALUES
- AC20-107A
 - COMPOSITE AIRCRAFT STRUCTURE
- DOT/FAA/AR-03/19
 - Material Qualification and Equivalency for Polymer Matrix Composite Material Systems: Updated Procedure
- CMH-17
 - COMPOSITE MATERIALS HANDBOOK

A Part of Report Contents

- Evaluation of Strength
 - Building Block Approach
 - Consideration of ununiformity
 - Effects depending on process
- Material specification
 - Fiber characteristics (configuration...)
 - Resin characteristics (curing time...)
 - Test methods (ASTM...)
- Process specification
 - Tools
 - Processing parameters (resin transfer time...)
 - Procedure

