Japan: Aircraft Industry and Aeronautical Research Plan

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Towards a Global Vision for Aeronautics
ICAS Sorrento Workshop – October 6, 2003
Outline

- Overview of Aircraft Industry & Air Transportation in Japan
- Advisory Report on Aeronautical R&D at JAXA
  - NAL (National Aerospace Lab.), NASDA (National Space Development Agency), and ISAS (Inst of Space & Aero Sciences) were integrated into JAXA (Japan Aerospace Exploration Agency)
- Research Activities at ENRI (Electric Navigation Research Institute)
Aircraft Industry in Japan

- All Aviation Activities were reopened in 1952.
- Commercial
  - From Domestic to International
- Military
  - From License to Domestic
Comparison with Different Areas

- Automobile: 40 trill. yen (2000)
- General Machine: 30.8 trill. yen
- Electric: 13 trill. yen
- Steel: 12 trill. yen
- Computer: 9.6 trill. yen
- Ship: 2.2 trill. yen
- Aircraft: 1 trill. yen
- Robot: 0.7 trill. yen

Sales in Trillion Yen (2000)
Aircraft Industry (Commercial 1)

- All Aviation Activities were reopened in 1952.
- First Big Project was YS-11 (60 seat turbo pop)
  - Nippon Aircraft Manufacturing Co. (60% Government)
  - First Flight 1962
  - Total Products 182 (82 exported)
  - Production ended in 1971 with a total loss of 36 billion yen.
Aircraft Industry (Commercial 2)

- MHI produced MU-200 (turbo prop) and MU-300 (jet)
- FHI produced FA-200
- Unsuccessful business

1978
1965
Aircraft Industry (Commercial 3)

- Japanese participation in Boeing aircraft as risk sharing partners
  1981 - 1994

- International Cooperation
  - MHI- Bombardier
  - KHI- Embraer
  - FHI- Rayseon

Embraer 170
Aircraft Industry (Commercial 4)

- We have been eager to develop new domestic passenger aircraft after YS-11
- 30-seat regional jet plan
  - Ministry of Economy, Trade and Industry project of R&D for high performance/environment adaptability of small size aircraft

- B-7E7
Aircraft Industry (Military 1)

- Product under license
- Original Design

1972

T1 1958

1981

US1 1967

F1 1971
Aircraft Industry (Military 2)

- International Cooperation
  - Japan-US Design Team
  - Co-cured composite wing structure
  - Active phased array radar

- New Plan 1995
  - Fighter-Support XF-2
  - Anti-submarine patrol
  - Jet transport
Air Transportation in Japan
Domestic Air Transportation

![Graph showing domestic air transportation trends with key events labeled: 1st oil shock, 2nd oil shock, JAL B747 crash, 9/11 terror.]
International

Passenger from and into Japan (left scale)

Ratio of Japanese Airlines

9/11 terror

JAL and ANA (left scale)
Network of Bullet Train (Shinkansen)

- Big competition between high speed train and aircraft
- Need multi modal concept
Research Institutes

- Ministry of Education, Culture, Sports, Sciences and Technology (MECSST)
  - JAXA (Japan Aerospace Exploration Agency: ex NAL, NASDA, ISAS)
  - Universities
- Ministry of Land, Infrastructure and Transport
  - ENRI (Electric Navigation Research Institute)
- Japan Defense Agency
  - TRDI (Technical Research and Development Institute)
  - National Defense Academy
Promotion Plan of Aeronautical Sciences (2003/5)

- Council for Science and Technology in MECSST
  - Subdivision on R&D planning and Evaluation

- Advises for Aeronautical R&D Activities at JAXA in next 5-10 years
Main Points

- JAXA should meet society’s requirements more sufficiently.
- JAXA should be struggling to develop long term research with higher risk.
- JAXA should focus on system technology including air transportation.
- JAXA should provide large scale research facilities.
R&D for Domestic Aircraft Development

- Low Cost (20%)
- Quiet
- Low Fuel Consumption (20%)
- Low DOC (20%)
- Safety Structure
- CFD based Design
- Development of Small Jet Engine

METI plan
R&D for Safety Aircraft Operation

- Atmospheric Wind Sensor
  - Airborne Doppler Laser Radar (Lidar)
- Advanced Avionic System
- Man-Machine Interface
R&D contributing Safe and Reliable Society

- UAV technology for Observation
- All Weather Helicopter Operation (Rescue & Doctor Helicopter)
R&D for Advanced Fundamental Technology

- CFD based Aircraft and Engine Design
- Composite Material
- Advanced Avionics
R&D for Innovative Technology

- Reusable Space Transportation System
- Stratosphere Platform
- SST
- V/STOL
High Speed Flight Demonstrator HSFD2
International Cooperation with France and Sweden
Main Researches at ENRI
Electric Navigation Research Institute
Communications

- Air Traffic Control Workstation
Navigation

- Satellite-Based Augmentation System
Surveillance

- Aircraft Surveillance by ADS-B
  - Automatic Dependent Surveillance-Broadcast
ATM

- Bird View Display
All of the Japan’s recent research activities in Aeronautical science will be presented in ICAS 2004 Yokohama Congress.

Technical tours to JAXA Aeronautical research facilities and ENRI Navigation research facilities are arranged in ICAS 2004.