Civil Aircraft & MRO Market in Japan: Outlook and Upcoming Challenges

January 29th

2019

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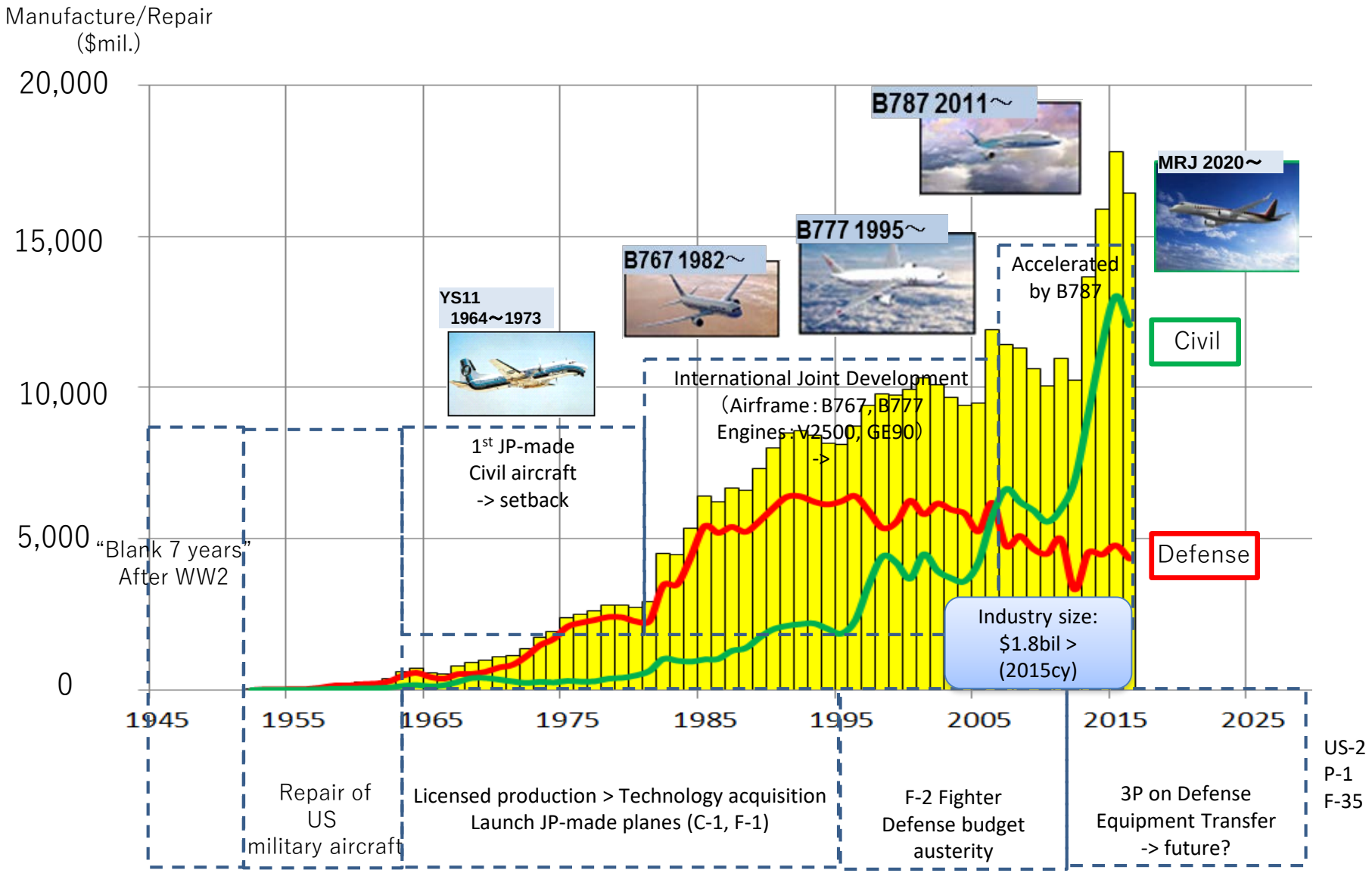
History & Future of Japanese Aircraft Industry

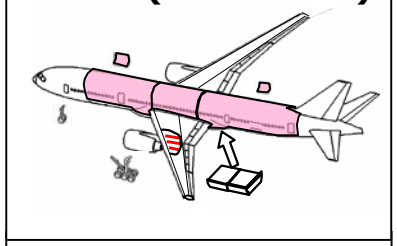


Japan as a Joint Development Partner

- Japan has been participating in international projects working on airframe structure and engine parts for more than 40 years .

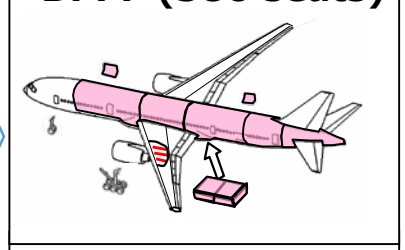
Airframe

B767 (250 seats)



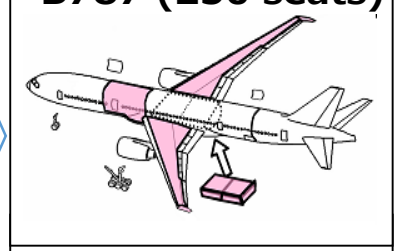
Participation : 15%

B777 (380 seats)



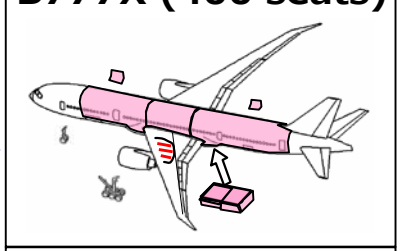
Participation : 21%

B787 (250 seats)



Participation : 35%

B777X (400 seats)



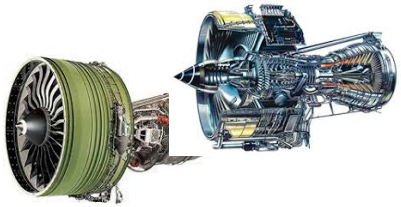
Participation : 21%

Next Generation

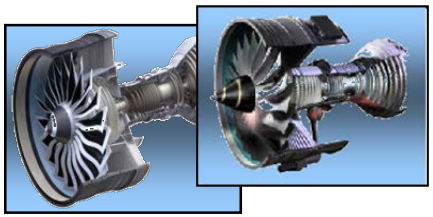
Engine

IAE（JV w/PW etc.）
: V2500
(A320 (150 seats))
Participation: 23%

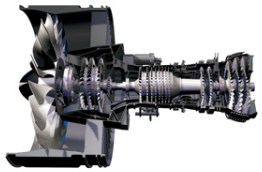
RR:Trent800/
GE: GE90
(B777 (380 seats))
Participation: 9～10%



RR: Trent1000 /
GE: GEnX
(B787 (250 seats))
Participation: 15%



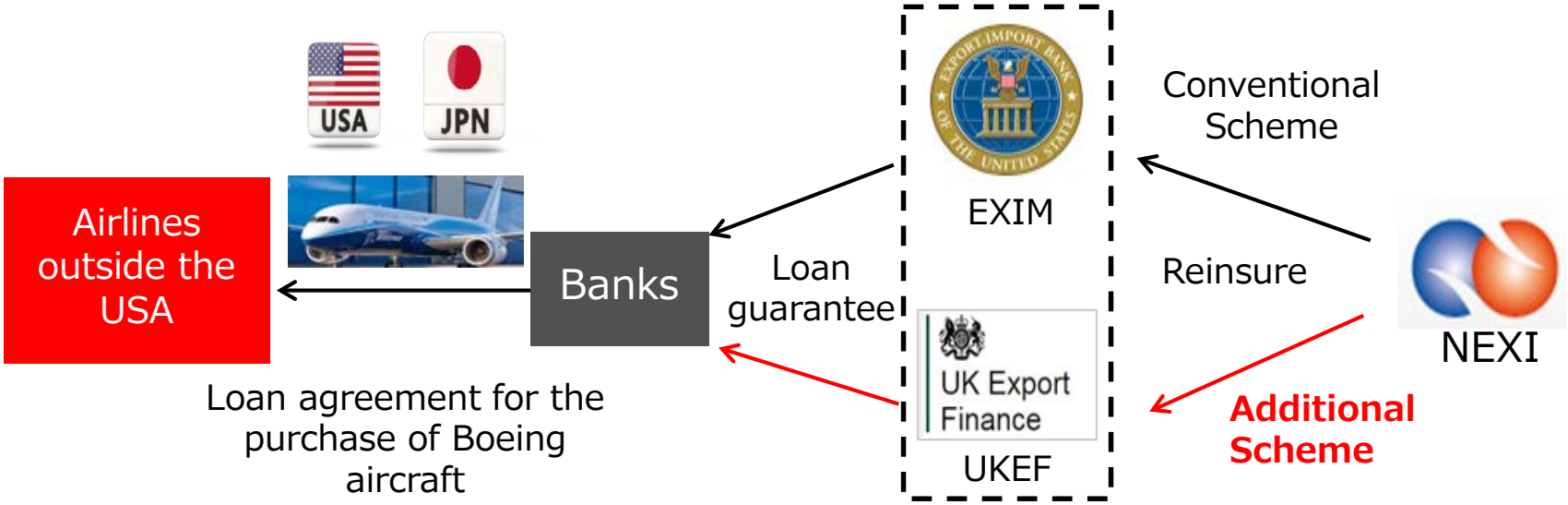
PW: PW1100G-JM
(A320neo (150seats))
Participation: 23%



GE: GE9X
(B777X (400 seats))
Pariticipation: 10.5%

International collaboration for the export finance

- Instead of USEXIM, which stops service for a while, ECAs of UK and Japan (UKEF and NEXI) have started to support of export finance of Boeing since 2017.
  (This additional scheme works only for the Boeing 787 with Rolls Royce engine.)



Expanding Cooperation with Airbus

- METI and DGAC (French aviation authority) established the Japan-Airbus Ad Hoc Civil Aeronautical Industry Working Group on March, 2017.
- Technology companies from inside/outside aviation industry are discussing potential collaboration with Airbus.
- Along with expanding business with Airbus, we aim to expand business outside the aircraft structure and engine.

G to G (Japan-France)

METI and DGAC signing ceremony on March 1st , 2017.

Japanese Companies× AIRBUS

Japan-Airbus Working group on March 1st, September 22
Participants over 100 companies and 150 people

Japan-Airbus supplier training program on May 22-25th(4days)
Participants over 30 companies, 50 people

Policy to Enhance Competitiveness in Aircraft System

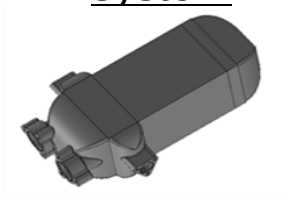
- METI works to improve the business environment, and provides R&D funding to enhance international collaboration among industry, government and academia.

B2B business matching opportunities

International Workshops, Seminars, In/Outbound Site Visits
- Including METI International Civil Aviation Mission

Lighter integrated heat exchanger system

High L/D Surface Air Cooled Oil Cooler



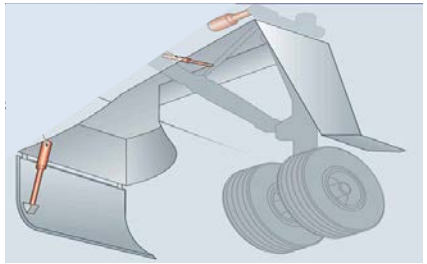
High Efficiency Fuel Oil Heat Exchanger

Modulating Oil Bypass Valve

shefae2 SURFACE HEAT EXCHANGERS FOR AERO ENGINES

SPP SUMITOMO PRECISION × Rolls-Royce

Landing gear extension and retraction system



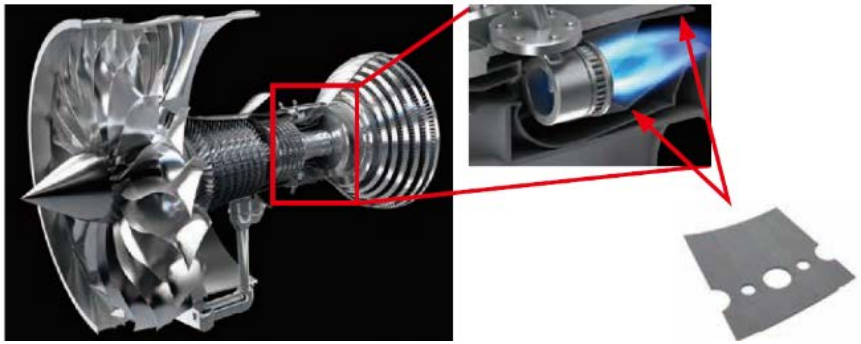
SPP SUMITOMO PRECISION × AIRBUS

Policy to Enhance Competitiveness in Aircraft Materials

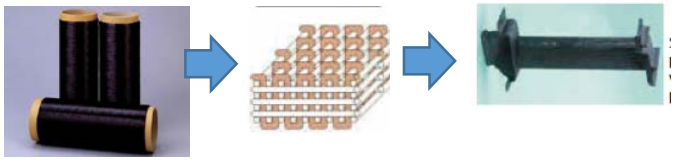
- METI/NEDO have provided R&D assistance on "**CMC**" development since 2011, targeting "2019" to achieve;
  - More than 200 Mpa
  - Less than 20% decreasing of strength after 1400°C *400hr

  toward better fuel efficiency and CO2 reduction.

Development of Low cost CMC by designing of exchangeable combustor liner and its coating technology



Development of High Pressure Turbine and evaluation of its coating technology for the 3rd generation of SiC matrix composite



MRJ (Mitsubishi Regional Jet): An Example of Our Willingness to Work with International Partners

- Japan's first jet airliner with 70-90 seat capacity, being developed by Mitsubishi Aircraft Corporation.
- The first delivery is planned for 2020 to All Nippon Airways and the flight tests are progressing in the U.S.

Component Category	Company
Jet Engine	Pratt & Whitney
Auxiliary Power Unit	Pratt & Whitney Canada
Avionics	Rockwell Collins
Hydraulic System	Parker Aerospace
Air Conditioning, APU	Hamilton Sundstrand
Pylon	Spirit Aero Systems
Seats	Zodiac
Interior	HEATH TECNA
Slat, Flap, Belly Fairing	AIDC
Windshield	PPG Industries
High Pressure Duct	Daher Aerospace
Cockpit Panel	KORRY Electronics

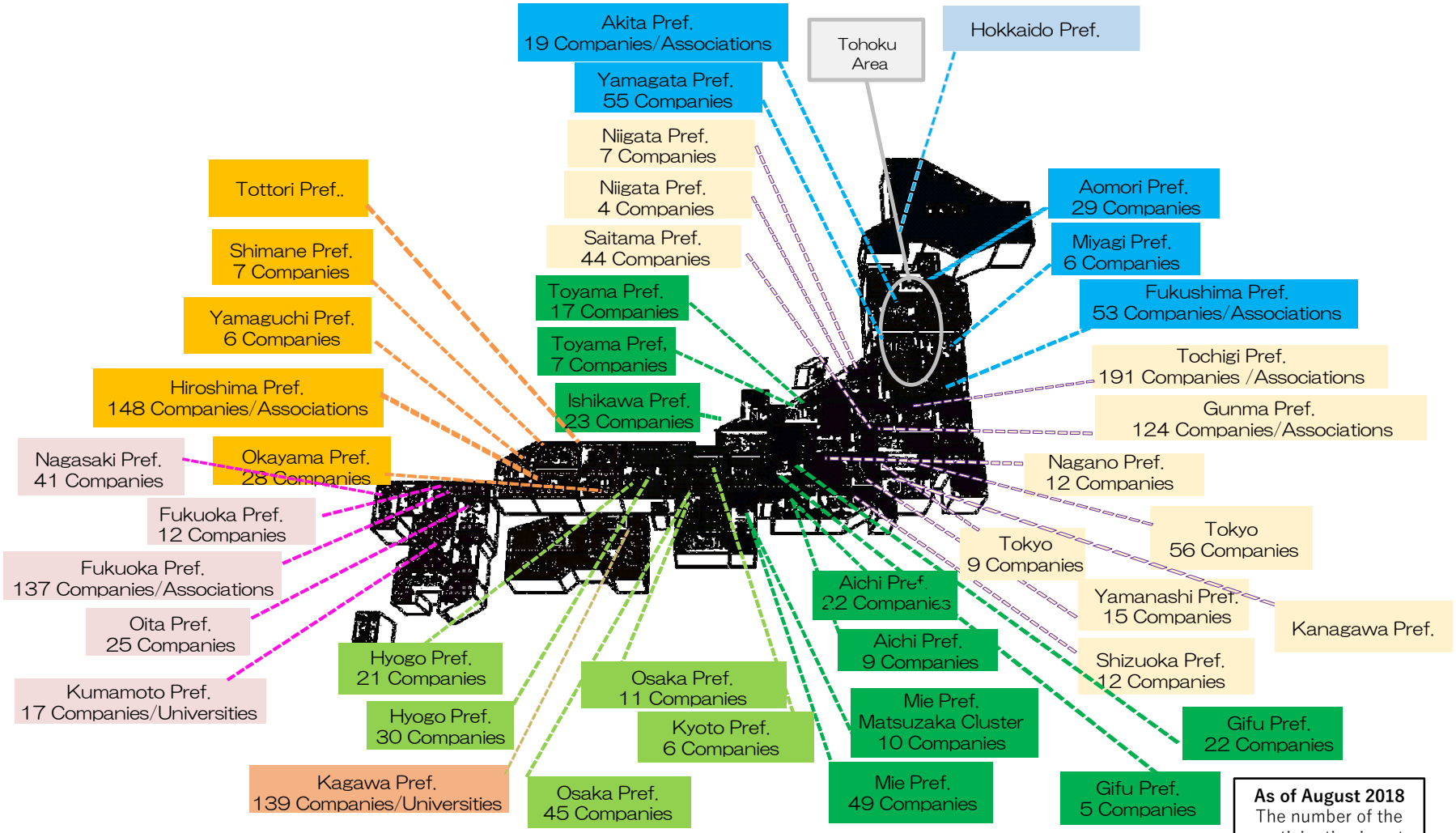
(The picture was taken at the Paris Air Show in 2017)

- ✓ Category: Regional Jet (70-92 seats)
- ✓ Range: 3,770km
- ✓ Performance:
  - High Efficiency (GTF Engine, Aerodynamic Design)
  - Environmentally friendly
  - Comfortable Cabin

Aircraft Manufacturing Clusters in Japan

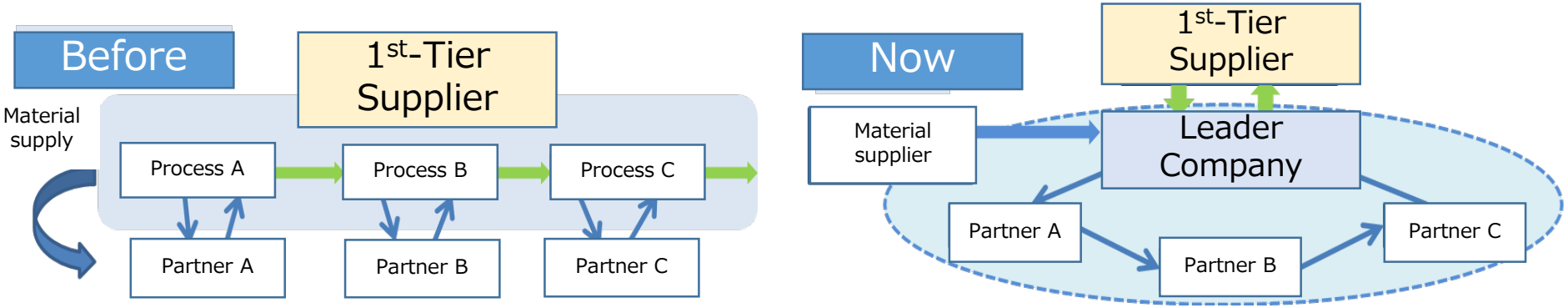
METI

- Japanese SMEs are forming clusters to enter the aircraft manufacturing.
- There are about 40 clusters all over Japan.



As of August 2018
The number of the participation is not the latest.

Aircraft Manufacturing Clusters in Japan



Ex)"Matsusaka Cluster"

- 10 SMEs forms an association under one roof for efficient aircraft parts production.

MITSUBISHI HEAVY INDUSTRIES

Matsusaka Cluster

株式会社 小池製作所

株式会社 松原製作所

金属・樹脂部品の開発、設計、製造、物流管理 真和工業株式会社

Enomoto BeA 榎本ビーエー株式会社

WADA AIRCRAFT TECHNOLOGY

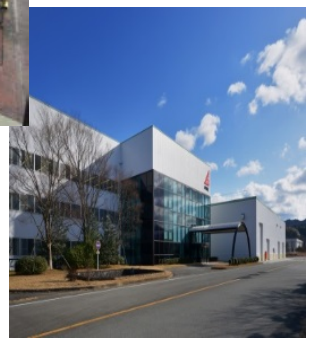
Kosaka IRON WORKS Co.,LTD.

MIZUNO 株式会社 水野鉄工所

平和産業 株式会社 Pioneer of five axis processing simultaneously and CAD/CAM

KATO

松阪APM



Testing facilities for Aircraft Parts and Component

METI

Temperature / Altitude / Humidity Icing Test Chamber

It reproduce atmospheric pressure, temperature and humidity from the ground to the sky, and evaluate the safety and reliability of equipment.

Main specifications

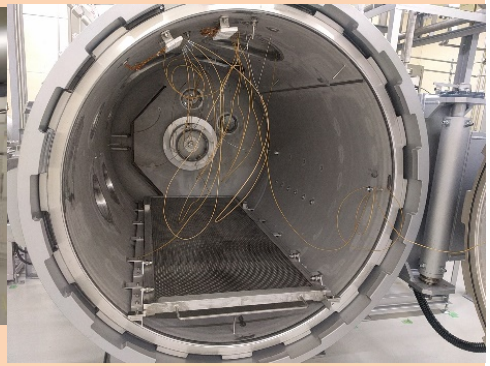
Pressure Range: 101.3 kPa to 10.7 kPa
(Atmospheric pressure) (equivalent to 52,000 ft altitude)
Temperature Range: -70 ℃ to 100℃ (atmospheric pressure)
-60 ℃ to 100℃ (10.7 kPa to atmospheric pressure)
Humidity Range: 20% RH to 95% RH
In the Test Chamber: W 1,500 × H 1,500 × D 4,000 mm
Test Chamber Outer dimension: W 3,380 × H 2,835 × D 5,100 mm
Resistance to skydrolling , specimen slide with colloid

Explosion Proof Test Chamber

It evaluates not causing an explosion in the explosive gas around by the operation of the equipment and the generation of heat.

Main specifications

The pressure range : from 101.3 kPa to 4 kPa
The pressure drawdown time : from 101.3 kPa to 4 kPa within 15 minutes
The temperature range : from 10 ℃ to 260℃
The heating-up-period : from 20℃ to 150℃ within 90 minutes
Use fuel : N-Hexane
Main chamber size : diameter 1.5m × depth 2.0m
Sub chamber size : diameter 0.25m × depth 0.25m
Interior-lighting , High Speed camera
Manipulator use possible
Program operation , The fixed value operation
Manual operation's being possible



In 2019, the combustion / fire resistance test facility is planned to be introduced.

NAMAC

全国航空機クラスター・ネットワーク
The Nationwide Network of Aircraft Manufacturing Clusters

- The Nationwide Network of Aircraft Manufacturing Clusters(NAMAC) was established in 2017 for inter-cluster/SME cooperation and to appeal for foreign companies.
- The NAMAC website list the information of each cluster and its member companies, indicating their certificates and machines.

※1

Category

- ☐ Assembly, Sub-Assembly
- ☐ Functional Component, Equipment
- ☐ Part Machining
- ☐ Sheet Metal Forming
- ☐ Composite Processing
- ☐ NonDestructive Testing
- ☐ Chemical Processing
- ☐ Heat Treating
- ☐ Electric Cable/Harness
- ☐ Printed Boards
- ☐ Furnishing, Interior
- ☐ Tooling, Jig, GSE
- ☐ Engineering/Design

※2

Nadcap

- ☐ Conventional Machining as a Special Process/CMSP
- ☐ Chemical Processing/CP
- ☐ Coatings/CT
- ☐ Heat Treating Materials Testing/HT
- ☐ Materials Testing Laboratories/MTL
- ☐ NonDestructive Testing/NDT

※3

OEM

This search for OEM is OR search.

- ☐ Boeing
- ☐ Bombardier
- ☐ airbus
- ☐ Honeywell

https://namac.jp/en/

Japanese companies in ASEAN

- Japanese aircraft companies have also started working with ASEAN countries.
- There are many Japanese SMEs they have already manufacturing bases in ASEAN for other sectors, there are huge potential to expand the cooperation in the aerospace sector as well.

Vietnam

Aero-Design & Manufacturing Service (Vietnam) Co.,LTD <SMEs>
Jigs, Tools, and program design

Mitsubishi Heavy Industries, Ltd.
Wing parts and fuselage parts

Nikkiso Vietnam, Inc.
Engine parts and wing parts

Philippines

Jamco Philippines, inc.
Composite material for aircraft interior components, Panel processing, etc.

Singapore

JAMCO Aero Design & Engineering Pte Ltd.
Design for repairing aircraft interior items, etc.

SINGAPORE JAMCO PTE LTD.
Maintenance of aircraft and aircraft equipment

Nabtesco Aerospace Singapore Pte. Ltd
Repair of aircraft equipment,etc.

Malaysia

Asahi Aero Malaysia Sdn.Bhd.<SMEs>
Surface treatment and other processing of aircraft parts.

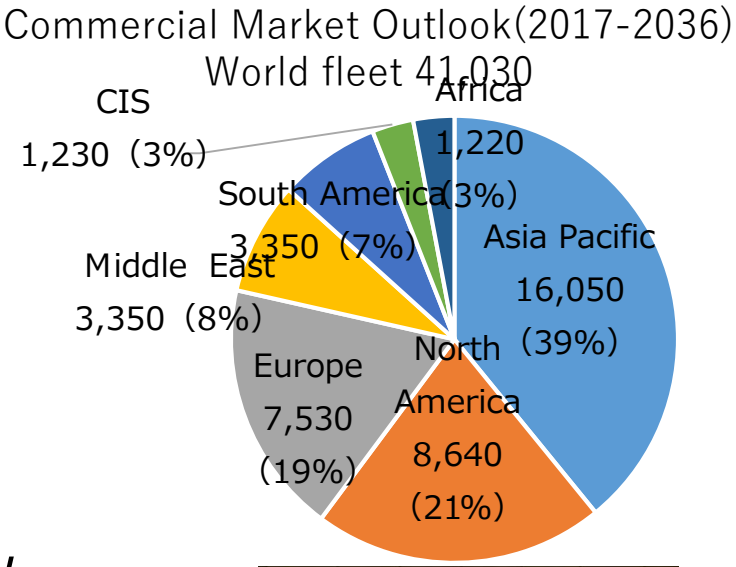
Wada Aircraft Technology<SMEs>
Design aircraft parts and jigs and tools.

IAC Manufacturing (Malaysia) Sdn.Bhd.<SMEs>
Manufacturing aircraft component and surface treatment

ASIA AIRCRAFT SUPPLY CHAIN FORUM

- The Asian civil aviation market is expected to **expand significantly**.
- On November, 2018, "ASIA AIRCRAFT SUPPLY CHAIN FORUM" was held to discuss **potential of the aircraft supply chain in Asia**.

About 350 officials and experts from international companies participated in the event in Tokyo.



Boeing

"we would like to add more to our supply chain if they have potential"

Collins Aerospace

"We would like to cooperate with cutting-edge materials, manufacturing methods, and technologies in fields such as Electrification and integration."

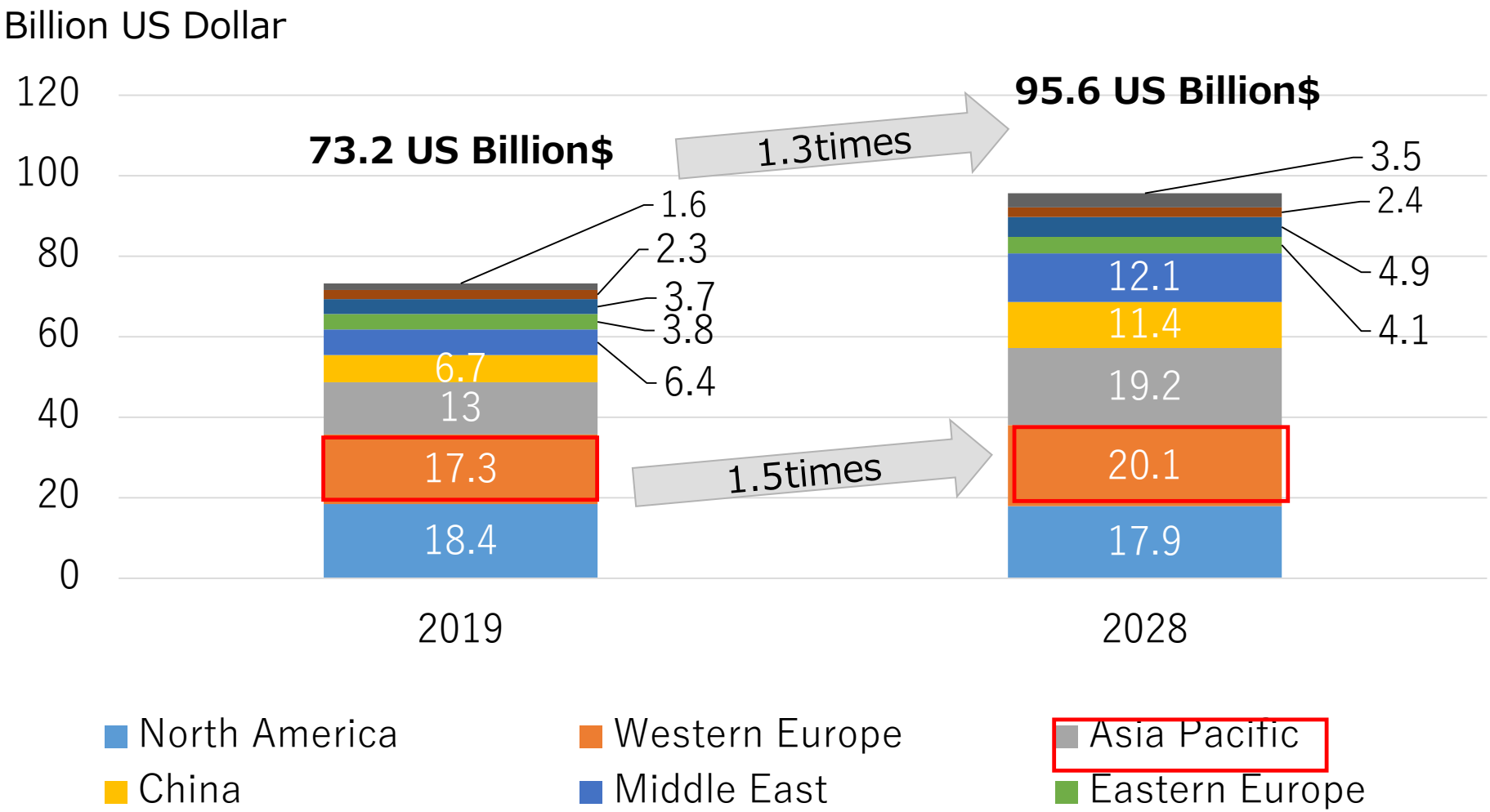
Safran

"Japanese suppliers provide high added value. I would like to deepen the relationship more."

From the left, MIDA, Malaysia, MoI, Thailand & METI, Japan

MRO Market Forecast 2019-2028

- In Asia- Pacific region, the MRO market is expected to grow 50 % over the next 10 years.



Source: Aviation Week 2019 Fleet &MRO Forecasts

Okinawa MRO & Aviation Industry Cluster

- The first Okinawa-based MRO started its operation this January 2019.
- Okinawa is closer to the center of the major Asian airline network.

Capacity of the hanger

- 3 narrow-body aircraft and a wide-body aircraft

Maintenance facility

Completion Ceremony (Nov, 2018)

Source: Okinawa Pref, website

Major MRO operations in Asia

HAECO

China/Xiamen

Hong Kong

MTU Aero Engines

China/Zhuhai

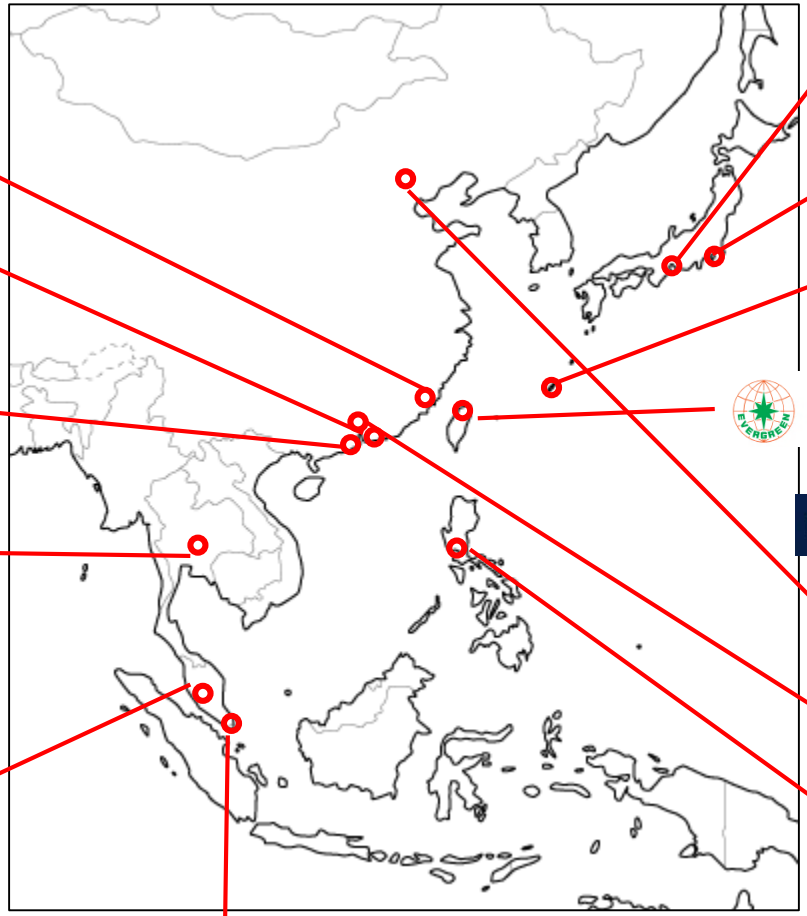
ROLLS ROYCE

Thailand

AIRFOIL services

(JV between Lufthansa and MTU)

Malaysia/Selangor



Singapore

MITSUBISHI HEAVY INDUSTRIES AERO ENGINES

IHI

MRO Japan

EVERGREEN AVIATION TECHNOLOGIES CORP

Lufthansa Technik

Ameco Beijing

Beijing

Shenzhen

Philippines

SIA ENGINEERING COMPANY

ST Engineering

Engine MRO topics in Japan

- IHI decided to set up new facility to expand MRO business
- MHIAEL starts new engine MRO business.

IHI

- Has a variety of repair experiences on the many jet engine components (V2500, CF34-8,10 and GEnx)
- Set up a new Commercial Aero Engine maintenance base near Tokyo and this base is planned to commence operation by the end of 2019

Image of new base

Source: IHI Press Release, website

MITSUBISHI HEAVY INDUSTRIES AERO ENGINES

- Providing airline operators worldwide with MRO services for PW4000 and V2500 engines.
- Released that to join MRO services for PW1100G-JM

Image of current MRO

Source: MHIAEL Press Release, website