

# Aero Engine, Space & Defense Business Area Briefing



September 20, 2023

## IHI Corporation

Hideo Morita

Director; Managing Executive Officer; President of  
Aero-Engine, Space & Defense Business Area

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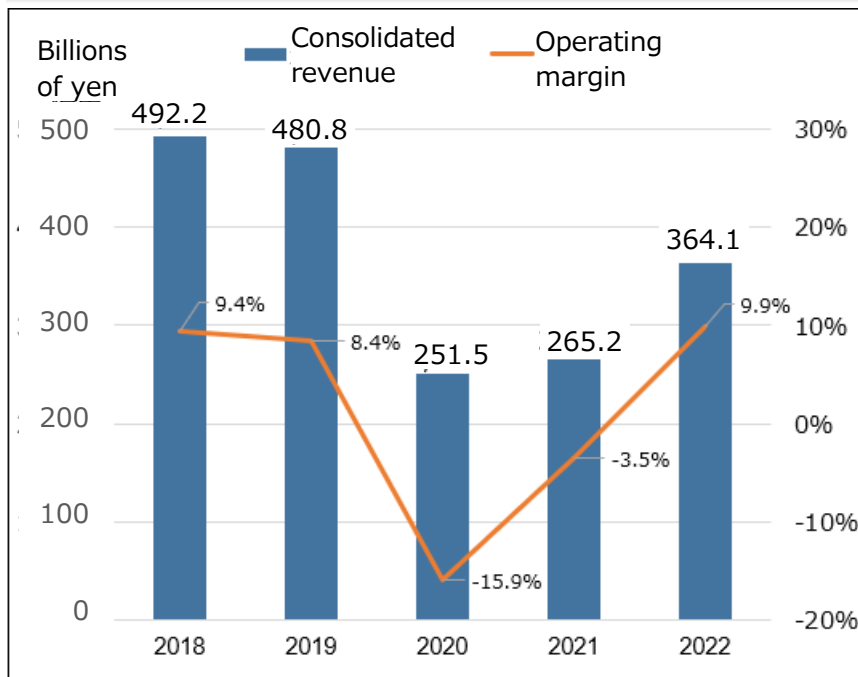
- 1. Business Area Outline**
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# 1. Business Area Outline

<b>Business head</b>		Hideo Morita, Managing Executive Officer
<b>Number of employees (as of March 31, 2023)</b>	<b>(Consolidated basis)</b>	6,981
	<b>Parent company</b>	4,177

<b>Business structure</b>	<ul style="list-style-type: none"> <li>• Defense Systems Division</li> <li>• Civil Aero-Engine Division</li> <li>• Rocket Development Department</li> <li>• Space Systems Business Preparation Office Research &amp; Engineering Center</li> <li>• Production Center</li> <li>• Lifecycle Solutions Center</li> <li>• Transformation Center</li> </ul>
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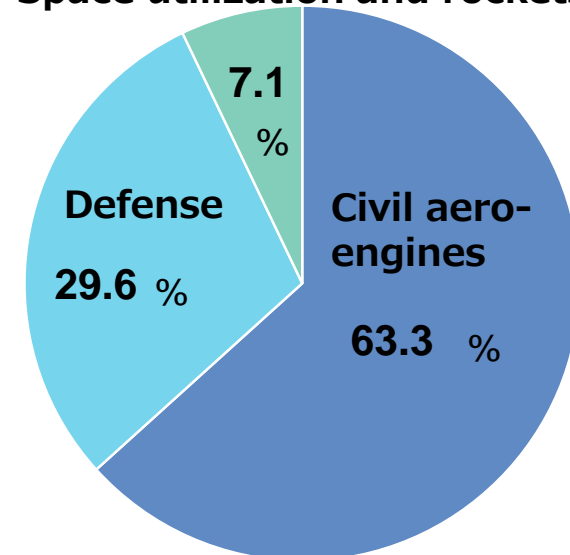
## Operating Results



\* Consolidation since FY2020 based on International Financial Reporting Standards

## FY2022 Revenue Composition

### Space utilization and rockets



# 1. Business Area Outline: Product Lineup

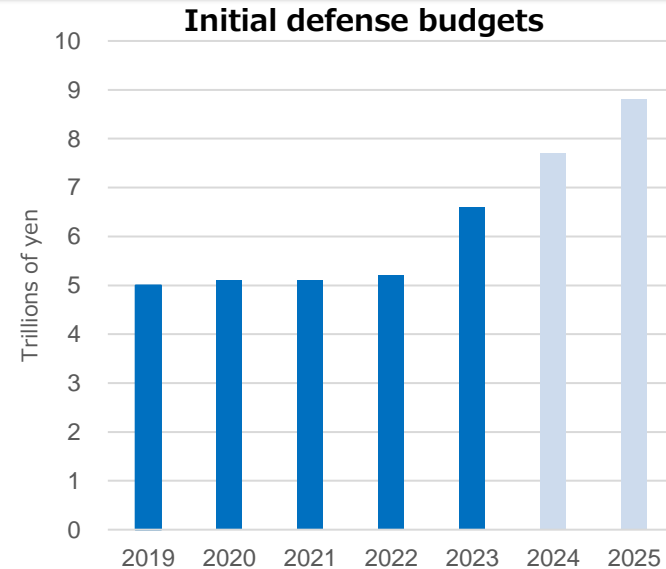
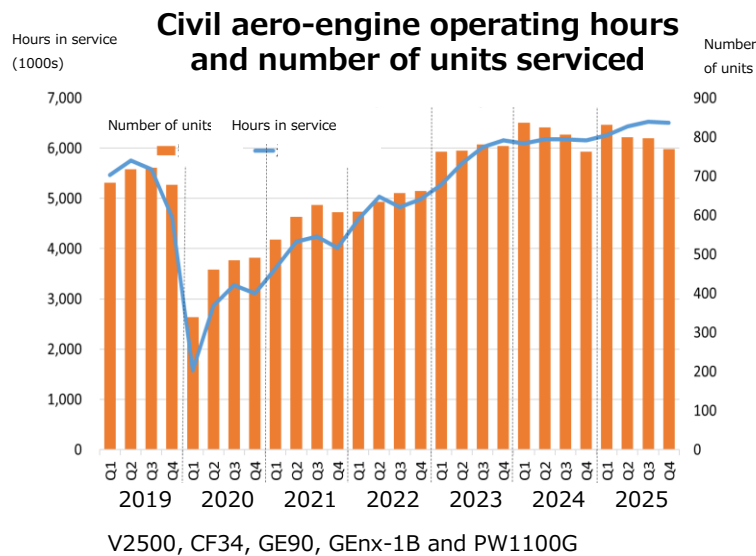
Businesses	Key Products						
<p>Civil aero-engines</p>	<p>Source: *1      Source: *2      Source: *3      Source: *4      Source: JAEC      Source: *5      Source: *6</p> <p>GE9X      GE90      GEnx      V2500      PW1100G-JM      CF34-8/10      Passport20</p>						
<p>Defense Aircraft engines Gas turbines for marine vessels Equipment</p>	<p>Source: *7</p> <p>F7      F135      LM2500      CIWS*1      Nuclear, biological, and chemical alarms      Decontamination sets</p> <p>F100</p>						
<p>Space Development</p>	<p>Source: *8</p> <p>H3 Image from JAXA      Epsilon Image from JAXA      Compact rocket      Rocket turbo pumps      IHI-SAT Nano-satellites      Satellite data application solutions      Space Station Image from JAXA      Hayabusa recovery capsule Image from JAXA</p>						

\*1) CIWS: Close in Weapon System

Note: See slide 16 for sources

### Civil Aero-Engines

- ✓ Global aviation demand should largely recover by 2024
- ✓ Ongoing supply chain disruptions and price hikes → need to bolster financial strength
- ✓ Competition intensifying to develop light, electrified, and other fuel-efficient products (carbon-neutral)

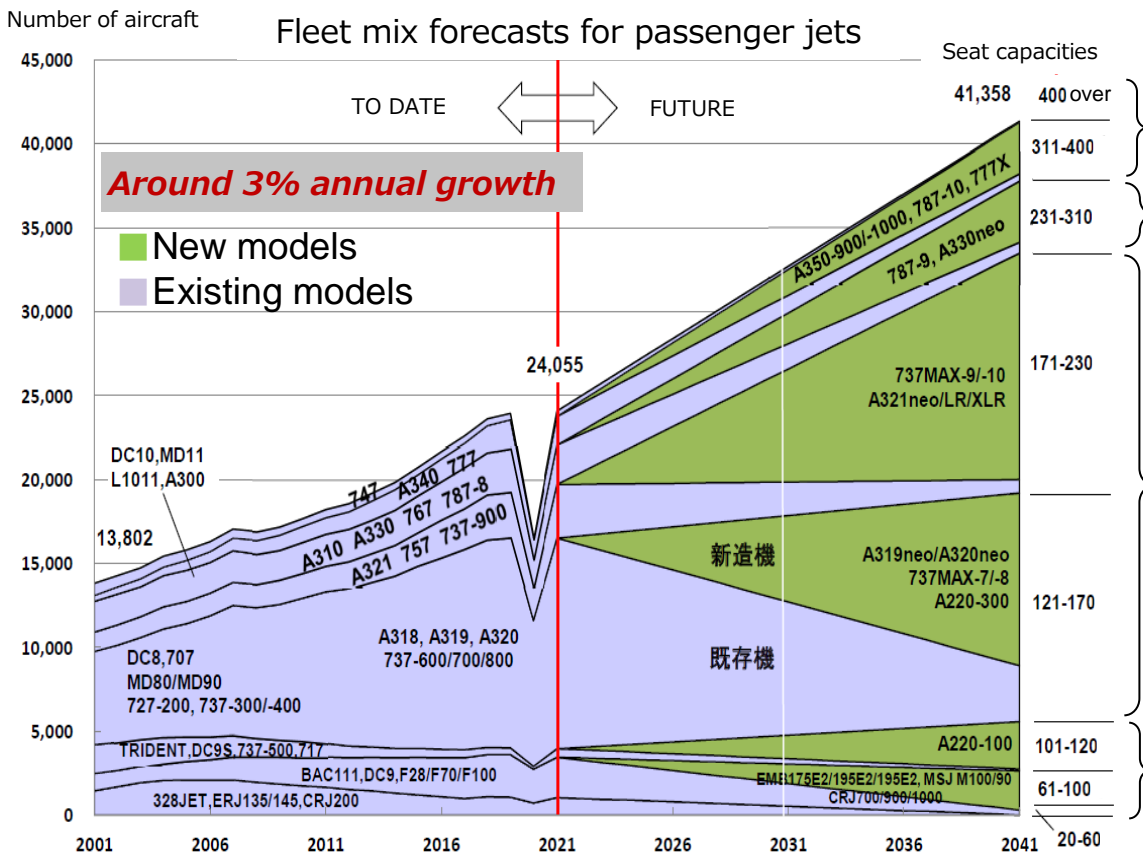


### Defense and Space

- ✓ Defense: Cabinet decision on three national security documents → Government policy to dramatically reinforce defense capabilities and lift defense budget
- ✓ Space: Global market to expand, primarily for satellite services → Market to triple to more than ¥100 trillion by 2040
- ✓ Defense and Space: Satellite data-based solutions business expanding across both fields

## 2. Business Environment Outlook and Assumptions








- With global demand for aircraft poised to steadily expand, IHI participates in programs to develop and mass-produce best-selling engines all classes, from small through large and super-large models
- Refining proprietary technologies across domestic supply chain and tackling the world market



Source: Japan Aircraft Development Corporation

### First generation

### Second generation

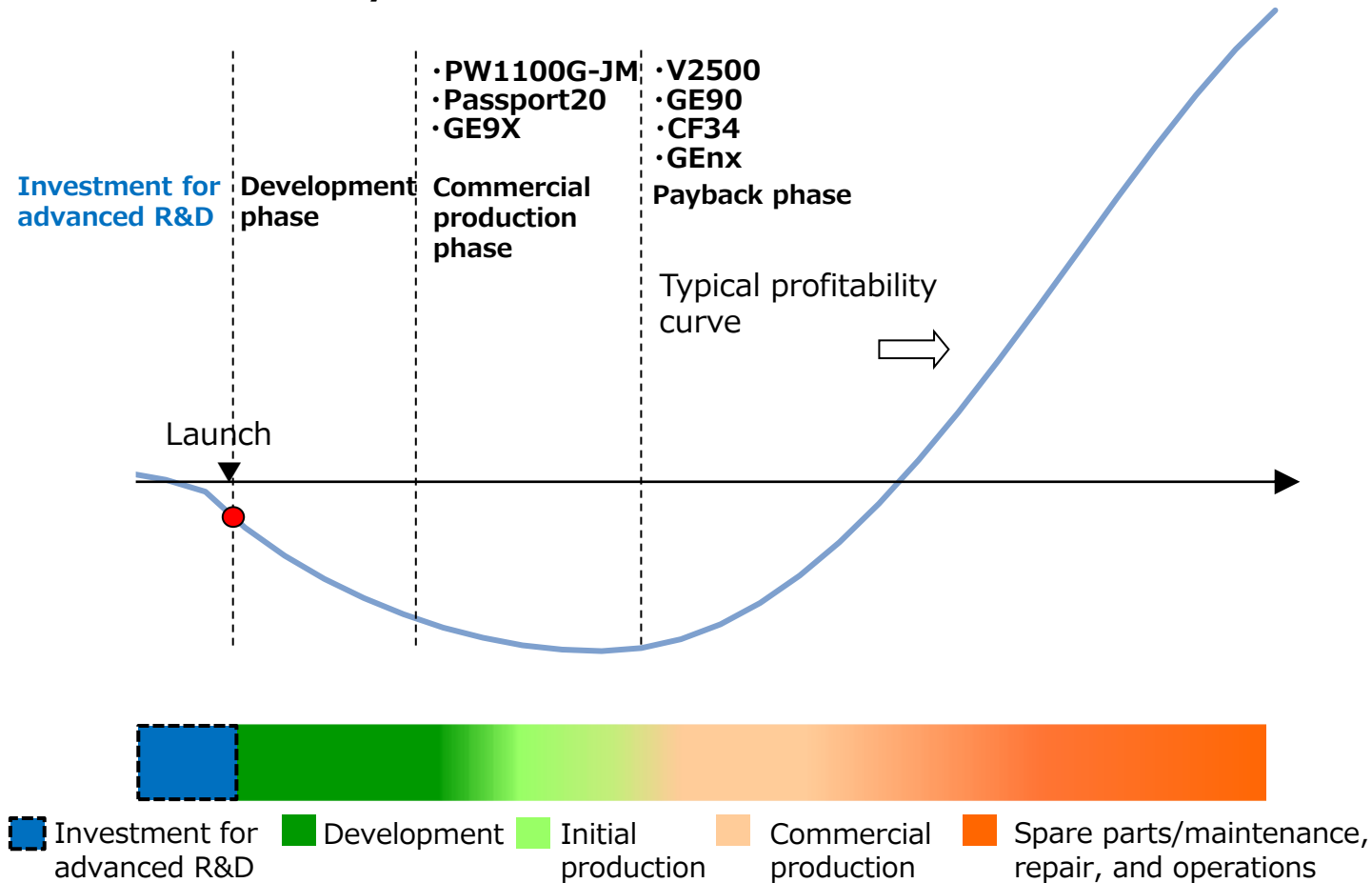
 Source: *1 <b>GE90 (B777)</b> IHI share: 9% • In service since 1995	➔	 Source: *5 <b>GE9X (B777 successor)</b> IHI share: 11% • Type recognition obtained in 2022 • In service from 2025
 Source: *2 <b>GEnx (B787)</b> IHI share: 13% • In service since 2011		
 Source: *3 <b>V2500 (A320ceo)</b> IHI share: 14% • In service since 1988	➔	 Source: *6 <b>PW1100G-JM(A320neo)</b> IHI share: 15% • In service since 2016
 Source: *4 <b>CF34 (Bombardier and Embraer RJ)</b> IHI share: 27% • In service since 2001	➔	 Source: *7 <b>Passport 20 (G7500/8000)</b> IHI share: 27% • In service since 2018

Note: See slide 16 for sources

## 2. Business Environment Outlook and Assumptions

### Attributes of civil aero-engine business

- Advanced technology requirements
- Large initial investments
- Payback over 15 to 20 years



➤ As more programs enter payback phase, investing extensively in developing advanced technologies is also necessary to tackle challenges in those areas

# 3. Aero Engine, Space & Defense Business Area Initiatives

## (1) Segment Strategies Based on Group Management Strategies 2023

We have positioned the aero-engines and rockets as growth businesses:

- As well as reinforcing and expanding our civil aero-engine and defense fields, we will drive growth by overhauling our businesses
- We will create new business areas from lifecycle and value chain perspectives

Expanding businesses from lifecycle and value chain perspectives

### Initiatives for next-generation aircraft

- Lightweighting Technology
- Electrification technology
- Sustainable aviation fuel and synthetic fuel

Eco-friendly and economically viable carbon-neutral aircraft

#### Strengthen existing businesses

Operating climate: Returning to growth after pandemic downturn, with defense sector demand increasing

#### Reinforce aero-engine business

- Improve gas turbine performance
- Develop engines for next-generation fighter aircraft
- Apply proprietary technologies on next-generation engines
- Establish new maintenance sites
- Expand materials businesses



Boost profitability and asset efficiency dramatically by tapping digital technology to overhaul production

#### Fortify rocket business

- Increase production structure to meet growing defense demand
- Reinforce solid rocket competitiveness
- Establish launch service business



#### Space, terrestrial, and undersea data utilization initiatives

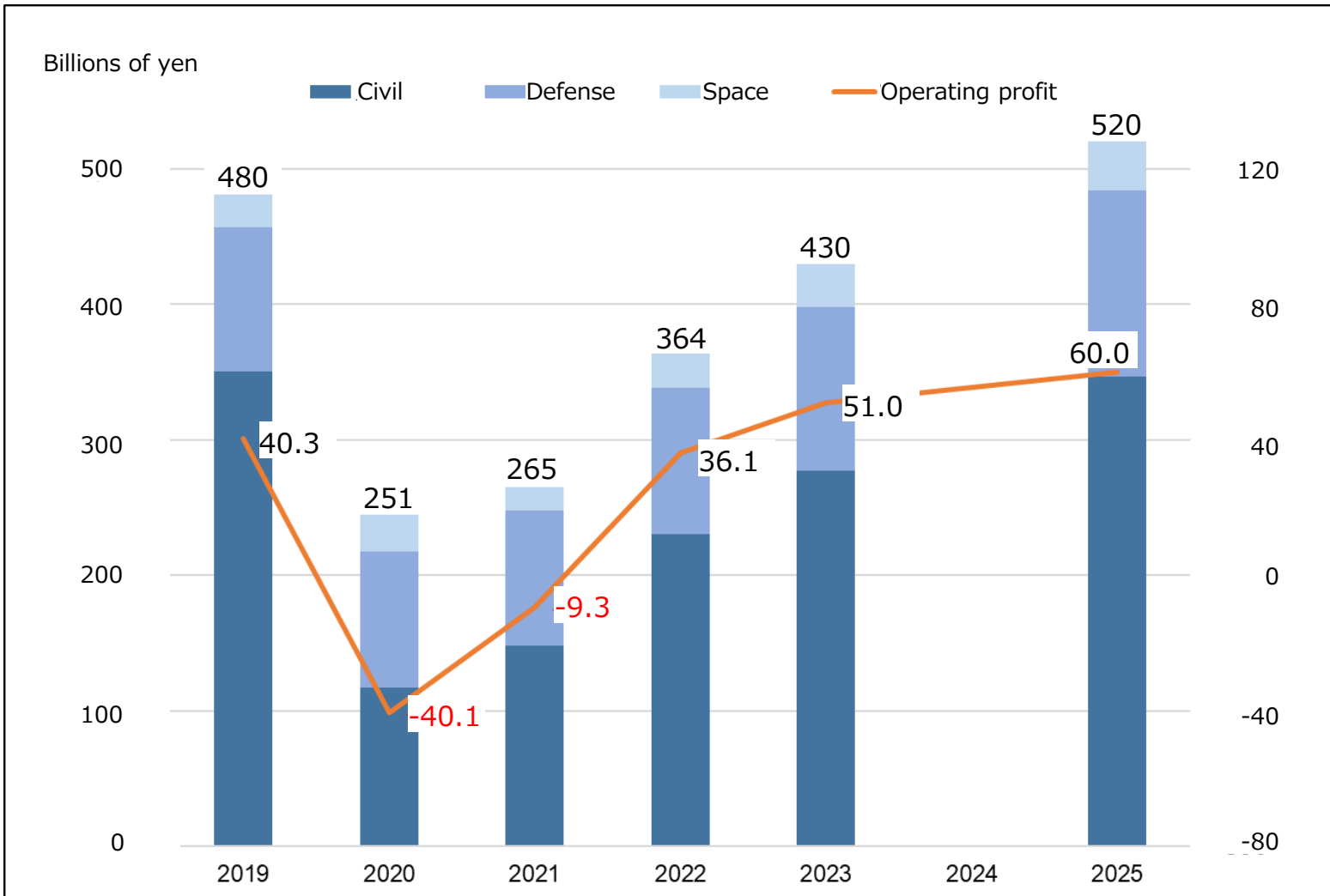
- Surveillance and defense systems
- Collaborate with partners in using satellites for vessel surveillance, forest management, and other purposes



### 3. Aero Engine, Space & Defense Business Area Initiatives

#### (1) Segment Strategies Based on Group Management Strategies 2023

## Earnings targets

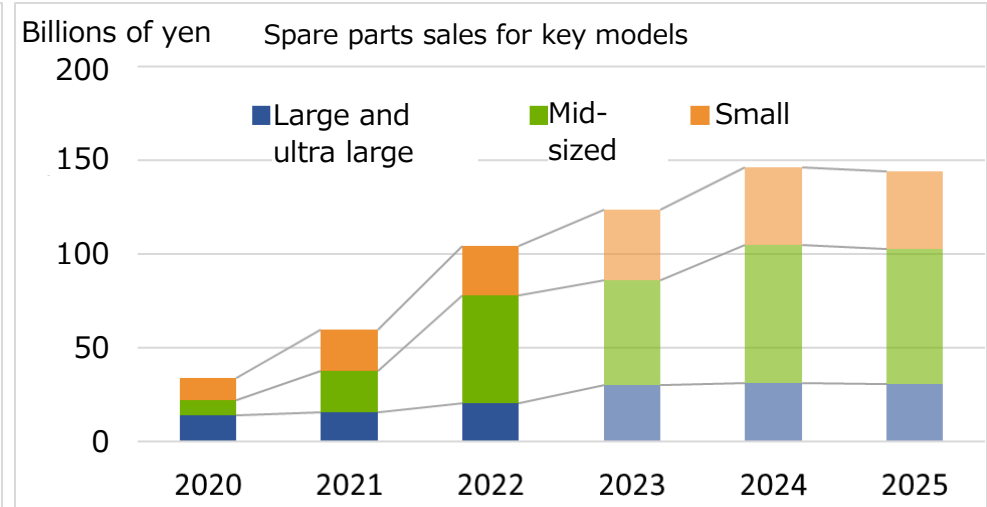
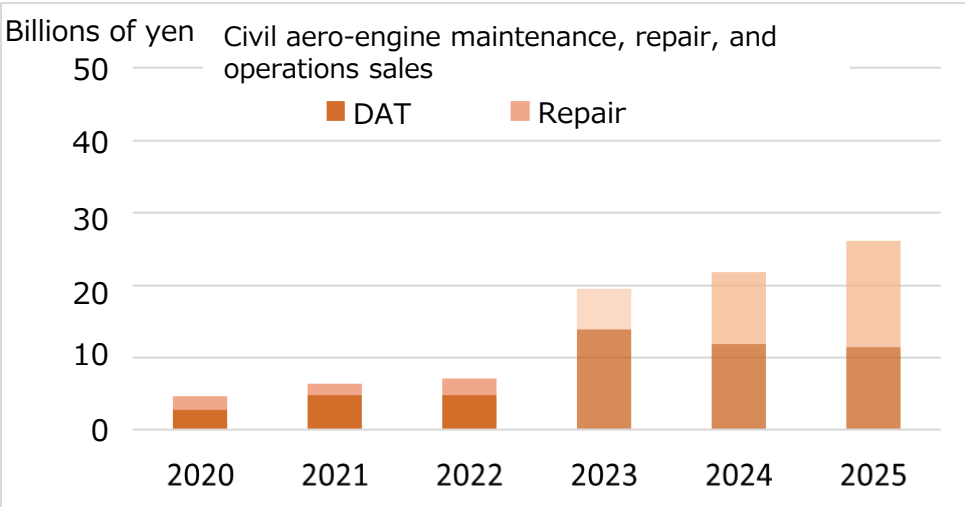
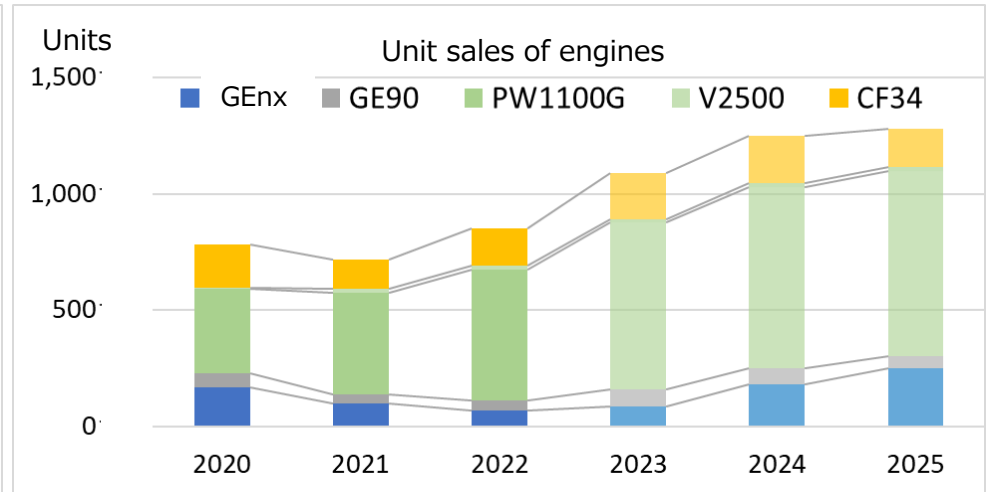
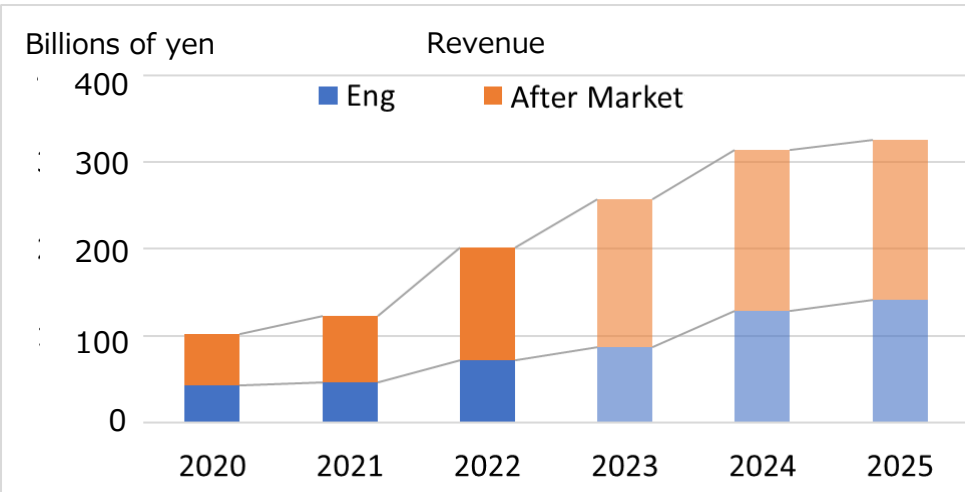


- Revenue bottomed out in FY2020, and should recover to pre-pandemic level by FY2025
- Returned to profitability in FY2022; operating margin should stabilize at 10% from FY2022

# 3. Aero Engine, Space & Defense Business Area Initiatives

## (1) Segment Strategies Based on Group Management Strategies 2023

### Civil aero-engines business revenues



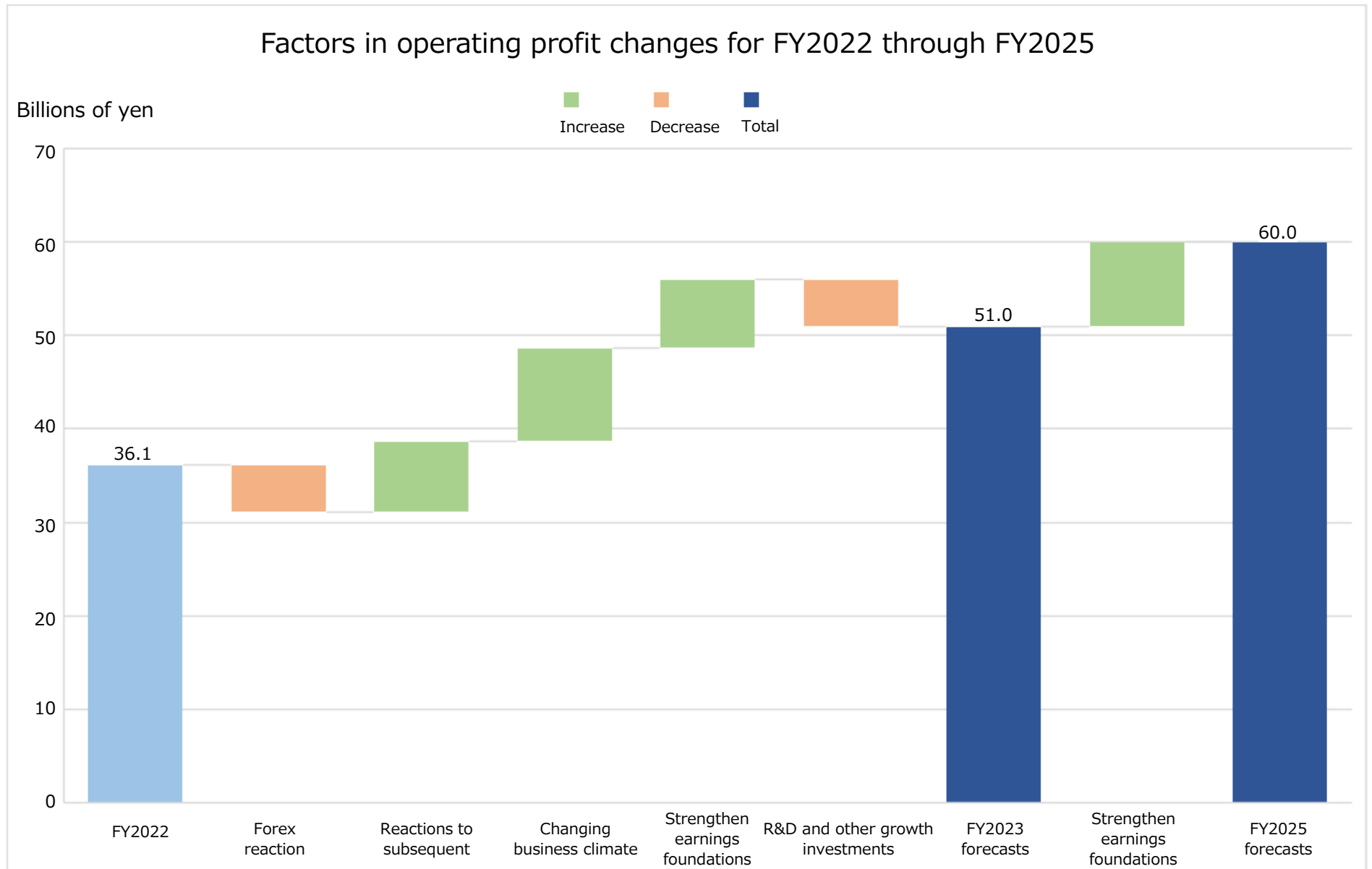
\*Figures from FY2023 are projections; forex assumption for revenue is ¥130 to US\$1

- Sales up steadily for PW1100G-JM engine (on Airbus A320neo) offering excellent fuel efficiency
- Sales of spare parts, particularly for small and mid-sized aircraft turning around in line with passenger demand recovery

# 3. Aero Engine, Space & Defense Business Area Initiatives

## (1) Segment Strategies Based on Group Management Strategies 2023

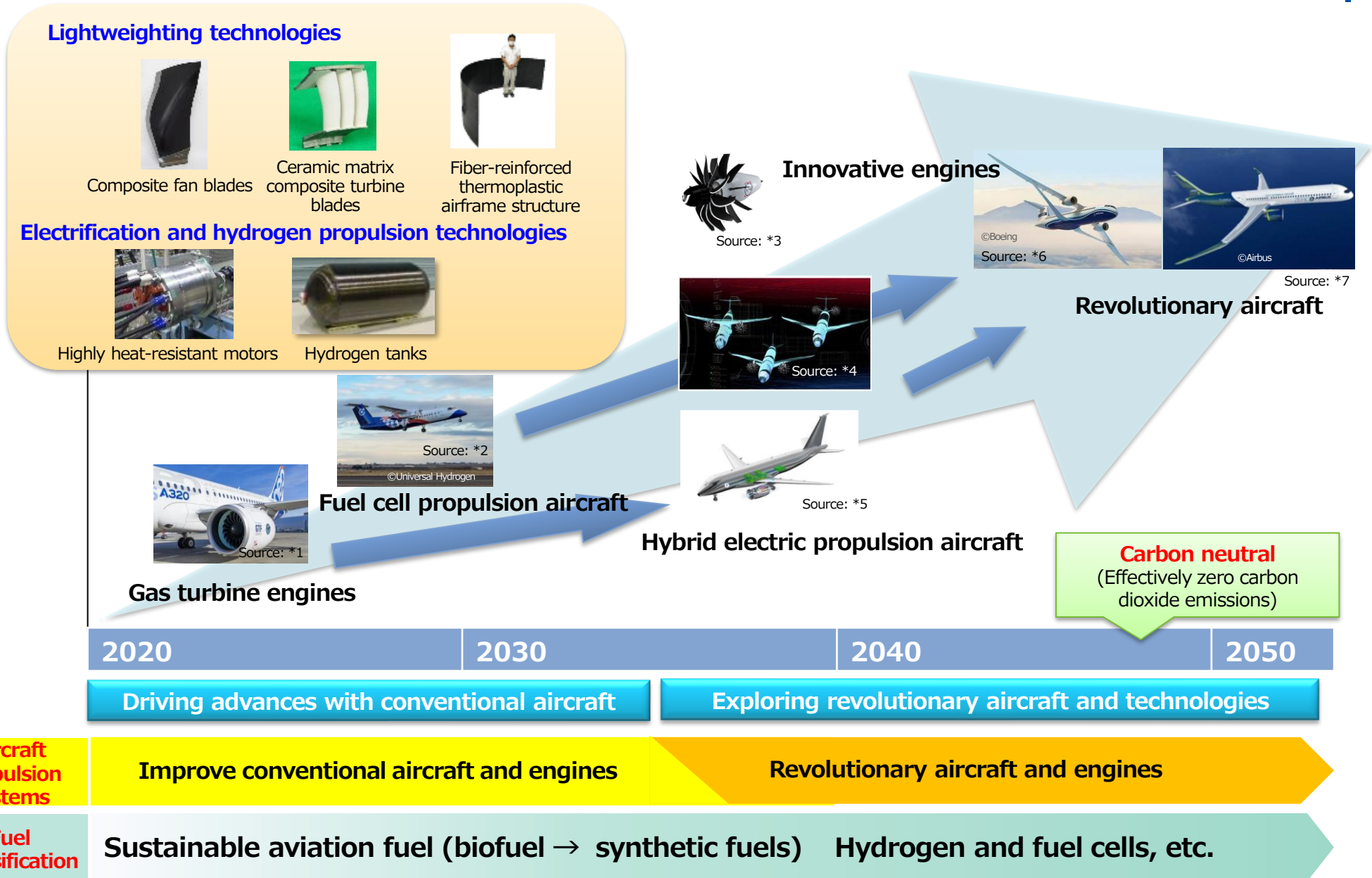
### Earnings Analysis



# 3. Aero Engine, Space & Defense Business Area Initiatives

## (2) Business Strategies to Reach Performance Targets

### Civil aero-engines (pursuing carbon neutrality)



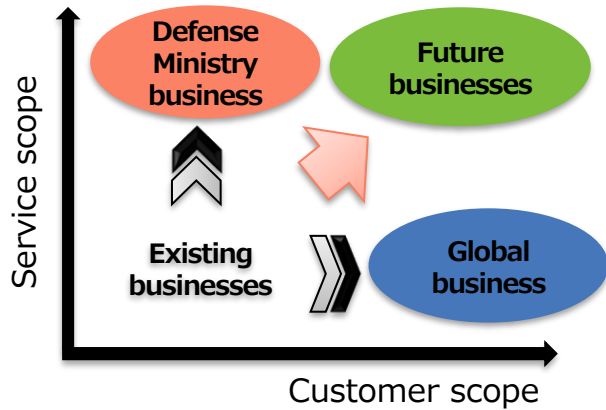
# 3. Aero Engine, Space & Defense Business Area Initiatives

## (2) Business Strategies to Reach Performance Targets

### Defense business

Cabinet decision on three national security documents leading to government policy to dramatically reinforce defense capabilities and lift defense budget

- **Priority capabilities in ramping up defense capabilities** → **Major priority projects**
  - Standoff defense and integrated air defense missile defense capabilities → Missiles and rocket motors
  - Unmanned asset defense capabilities → Including drones and unmanned underwater vehicles
  - Cross-domain operational capabilities and command and control and information-related functions → New engines, information-gathering satellites, and ocean surveillance
  - Durability and toughness → Expand engine auxiliary parts sales and conclude comprehensive agreements
- **Positioning defense production and technological foundations as defense capability**
  - Boost profit margins, engage in Japan-led international joint development, and transfer defense equipment overseas



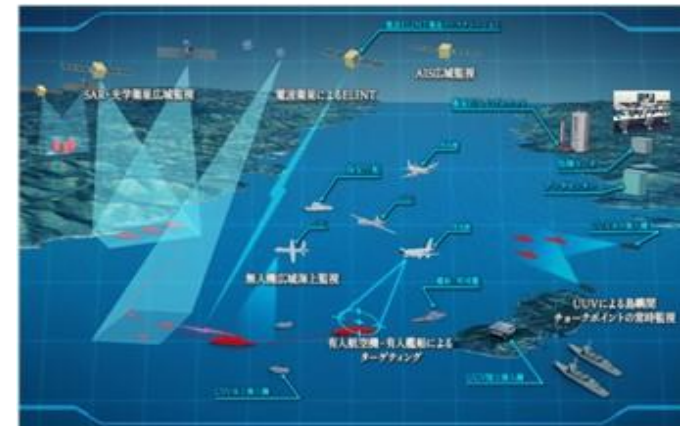
Next-generation Global Combat Air Programme fighters → International joint development



Unmanned underwater vehicles



F100 engine (for defense equipment transfer)



Marine surveillance → Multiregional surveillance

# 3. Aero Engine, Space & Defense Business Area Initiatives

## (2) Business Strategies to Reach Performance Targets

### Rocket systems and space utilization business

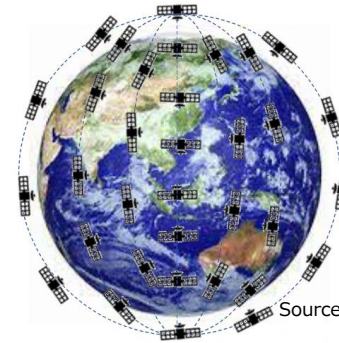
Source: \*1 [https://www8.cao.go.jp/cstp/anzen\\_anshin/20221021\\_meti\\_3.pdf](https://www8.cao.go.jp/cstp/anzen_anshin/20221021_meti_3.pdf)

Solutions provision

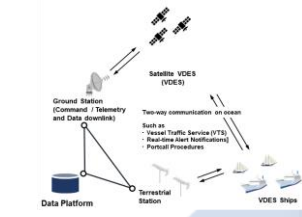
Launch services

Rocket and satellite manufacturing

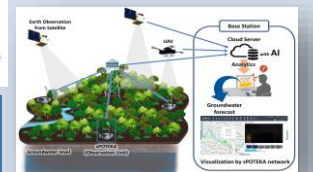
As well as developing, manufacturing, and providing launch services for rockets and satellite components, we look to partner with other companies to provide solutions that help customers resolve their issues



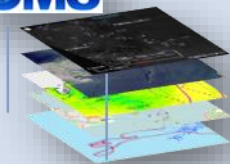
VDES Satellite constellation



Vessel monitoring (VDES)



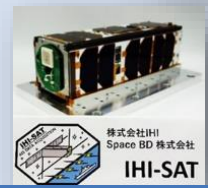
Forest management



Epsilon launch services

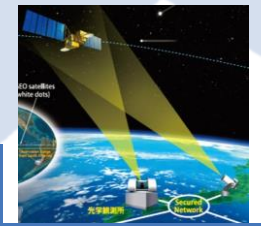


提供: JAXA



Nanosatellites

Ocean surveillance



Understanding space conditions

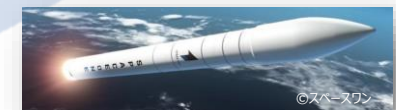
Development, manufacturing, and parts supply



提供: JAXA



提供: JAXA



Small commercial rockets

iOMS : IHI Ocean Monitoring Service  
AIS : Automatic Identification System  
VDES: VHF Data Exchange System

# 3. Aero Engine, Space & Defense Business Area Initiatives

## (2) Business Strategies to Reach Performance Targets

### Overhaul production efficiency and business structure through new Transformation Center

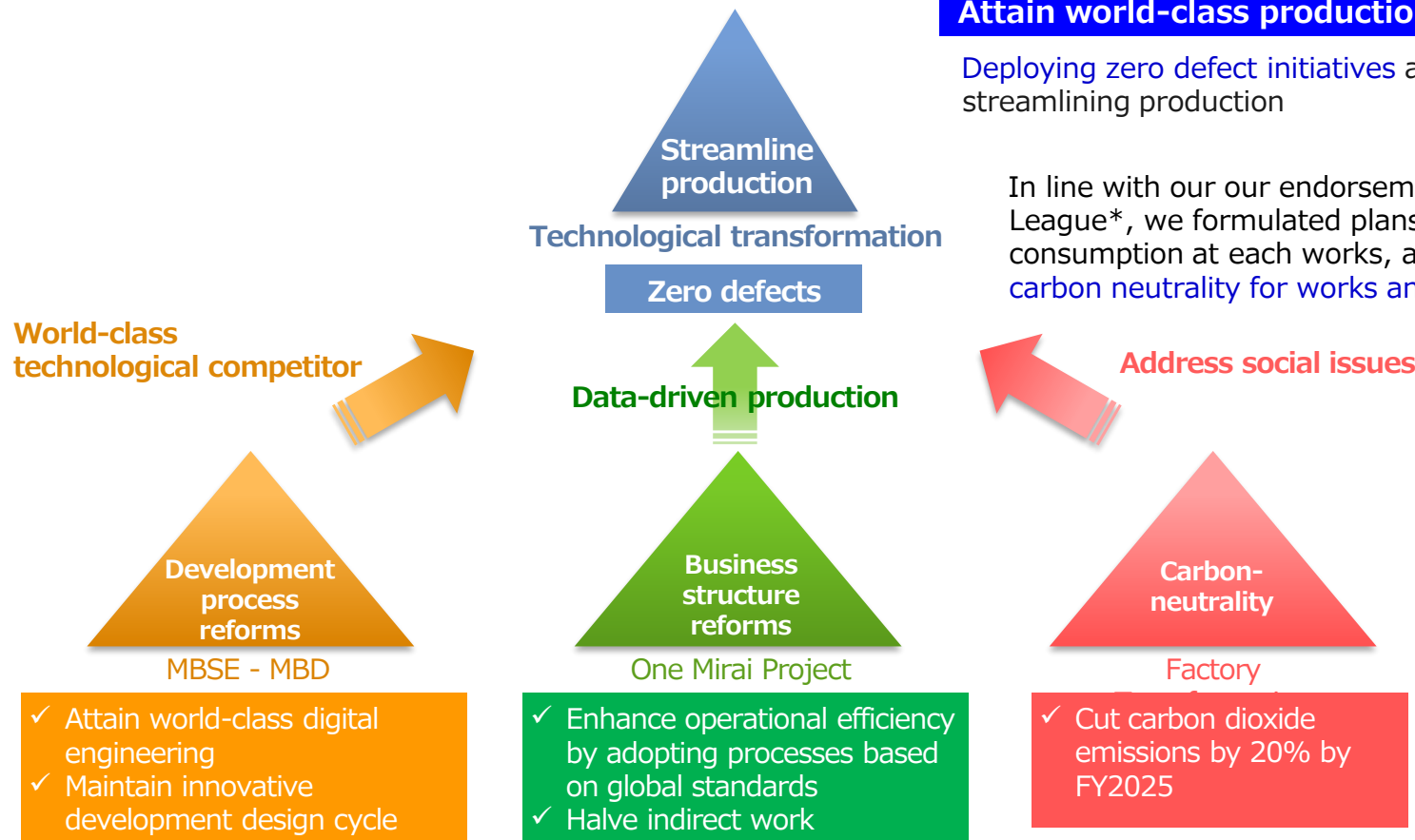
Leverage robust digital infrastructure to deliver world-class production efficiency and profit margins equal to exceeding those of original equipment manufacturers

Operate as specialized reform organization that integrates design and manufacturing and **unites with all business units and the Production and Research and Engineering centers to create and embed reform-centric culture** that always takes on new challenges without fear of failure

#### Attain world-class production efficiency

Deploying zero defect initiatives as first step in streamlining production

In line with our our endorsement of the GX League\*, we formulated plans to cut electricity consumption at each works, and are pursuing carbon neutrality for works and our products



\* The GX (for green transformation) League is a forum for companies to discuss ways to achieve economic growth and reform social systems through initiatives to achieve carbon neutrality by 2050.

## P. 4

- \*1 <https://www.geaviation.com/commercial/engines/ge9x-commercial-aircraft-engine>
- \*2 <https://www.geaviation.com/commercial/engines/ge90-engine>
- \*3 <https://www.geaviation.com/commercial/engines/genx-engine>
- \*4 <https://www.mtu.de/engines/commercial-aircraft-engines/narrowbody-and-regional-jets/v2500/>
- \*5 <https://www.geaerospace.com/propulsion/commercial/cf34>
- \*6 [https://www.ihico.jp/all\\_news/2016/aeroengine\\_space\\_defense/1190378\\_1652.html](https://www.ihico.jp/all_news/2016/aeroengine_space_defense/1190378_1652.html)
- \*7 <https://www.prattwhitney.com/en/products/military-engines/f135>
- \*8 <https://www.space-one.co.jp/gallery/>

## P. 6

- \*1 <https://www.geaviation.com/commercial/engines/ge90-engine>
- \*2 <https://www.geaviation.com/commercial/engines/genx-engine>
- \*3 <https://www.mtu.de/engines/commercial-aircraft-engines/narrowbody-and-regional-jets/v2500/>
- \*4 <https://www.geaerospace.com/propulsion/commercial/cf34>
- \*5 <https://www.geaviation.com/commercial/engines/ge9x-commercial-aircraft-engine>
- \*6 <https://www.mtu.de/maintenance/commercial-aircraft-engine-services/engine-portfolio-mro/narrowbody-and-regional-jets/pw1100g-jm/>
- \*7 [https://www.ihico.jp/all\\_news/2016/aeroengine\\_space\\_defense/1190378\\_1652.html](https://www.ihico.jp/all_news/2016/aeroengine_space_defense/1190378_1652.html)

## P. 12

- \*1 <https://www.prattwhitney.com/en/newsroom/news/2022/10/04/pw-gtf-advantage-tm-flight-testing-starts-on-airbus-a320neo-aircraft>
- \*2 <https://hydrogen.aero/press-releases/universal-hydrogen-successfully-completes-first-flight-of-hydrogen-regional-airliner/>
- \*3 [https://www.cfmaeroengines.com/wp-content/uploads/2021/07/CFM\\_RISE\\_Whitepaper\\_Media.pdf](https://www.cfmaeroengines.com/wp-content/uploads/2021/07/CFM_RISE_Whitepaper_Media.pdf)
- \*4 <https://blog.geaerospace.com/product/the-future-of-flight-engine-maker-unveils-new-technology-development-program-to-cut-co2-emissions-by-20/>
- \*5 <https://www.mtu.de/newsroom/press/press-archive/press-archive-detail/clean-aviation-switch-project-to-advance-hybrid-electric-and-water-enhanced-turbofan-technologies/>
- \*6 <https://www.boeing.jp/%E3%83%9B%E3%83%BC%E3%82%A4%E3%83%B3%E3%82%AF%E7%A4%BE%E7%B4%B9%E4%BB%8B/%E3%82%B5%E3%82%B9%E3%83%86%E3%83%8A%E3%83%93%E3%83%AA%E3%83%86%E3%82%A3.page.page>
- \*7 <https://www.airbus.com/sites/g/files/jlcbita136/files/2021-06/Full%20Report-Airbus-SE-Annual-Report-2020.pdf>





Forward-looking figures shown in this material with respect to IHI's performance outlooks and other matters are based on management's assumptions and beliefs in light of the information currently available to it, and therefore contain risks and uncertainties. Consequently, you should not place undue reliance on these performance outlooks in making judgments. IHI cautions you that actual results could differ materially from those discussed in these performance outlooks due to a number of important factors. These important factors include political environments in areas in which IHI operates, general economic conditions, and the yen exchange rate including its rate against the US dollar.