

## Business Profile

The Aerospace Business has grown as we developed landing gear systems and heat management systems for engines and air-conditioning equipment and improved our design and manufacturing technologies for aerospace products, in addition to pursuing our inherited business of manufacture and repair of propeller products for the Ministry of Defense. Our products are incorporated in about 80% of the Defense Ministry's air fleet, long contributing to Japanese sovereign security.

Based on our experience in the design and manufacture of products for the Ministry of Defense, we entered the commercial aircraft equipment market and

have established a track record. Regarding the landing gear systems business, we won orders for, and have continuously shipped, landing gear systems for the regional jet CRJ700 manufactured by Bombardier in Canada. In the segment of heat management systems for aircraft engines, our products are used in almost all commercial aircraft engines manufactured by Rolls-Royce for the Boeing 787 and Airbus A350 among others. Moreover, we manufacture and ship heat management systems for air-conditioning systems and auxiliary power systems as well as aircraft engine starters, consistently contributing to the safety of transportation by air as a manufacturer of key aircraft equipment.

## Business Strategy

For aerospace products for the Ministry of Defense, we will maintain or improve our dependable production and repair processes and production technology to assist the safe and systematic operation of aircraft. While adhering to this principle, we will achieve improvements in productivity to ensure a healthy profit base as a private corporation. For equipment for commercial aircraft, the business is affected by the substantial downturn in the aircraft market due to COVID-19. Nevertheless, we will strive for increased orders for products designed for small to medium-sized aircraft, with which the market is expected to recover quickly, while rationalizing the business operations by cutting fixed costs and inventory assets.

In the defense field, we will begin efforts to take part in development of landing gear systems and heat management systems for future fighter aircraft. In the commercial aircraft market segment, we intend to work toward the carbon-free society. Development of more electric or hydrogen-fueled aircraft is under way on a global scale. For these aircraft, we will continue the development of electro-hydrostatic landing gear extension and retraction systems. Additionally, we will work on the development of thermal analysis technology, equipment design, and products, as well as additive manufacturing technology for heat management systems helping exhaust large amounts of heat from aircraft.

## Major Product Lines and Strengths of Sumitomo Precision Products

### Aerospace Products (Landing Gear/Propeller Business)

#### Landing gear systems for commercial aircraft

**CRJ1000**  
(from Bombardier Web Page)

**CRJ700/900/1000 Dressed Main Landing Gear Assy**  
Shock absorption during landing

**CRJ700/900/1000 Dressed Nose Landing Gear Assy**  
Steering during taxiing

- Development process and safety analysis required for developing commercial aircraft plus design capability compliant with JIS Q 9100 and other global standard design specifications
- Precision machining with a focus on manufacturing technology and equipment for cutting and grinding high-strength metal materials
- Manufacturing technology, accumulated expertise, and equipment for heat treatment, various plating processes, and other special processes
- Accumulated expertise and equipment required for assembling and testing hydraulic, pneumatic, and structural components
- MRO framework established in collaboration with our subsidiary that provides servicing, repair, and customer support for landing gear systems and hydraulic equipment

#### Landing gear systems/propellers for defense aircraft

**C-2 Main Landing Gear**  
Shock absorption during landing

**C-2 Nose Landing Gear**  
Steering during taxiing

**P-3C propeller system**  
Driven by an engine to produce thrust

### Heat Management Systems (Aircraft Heat Exchanger Business)

**Trent 1000<sup>®</sup> Engine**  
[Photograph: Courtesy of Rolls-Royce plc.]

**Trent 1000<sup>®</sup> Engine Surface Air Cooled Oil Cooler**

**Trent 1000<sup>®</sup> Engine Fuel Oil Heat Exchanger**

- Heat management technology and joining of metal materials
- Thermal analysis and design technology for heat management systems suitable for aircraft engines
- High efficiency, compact size, and low weight as well as shapes that help reduce air drag contribute to reducing the fuel consumption and noise of aircraft engines.
- Fin design, molding, and manufacturing technologies for maximizing the heat exchange efficiency of heat exchangers
- Product quality and delivery punctuality highly rated by UK-based Rolls-Royce, one of the big three manufacturers of aircraft engines

## Social value of major products

Since its founding, Sumitomo Precision Products has manufactured and shipped landing gear systems, propellers, and other equipment for the Defense Ministry's aircraft and has long provided maintenance and repair services. The company contributes to Japanese sovereign security as these

products assist the operation of aircraft extensively used in the Defense Ministry's peacekeeping operations and rescue and disaster relief activities. Moreover, the company's landing gear systems, heat management systems, and other products for commercial aircraft help ensure safe air transportation.

## Initiatives toward a sustainable society

### Technology development for heat management equipment for electrified/hydrogen-fueled aircraft

In recent years, reducing environmental impact by cutting aircraft's CO<sub>2</sub> emissions has become a key issue across the world. Development efforts are under way for technologies and products for the electrification of, and use of hydrogen fuel by, aircraft. Against this backdrop, it is expected that demand for lightweight, high-performance, and complex-shaped heat exchangers will grow to cool electric equipment, including inverters, batteries, and motors,

and to enable heat exhaustion or recycling for an entire aircraft. Sumitomo Precision Products will continue to strive for the development of thermal analysis technology, equipment design, and products fulfilling market needs while paying attention to the trends in the aviation industry. In addition, it will explore novel manufacturing techniques, such as metallic 3D printing (metallic additive technology).

Thermal analysis example (numerical analysis of fluid flow)

Example of optimized heat exchanger fluid path (optimized topology\*)

Prototype heat exchanger created with a metallic 3D printer

\* A class of structural optimization techniques used to determine the optimal material density distribution based on engineering conditions (design variables) established within a specified range of material distribution

### Development of electric landing gear extension and retraction systems

This is based on results obtained from a project commissioned by the New Energy and Industrial Technology Development Organization (NEDO).

Reducing the environmental impact of aircraft through electrification is receiving attention. To electrify landing gear extension and retraction systems, Sumitomo Precision Products is conducting joint R&D with Airbus in the electro-hydrostatic actuation (EHA) system for landing gear extension and retraction.

While conventional aircraft use engine-driven hydraulic pumps, we will seek to improve fuel efficiency by switching to a system in which an electric motor drives only when hydraulic power is required.

The system under development by Sumitomo Precision Products is highly evaluated by Airbus. The company will work on the development with the aim of mounting the system in next-generation electrified aircraft.

EHA for main landing gear extension and retraction system