

People Who Lead Our Jet Engine Factories to Realize Your Dreams



Field leaders who make dreams come true

In the manufacturing industry, it is inevitable that some work requires a certain level of craftsmanship, i.e., the artistry and decisions of artisans, which is inimitable by machinery. Such work includes, for example, linear thermal processing, or “line heating” for short, to make the gracefully curved form of a ship, electrical instrumentation used for testing large rotary machinery, and nondestructive testing of jet engines and approval/rejection of the test results. Key persons who preserve such skills were introduced as “Intangible Assets” in *Journal of IHI Technologies* Vol. 52, No. 2.

Production engineers are also essential. They grasp the entire manufacturing process and contribute to the maintenance and improvement of IHI’s comprehensive technical expertise, as well as to the development of new technologies. They assess the artistry of artisans, the staff’s abilities, the environment, machinery’s capabilities, etc. of the manufacturing plant to construct and review the production lines and to launch state-of-the-art test cells (facilities for testing). They also coordinate in-house programs and schedules with overseas manufacturers through negotiations with them. In addition to IHI’s technical strength, the management abilities of these engineers are also “Intangible Assets” of which IHI boasts.

In Aero-Engine & Space Operations, the “key person promotion system” was set up to foster specialists in their respective fields of expertise for the purpose of maintaining and improving production technologies. In Aero-Engine & Space Operations, key persons are defined as “a person who

leads development, plans strategies in his or her technical field and promotes the improvement of technical abilities related to the design and manufacturing of products and main components as well as the necessary technologies.”

IHI is producing the main engines of Air Self-Defense Force jets, as well as jet engine components of civil aircrafts, such as the V2500 mounted on the Airbus A320, the GE90 on the Boeing 777, and the GENx on the Boeing 787. IHI is taking part in the production or maintenance of almost all world-leading jet engines. Now let us introduce some of the accomplishments of our key person “Intangible Assets,” in their fields of “electrical machining,” “process design” and “maintenance engineering.” Fields that are essential for the manufacturing and maintenance of jet engines.

What are jet engines?

Before coming to the main subject, let us briefly explain the structure of a jet engine, which the key persons in this article are involved in. A jet engine is made up of a fan, compressor, combustor, and turbine among other parts. It works as follows. First, the fan at the front of the jet engine rotates, which creates an air flow, and most of that air is ejected from the back of the engine, which constitutes the majority of the engine’s thrust, without passing through the core parts of the engine such as the compressor. Meanwhile, the rest of the air flow, which does enter the compressor, is compressed into high-pressure air, and the high-pressure air is mixed with fuel and burned in

the combustor. The resulting high-temperature and high-pressure combustion gas becomes a high-speed jet, which rotates the turbine at the back at high speed. Further, the torque is transmitted to the shaft and then to the fan and compressor, which keeps them rotating at high speed to continuously generate a large thrust. Detailed requirements are specified for manufacturing the components, as well as for their assembly, maintenance, and testing. International accreditation organizations periodically check if all the requirements are satisfied.

Key persons who supervise “Monozukuri” sites (making things)

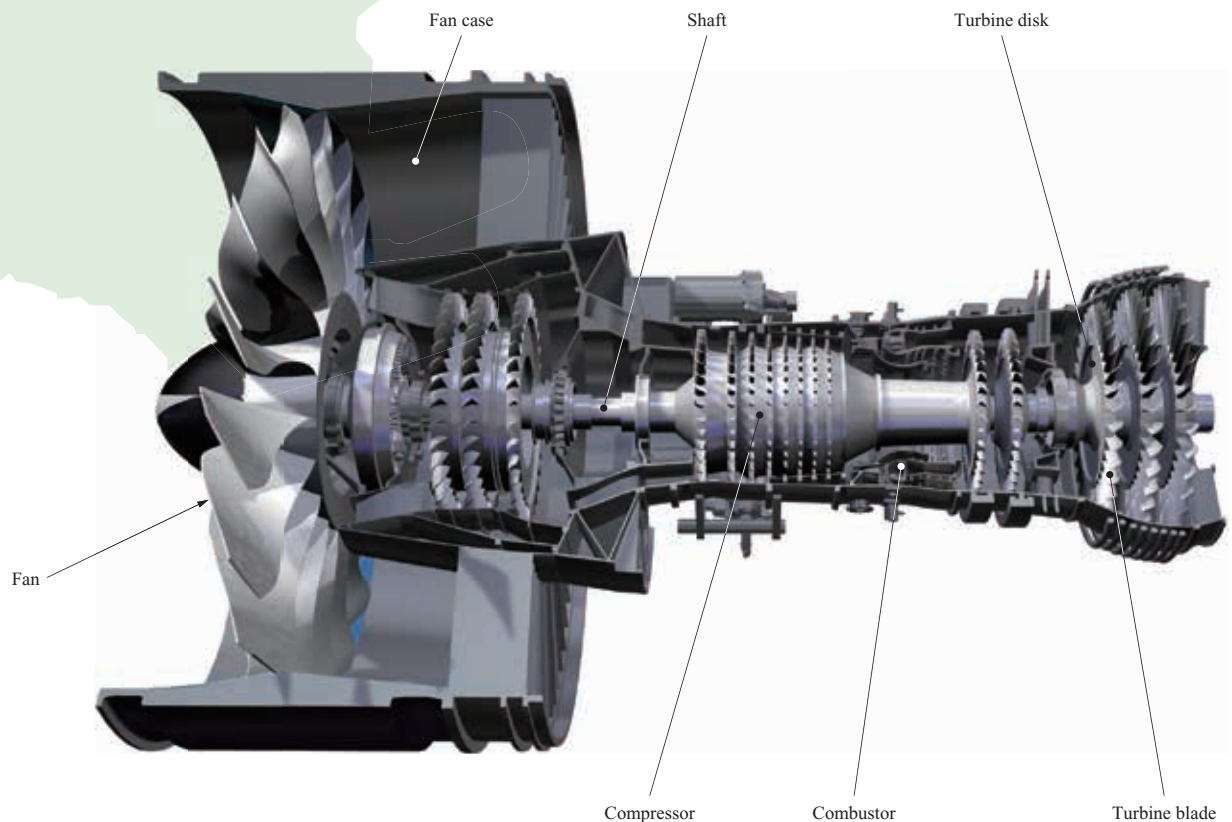
Let us introduce the first key person, Norimasa Taga of Kure Aero-Engine & Turbo Machinery Works, Hiroshima. He is the key person of shaft production. Long shafts for jet engines currently produced in the factory account for those used in 70 to 80% of the world’s aircraft engines in the field. Here, he supervises the entire shaft production process. He also takes a major role in maintaining and improving shaft technologies, including negotiating with overseas engine manufactures, as well as the supervision of process design, machining, and finishing.

Takashi Furukawa of Soma No. 1 Aero-Engine Works,

Fukushima, is involved in producing air flow capturing parts, i.e., engine blades. Each blade has a finely curved surface, and its shape varies depending on the type of engine, or the component on which the blade is to be mounted (fan or turbine, etc.). In order to accurately machine and mass-produce blades with a high degree of accuracy, a combination of technologies including electrical discharge machining, electrolytic machining, and laser beam machining are applied. Furukawa is also a key member of the team developing MSCoating®.

Every production process of jet engines has to be conducted with a full sense of responsibility for the safety of the aircraft while in flight. Before delivery after maintenance, strict testing is carried out not only for new jet engines but also for engines sent back to the factory for overhaul. The third key person is Satoru Sugaya of Mizuho Aero-Engine Works, Tokyo. He took part in the launch of a new test building (test cell) as a key person responsible for engine testing, and is currently supervising the whole testing process.

From the next page, we will feature these three key persons one by one, who combine various technologies to realize higher-quality products at high efficiency and with safety first.



Cross sectional view of PW 1100G-JM engine
(Image credit: Pratt & Whitney)