
Japan reveals digital development plan for F-X fighter

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UPDATED

The Japanese Ministry of Defense (MoD) has outlined a commitment to apply digital engineering techniques and technologies in the development of the country's next-generation F-X fighter aircraft.

The MoD told *Janes* that the move to introduce such digital methods is part of a wider effort on the F-X programme to achieve enhancement in quality and efficiency across the design, development, production, and sustainment of the aircraft.



*A conceptual image of Japan's future F-X fighter aircraft, released by the Japanese MoD.
(Japanese MoD)*

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The MoD said the effort is also aligned with modern fighter aircraft practices in countries such as the United States and the United Kingdom, from companies which are expected to be involved in the development of the F-X fighter.

“Digital transformation has the potential to make a significant impact on every phase of research and development (R&D), mass production, and maintenance of defence equipment,” a spokesperson from the MoD told *Janes*.

The spokesperson added that both the MoD and the Japan Self-Defense Forces (JSDF) “recognise the importance of a deep understanding” about digital engineering, and are working to integrate such capabilities with the aim to be able to “efficiently acquire and operate superior equipment”.

By way of example, the spokesperson pointed to the MoD's ongoing project to conduct research on applying open systems architecture (OSA) – through which systems are interoperable and connectable – to the development of onboard F-X mission systems such as fire control, navigation, communications, and electronic warfare.

“Applying OSA enables us to enhance the fighter aircraft's expandability so that future upgrades of subsystems can be made at low cost and in a short period of time without major refurbishment. We intend to apply this technology to the F-X,” the spokesperson said.

Digital engineering developments will also be an aspect of Japan's co-operation with foreign suppliers on the F-X programme, the MoD spokesperson said.

In December 2020 the MoD selected Lockheed Martin to partner prime contractor Mitsubishi Heavy Industries (MHI) in developing the F-X. The spokesperson also confirmed that the MoD is discussing with the UK “the feasibility of co-operation at the subsystem level” on the F-X.

“In any case, we plan to promote the development of the F-X fighter aircraft through incorporating excellent examples – such as digital engineering and OSA – from overseas countries in the research, development, and production processes,” said the MoD spokesperson.

The Japanese defence ministry is aiming to start F-X prototype production in 2024, with flight tests scheduled for 2028, and mass production in 2031. The MoD plans to begin formally deploying the new aircraft around 2035 to start replacing the Japan Air Self-Defense Force's (JASDF's) Mitsubishi F-2 fighter aircraft.

Analysis

The MoD's efforts to integrate computer-driven manufacturing techniques on the F-X programme is linked to its commitment in its 2020 Defense White Paper to support the advancement of an “efficient and resilient” defence industrial base. The white paper said this effort should incorporate methods to “make equipment manufacturing processes efficient, and to thoroughly reduce costs”.

The benefits of applying such technologies have been highlighted to the MoD by US programmes such as Boeing's development of its T-7A Red Hawk advanced jet trainer aircraft. Boeing has stated that the aircraft was built by applying digital engineering processes, agile software development, and an open architecture mission system.

According to Boeing, these digital methods, compared with traditional techniques, supported a 75% improvement in first-time engineering quality on the T-7A, an 80% reduction in assembly hours, and a 50% reduction in software development and verification time.

As part of its drive to achieve such efficiencies, the MoD is also exploring the plausibility of wider integration into defence production programmes the advanced methods that have been adopted in civilian sectors. Such applications include additive manufacturing, cloud manufacturing, and

artificial intelligence data processing. The MoD also hopes that such efforts will benefit from Japanese defence contractors' wide integration into civilian manufacturing.

The 2020 Defense White Paper states, “The MoD/JSDF will [pursue] new initiatives ... incorporating successful examples in the civilian sector into the manufacturing of defence equipment.”