



Japan's military aircraft slump

In the early 1990s, Japan was widely assumed to be on the fast track toward aviation industry growth, if not leadership. In many other manufacturing segments, especially electronics and cars, Japanese firms enjoyed strong advantages in technology, finance, manufacturing processes, and corporate organization. Aviation was viewed as the next logical step. Many economists, industry leaders, and government officials thought the Japanese government had a roadmap that leveraged military work and jetliner subcontracts into a larger goal.

Yet an assessment of Japan's military aviation industry today yields a very different conclusion. The past 10 years have seen a marked and sustained dropoff in the country's military aircraft efforts. Commercial work is taking up only part of the slack. And because military work is essential for any healthy aerospace industry, this raises questions about the country's long-term aviation manufacturing strategy.

Downdraft

For decades, Japan used local production of foreign systems to grow its military industry revenues and capabilities. Although it built some locally designed jet trainers and turboprop planes, most of its military aircraft acquisition spending went to foreign fighters, helicopters, and special-mission aircraft built in-country with a high degree of local content at inflated prices.

Production of these systems rose at a relatively consistent pace through the 1970s and 1980s. The peak year for Japan's military aircraft industry output was 1992, which saw deliveries of 72 planes worth \$3.2 billion. This comprised \$650 million in rotorcraft, \$1.1 billion in license-built F-15s, and \$1.5 billion in other fixed-wing aircraft.

Yet this peak was followed by a marked decline. Last year was the lowest point in decades—deliveries came to a mere 18 aircraft worth \$720 million. Given funding for current programs, there

is nothing that will revive this low level through the end of the decade.

A key component of this market slump has been the disappointing Mitsubishi F-2 fighter, created under the FS-X program for Japan Air Self Defense Force (JASDF) requirements and using Lockheed Martin's F-16 as a template. This was the first time Japan had sought to design a supersonic combat aircraft for local needs.

The FS-X Memorandum of Understanding, signed in 1988, created intense controversy. Many U.S. politicians and trade experts denounced it as a technology giveaway and a blatant attempt to acquire the technology to build an upgrade of an aircraft that Japan should have been required to purchase off the shelf.

Yet despite this fear, the F-2 has proven an expensive plane and a technical disappointment. Even though development started in 1989, production deliveries did not begin until September 2000. The key technologies involved, particularly an all-new composite wing, have proven troublesome, and total development costs came to about \$5 billion. The unit price tag is over three times that of a typical F-16C Block 50. The F-16 itself has by now evolved to offer many of the same capabilities, and some new ones too.

In August 2004 the Japanese government announced that it might cease production of the F-2 as part of its midterm defense review plans. Under the new proposed plan, procurement would end at 86-100 planes, with 76 already funded through FY04. Another five were funded in FY05. The last of the 81 now funded will be delivered in FY08, although production is likely to keep going for another few years at the current very low level.

The future: X-planes

To revive the nation's military aircraft industry in the aftermath of the F-2 program's demise, the Japan Defense Agency

The F-2 program was Japan's first effort to design a supersonic combat aircraft for local needs.





On March 1, Kawasaki Heavy Industries delivered C-X test aircraft No. 1 to the JDA Technical Research and Development Institute.

(JDA) is planning three programs for production in the next decade. The first two are closely related.

The C-X/P-X is a joint effort to create both a next-generation cargo transport (C-X) and a next-generation maritime patrol/antisubmarine warfare aircraft (P-X). The Japanese military wants to buy 80 P-Xs and 44 C-Xs, with the P-X entering service in 2011 and the C-X in 2012.

In November 2001, the JDA selected Kawasaki to lead this effort. Kawasaki had been prime contractor for the two airplanes intended for replacement by the new aircraft family, the C-1 transport and the P-3 maritime patrol aircraft. The company built 107 P-3s under license from Lockheed Martin, the last one delivered in early 2000.

Given the widely divergent missions for the two planes, it is not surprising that early hopes for a great degree of commonality have not panned out. The C-X has a high wing with two General Electric CF6-80C2 turbofans. The P-X has a low wing with four smaller (and completely new) Ishikawajima-Harima Heavy Industries XF-7 engines. The fuselages are almost completely different, too, and the P-X relies on a new, risky maritime patrol combat system. The only commonality is in the flight deck and some relatively small wing and rear-fuselage components.

With the high level of nearly unique development work necessary for the two planes, it is not clear that Japan can afford to develop and produce both types. And replacement with off-the-shelf foreign systems cannot be ruled out. The P-X requirement could easily turn into a Boeing 737 MMA (Multimission Maritime Air-

craft) acquisition. The C-X would be replaceable by Lockheed Martin's C-130J, Airbus's A400M, or Boeing's C-17, or a mixed fleet of these types. Even with local production or industry offsets, these acquisitions would involve considerably smaller Japanese industry roles than those planned for P-X/C-X.

The third new Japanese military aircraft program, F-X, is a requirement for a new fighter, also entering service early in the next decade. This will probably involve license production at Mitsubishi, replacing F-2 revenues. The JASDF and JDA are considering their options, which include later model Boeing F-15s (F-15K equivalents, or better) or Boeing F/A-18E/Fs, Eurofighters, Lockheed Martin F-22s, and a new upgraded version of the F-2. In 2004 Japan also received its first Lockheed Martin F-35 Joint Strike Fighter briefing, so that fighter might be in the running as well.

The most notable aspect of the F-X program is that it implies a return to the kind of low-risk, high-dollar spending seen in pre-F-2 Japanese fighter programs, which only involved license production of U.S. designs. Before the F-2, for example, Mitsubishi built 199 Boeing F-15s at a unit cost of around \$100 million. Before that, Mitsubishi built 125 McDonnell Douglas F-4 Phantoms.

Although the new fighter prospects sound promising, there is a major risk with Japan relying on the F-X to boost its military industry fortunes. Some elements in the JASDF are known to favor acquisition of the F-22, the most expensive and capable choice. While the U.S. could agree to some limited industrial cooperation, there is almost no chance of out-

right license production for such a high-technology aircraft. If the F-22 is selected, Japanese industry's share of the procurement cash could be relatively low. Japan's aircraft industry would suffer the loss of its fighter franchise, historically the backbone of its work.

It is also notable that F-X will not involve significant development work. If the F-2 was designed to give Japanese industry a strong boost in platform design and integration, this capability has gone nowhere, and the next Japanese fighter will not provide ongoing support to a fighter design department. In fact, the Japanese military aircraft downturn is more than just a comment on post-Cold War budget realities; it also speaks to the relative desirability of indigenous solutions, rather than off-the-shelf purchases or work-shares in programs with larger production volumes.

Meanwhile, plans to evolve Kawasaki's T-4 trainer into a heavier, supersonic derivative have also been shelved, eliminating another potential new design project. Deliveries of the baseline T-4 ended in 2003.

Presumably, some of the engineers working on the F-2 have been encouraged to migrate over to C-X/P-X design, but these programs involve some different skills and technologies.

Commercial consolation

Despite the downturn and uncertain future on the military side, Japan's commercial aviation industry has made some wise partnership choices, and is now benefiting from them. The country's three major avi-

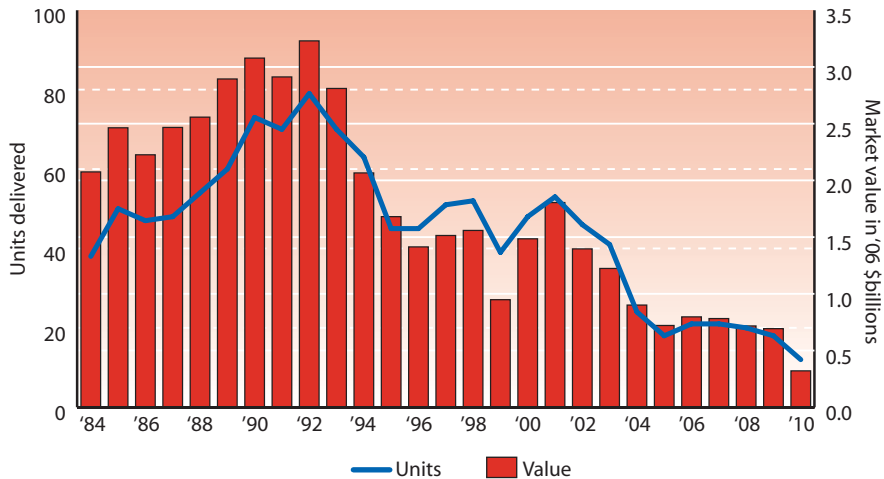


The F-X may be based on a variant of this F-15.

JAPANESE AIRCRAFT PRODUCTION 1984-2010

Waiting for F-X, P-X, C-X

Total market compound annual growth rate -4.7% through 2006



ation players—Kawasaki, Mitsubishi, and Fuji Heavy Industries—have a 21% share of Boeing’s 777 airframe, and 35% of Boeing’s 787 airframe. The first is on track to be the second most successful widebody of all time (after the 747); the second has had the most successful commercial launch of any widebody to date (over 350 firm orders through May, and still two years before the plane enters service).

Specifically, Japan’s 777 work includes the bulk of the fuselage (including the pressure bulkhead and tailcone, as well as the tail and wing center sections and wing inspar ribs). The 21% figure also includes work by Shin Meiwa of Konan, which produces wing-to-body fairings, and Nihon Hikoki, which produces airframe parts, including a contract for composite nose landing gear doors. Many of the same players have a share of the 787 airframe, with the three major players building the entire wing.

Japan’s three major aviation players have a 35% share of Boeing’s 787 airframe.



But while the 777 and 787 are doing very well, the country’s original Boeing partnership, on the 767, is in its final year or two. Production is now running at about one per month, and the 787 will take its place in Boeing’s product line. Plans for an aerial refueling tanker version, the KC-767, could well be dashed after a very limited production run, four planes each for Italy and Japan.

Also, these Boeing jetliner workshares have not evolved into finished systems, such as locally developed commercial platforms. Dreams of a home-built regional aircraft have come and gone over several decades, with nothing produced since the semisuccessful NAMC YS-11, built in the 1960s. Funding for a notional new regional jet continues at a very low level, as it has for decades.

There is also discussion of a commercial cargo version of the C-X transport. Initial specifications for this aircraft indicate that it would be completely inappropriate as a commercial plane, a problem that would be exacerbated by high overhead and production costs. In addition, there are no historical examples of military cargo jets successfully used as commercial cargo models.

Business jets are another possible segment for Japanese market entrance, with Honda particularly interested in the very light jet segment. But again, there have been no firm production plans, and the most notable Japanese business jet so far was Mitsubishi’s Diamond. This entry-level design was sold to Beech Aircraft in the 1980s and has evolved into the very successful Raytheon Hawker 400, built in Wichita. Mitsubishi had sold a mere 94 Diamonds; Beech/Raytheon has sold over 750 Beechjet/Hawker 400s, all built in Kansas.

As for rotorcraft, Japanese industry has not leveraged its military production efforts into any notable commercial projects. Kawasaki builds the Eurocopter EC 145 (known as the BK.117C2) under license, but the production rate is about two to four a year. Mitsubishi’s efforts to create a purely indigenous design, the MH2000, ended in failure. The company pulled the plug on this comatose rotorcraft in April 2005, after building six machines.



Mitsubishi pulled the plug on the MH2000 after building just six machines.

Thus the Boeing subcontracts are the only bright spot in Japan’s aviation picture. And the increasing aerospace trade gap—in America’s favor, according to U.S. International Trade Commission numbers—indicates that Japan’s improving commercial jetliner business is not making a decisive difference in the nation’s aerospace industry fortunes.

In any event, commercial market prospects are important, but a strong military side is essential for any nation’s aerospace industry. Japan’s military downturn, and the highly uncertain prospects for the military sector’s recovery, means serious weakness in any plans the country might have to enlarge its global aerospace industry role.

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