

Complexity costs for the F-35; JSF is the first real joint aircraft; 2030 Air Dominance fighter?; That F-35 is a pretty good deal, actually

AN EXPENSIVE JOINT


“Contrary to expectations,” joint service aircraft programs historically have cost more than single-service airplane projects, according to a recent RAND Corp. study. The study’s authors recommended the Pentagon “avoid” joint fighter programs in the future. Nevertheless, the next big fighter project, now entering its early stages, is being considered—at least initially—for joint service use.

The December 2013 RAND study—“Do Joint Fighter Programs Save Money?”—was requested by former Air Force Materiel Command chief Gen. Donald J. Hoffman. He wanted to know if there really has been a payoff in commonality and life cycle costs from the often exasperating process of harmonizing the disparate requirements of the Air Force, Navy, and Marine Corps in combat aircraft. RAND studied 11 previous efforts at joint service fighter programs—notably including the (infamous) TFX of the 1960s, the Advanced Combat Fighter of the 1970s, the A-12 attack aircraft, and the current F-35 strike fighter—and found no evidence that commonality delivered savings.

RAND compared the cost growth of research, development, test, and evaluation and procurement of single-service programs—both real and “notional”—with joint programs, accounting for inflation and measuring them at a similar stage in their progress.

“Our analysis ... shows that nine years past” Milestone B, when a program gets underway, the F-35’s life cycle costs “are higher than if the services had pursued three separate fighter programs,” the RAND team determined. The best possible savings in development is about 30 percent, the authors said, and the Joint Strike Fighter’s overruns have already consumed those savings by a wide margin.

Just as troubling, RAND said that consolidating all the fighter work in one industrial basket—Lockheed Martin is the only company making fifth generation fighters for the Air Force, for example—has led to “declining numbers of credible fighter/attack aircraft prime contractors, a situation that is likely to reduce competition and innovation in the future.”

Those risks are well-understood by senior Pentagon officials, who said they only resort to joint programs when it’s clearly necessary for interoperability and worth the acknowledged extra expense.  (Read more about joint programs online at www.airforcemag.com. Search “Out of Joint.”)

Mark A. Lorell, senior political scientist at RAND and lead researcher on the joint fighter study, told *Air Force Magazine* the main work on the joint fighter study was completed in 2011, because Hoffman wanted a “fast turnaround” to get basic answers to his questions. The work was thus based on the Pentagon’s Cost Assessment and Program Evaluation (CAPE) shop’s 2010 life cycle cost estimate for the F-35 JSF—the cost to procure and operate the fleet for 53 years—which was in excess of \$1.1 trillion.

Last August, however, the F-35 system program office told the Senate its new life cycle cost numbers were \$857 million—a 22 percent reduction—and those numbers were expected to decline. More recently, Lockheed Martin

estimates the cost at around \$782 billion. The official life cycle cost will be revealed this spring in the Pentagon’s next Selected Acquisition Reports, which benchmark the department’s biggest acquisition programs.

Although RAND was not charged with “evaluating the F-35 program per se” and didn’t consider recent cost reductions, Lorell said the JSF probably won’t break even versus separate-service efforts. While there are potentially significant life cycle savings in the long run, he said, they don’t offset far higher upfront “complexity” costs stemming from chronic design changes needed to satisfy all users.

“I have nothing but incredible admiration for the contractors and engineers ... who are rolling these extremely divergent requirements” into as common an air vehicle as possible, Lorell said.

“It’s incredibly technologically challenging” to design a single platform able to fulfill the Navy’s need for a stealth bomber, the Air Force’s need for a stealthy fighter/attack aircraft, and the Marine Corps’ desire for a close air support platform capable of vertical takeoffs and landings, he said. As a result, the JSF really is three different airplanes with a degree of commonality.

RAND pegged the F-35’s commonality at around 40 percent.

HARD TO COMPARE

In the fighter study, RAND acknowledged the “impossibility” of comparing the JSF to a previous joint fighter production program because it’s the first to have made it this far. In previous efforts, one service—usually the Navy—backed out when it felt its needs weren’t adequately addressed, lowering production runs and increasing development and unit costs.

The authors conceded that the F-35 is “not only the largest, most ambitious, and complex joint fighter program in history; it is the only fully joint fighter program ... in the past 50 years to have progressed beyond the joint development stage into the joint procurement phase.” The TFX, for example, never entered service in both the Navy and Air Force; only USAF bought it, as the F-111. The Navy refused to buy the single-engine F-16 and opted instead for the dual-engine F/A-18; there was zero commonality between the two.

The F-4 Phantom and the A-7 Corsair were technically joint in that both the Air Force and Navy/Marine Corps flew them, but they were both developed by the Navy alone and the Air Force was obliged to buy them later, for the sake of commonality. As USAF tweaked them for its own needs, however, they grew increasingly less common with the Navy aircraft, RAND said.

Because no truly joint program has ever come to fruition from its inception, RAND also sought context by examining several nonfighter joint aircraft programs, including the T-6 Texan trainer, the E-8 JSTARS radar surveillance aircraft, and the V-22 Osprey tilt-rotor—none of them a star performer in meeting predicted costs.

Based on its research, RAND recommended that “unless the participating services have identical, stable requirements,” the Defense Department should “avoid future joint fighter and other complex joint aircraft programs.”

The JSF program office, through a spokesman, said, “We appreciate the study; affordability is the No. 1 priority on the program and we are seeing some signs of progress.” He said unit prices on new F-35s “continue to go down with each production lot of aircraft and our operations and sustainment estimates are going down as well.” However, “we’re nowhere near where we need to be, and we’re working with industry on a number of initiatives to continue to reduce F-35 costs.”

ENTER THE NEW JOINT FIGHTER


The Air Force and Navy will investigate a successor to the F-22 and F/A-18, respectively, with an analysis of alternatives due to get underway in 2015, Pentagon and industry officials said. Jointness is an early consideration. The project is notionally called the “2030+ Air Dominance” fighter.

The ground rules for the AOA are being coordinated among the two services and the Office of the Secretary of Defense, and one of the questions it will answer is whether a single-type solution for both services is warranted and practical. If not, they are to look for ways to at least find commonality in major subsystems—such as in engines, radars, other sensors, or reuse of software from other projects. The Navy’s effort, in the conceptual stage for a few years, is called the F/A-XX.

The 2030+ fighter project at this stage is similar to the Joint Advanced Strike Technology program of the 1990s. The JAST effort was intended to be a survey of advanced and impending technologies that would influence air combat in the 2010 to 2030 time frame, but as post-Cold War defense budgets shrank and new fighter needs loomed, it morphed into the Joint Strike Fighter program.

JAST absorbed the Air Force’s Multirole Fighter program meant to replace the F-16, the Navy’s A/F-X project to replace the A-6, and the Marine Corps Advanced Short Takeoff and Vertical Landing (ASTOVL) project to replace the AV-8B. The JAST project was initially headed by Lt. Gen. George K. Muellner, now the Air Force Association’s Chairman of the Board.

Like JAST, the new project will first survey the art of the possible in the 2030-plus time frame, with an eye on both manned and unmanned capabilities as well as new propulsion, advanced stealth, sensor technology, laser weapons, and sensor fusion, to include a high degree of automation and use of artificial intelligence. Pentagon officials have stressed that there are no presumptions about what capabilities the aircraft will have or indeed whether it must be a sixth generation fighter. Operational conditions in the 2030s may or may not warrant a generational improvement over the F-22, they said, and competition from other projects—the Long Range Strike Bomber, recapitalization of the tanker fleet, and ongoing F-35 production—may not allow it.

 (For more on the sixth gen fighter, visit airforcemag.com. Search “Sixth Generation Fighter.”)

When it was pointed out in 2010 that the earliest F-22s will reach retirement age in the late 2020s, and such programs typically take 20 years to gestate, Michael B. Donley, then the Air Force Secretary, told *Air Force Magazine* that an F-22 replacement project would—or should—likely get underway in 2015. Air Combat Command chief Gen. Gilmory Michael Hostage III made similar statements last year.

Although Air Force officials have long said that hypersonic flight is probably too far of a technological reach to incorporate in its next generation fighter, Lockheed

Martin has recently unveiled concepts for a manned Mach 5 reconnaissance aircraft, and the Air Force Scientific Advisory Board will look at the readiness of hypersonic flight for reconnaissance or strike as one of its areas for investigation in 2014.

Air Force Chief of Staff Gen. Mark A. Welsh III, meeting with defense reporters in November, said USAF’s experience with the X-51 WaveRider program “indicated that hypersonic flight for a purpose is possible. It’s a plausible investment approach.”

Welsh added that hypersonic flight for a combat platform “appeals to me for a very simple reason. Not because it’s cool, but because speed compresses decision timelines. That’s actually a very good thing from a military perspective.” If it turns out to be practical, “it’s worth pursuing.”

He also said that there’s no “preconceived notion of what kind of platform” to pursue for air-breathing hypersonics, but “I think it will probably start small”—he suggested a missile-sized system comparable to the X-51—“and then who knows where it will go after that.”

F-35 C-NOTE

Lockheed Martin delivered the 100th F-35 in December, expressing confidence that the cost of the fighter will not only come down, but will be cheaper than any potential competitor.

The F-35 will eventually cost “less than any fourth generation fighter in the world,” company F-35 Executive Vice President and General Manager Lorraine M. Martin told reporters. The F-35 is touted as a “fifth generation” fighter, meaning it employs a blend of stealthiness, sensor fusion, and advanced sensors. Fourth generation aircraft, making up the bulk of Air Force, Navy, and Marine Corps inventories, lack at least the stealth and many of the advanced sensor capabilities of the F-35 and its Air Force F-22 stablemate.

Five years from now, Martin said, the F-35’s unit cost will be about \$75 million in today’s dollars (\$85 million in 2018 dollars). Though competitors—such as Boeing’s F/A-18 Super Hornet—may offer a lower sticker price, she said, “look at what’s included,” suggesting that much of the gear that “comes standard” on the F-35—including targeting pods, radars, additional fuel tanks, additional sensors, etc.—are sold separately with the Super Hornet.

Briefers at the event also described the training concept of operations at Luke AFB, Ariz., for the F-35, because the 100th airplane will be the first delivered there to support F-35 combat training for Air Force and international pilots. Both Air Force and international pilots and maintainers will work on a joint training force of aircraft, which are so common that maintenance will simply generate aircraft and pilots will fly them, regardless of the nationality of either. Thus, Turkish pilots could be flying Italian F-35s, and US pilots could be flying Dutch or Australian airplanes.

Asked about liability for these aircraft—if a foreign pilot, through his own error, destroys a US airplane, for example—the F-35 program office said the participating countries have agreed to an “at your own risk” arrangement. That means whatever nation loses an aircraft will bear the cost.

“We have a similar arrangement” at Eglin AFB, Fla., an F-35 spokesman said. There, British and Marine Corps pilots are jointly operating F-35B models, and if one is destroyed, the owning nation will bear the liability.

The spokesman said this is not unusual; Marine Corps pilots serve as exchange pilots with USAF, and if one were to “break an F-15,” the Air Force would bear the expense. It is acknowledged as “the cost of doing business” by all the F-35 partners, the spokesman said. ■