

Boeing Touts Advanced Fighter Versions As 'Different Animals'

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When Lockheed Martin's X-35 beat the Boeing X-32 to win the trillion-dollar Joint Strike Fighter program in 2001, Boeing might have thought its days in the fighter business were numbered. Sixteen years later, Boeing's F-15 and F/A-18 appear to have survived the stealth craze of the past two decades that threatened to render them obsolete in the fighter market.

As Lockheed's F-35 Joint Strike Fighter and now-terminated F-22 Raptor languished in programs that were over cost and behind schedule, Boeing capitalized. It rolled newer and more advanced mission systems, sensors and weaponry into updated versions of its EA-18 Growler, F-15 Eagle and F/A-18E/F Super Hornet platforms, which the company says makes them competitive with so-called fifth-generation warplanes.

By applying "iterative innovation," the same technology-insertion tactic that will keep its AH-64 Apache and CH-47 Chinook rotorcraft flying through 2060, the company has secured futures for its fighter production lines into the early-2020s, and probably beyond. The aircraft themselves will be in operation past 2040.

The U.S. Navy already has all the Super Hornets it originally intended to buy, but new threats and force requirements could prompt it to buy as many as 120 additional F/A-18E/Fs while transitioning to Boeing's Block 3 model beyond fiscal 2019. Meanwhile, the U.S. Air Force has more than \$12 billion earmarked for C-model Eagle and E-model Strike Eagle upgrades through 2025, not including the \$5 billion already spent by Boeing and its international customers on F-15 improvements during the past 6-7 years.

Boeing believes it now possesses aircraft that can match or exceed the F-22 and F-35 technologically, not counting their superior low-observable designs. Many of the advanced sensors and weapon systems being introduced on the F-15 and F/A-18 will not be rolled into the F-35 until Block 4 in the 2020s.

Despite the lack of the low-observable shape and antennas needed for all-aspect stealth on the aircraft, "when the door is knocked down, you want the range, firepower and connectivity that we can provide," Boeing says. According to the company, it will need to put "new wrappers" on the F/A-18 and F-15, something that Boeing Phantom Works appears to be doing, to make them as competitive against integrated air defense systems in a high-end conflict against the Lockheed fighters. But for almost all other combat scenarios, including air-to-air, air-to-ground and counter-sea missions, the "Advanced F-15" and "Advanced F/A-18" are ideal.

“For an in-production air-superiority aircraft, nothing compares to an F-15 today,” says Steve Parker, Boeing Military Aircraft vice president for F-15 programs. “Nothing flies faster, nothing goes higher, nothing carries more.”



Boeing says electronic-warfare upgrades and infrared signature reduction will help improve the F/A-18 Super Hornet's survivability. Credit: Boeing

The company has dropped its former “Silent Eagle” concept, in which weapons were to be carried internally to reduce the aircraft’s radar signature. Boeing points out that potential adversaries have caught up with stealth technology by switching frequencies; introducing more powerful active, electronically scanned array (AESA) radars with faster computer processors; and installing new long-range, wider-search, infrared search-and-track pods.

Almost every proposed Silent Eagle capability, barring the conformal internal weapons bays, has been carried forward into the advanced Eagle configurations being delivered to Saudi Arabia (F-15SA), proposed to Qatar (F-15QA) and considered by Israel.

The U.S. Air Force upgrades will provide what Boeing calls the world’s fastest military aircraft mission computer (the Advanced Display Core Processor II) and most powerful electronic-warfare suite (BAE Systems’ Eagle Passive/Active Warning Survivability System). Boeing has already installed the new Raytheon APG-63(V)3 AESA radar on 125 of approximately 200 air-superiority F-15C Eagles and is gearing up to install the Raytheon APG-82(V)1 on another 200 or so F-15E Strike Eagle fighter-bombers. The U.S.’s F-15 technology road map is valued at more than \$12 billion through 2025.

The newest single- and tandem-seat Eagles have fly-by-wire flight controls that allow Weapon Stations 1 and 9 to be activated, increasing the number of weapons or sensors carried per sortie. With the new Advanced Missile Bomb Ejector Rack, the Eagle’s missile carriage will be expanded to accommodate 22

weapons per sortie, from 16.

Both front- and backseats have Digital Joint Helmet-Mounted Cueing Systems, and future versions are expected to come with the improved wide-area display cockpit and low-profile head-up display Boeing has been developing with its suppliers. Today's F-15s are powered by twin General Electric F110-129 turbofans, which were chosen by Saudi Arabia. The aircraft is also compatible with GE's more-powerful F110-132, which equips the United Arab Emirates' Lockheed F-16E/F Block 60 fighters. "We're engine-agnostic," Parker says.

One of the most significant changes to the Eagle is its airframe design life. The Eagles the U.S. flies today are rated for 9,000 flight hours, whereas the Advanced F-15's wing and fuselage have been strengthened to achieve 20,000 hr.

"It's a different animal today," Parker explains. "It looks kind of the same, but it is very, very different. We have a road map that takes the F-15 out into the 2040 time frame."

One or two years ago, Boeing had few prospects for new production of the F-15 and F/A-18 in St. Louis, but that has changed.

Boeing says current orders will continue F-15 production through 2019; near-term deals would push production into the late-2022 time frame; and "we also have potential opportunities we are working now that would take the production line just past the mid-2020s," Parker says. Boeing has all but secured a deal for "up to 72" Qatari F-15QAs, and another customer in the region, likely Israel, is considering a sizable order.

Boeing has not delivered new Strike Eagles to the U.S. military since the mid-2000s, but Parker would welcome orders to boost fighter manufacturing capacity. So far, the Air Force is not interested in new F-15s, but it does have plans to replace the F-15C with a sixth-generation aircraft, termed the Penetrating Counter-Air (PCA). Parker anticipates continued investment in the F-15C until the PCA aircraft is developed and delivered in the numbers required. Structural upgrades will keep the 1970s models flying into the 2030s, he says.

On the F/A-18 side, the Navy has decided to keep buying Super Hornets alongside the F-35C to meet an immediate need for greater numbers of strike fighters. The service's program of record was 563 F/A-18 E/F aircraft, but now Boeing sees opportunities for significant follow-on orders. All aircraft delivered after fiscal 2019, for domestic and international customers, will be Block 3 versions.

Kuwait has been approved to buy "up to 40" F/A-18E/Fs, and Canada is considering an "interim fleet" of about 18 aircraft to bolster its outdated CF-18 Hornets. The Canadian deal could fall through, depending on how hard Boeing pushes its trade dispute with Canada over government subsidies to Montreal-based Bombardier in the commercial aircraft market. The Super Hornet is also being promoted to India and Finland. Boeing recently lost to Lockheed's F-35 in Denmark.

Larry Burt, Boeing's director of global sales and marketing for global strike programs, says near-term opportunities would take F/A-18 production into the mid-2020s. The company needs to build about 24 Super Hornets per year for production to remain viable.

As different as the Block 3 version of the Super Hornet is from its predecessors, Boeing is already looking at capabilities for Block 4.

"We're not trying to be the F-35; you don't need a fifth-gen for all missions," he says. However, he adds that it is easier to evolve and enhance the F/A-18 and F-15 airframes than low-observable platforms like the F-35.

"You could keep evolving the mission systems, sensors and capability of the Super Hornet and maybe eventually put a new wrapper on it," Burt notes.

The Growler is a story of "incremental innovation" for Boeing. The Navy has almost doubled its original program of record to about 160 from 88.

The service is now moving forward with planned upgrades that will keep the aircraft relevant into the 2040s. The centerpiece of the "Advanced Growler" is Raytheon's Next-Generation Jammer, which passed a critical design review in April. Complementary features are improvements to the Growler's integrated ALQ-218 radar warning, electronic support and electronic intelligence systems, which also are produced by Northrop.

Boeing says it is still in contract negotiations with the U.S. Navy to pull all of the planned Growler upgrades into a single service-life upgrade program, which would include an extension of the aircraft's structural service life to 9,000 from 6,000 hr. The airframer also is pushing the GE F414 Enhanced Engine for the Growler and Super Hornet, which would provide 18% more power.



For strike operations, the Advanced F-15 can carry 16 Small-Diameter Bombers, four AIM-120 Amraams, two AGM-88 HARMs, one 2,000-lb. JDAM-ER and two 600-gal. fuel tanks. Credit: Boeing

Australia is the only other operator of the Growler platform, and it is already positioning to acquire the Next-Generation Jammer.

The potential Super Hornet deals with Canada and Kuwait do not include Growlers, Boeing confirms.