

Not Ready for Prime Time

DOT&E Report: The F-35 Is Not Ready for IOC and Won't Be Any Time Soon

Inside-the-Beltway wisdom holds that the \$1.4 trillion F-35 Joint Strike Fighter (JSF) program is too big to cancel and on the road to recovery. But the [latest report](#) from the Defense Department's Director of Operational Test and Evaluation (DOT&E) provides a litany of reasons that conventional wisdom should be considered politically driven propaganda. The press has already reported [flawed software](#) that hinders the ability of the plane to employ weapons, communicate information, and detect threats; maintenance problems so severe that the F-35 has an "overdependence" on contractor maintainers and ["unacceptable workarounds"](#) (behind paywall) and is only able to fly twice a week; and a high-rate, premature production schedule that ignores whether the program has demonstrated essential combat capabilities or proven it's safe to fly. All of these problems are increasing costs and risks to the program. Yet rather than slow down production to focus resources on fixing these critical problems, Congress used the year-end continuing resolution omnibus appropriations bill—termed the "cromnibus"—[to add 4 additional planes to the 34 Department of Defense \(DoD\) budgeted for Fiscal Year 2015](#). The original FY2016 plan significantly increased the buy to 55, and now the program office is further [accelerating its purchase of these troubled planes to buy 57 instead](#).

At some point, the inherent flaws and escalating costs of a program become so great that even a system with massive political buy-in reaches a tipping point. The problems described in the DOT&E report show that the F-35 has reached a stage where it is now obvious that the never-ending stream of partial fixes, software patches, and ad hoc workarounds are inadequate to deliver combat-worthy, survivable, and readily employable aircraft. This year's DOT&E report also demonstrates that in an effort to maintain the political momentum of the F-35, its program office is not beneath misrepresenting critically important characteristics of the system.

In sum, the old problems are not going away, new issues are arising, and some problems may be getting worse.

Below are some of the key issues raised by the DOT&E report.

Cooking the Numbers

The Joint Program Office, led by Air Force Lt. Gen. Chris Bogdan, is re-categorizing failure incidents to make the plane look more reliable than it actually is. This kind of number-cooking has been done in other important areas of the program, such as using gimmicks to [lowball acquisition costs](#) and [operating costs per flying hour](#).

Regarding the F-35's reliability, [Giovanni de Briganti at *Defense-Aerospace* summarized DOT&E's description of the program office's maintenance manipulations in detail](#). Specifically he highlighted that the Joint Program Office:

- Described part failures as “induced” (caused by a mechanic’s mistake) rather than “inherent” (due to inadequate design) to avoid counting design failures that degrade the “mean flight hours between inherent failure” statistics—[one of the metrics for Lockheed’s contract](#). As just one—innocuous sounding but typical—example, this includes [re-categorizing nut plate failures](#) on removable surface panels, which DOT&E points out is “one of the most common failures in aircraft,” as induced rather than inherent;
- [Threw out actual failures](#) from reliability metrics if the part that failed will be replaced in the future by a redesigned part;
- Exaggerated the F-35’s reliability and shrunk the number of failures reported by re-scoring a series of unsuccessful fixes as just one repair. In the original report that de Briganti analyzed, DOT&E wrote that “[d]iscrepancies for which maintainers have to attempt multiple solutions before finding a true fix are being scored as a single event, while in the past they were documented as multiple repair attempts, each with its own MTTR (Mean Time To Repair)”;
- Under-counted tires that failed and [“worn beyond limits” as a “no-defect replacement](#),” even though “[t]he program is seeking redesigned tires for all variants to reduce maintenance down time for tire replacements.”

“Recent improvements in F-35 reliability figures are due to changes in the way failures are counted and processed, but do not reflect any actual improvement,” writes de Briganti. Instead, massaging the numbers helps Lockheed Martin meet its contract specifications. It doesn’t, however, decrease the user’s maintenance burden or help the plane fly more often.

Testing Being Deferred, Not Completed

In order to show that they are more or less keeping up with their announced testing schedule, the F-35 program office has been eliminating and “consolidating” test points by the hundreds instead of actually flying more. Specifically, DOT&E wrote, “[t]he program is [eliminating test points that are designed to characterize performance](#) (i.e., in a larger combat maneuvering envelope than a specific contract specification condition), reducing the number of test points needed to verify the 2B capability for fleet release, and deferring fixes for deficiencies to Block 3.” Those [eliminations include 840 test points](#) in February that were intended to support certifying the Block 2B release in time for this summer’s launch of the Marines’ Initial Operational Capability (IOC) effort; as a result, the IOC squadron will be flying with an uncertified 2B avionics system.

DOT&E also found that, because F-35 testing to date has uncovered so many unanticipated design failures, each planned test point accomplished uncovers the need for another [.91 “growth” test points](#) in order to fix the newly discovered problems. To cover up the slow test progress due to “growth” test points, the program is deferring fixes for an average of 61 percent of these newly discovered deficiencies in Block 2B to later blocks.

Significant Safety Risks Are Still Unresolved

Live-fire test and evaluation confirmed that the fuel tank system that fills the wings and surrounds the engine is at significant risk of catastrophic fire and explosion in combat. The DOT&E report explained that the live-fire tests “demonstrated the expected cascading damage vulnerability to fuel ingestion, fuel and hydraulic fire, and hydraulic ram events.” This means that if an F-35 is hit by gun or missile projectiles—even fragments—in any of the multiple fuel tanks throughout the plane, there’s a likelihood of catastrophic failure. The F-35 design attempts to mitigate these problems by reducing the amount of fire-sustaining oxygen in the fuel tanks’ explosive vapor spaces, but the On-Board Inert Gas Generation System (OBIGGS) remains unable to eliminate enough oxygen during dives, and [may require additional post-production modification](#), even [after its recent redesign](#). Further, if the pilot needs to dump fuel for emergency landings, that creates a fire problem as well because the fuel doesn’t fully eject; instead it “collects in the area between the flaperons and the aircraft structure and runs inboard toward the Integrated Power Package exhaust outlet, creating a potential fire hazard.” The 270 volt electrical system in the F-35—[unprecedented in a fighter aircraft](#)—also elevates fire risk because such high voltages increase the likelihood of strong sparks from wires damaged by maintenance mistakes or even minor combat hits.

While on the ground, the F-35 Lightning’s electrical and fuel tank systems are also [inadequately protected against lightning strikes](#) due to the OBIGGS’s inability to maintain “residual inerting,” which is to remove enough oxygen from the tanks’ explosive vapor spaces to be safe for at least 12 hours after flight, is a lightning protection requirement. Last year DOT&E found that current inerting capability “does not protect the aircraft against damage to the airframe resulting from lightning-induced currents.” Lightning tolerance qualification testing is ongoing, but the plane continues to be restricted from flying [within 25 miles of thunderstorms](#), creating a major training problem at Eglin Air Force Base, [an area where intense lightning strikes occur regularly](#). Addressing lightning safety on the ground, DOT&E writes, “[i]f the residual inerting cannot be improved, [aircraft maintainers will be required to purge fuel tanks with external nitrogen more frequently](#) or alternative lightning strategies.” OBIGGS redesigns to cure the problem have been inadequate to date.

Other live-fire test shots into the propulsion system revealed that “sustained fires were created in the shot into the variable area vane box nozzle due to leakage in the actuating hydraulics, and the shot into the roll duct nozzle door due to damage to the adjacent fuel tank. These fires would ultimately have led to [cascading structural damage](#).”

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The F-35 has a high level of vulnerability to catastrophic fire from both combat and weather hazards; its level of vulnerability may be so high as to be unprecedented. This problem is so combat-critical that exhaustive, additional comparative (versus legacy aircraft) live-fire testing needs to be started now and completed before the end of the F-35's Initial Operational Testing and Evaluation (combat-realistic) tests in 2019.

Wing Drop Concerns

Last year DOT&E reported that every F-35 variant struggled with [uncommanded "wing drop"](#) when maneuvering hard at high subsonic and transonic speeds. This is particularly dangerous because uncommanded—which is to say, uncontrolled—wing drop can result in crashes and an inability to outmaneuver attacking planes or missiles in combat. This year's report notes that [all three variants needed](#) "modifications of the control laws to control the effects of transonic flight [wing drop] and buffet maneuvering." Unfortunately, the needed control law modifications will reduce the maneuverability of the F-35, only exacerbating the plane's [performance problems in this area](#). The F-35C's wing drop problem is "worse than other variants" and future testing will incorporate spoilers installed in the wings to address the problem. Lockheed Martin [publicly reported designing add-on spoilers in 2009](#), and DOT&E described plans to consider how to incorporate these new spoilers in the test plan in its [2012 report](#). However, add-on spoilers, such as those added to the F-18E/F to address a similar problem, almost certainly will decrease all-around stealth as well as increase weight and drag, thereby further decreasing maneuverability, acceleration, and range. Moreover, much of the extensive maneuver testing needed to validate fixes to the wing-drop problem is currently impossible due to the speed and g limits imposed by the continuing engine fan-rubbing problem (described below).

Heavy buffeting during high angle of attack maneuvers (such as during dogfighting, outmaneuvering threat missiles, and flying close support) has been reported as a serious ongoing

problem with the F-35 since at least 2009. Such buffeting can cause fatigue cracks that lead to structural failure and can degrade weapons aiming, missile evasion, and dogfighting ability.

Testing to investigate the impact of buffet and transonic roll-off (TRO or “wing drop”) on the helmet-mounted display and offensive and defensive maneuvering found that “[b]uffet affected display symbology, and [would have the greatest impact in scenarios where a pilot was maneuvering to defeat a missile shot](#).” Buffeting also degrades the gyroscopes in the inertial platforms which are essential for flight control, navigation, and weapons aiming. DOT&E explained that this was an ongoing issue: “In heavy buffet conditions, which occur between 20 and 26 degrees angle of attack, faults occurred in the inertial measurement units (IMUs) in the aircraft that degraded the flight control system (two of three flight control channels become disabled), requiring a flight abort.” This limitation to maneuverability is an obstacle that must be overcome and any remedy must be validated by additional testing before 2B release.

It is implausible that any aircraft with these inherent problems in basic weapons delivery and dogfight maneuvering would be approved for deployment, and yet the Marines Corps and Air Force are pressing ahead with their dates for “initial operational capability” in 2015 and 2016, respectively. If internal Pentagon and external congressional oversight were operative, these problems would be show-stoppers.

Engine Problems Continue to Hold the F-35 Program Back

A major engine failure—caused by [excessive engine flexing](#), induced hard rubbing, and then catastrophic failure of fan blades—started a fire that [destroyed the rear fuselage and tail of an F-35A](#) in June 2014. [All F-35s have been severely restricted](#) in speed (under .9 Mach for production aircraft and 1.6 for test planes), turning g (3.0g and 3.2-g respectively), and maneuver limits (less than half-stick roll rate and 18 degrees angle of attack) as a result. These restrictions have made it impossible to fully test weapons loads, buffeting during maneuvers, maneuver limits, and wing drop limits for the various F-35 versions. The restrictions have also stopped testing on the [ground collision avoidance system](#)—which warns pilots when to pull up to avoid crashing—even though a working system is one of the key safety requirements for meeting the Marine Corps’ IOC date. Overall, the limitations resulted in a [17 percent decrease in productivity](#) for testing mission systems, blocking [53 percent of the remaining Block 2B test points](#).

Some of these restrictions may remain in place for a considerable time because [no long-term fix for the engine’s excessive flexibility has been found](#). Additional restrictions have been added as well. After a [crack in the nacelle vent inlet tube](#) was discovered “following an incident where ground crews observed fuel leaking from the tube during hot pit ground refueling,” all production aircraft were restricted to 3 g’s and no air refueling. This restriction was lifted when

the tubes were replaced on the test aircraft, but remains in place for all other fielded production aircraft.

Ultimately the F-35's engine problems are creating so many flight test restrictions that they are delaying testing significantly, which could impede meeting key safety and combat utility requirements for the Marine Corps' IOC date. It also makes the inappropriateness of designating this aircraft for any combat operations until all these issues are fully resolved all the more obvious.

Dangerous Helmet Failures

The F-35's helmet-mounted display system (HMDS) projects onto the pilot's visor threat information, flight instrument readout, and almost 360-degree video and infrared images of the world around the pilot. Supposedly this provides the pilot with "[unprecedented situational awareness and tactical capability](#)." The almost 360-degree video and infrared imagery comes from the six cameras and complex processing software of the Distributed Aperture System manufactured by Northrop Grumman. DOT&E has found, however, that even after a major redesign and software upgrade the Distributed Aperture System "continues to exhibit [high false-alarm rates and false target tracks](#), and poor stability performance." Testing of the redesigned helmet system "discovered deficiencies, particularly in the [stability of the new display management computer](#) for the helmet, and suspended further testing until software that fixes the deficiencies in the helmet system can be provided to the major contractor and included in an updated load of mission systems software."

All of these problems mean that the pilot cannot rely on the helmet display to provide adequate situational awareness in combat. This is particularly a concern for rear hemisphere threats, since the unusually wide fuselage and solid bulkhead directly behind the pilot's head means [he cannot see below or behind him if his helmet fails](#). As we previously reported, pilots found it "nearly impossible to check [their six o'clock position to the rear] under g" and complained that "Aft visibility will get the pilot gunned [down] every time," referring to close-range combat.

Failure to fix these serious problems, and to demonstrate the efficacy of the fix in operational testing, will result in an aircraft unsuitable for combat.

Initial Combat Capabilities for the Marine Corps Variant Will Be Even More Limited Than Planned

The JSF Program had restructured its testing plan—[even putting off some flight testing for the Air Force's F-35A](#)—to accommodate and validate the Block 2B avionics system's functionality to meet the end of 2015 IOC date announced by the Marine Corps. DOT&E found Block 2B avionics has approximately [1,151 open deficiency reports](#), including 151 that were "[mission critical' with no acceptable workaround](#) for Block 2B fleet release," "572 relevant to and

affecting 2B capability,” and “579 carried over for consideration for correction in Block 3.” These critical deficiencies made releasing a validated 2B system for the Marine Corps’ IOC unrealistic.

Since Block 2B is the [first block to have any claimed combat capability](#), that IOC—if and when it is declared—will be lacking required 2B “[operationally-relevant ... performance](#)” combat capabilities, according to the DOT&E report. Those capabilities and their flight tests are now [deferred to later Blocks 3i and 3F](#), which introduce an all-new computer but will not have “Full Operational Capability” (FOC). The first FOC system will be Block 4, currently scheduled to be declared fully capable in 2022—assuming no further schedule slips in the intervening seven years.

The Marine Corps’ professed plan to have initial operational capability as soon as later this year is a charade.

ALIS Software Failures

The F-35’s software includes [over 30 million lines of code](#) between the F-35’s onboard computer and its ground-based Automatic Logistics Information System (ALIS) combat data and logistics system. To put this in perspective, the GAO testified in 2012 that the amount of code on the plane was approximately [three times more than the F-22A and six times more than the F-18E/F Super Hornet](#). DOT&E found that developing and then testing this unprecedented amount of code is discovering significant performance failures and resulting in schedule slips. These include navigation system inaccuracies and instabilities that are delaying weapon delivery accuracy testing, failures in software fusion of multiple sensor inputs that create false alarms and false target tracks, and so much growth in the size and weight of the ALIS multi-computer system that it cannot be deployed with the F-35. The [size and weight of ALIS](#) is so substantial that it necessitates the design and development of a whole new set of ALIS computers, which will require a whole new round of validation testing.

Moreover, ALIS software worsens F-35 reliability and maintainability problems. DOT&E finds, “[ALIS continues to be cumbersome](#) to use and inefficient, and requires the use of workarounds for deficiencies awaiting correction.” Specific workarounds noted in the report include having to manually enter consumable information like oil usage and frequent submission of formal support requests to Lockheed Martin because “troubleshooting functionality is incomplete.” The diagnostic capability of ALIS, its fault and failure management, has “[demonstrated low detection rates, poor accuracy, and high false alarm rates](#).” To compensate, “fielded operations have had to rely on manual workarounds, such as maintainer-initiated built-in tests, extra scheduled inspections, and reliance on contractor personnel.”

Like the airplane itself, its essential support component, ALIS, is not ready for operational employment.

Software Snarls Jeopardize Combat Suitability

[Block 2B mission software deficiencies](#) undermine the ability to find targets, detect and survive enemy defenses, deliver weapons accurately, and avoid fratricide, according to the DOT&E report, due to shortfalls in “fusion, radar, passive sensors, identification of friend-or-foe, electro-optical targeting system, and the aircraft navigation model.”

DOT&E also expresses concerns about certification of mission data loads—the data files that were supposed to be generated by the classified portion of ALIS and are essential for cueing F-35 sensors and other mission systems in order to be able to fly an assigned mission. Because of the many ALIS problems and schedule slips, the classified mission data loads have been [temporarily split off and are being generated by a separate computer laboratory](#). Two usable mission loads are required for the 2015 Marine Corps F-35B IOC testing. DOT&E is deeply concerned, however, that those loads have not yet been fully developed and will not be flight tested on a realistic target range in time for the beginning of Marine IOC testing this summer: “Truncating the mission data load development and conducting open-air flight testing early on a limited open-air range for the purpose of releasing a mission data load in mid-2015 would [create significant operational risk to fielded units](#).” Lab testing performed to date is “not adequate for development of mission data loads for use in operationally realistic conditions.” In other words, the F-35B aircraft and pilots declared by the Marine Corps to be operationally ready for combat will have to fly those combat missions with mission-critical software and data loads that are essentially untested, jeopardizing mission success, aircraft, and pilots’ lives.

The Marines apparently plan to send into combat an aircraft with serious operating limits, excess vulnerability, and an incomplete, jerry-rigged support system with essential mission data loads that are untested.

The DOT&E report shows that no amount of number-cooking can hide the fact that the F-35 suffers significant design flaws that undermine combat capabilities and safety. The schedule for achieving the additional but still limited air combat and ground attack capabilities of the Block 3F mission systems, planned for after the Marines’ IOC, is already slipping and requires “[extensive modifications](#), including new processors, in addition to those needed for Block 2B capability.” Under the current schedule, these modifications will not be available until after spin-up training for the 2017 beginning of IOT&E.

Hiding Today’s Failings While Building a Huge Future Cost “Bow Wave”

By continuing to defer critical testing, crucial fixes, and promised capabilities, the JSF Program Office achieves two purposes essential for continued congressional funding: 1) creating the appearance of an “on-track” program, and 2) transferring to the distant out-years the major cost overruns incurred by today’s test failures and their resultant redesign and fleetwide retrofit expenses.

Among the deferred flight test hours are approximately 1,000 mission systems test points intended for Block 2B release that have been deferred, with some likely to be carried over to 3F and beyond. Add to this the continuously emerging stream of “growth” test points, with nine new tests needed for every ten points successfully accomplished, and six of those nine being deferred to the distant future.

The expense of the deferred test flight hours is only the tip of the iceberg. Far more expensive are the redesign and fleetwide retrofit costs resulting from the shortcomings that inevitably emerge during those deferred flight tests. The longer those tests are deferred and the more we ramp up production now, the more expensive retrofits will be necessary for the larger fleet of flawed F-35s.

Even more expensive than the cost implications of deferred testing are the costs of achieving the capabilities being [deferred to Blocks 3F, 4A, 4B, and later, including](#) the more vaguely defined Blocks 5, 6, and 7. These deferred capabilities are major cost items, many of which fall beyond the five-year budget and are not even included in the current \$400 billion acquisition cost estimate. They include [B-61 nuclear bomb integration, external weapons pylons and load integration, external fuel tanks, 25mm gun pods, 25mm combat ammunition, JSOW guided weapons integration](#), adding long range infrared scan and track, [new radio/data links for interoperability with the F-22s, F-15s, and F-16s](#), integrating the six-AMRAAM load, [AIM 9X integration](#), all-aspect passive threat detection, maritime radar mode, and more.

The total cost of test, retrofit, and capabilities deferral can be significant. In the \$67.3 billion F-22 program, the Air Force deferred so many fixes and [capabilities](#) past the end of production that the resulting F-22 “modernization” package added [\\$11.3 billion of previously unacknowledged costs](#)—a 17 percent add-on to the F-22 procurement. (This package, which largely fixed deferred shortcomings and deferred capabilities, is included in this year’s DOT&E report as a separate major acquisition program suffering additional “[stability and radar performance shortfalls](#).”) Simply based on the DOT&E analysis of deferred testing and the [Joint Program Office’s descriptions of Blocks 4, 5, 6, and 7 capabilities](#), the F-35 program appears to be deferring significantly more testing, fixes, and capabilities than the F-22 did. Assuming the proportion of F-35 deferred work to be no greater than the F-22, the F-35 program’s hidden “bow wave” can be calculated to amount to \$67 billion, an overrun equal to the entire program cost of the F-22.

A Maintenance Nightmare

The complexity of maintaining the F-35 at this point means that none of the Services are ready to keep it in working order. Instead, DOT&E found that maintenance “[relies heavily on contractor support and unacceptable workarounds](#).”

Even using the cooked numbers described above, the plane [isn’t reaching any of the nine reliability measures](#) the program was supposed to achieve by this point in its development.

DOT&E put together a chart of the many problem systems driving the low reported numbers for availability and reliability:

| HIGH DRIVER COMPONENTS AFFECTING LOW AVAILABILITY AND RELIABILITY | | |
|---|---|---|
| | Common to All Variants | Additional High Drivers by Variant |
| F-35A | <ul style="list-style-type: none"> • Avionics Processors • Main Landing Gear Tires • Thermal Management System • Ejection Seat Assembly | <ul style="list-style-type: none"> • Exhaust Nozzle Assembly • Exhaust Nozzle Converging-Diverging Link |
| F-35B | <ul style="list-style-type: none"> • Panoramic Cockpit Display Electronics Unit • Low Observable Cure Parameters • Helmet Display Unit | <ul style="list-style-type: none"> • Upper Lift Fan Door Actuator¹ • 270 Volt DC Battery |
| F-35C | <ul style="list-style-type: none"> • Seat Survival Kit • Igniter-Spark, Turbine Engine • On-Board Oxygen Generating System | <ul style="list-style-type: none"> • Data Transfer Cartridge • Solenoid Operated Fuel Valve |
| 1. Unique to the F-35B | | |

DOT&E found that the program achieved [61 percent of planned flight hours](#) and that [the average rate of availability](#) was as low as 28 percent for the F-35A and 33 percent for the F-35B. The program created a new “modeled achievable” flight hour projection “[since low availability was preventing the full use of bed-down plan flight hours.](#)” In fact, according to the Assistant Secretary of the Air Force for Financial Management, in FY2014, each non-test F-35 flew only 7.7 hours per month, which amounts to approximately one sortie every 5.5 days—for combat purposes, a sortie rate so low as to be crippling.

When it came to reliability, the mean flight hours between critical failures (MFHBF) have increased since last year—meaning that at least the newly redefined critical failures are occurring less frequently—but are still below threshold. Mean flight hours between removal (MFHBR) have increased as well, but are still only 59 percent to 65 percent of the required threshold. In measuring the rate of progress for reliability, DOT&E found “[f]or most of the measures, [the F-35 must achieve a much faster growth rate than currently exhibited](#)” to meet requirements by maturity. DOT&E found that mean corrective maintenance time for critical failures [got worse for the F-35A and the F-35C over the last year](#). Put simply, while the F-35 remains far behind schedule on many suitability measures, on some it is going backwards.

Stealth (also referred to as “low observables”) only continues to add to these maintenance nightmares and “[contribute to extensive maintenance time, especially long cure times](#)” for repair.

Problems in the ALIS with misdiagnosing failures, misidentifying replacement parts, and failing to detect the need for new parts are also contributing to longer maintenance times.

As mentioned above, the Joint Program Office is trying to minimize these concerns by counting fewer failures that could and should be attributed to design. In September 2012, the program reported “twice as many inherent failures as induced failures, and there were many more inherent failures than induced every subsequent month through May 2013.” But after the re-categorization of nut plate failures from inherent to induced in June 2013, the trend reversed and “records showed that there were [more than twice as many induced failures than inherent failures](#),” continuing for each subsequent month. DOT&E indicates this re-categorization [undermines the credibility of the metric](#) for measuring reliability because it’s inconsistent with other metrics: “This sudden and abrupt reversal of the relationship between induced and inherent failures across the F-35A fleet suggests that scoring failures differently (induced vice inherent) may result in an increase in the design-controllable metric that is not manifested in other reliability metrics.” In other words, actual availability, reliability, and maintainability data has been masked by analytical gimmicks.

The newest DOT&E report found that structural cracking remains an issue as well. Previous DOT&E reports found [airframe cracks](#) and a cracked wing carry-through bulkhead [halted durability testing for a year](#). This year DOT&E reports durability testing of the [F-35A revealed cracking](#) on the left-hand side integrated power package shear web lug at Fuselage Station 503, the left-hand side Fuselage Station 503 frame support, and the left-hand side F2 fuel floor flange. [Durability testing of the F-35B is on hold](#) after a severed bulkhead transferred loads to an adjacent bulkhead and caused cracking necessitating a redesign. Structural cracking, often dismissed as an old issue because cracked parts have been redesigned, is proving to be a recurring and enduring problem that is not yet resolved.

Conclusion: Exquisitely Limited Capability

Overall, DOT&E’s report reveals:

- The Joint Program Office, led by Lt. Gen. Bogdan, is re-categorizing or failing to count aircraft failures to try to boost maintainability and reliability statistics;
- Testing is continuing to reveal the need for more tests, but the majority of the fixes and for capability deficiencies being discovered are being deferred to later blocks rather than being resolved;



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- The F-35 has a significant risk of fire due to extensive fuel tank vulnerability, lightning vulnerability and an OBIGGS system unable to sufficiently reduce fire-sustaining oxygen, despite redesigns;
- Wing drop concerns are still not resolved after six years, and may only be mitigated or solved at the expense of combat maneuverability and stealth;
- The June engine problems are seriously impeding or preventing the completion of key test points, including ensuring that the F-35B delivered to the Marine Corps for IOC meets critical safety requirements; no redesign, schedule, or cost estimate for a long-term fix has been defined yet, thereby further impeding g testing;
- Even in its third iteration, the F-35's helmet continues to show high false-alarm rates and computer stability concerns, seriously reducing pilots' situational awareness and endangering their lives in combat;
- The number of Block 2B's already limited combat capabilities being deferred to later blocks means that the Marine Corps' FY2015 IOC squadron will be even less combat capable than originally planned;
- ALIS software failures continue to impede operation, mission planning, and maintenance of the F-35, forcing the Services to be overly reliant on contractors and "unacceptable workarounds";
- Deficiencies in Block 2B software, and deferring those capabilities to later blocks, is undermining combat suitability for all three variants of the F-35;
- The program's attempts to save money now by reducing test points and deferring crucial combat capabilities will result in costly retrofits and fixes later down the line, creating a future unaffordable bow wave that, based on F-22 experience, will add at least an additional \$67 billion in acquisition costs; and
- Low availability and reliability of the F-35 is driven by inherent design problems that are only becoming more obvious and difficult to fix.

The F-35 is years away from being ready for initial operational capability. To send this airplane on a combat deployment, or to declare it ready to be sent, as early as the Marines' 2015 or the Air Force's 2016 IOC dates, is a politically driven and irresponsible mistake. DOT&E's report shows that the current IOC plans for the F-35A and B should be rejected as unrealistic. Without meaningful oversight from the Department of Defense or Congress, however, these IOC declarations will go unchallenged.



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The F-35 program is designed so that there is no requirement to prove its combat capability before approving an annual production rate of 57 aircraft, a rate unprecedented for any fighter with so little operational testing accomplished and so many unresolved problems. Further production of the F-35 at this point, let alone an increase in already high and unwarranted production rates, is unsupported by the DOT&E data. But that data is being ignored to continue funding a [politically driven acquisition program](#).

The F-35's unrealistic production and IOC schedule is divorcing the declaration of initial operating capability from operational reality. Deferring combat capabilities, increasing future costs, and increasing the risk of delivering seriously deficient combat effectiveness mandates revising the current schedules for IOC and for production ramp-up. Further accelerating a program with this many major design, safety, and reliability problems is a disservice to our people in uniform who have to fly, maintain, and go to war with this weapons system.

Despite Congress's rhetoric regarding reform and accountability, they are rewarding the cooking of data, reckless program concurrency, and disastrous acquisition management by approving and funding the F-35's current path. Their accession and approval will ensure that future acquisition programs have even worse outcomes.