

**RESPONSE TO F-22 WASHINGTON POST ARTICLE BY JEFF SMITH**

**CLAIM** ...30 hours of maintenance for every hour in the skies... (Para 1)

**AF RESPONSE** True based on the DOT&E Report from 2007 at 34 hours.

**CLAIM** ...hourly cost of flying to more than \$44,000... (Para 1)

**AF RESPONSE** The total variable cost per flying hour includes: aircraft part repairs (depot level repairs [DRLs]), replenishment spares, consumables, engine parts and aviation fuel. The F-22 FY08 total variable cost per flying hour (17,711 total hours flown) was \$19K and the F-15 FY08 total variable cost per flying hour (122,762 total hours flown) was \$17K.

Costs included in the variable cost per flying hour are a subset of total operational cost per flying hour. For the F-22, contractor support is included in both the variable cost per flying hour and the operational cost per flying hour. Contractor costs which meet the definition of a variable cost are included in the \$19,750 Variable CPFH, along with appropriate government costs. Other contractor support costs are added in, along with appropriate government costs, to obtain the total \$49,808 Operational CPFH.

**F-22 vs. F-15**

**2008 Cost Comparison Breakdown**

	Costs Variable w/ Flying Hours	Costs Variable w/ of a/c	#Fixed Costs
F-22	\$19,750 CPFH*	\$2.5M cost per a/c	\$276M total
F-15	\$17,465 CPFH*	\$2.4M cost per a/c	\$318M total
Major Activities: (by category)	Repairs (DLRs) Spares Consumables Fuel	Depot Maintenance Base Operations	Engineering Tech Data Program Mgmt Indirect Costs

- Cost comparison includes all O&S costs (both CLS and organic)
- Once costs are bucketed into categories, F-22 and F-15 costs are similar

**Note: \* Costs variable with flying hours are preliminary estimates.**

**CLAIM** ...radar-absorbing metallic skin is the principal cause of its maintenance troubles, with unexpected shortcomings --... (Para 2)

**AF RESPONSE** True.

**CLAIM** ...such as vulnerability to rain and other abrasion... (Para 2)

**AF RESPONSE** Not true. Rain is not the cause of skin issues.

**CLAIM** ... aircraft fleets become easier and less costly to repair as they mature, key maintenance trends for the F-22 have been negative in recent years, and on average from October last year to this May...(Para 3)

**AF RESPONSE** Not true. Have been improving.

**CLAIM** ...just 55 percent of the deployed F-22 fleet has been available to fulfill missions guarding U.S. airspace, the Defense Department acknowledged this week. The F-22 has never been...(Para 3)

**AF RESPONSE** Fleet average 64.5 and Operational Fleet (LAFB, EAFB, HAFB) 61.5. The mission capable rate has improved from 62% to 68% percent from 2004 to 2009.

**CLAIM** ... only 1.7 hours .... (Para 5)

**AF RESPONSE** True based on the FOT&E Report. The F-22 program does not measure mean time between critical failure. However, Mean Time Between Maintenance (MTBM) has dramatically matured from 0.97 in 2004 to 3.22 as demonstrated by Lot 6 aircraft performance.

**CLAIM** ...\$350 million apiece.... (Para 5)

**AF RESPONSE** \$350 million then-year cost is true for the programs average unit cost (PAUC) for 184 aircraft, which includes all RDT&E and procurement costs. The fly away cost of the F-22 is \$142.6M each for Lot 9 aircraft.

**CLAIM** ...Structural problems that turned up in subsequent testing forced retrofits to the frame ...(Para 19)

**AF RESPONSE** Misleading. The F-22 had a series of structural models that were tested throughout its development in a building block manner. Lockheed Martin completed static and fatigue testing in 2005 on two early production representative airframes. The results of those tests required upgrades to the airframe in a few highly stressed locations. Follow up component level testing was completed and structural redesigns were verified and implemented into the production line. For aircraft that were delivered prior to design change implementation, structural retrofit repairs are being implemented by a funded program called the F-22 Structural Retrofit Program.

**CLAIM** ... changes in the fuel flow...(Para 19)...

**AF RESPONSE** False. The F-22 fuel system has NOT required redesign. The F-22 program has improved the reliability of individual fuel system components as part of our reliability and maintainability improvement program.

**CLAIM** ...forced the frequent retesting of millions of lines of code...(Para 19)

**AF RESPONSE** False. Diagnostic software is designed to automatically detect and isolate system faults. Currently it detects system faults 64% of the time and isolates the fault 92% of the time. This is up from 42% and 63% respectively in 2006. The F-22 program continues to incorporate diagnostic improvements as part of our reliability and maintainability improvement program.

We do not see anything inherent in the way the software is written that makes it hard to change. The avionics systems, air vehicle systems and engine systems and their operating software require highly qualified personnel to implement

changes and require an increased amount of system-level integration testing. Very strict coding and documentation standards are used in the design and development of the F-22 software. Adherence to these standards is what positions the code to allow for future changes.

**CLAIM** ... Skin problems ...(Para 20)

**AF RESPONSE** The issues noted from the FOT&E 2 Report are: 1 abrasion, 1 canopy, 3 missing filler, 4 roll up, 12 tip breaks and ~150 tip/edge damages.

**CLAIM** ...Over the four-year period, the F-22's average maintenance time per hour of flight grew from 20 hours to 34, ...(Para 21)

**AF RESPONSE** Misleading, the two numbers cited are from FOT&E 1 and FOT&E 2 averages respectively. The F-22 program does not measure mean time between critical failure. However, Mean Time Between Maintenance (MTBM) has dramatically matured from 0.97 in 2004 to 3.22 as demonstrated by Lot 6 aircraft performance.

**CLAIM** ...The Air Force says the F-22 cost \$44,259 per flying hour in 2008; the Office of the Secretary of Defense said the figure was \$49,808. The F-15, the F-22's predecessor, has a fleet average cost of \$30,818. ...(Para 22)

**AF RESPONSE** The total variable cost per flying hour includes: aircraft part repairs (DLRs), replenishment spares, consumables, engine parts and aviation fuel. The F-22 FY08 total variable cost per flying hour (17,711 total hours flown) was \$19K and the F-15 FY08 total variable cost per flying hour (122,762 total hours flown) was \$17K.

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**Note: \* Costs variable with flying hours are preliminary estimates.**

**CLAIM** ... of "catastrophic loss of the aircraft."...(Para 28)

**AF RESPONSE** False. The Air Force has determined that there is no need for costly repairs, now or in the future. Boeing reported to USAF that for a limited number of F-22 titanium fuselage boom structures fabricated up to that time period, the titanium material used did not meet stringent F-22 specifications. It had different fatigue mechanical properties than what was certified for production. After extensive review of the titanium by Program experts it was determined that the as-fabricated fuselage boom structural assemblies did not require costly production repairs or scrapping of these high-cost fuselage boom assemblies. However, additional structural inspections had to be imposed on these particular parts to satisfy airworthiness certification requirements per the F-22 Aircraft Structural Integrity Process. These inspections are now in place and conducted in a routine manner per F-22 maintenance instructions.

**CLAIM** ...through increased inspections over the life of the fleet, with expenses to be mostly paid by the Air Force....(Para 28)

**AF RESPONSE** False. Fair and reasonable consideration was provided by the contractor to the AF for additional inspection burden.

**CLAIM** ...It delaminates, "loses its strength and finish"....(Para 31)

**AF RESPONSE** False. Each F-22 canopy costs \$120k. Canopies do not lose strength over time and are removed due to optical degradation NOT safety of flight. The F-22 canopy coating life requirement is 800 hrs. Canopy coatings are unique to the F-22 system. The requirement was achieved and demonstrated in laboratory tests in Engineering and Manufacturing Development. During early operation usage the program discovered previously unknown impacts due to environmental effects that reduced coating durability. Presently, canopy coatings last an average of 331 flight hours. The program has incorporated several coating improvements. Coating life continues to improve.

**CLAIM** ...\$120,000 refurbishments at 331 hours of flying time, on average, instead of the stipulated 800 hours...(Para 32)

**AF RESPONSE** Misleading. Each F-22 canopy costs \$120k. Canopies do not lose strength over time and are removed due to optical degradation NOT safety of flight. The F-22 canopy coating life requirement is 800 hrs. Canopy coatings are unique to the F-22 System. The requirement was achieved and demonstrated in laboratory tests in Engineering and Manufacturing Development. During early operation usage the program discovered previously unknown impacts due to environmental effects that reduced coating durability. Presently, canopy

coatings last an average of 331 flight hours. The program has incorporated several coating improvements. Coating life continues to improve.

**CLAIM** ... it fully met two of 22 key requirements...(Para 33)

**AF RESPONSE** There are only 11 key performance parameters.

**CLAIM** ... After four years of rigorous testing and operations, "the trends are not good...(Para 35)

**AF RESPONSE** False. The mission capable rate has improved from 62% to 68% percent from 2004 to 2009.

The F-22 program does not measure maintenance time per repair. Direct Maintenance Man-Hours per Flying Hour (DMMH/FH) has improved from 18.10 DMMH/FH in 2008 to 10.48 DMMH/FH in 2009.

**CLAIM** ....It will, among other things, give F-22 pilots the ability to communicate with other types of warplanes; it currently is the only such warplane to lack that capability.... (Para 38)

**AF RESPONSE** Provides the F-22 to transfer digital data to other ( Multi-function Advanced Data Link) MADL equipped aircraft.

**CLAIM** ... One of the last four planes Gates supported buying is meant to replace an F-22 that crashed during a test flight north of Los Angeles on March 25, during his review of the program...(Para 40)

**AF RESPONSE** Misleading. All 4 Lot 10 aircraft will be combat coded.

**CLAIM** Paragraph 40-41

**AF RESPONSE** Cannot comment on this information because the report has not been released yet.