

# OPINION

**O**n 6 April US Secretary of Defense Robert Gates announced a number of decisions on major weapons programmes in the Pentagon's next budget.

*The New York Times* termed the decisions a "sweeping overhaul" of the Pentagon. Indeed, Gates' decision to cut off F-22 fighter production at 187 fighters is an essential step in any real reform plan.

However, his complementary decision to rely on the Lockheed Martin F-35 Joint Strike Fighter to modernise US Air Force (USAF) undoes everything constructive that he accomplished – more so than he might ever imagine. Quite justifiably, Gates said the decision to stop F-22 production was not even a "close call".

At more than USD65 billion to procure the puny number being built, none of them used or useful in the wars in Iraq and Afghanistan, the F-22 contributes mightily to the problem of the air force's shrinking and ageing aircraft inventory – at greatly increased cost.

The F-22 is also a huge disappointment as a fighter – a likely failure in any hypothesised future air war against an enemy with a competent air force – unlikely as such an enemy seems in today's world.

The F-22 embodies a series of classic Pentagon procurement mistakes that should never be repeated. First, discarding the highly successful reform introduced by the F-16 and A-10 programmes, there was no competitive "fly before you buy". That is, there was no production-representative, combat-capable prototype, no competitive dog-fighting between the candidates, and certainly no realistic estimate of cost and its effect on force size before the decision to go into production.

Instead, we got pseudo-prototypes, which wags in the Pentagon called "a paint job the shape of an F-22". With these two non-prototypes, the Department of Defense (DoD) also failed to have a combat fly-off, failed to explore the F-22's main features such as the engines and combat-critical avionics, and failed to test the vaunted "stealth" in-flight against actual enemy radars.

Instead, the DoD sidelined the two non-prototypes and then pursued an unbelievably long and costly development programme of what constituted a whole new, untested aircraft. Predictably the DoD committed to production long before flight testing was anywhere near complete – ultimately in the face of major test problems explicitly pointed out by its own Director of Operational Test and Evaluation.

Solving all the problems added huge costs, delays, and performance compromises. A programme sold in 1991 on the basis of a fleet of 648 fighters for the price of USD149 million apiece ended up today as a token force of only 187 aircraft costing an appalling USD350 million each.

The unit cost ballooned by 135 per cent; the inevitable result was that the DoD shrank

## Glossing over the F-35 JSF aircraft project



**Following plans to cap F-22 fighter production, the US decision to rely on the F-35 aircraft is unsound, according to Pierre M Sprey (left) and Winslow T Wheeler**

the force by a factor of more than three.

Second, rejecting the combat effectiveness-based approach used on the F-16, the F-22 designers rested on the dream of radar-based, beyond-visual-range (BVR) air-to-air combat. It was the same technological wishful thinking used in the 1950s, the 1960s, and the 1970s, when the USAF spent billions of dollars trying and failing to develop effective radars, friend-or-foe identification systems, and radar-guided missiles to realise the BVR dream of killing enemies in the air at very long distances.

From 1983 to today, the air force is trying yet again with the F-22, this time with the hugely expensive and performance-degrading addition of stealth. The fundamental technological problems remained, however.

As with all previous radar-dependant fighters,

**'The F-22 designers rested on the dream of radar-based, BVR air-to-air combat'**

the F-22's big radar and avionics (and stealth) added major weight, drag, and complexity – thereby severely degrading combat-essential characteristics, such as manoeuvring agility and sortie rate.

Worse, stealth fails to eliminate the Achilles heel of the wishfully named 'low probability of intercept' radar and, indeed, all active radar BVR combat: alerting the enemy way beyond effective radar range, solving his friend- or-foe identification problem with a unique signal, and giving him a perfect beacon to guide his radar-homing missiles (a technology the Russians have specialised in for decades).

It is near delusional to ignore that all our stealth aircraft since the SR-71 have been routinely detected by ordinary ground radars around the world – and it is completely delusional to think that potential enemies and even friends have not figured out how to detect the spread spectrum signature of the F-22's powerful radar signal.

Also, has everyone forgotten that we lost two stealth F-117s to the radar defences of the technologically rudimentary Serbs in 1999? It is the worst form of foolishness that the USAF fails to routinely fly and train in scenarios where the 'red' force exploits the F-22's vulnerabilities.

Instead, the air force stages what amount to (self-deluding) publicity exercises based on ground rules that cripple the forces replicating the enemy, denying them the effective technology and countermeasures that a real enemy surely will have. To compound the error, the air force also assumes "probabilities of kill" for the F-22's missiles that are demonstrably way beyond any actual combat experience.

All of this, and almost certainly worse, is true for the F-35. Sold as "affordable" by its advocates, the Joint Strike Fighter was actually designed as anything but. Its price has been climbing ever since.

In 2001, the Pentagon planned a total of 2,866 aircraft for USD226.5 billion. That meant a pricey USD79 million per copy – one of America's most expensive fighters ever, except, of course, for the F-22. Subsequently, the Pentagon plan was altered to reduce the buy to 2,456 (14 per cent less) for a 32 per cent increase in cost, USD298.8 billion.

At USD122 million each, it is hardly "affordable". Moreover, that not particularly affordable number is sure to increase. In fact, it already has. Late last year, the Pentagon accepted a new cost estimate for the 30 aircraft to be bought in 2010. Originally projected to cost USD10.4 billion, Secretary Gates told us on 6 April they will cost USD11.2 billion, or on average an appalling USD373 million each.

That unit cost will decline somewhat as the buy increases, but it is entirely possible that it will end up at about USD200 million. Current in-house DoD cost re-estimates already predict USD7 billion more in cost growth between 2011 and 2015 for problems already identified, and there is surely more to come.

So much more cost growth is easily predictable because the F-35 programme managers failed to learn any of the lessons of the botched F-22 programme.

Instead of embracing “fly before you buy”, they are rushing headlong into their plan to produce up to 513 aircraft with only two per cent of flight testing now complete. In that handful of test hours, the programme has already discovered significant problems in the avionics and engine that now must be fixed.

Even more astounding, the programme plans to verify only 17 per cent of the aircraft’s characteristics with flight-testing, according to the Government Accountability Office and Pentagon insiders. The rest will be verified by computer simulations, testbeds, and desk studies. Desk studies?

It gets even worse. For survival against enemies in the air, the F-35 will depend on the same technological dream of BVR combat. It has to – as a close-in dogfighter, it is a disaster.

If one accepts all the design and performance promises currently made, the F-35 will be overweight and underpowered. At 49,500 lb (22,450 tonnes) air-to-air take-off weight and 42,000 lb of engine thrust, it will be a significant step backward in thrust-to-weight ratio for a new fighter.

With only 42 m<sup>2</sup> of wing area, wing loading will be a whopping 108 lb/ft<sup>2</sup>. That makes the F-35 even less manoeuvrable than the appalling F-105 ‘Lead Sled’ that got wiped out over North Vietnam.

With a payload of only two 2,000 lb bombs in its bomb bay – much less than the F-105 could carry – the F-35 is hardly a first-class bomber either. As a close air fighter to support US troops engaged in combat on the ground, the F-35 is hopeless.

Too fast to find targets and to separate out friendlies from the enemy on its own, too delicate to withstand ground fire, and too fuel thirsty to loiter over US forces for sustained periods, it is a giant step backward from the current A-10. Pentagon statements confirm awareness of some F-35 problems, but the proposed actions are only cosmetic – putting lipstick on the pig, as it were.

For example, US Marine Corps General James Cartwright, Vice Chairman of the Joint Chiefs of Staff, told the press on 7 April that the programme is accelerating the test plans and increasing the number of test assets.

This statement is a complete mystery to



The **F-35 Joint Strike Fighter** is likely to cost USD373 million per unit

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Pentagon insiders who report there has been no change to the woefully inadequate test plan, as written in the 2010 budget.

As a matter of fact, sources report to us the consideration in Lockheed Martin of reducing the already inadequate number of test aircraft even further in order to save money.

More to the point, there is no change in the current plan to procure more than 500 aircraft before completion of the flight test programme, the one that tests only 17 per cent of the F-35’s performance characteristics.

The final irony is how the Pentagon thinks it can perform those “desk studies” that will pretend to verify F-35 performance, in lieu of flight testing.

Just before Secretary Gates announced his recent decisions, the Senate Armed Services Committee (SASC) considered and “marked up” S.454, the Weapons Systems Acquisition Reform Act of 2009 introduced by senators Carl Levin, D-MI, and John McCain, R-AZ.

Riddled with loopholes, the draft bill did, however, have one uncompromised provision; it barred contractors from participating in DoD assessments of their own weapon programmes.

Sadly, the SASC adopted an amendment to the bill, supported by the Pentagon, which permits contractors to do precisely what the original provision prohibited: letting contractors write their own report card. We can now expect to be informed by the Pentagon in the future that the F-35 has passed all its tests – on Lockheed Martin stationery.

Before 7 December 1941, the US Navy oozed confidence that its battleships were secure in Pearl Harbor, arguing that the Japanese were too backward technically to develop a torpedo that could operate in the shallows of the harbour.

Accordingly, the navy deployed no torpedo nets. The rest is history. With our fatally flawed F-35 (and F-22), we are setting ourselves up for a Pearl Harbor in the air against any enemy that cares to exploit our obvious and real, but ignored, vulnerabilities.

With his announcements on 6 April, Gates stated his intent to “profoundly reform how this department [the Pentagon] does business”. He clearly understands the need to change. Unfortunately, it appears he is also ill-served by advisers assuring him that the F-35 is not a road to still more ruin.

**Pierre M Sprey**, together with Colonel John Boyd and Colonel Everest Riccioni, brought to fruition the F-16; he also led the design team for the A-10 and helped implement the programme.

**Winslow T Wheeler** is the director of the Straus Military Reform Project at the Center for Defense Information in Washington.

## Lockheed Martin responds: ‘the world’s best air forces choose the world’s best aircraft’

It is unfortunate that there are so many misrepresentations and distortions of fact presented in the opinion piece offered by Mr Wheeler and Mr Sprey.

The simple facts are as follows:

- The F-35 will be the most lethal and survivable multirole fighter in history;
- The F-35 is meeting or exceeding every single one of the Key Performance Parameters that the services have mandated;
- The F-35’s capabilities are being validated in our laboratories, and in our ground- and flight-test programme today;
- The F-35’s procurement costs to date are meeting programme cost objectives, and are on track to meet our customers’ unit flyaway cost targets; and
- The F-35 programme is on schedule to deliver the first production-model aircraft next year.

We are also very pleased to see that many of the world’s most elite air forces – including the US Air Force, US Navy and US Marine Corps, and the Royal Air Force and Royal Navy – do not agree with the opinions of Mr Wheeler and Mr Sprey, and that recent endorsements of the F-35 programme both in the US and abroad underscore those convictions.

We are most proud of the fact that the F-35 is the system of choice for all participating nations to protect the freedoms that enable those with differing opinions to speak out.

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