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Wake Turbulence

Winter/spring 2010 world aerospace developments



Written by: Jan Tegler on October 21, 2010
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Austrian air force Eurofighter Typhoons in flight. Eurofighter, like MiG, Gripen International, Dassault, Lockheed Martin, and Boeing, is fighting hard to win one or more of the few aircraft competitions up for tender. Photo courtesy of Eurofighter GmbH.

The global aerospace defense sector continues to experience much more than a "moderate chop" as 2010 unfolds. The worldwide economic recession that began in late 2008 seemed to abate somewhat as the year began, but echoes of the downturn returned as spring progressed. These were accompanied throughout the first months of the year by sweeping policy and programmatic shifts, political upheaval, and the chronic dysfunction of the aerospace procurement process at home and abroad.

On the world stage, a debt crisis emerged in Greece, forcing the financial bailout of the nation by European Union members and widespread concern about the debt burdens of other European countries, including Portugal, Ireland, Italy, and Spain. This in turn, caused the Euro to weaken significantly, with implications for trade throughout the European zone and beyond. Russian defense spending and aerospace activity trended upward, but Europe's financial distress seemed likely to affect Moscow. In the U.K., parliamentary elections brought change to 10 Downing St. and a swing of power back to conservatives. The implications of the new government are, as yet, unclear.

In Asia as well, economic weakness slowed activity generally. China again bucked the trend, but declared that it would limit the growth of its overall defense budget to just 7.5 percent for 2010. The announcement was met with skepticism by many western analysts, who cited nearly two decades' worth of unbroken double-digit rises in China's defense budget. India announced it would increase its defense budget slightly (about 4 percent) but indecision bogged down a number of aerospace procurement programs.



The UH-60M Black Hawk program got \$1.25 billion in funding for 74 more aircraft. Photo courtesy of Sikorsky.

According to international accounting and consulting firm Deloitte, global aerospace spending was forecast to remain flat at roughly 2 percent of global GDP, with the United States, Saudi Arabia, and Israel spending a proportionately higher amount, and European and Asian countries spending less.

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Domestically, the year began with American military airlift playing a vital role in providing assistance to Haiti in the wake of the 7.0-magnitude earthquake that struck in early January. However, tremors of another kind began to be felt throughout the U.S. space industry in February with the Obama administration's radical shift in policy, favoring private spaceflight and walking almost completely away from government-sponsored manned space flight.

Cancellation of the Constellation Program of human space exploration vehicles was announced, killing the Ares-I, the crew launch vehicle designed to carry U.S. astronauts to low Earth orbit, and the Orion capsule that would ride atop it to the International Space Station (ISS), the moon, and perhaps even Mars. Obama's plan called for NASA to receive a \$6 billion increase over five years over its current budget, but the money would be used to help develop a commercial route to the ISS. With the looming retirement of America's space shuttle fleet, the shift would leave U.S. astronauts hitching rides on Russian Soyuz rockets until any commercial endeavor achieved success. Oddly, Obama also called for exploration of an asteroid by 2025.



A CH-47F Chinook, newest and most advanced helo of a long and venerable line that has become vital to supporting the fight in the difficult conditions and terrain of Afghanistan. Photo courtesy of The Boeing Company.

On May 14, the last flight of shuttle *Atlantis* launched for the ISS with a load of gear for the space station. Only two more missions, utilizing *Endeavor* and *Discovery*, remained before the 30-year program ends in 2011.

Reportedly, the announcement left most of the agency's senior managers at a loss for words. By May, the administration's space policy remained in debate, with some in Congress working toward softening the plan. Ex-astronauts, including Neil Armstrong, Eugene Cernan, and James Lovell, voiced strong opposition to the plan, and it looked likely that the policy might be overhauled with a revival of the canceled Constellation Program's Orion space capsule. Final approval of the Obama plan will probably not come before 2011.

A bumpy ride was unfolding for the aerospace defense industry as well with the February release of

the Pentagon budget request for 2011, and the 2010 Quadrennial Defense Review (QDR) and Ballistic Missile Defense Review (BMDR).

The \$708 billion budget request for 2011 represented a modest 1.8 percent increase from 2010 spending, with Secretary of Defense Robert M. Gates announcing that he planned to continue the "reforms" begun in 2010, switching resources from high-end/niche programs to dual-use efforts applicable to a range of operations. Priority was given to current conflicts, with emphasis on filling persistent shortfalls in capability that have harmed efforts, particularly in Afghanistan.

According to Gates, increased funding will be devoted to "intelligence, surveillance, and reconnaissance [ISR], including a 75 percent increase, over the next couple of years, in the number of combat air patrols by the most advanced UAVs, increasing the availability of helicopters by procuring more aircraft – around \$9 billion worth – of all kinds and adding two Army combat aviation brigades and growing special operations systems and personnel."

Meanwhile, the QDR places more focus on and investment in a new air-sea battle concept, long-range strike capabilities, space, and cyberspace. Rotary-wing assets were at the head of the queue to ensure success in counterinsurgency, stability, and counterterrorism operations. Sikorsky's UH-60M Black Hawk received \$1.25 billion to sustain funding for the production of 74 examples, while Boeing's CH-47F got \$1.2 billion for procurement and upgrade. The company's AH-64 received \$494 million for procurement, \$93 million for research and development, and an additional \$394 million for upgrades and modifications.

Notably, no funding was dedicated to new helicopter programs, including the Armed Aerial Scout (AAS) program that replaced the Armed Reconnaissance Helicopter (ARH) program terminated in 2008.

Contenders for AAS include AVX Aircraft's upgraded Bell OH-58D Kiowa, Sikorsky's high speed, coaxial-rotor X2 Technology Light Tactical Helicopter, and EADS North America/Lockheed Martin's AAS-72X, an armed derivative of their UH-72 Lakota. UH-72A Lakota production continues in 2010, with 45 of the light utility helicopters being built along with a number of mission equipment packages.

The lion's share of USN helicopter funding goes to the Bell-Boeing V-22, said to be performing well in

Afghanistan where Marine Corps Commandant Gen. James Conway indicated readiness rates for the aircraft reached the 70 to 80 percent range early in the year. Procurement of 35 Ospreys at a value of \$2.5 billion was announced. Generated by [www.PDFonFly.com](http://www.pdfonfly.com) at 1/31/2011 6:44:47 PM

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The AAS-72X is EADS North America/Lockheed Martin's offering for current and future armed aerial scout operations, under the Army's Armed Aerial Scout program. Photo courtesy of EADS North America

the budget, including a buy of five CV-22s for Air Force Special Operations Command. A CV-22 was lost in early April in southern Afghanistan. Three crew members and one civilian perished, while 16 more were injured. It was the first operational loss of an Osprey.



The Marine Corps' UH-1Y and AH-1Z upgrade/procurement programs continued to progress during the year. Imagery courtesy of Bell Helicopter Textron.

Other USN/USMC helicopter programs continued their procurement/upgrade cycle, including further buys of the MH-60R/S, UH-1Y, and AH-1Z. The only program that could be classified as slightly novel is the Marine Corps' CH-53K, a redesign of the service's CH-53Es with new engines and a 21st century cockpit. Still under development, CH-53K initial operational capability (IOC) has been delayed until 2015.

In February, the presidential helicopter competition formerly known as "V-XX," was re-launched, seeking 23 to 28 rotorcraft for the mission with a vague in-service date slated for sometime between 2017 and 2023. Competitors include a Lockheed Martin/Sikorsky pairing offering Sikorsky's H-92, Agusta Westland with its US-101 (formerly the VH-71, the winner of the competition last time around),

and Boeing, offering a version of its CH-47 and, believe it or not, also offering the V-22.

Perhaps the most tumultuous events of early 2010 surrounded the Joint Strike Fighter (JSF) program. Despite assurances as late as January from Air Force Chief of Staff Gen. Norton Schwartz that the USAF IOC for the F-35A in 2013 was "not likely" to slip, the JSF program was clearly in trouble.

Along with the release of the 2011 budget and the QDR in February, Gates announced the decision to stretch out the system design and development (SDD) phase for the F-35 by 13 months to November 2015 and restructure the F-35 Joint Strike Fighter office to provide increased oversight of a program he conceded had fallen behind in meeting key benchmarks. He replaced the government's JSF program executive officer (PEO) and withheld \$614 million of the award fee for the F-35 contract, the most expensive acquisition in U.S. military history, from the Lockheed Martin-led team. Marine Corps Maj. Gen. David Heinz, who had been in charge for almost one year, was relieved of his post.

A cascade of effects followed that initial fallout. The Air Force and Navy announced in March that IOC for their variants of JSF, the F-35A and F-35C, would slip until 2016, while the Marine Corps held fast to its late 2012 IOC for the F-35B. The Pentagon announced that 122 aircraft would be cut from the planned Air Force, Marine Corps, and Navy buys between FY 11 and FY 15 and low-rate initial production (LRIP) was shaved from 465 jets to 420.

The restructuring came in advance of a breach of the Congress' Nunn-McCurdy statute, which requires that the House be notified of a cost growth of more than 15 percent in a defense acquisition program. It also calls for cancellation of programs for which total cost grew by more than 25 percent over the original estimate. In mid-March, Ashton B. Carter, the Pentagon's under secretary for acquisition, technology, and logistics, told the Senate that the average per-unit cost of the F-35 jumped from \$50 million to \$95 million in fiscal year 2002 dollars, making cost in 2010 dollars an estimated \$112 million.



The F-35B airframe BF-01 made the first vertical landing in March 2010. Photo courtesy of Lockheed Martin.

By May, estimates put the JSF program at a cost overrun of 57 percent, and the debate about unit flyaway and sustainment costs between the Pentagon and Lockheed Martin had become so complex it was hard to follow.

International partners were standing by the program (though some were wavering) even as unit costs continued to be argued. Despite staunch opposition from the Pentagon and Gates, Congress approved continued funding for a second or "alternate" JSF powerplant. Development of the General Electric/Rolls-Royce F136 was about 70 percent complete as the House authorized \$485 million in funding in mid-May.

Meanwhile, test versions of the Marine Corps' F-35B finally began to arrive at NAS Patuxent River, Md. In January the second aircraft, BF-2, landed at Pax, followed by BF-3 and BF-4 as spring advanced. On March 18, BF-1 made the first-ever vertical landing for the F-35. To keep up with the restructured test and development program, Lockheed set a goal of 395 test sorties for 2010. By the end of April, 60 JSF flights had been made, indicating the rest of the year would be quite busy.

Implications of JSF program delays for the services were many, with both the USAF and USN acknowledging a "fighter gap" over the next decade. The Marines were most hard-pressed, struggling to extend the service life of their Hornets, Harriers, and Prowlers. Flight envelope restrictions and "high flight hour inspections" looked likely for Marine F/A-18C/Ds and AV-8Bs. USMC Prowlers will likely remain operational until at least 2010.



Australia received its first F/A-18F Super Hornet in March, and full IOC of 24 Super Hornets is expected by 2012. Photo courtesy of Australian Department of Defense.

The Air Force predicts it will be 185 fighters short of its need in 2024. That shortfall could increase, of course, if there are further JSF delays. For its part, the Pentagon seems to have accepted the gap and argues that it will not be as serious as forecast because the F-22 and F-35 are far more capable than the aircraft they are replacing. Nearly midway through 2010, plans still called for an Air Force acquisition of 1,763 F-35As to replace 2,228 legacy (F-15, F-16, A-10) fighters.

The Navy (to include the USMC) predicts a gap of 177 aircraft as legacy Hornets retire. The aforementioned mitigation planned by the Marines may help to some degree, but recognizing the problem, the USN planned to add to its previously planned buy of Super Hornets. In May, DoD certified the Navy's request for 124 F/A-18E/F and EA-18G aircraft between FY2010 and FY2013. The multiyear

procurement is intended to acquire the remaining "program of record" for 515 F/A-18E/F Super Hornets and 114 EA-18G Growlers.

On the other side of the world, the Royal Australian Air Force (RAAF) accepted its first F/A-18F on March 26. Full IOC for the service's 24 Super Hornets is expected by 2012 and the possibility remained that Australia could buy an additional 24 Super Hornets and convert 12 of the original fleet to EA-18Gs to cover any JSF delays.

Back home, Boeing continued work on as many as 233 wing-replacement sets for the A-10 as the \$1.6 billion Thunderbolt Lifecycle Program Support, expected to keep the Hog flying to 2028 or beyond, got under way.

Despite the JSF acquisition turmoil, the USAF's Air Combat Command stood up a "sixth generation fighter office" in the spring to identify requirements for "what's to come next." Around the world, other air forces were grappling with their own fighter acquisition and upgrade programs, including the nine partner nations that plan to buy the F-35. Their participation in the JSF program has a big impact on the shape of the modern fighter market, eating up a substantial portion of global demand for Western fighters. As a result, the ongoing fighter contests in India, Brazil, and Switzerland are of huge importance to other American and foreign fighter manufacturers.

India's Medium Multi-Role Combat Aircraft (MMRCA) competition dragged on through the first five months of the year, missing deadlines and forcing vendors including MiG Russian Aircraft Corporation (MiG-35), Dassault (Rafale), EADS (Eurofighter Typhoon), Saab (JAS-39NG), Lockheed Martin (F-16 Block 60+), and Boeing (F/A-18E/F) to rebid for the 126-aircraft acquisition contract. Flight trials of the competitors are still under way, meaning that a narrowing of the field and final selection will be delayed until 2011 at the earliest.



The first carrier variant F-35C also made its first flight during 2010. Photo courtesy of Lockheed Martin.

In March, India inducted its first four MiG-29K maritime fighters, set to operate from the deck of the ex-Russian aircraft carrier Admiral Gorskov (now INS Vikramaditya) slated for Indian service in 2013 if no further delays arise. A total of 45 MiG-29Ks are on order.

The Brazilian F-X2 fighter competition remained undecided. Three aircraft, including the Rafale, Gripen, and F/A-18E/F, remain under consideration. The Rafale looked like a winner last fall but reports in early 2010 suggested the Gripen had won favor with the Brazilian air force. Politics, in the form of general elections in October, threatened to postpone any decision until 2011.

The Swiss program to partially replace 54 F-5s appeared bogged down as well. The Eurofighter Typhoon, Saab Gripen, and Dassault Rafale are under consideration, but any choice will likely be delayed until some time after Switzerland's latest strategic defense review is complete, perhaps by fall.



In Russia, Sukhoi's fifth-generation T-50 (PAK-FA) prototype made its first flight on January 29. By May it had flown a further six times, with a second prototype scheduled to enter testing by the end of the year. An IOC of 2015 looks optimistic. The Yak-130 "Mitten," the first new Russian fixed-wing jet trainer in five decades, began deliveries to the air force in February, with plans for at least 72 examples in service. More broadly, Russia's current armament program calls for the delivery of more than 1,000 aircraft and helicopters, and nearly 200 air defense

Saab's Gripen NG was one of the contenders in the competition for Brazil's F-X2 fighter competition and India's MMRCA program. Photo courtesy of Gripen International.

aircraft and helicopters and nearly 200 air defense systems through 2020. Longer range planning included work on a conceptual design of a next-generation bomber (PAK-DA).

America's next-generation bomber program, meanwhile, has changed significantly, with officials now desiring a platform that would be as much about intelligence gathering as bombing, featuring

weapons that might include directed energy and network attack capabilities. The 2011 budget requested \$1.7 billion for the future bomber, casting it as a multi-role platform able to handle a spectrum of contingencies, from irregular warfare to conventional conflict.

Other large-aircraft programs were in flux. The soap opera-like KC-X competition saw Northrop Grumman announcing it would not bid for the \$35 billion aerial refueling tanker contract, citing source selection methodology favoring Boeing's smaller 767-based tanker rather than the EADS KC-30 (A330-based) tanker. By April, EADS was back in the competition, leading its own bid.

Boeing's C-17 production line remained open, mostly on the strength of foreign orders from the UAE and Britain, and looked as if it could benefit from troubles overtaking the Airbus A400M tactical transport program. The A400M finally flew just before the new year. Partners France, Germany, Belgium, Spain, Turkey, and the U.K. remained notionally committed to a buy of 180 A400Ms, but with program costs spiraling, Airbus asked partner governments to agree to a 25 percent increase in the price of the program. By February, the countries had agreed to a new financing scheme, but the U.K. announced it would cut its purchase from 25 to 22 aircraft.



Flight testing of Sukhoi's T-50 PAK FA aroused interest from nations such as India and alarm among many Western military analysts and milbloggers. Photo courtesy of Sukhoi.

Other program and operational cuts were expected in Britain, where it was thought at least one squadron of Harriers and a Tornado GR4 unit would be decommissioned over the next year or two.

Wrangling over the RAF's buy of Tranche-2/3

Eurofighters continued, complicated by Saudi Arabia's deliberations on delaying delivery of a portion of its 72-Typhoon purchase from the U.K. and the possibility of a deal between the U.K. and Oman for 12 Tranche 2 Typhoons. Saudi Arabia's Typhoons would also come from Tranche 2 production for the RAF.

A critical shortfall in British heavy-lift helicopter assets made it likely the government would order up to 22 additional CH-47Fs toward an eventual fleet of 70. Electronic intelligence capability was bolstered in the spring as the U.K. confirmed it would acquire three RC-135V/W Joint Rivet aircraft to replace the RAF's aged pair of Nimrod R1s.

The RAF was also concerned with a gap in cargo capability as the result of A400M delays and the rapid depletion of its C-130 fleet's service life due to operations in Afghanistan. Meanwhile, Lockheed Martin planned to increase C-130J production to 27 aircraft this year from 16 in 2009 on the strength of export sales and an effort by the Air Force to buy 16 AC-130J gunships. The company continued LRIP of 15 additional C-5Ms under the USAF's C-5 Reliability Enhancement and Re-engining Program (RERP). A total of 52 RERP kits are to be purchased through 2016.



The first P-8A Poseidon test aircraft arrives at Naval Air Station Patuxent River, Md., on April 10, 2010. U.S. Navy photo.

The U.S. Navy's P-8A Poseidon multirole maritime aircraft made progress, with the delivery of the first example to NAS Patuxent River in April for operational test and evaluation. A second aircraft arrived in May and an export order from India was confirmed for eight P-8Is for the Indian navy. An Indian-built data link system was delivered to Boeing in May for installation on the aircraft. More expansive Indian collaboration on a joint venture to co-develop a multirole transport aircraft (MTA) with Russia got under way as 2010 began, partnering Hindustan Aeronautics with Rosoboronexport/United Aircraft Corp. Intended to replace the Russian air force's aging fleet of An-12s, the Russians promised to purchase up to 100 MTAs. The Indians would purchase up to 45.

Indian neighbor Pakistan formally inducted the lightweight, multirole JF-17 fighter it co-developed with China to replace its aging fleet of Nanchang A-5, Chengdu F-7P/PG and Dassault Mirage III/V fighters, standing up its first operational squadron in February. Pakistan was also said to be planning a buy of up to 36 Chinese-built Chengdu J-10B advanced multirole fighters designated FC-20.

The prospect of fighter sales in Japan drew interest as the country reassessed its depleted fighter industry

early in the year. Boeing and the Eurofighter consortium, aware of the potential problem for the Japanese in fighter engineering, were offering Tokyo as much flexibility as possible in assigning development work on their aircraft to Japanese aerospace companies. Boeing is offering two options, its F-15SE Silent Eagle (a semi-stealthy version of the F-15) and the Super Hornet.

The Silent Eagle was also a leading candidate in South Korea's "next-fighter" program, with a buy of 20 or more fighters up for grabs. Early in the year, the country proposed two Korean aircraft programs, the K-FX fighter and KAH attack helicopter, with the aim of expanding its defense industry. The KAH looked more likely to come to fruition.



Pakistan was said to be considering a purchase of up to 36 advanced Chinese J-10B multirole fighters for its air force. Photo by Retxham.

Unmanned aircraft got a bump in the 2011 defense budget. The Navy requested \$26 million to pursue a marinized medium-endurance UAS and complete demonstration of an aircraft carrier-capable UCAS by 2018. Northrop Grumman's X-47B unmanned combat air vehicle conducted ground tests during the spring intended to demonstrate carrier suitability.

A follow-on armed demonstrator could lead to a possible replacement for the F/A-18E/F.

The Pentagon also requested 15 additional Air Force MQ-9 Reaper combat air patrols, up from the current target of 50 even as the service recognized that it must trim the number of people needed to operate the vehicles in the face of shortages of qualified UAV operators. On another track, the U.S. Army canceled its requirement for the Northrop Grumman Fire Scout, leaving the USN as the sole customer for the MQ-8B.

Funding for the Space-Based Space Surveillance (SBSS) system's procurement is ongoing. The first SBSS satellite, a Ball Aerospace/Boeing project able to keep tabs on satellites in geosynchronous orbit, is complete and slated for launch this summer. Similarly, the Space-Based Infrared System (SBIRS) is performing well, according to the Air Force.

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