



P-3 Orion: in operational service for 50 years

Second life on brandnew wings

By Marco P.J. Borst

Fifty years ago, on 13 August 1962, the Lockheed P3V-1 Orion was taken in use for operational service by US Navy Patrol Squadron Eight (VP-8). While the US Navy is preparing for the operational introduction of the Orion's successor, other P-3 operators are investing in life extension programs for their existing or new P-3 fleets. They are to continue the success story of the Mighty Orion.

Since its introduction in 1962, the P-3 Orion mission systems suite has constantly been improved. Today, the USN's P-3C AIP+ with the latest additions such as C4ASW which incorporates the International Marine / Maritime Satellite (INMARSAT) and Link 16 Line of Sight and Over the Horizon, features state-of-the-art mission equipment. The operational capabilities of today's P-3 are more or less equal to those of its replacement in the US Navy, the Boeing P-8A Poseidon.

Kiwi pioneers

The P-3 Orion's limitations were in the aircraft's structure components like its wings and horizontal stabilizers, which were affected by fatigue stress and corrosion after 20-25 years of intensive use. These potential problems had already been recognized by the Royal New Zealand Air Force in the nineties. Intensively flying a fleet of 1966 built P-3 Orions, the RNZAF launched a fatigue analysis program in 1993. The results of this program were remarkable: where USN P-3s were retired at a fatigue life index between 60 and 80 on a scale of 100, the New Zealand Orions were found to be at a fatigue life index of 135 already! Since New Zealand did not have the funds to replace its fleet of six P-3K Orions with new aircraft, other options were investigated. This led to a service life extension program, known as "Project Kestrel", which started in 1997 when aircraft NZ4204 arrived at the Celsius Hawker Pacific facility at Richmond,

The Republic of China Navy (RoCN) is to receive its first P-3C Orions in 2013. Their first aircraft, here seen with temporary USN markings, successfully completed its first test flight in late July 2012. It's the first time a new operator is receiving refurbished secondhand Orions with new wings.

(photo: Colin Clark)

P-3 Wing production at Lockheed's Burbank facility in 1967. The same tooling is now being used to build new outer wings in Marietta.

(photo: Lockheed Martin)



Australia. Under "Kestrel" the outer wings, horizontal stabilizer and center wing lower panels were replaced. Furthermore, the engine nacelles were refurbished, new electrical wiring in the wings was installed and a fuel dump capability was added. The new outer wings were built by Daewoo Heavy Industries in Changwon, South Korea, the company that was initially contracted to manufacture the wings for eight P-3C Orions built for the Korean navy. Daewoo, under contract by Lockheed Martin, made use of the original wing production tooling which was used at Lockheed's Burbank facility until 1977, when tools were moved to Canadair in Canada where the production of P-3 wings started in 1978. Canadair continued to manufacture P-3 wings until 1990. On 10 October 1998 the first "Kestrel" aircraft successfully completed test flying and it was soon returned in operational service. The project was completed in 2001 and added another 25 years to the P-3K Orion's technical life time.

New P-3 wing production

Without realizing it, the RNZAF was

The pioneer for a Lockheed Martin program which started in February 2007, ten years after the start of Project Kestrel. Before that, in December 2001, Lockheed Martin and Vought Aircraft Industries teamed up with plans for the production of new P-3 outer wings in Dallas (TX). Assembly and detail tooling was relocated from Changwon, Korea to Dallas but despite the success story of replacing the wings of P-3K Orions in New Zealand, Vought did not build any P-3 wings. But Lockheed Martin did not give up its plans. All wing tooling was refurbished by Pioneer in Texas under a contract from Lockheed Martin. The outer wing production plan was put before a Lockheed Martin Strategic Sourcing Board which then decided to in-source the wing production to Marietta, GA. The tools were relocated again, this time to Marietta. All tools were completely refurbished, modernized and re-mastered upon setup and where economically feasible, new tools were made to take advantage of modern manufacturing practices. In addition modern production technologies and lessons learned were used from F-22 and C-

130J production programs. The assembly line flow was re-configured based on lean enterprise principles. In November 2005, after extensive research during its Structural Life Assessment Program (SLAP), the company announced that it would open a P-3 wing production line at its Marietta (GA) facility. Fifteen months later, in February 2007, Lockheed Martin announced the launching customer for new P-3 wings: the government of Norway signed a contract to buy new wings for the six Royal Norwegian Air Force P-3C and P-3N Orions. It lasted until April 2008 before a second customer, the US Customs and Border Protection, contracted with Lockheed Martin ordering six all-new production wing kits. To date, CBP has placed firm orders for 14 life extension kits. A total of 73 wing sets have been ordered by five P-3 operators: Norway, US Customs and Border Protection, US Navy, Canada and Taiwan. The latter is about to introduce the P-3C Orion as a replacement for the Republic of China Navy's S-2T Trackers. Their first of twelve secondhand Orions recently left the Lockheed Martin Greenville facility after a complete modernization

which included re-winging. Where, in New Zealand's "Kestrel" program, the standard P-3C wings were used to re-wing a fleet of P-3B airframes, the wings built for the current programs are redesigned which resulted in improved corrosion resistance and fatigue life enhancements. The old problems won't come back within the same time frame, so the life extension might easily be for a longer period than the 20-25 years Lockheed Martin is advertising with.

P-3: the affordable alternative

Defence budgets in many countries are under pressure and we have already seen some countries cutting off their entire MPA capabilities. The Netherlands and the United Kingdom do not operate any Maritime Patrol Aircraft anymore. For The Netherlands this was a final decision: the Royal Netherlands Navy will never operate any manned MPA's anymore. The UK still seems to be looking for replacements for their Nimrods, but a tight budget prevents the British government from buying new MPA's. Re-winged and upgraded P-3 Orions from desert storage might be an affordable solution for the Royal Air

Lockheed Martin is manufacturing brandnew P-3 replacement wings at its Marietta GA facility, using both the original tooling and new technologies. Installation of the new wings is being done by Lockheed Martin in Greenville SC, IMP Aerospace in Halifax (Canada) and the USN's FRCS at NAS Jacksonville.

(photo: Lockheed Martin)



Force. And other existing P-3 operators, like Greece, Portugal, Spain, Germany and even Australia (which now is showing interest in the P-8A) might be looking at buying new wings for their existing Orion fleets since their national defence budgets will most likely never bring the purchase of Boeing P-8A Poseidons within reach. Not alone the purchase of a fleet of P-8's is highly expensive, additional costs of flight and maintenance crew training, tooling, ground equipment and to improve infrastructure of airfields cannot compare to the costs of continued operation with an existing fleet of P-3 Orions fitted with new wings and new mission suites..

More improvements
 Additional existing programs, like fitting glass cockpits, as well as new programs under development can further rejuvenate the old lady and make her ready for a few more decades of patrolling both over seas and over land. Lockheed Martin is currently working on the introduction of winglets and engine modifications for lower fuel consumption, increased electrical power generation and bomb bay mounted supplemental cooling systems for mission systems avionics. Even after 50 years of successful operation, the Lockheed Martin P-3 Orion still is the world's maritime patrol workhorse and will continue to work on the frontlines for decades to come

One of Norway's P-3N Orions is receiving its new wings at IMP Aerospace in Halifax, Canada. The airframe is over 40 years old, the new wings add another 20 years life time
 (photo: IMP)



Customer	wing sets ordered	wing sets delivered
Norway	6	4
Canada	10	6
US Customs	14	7
US Navy	31	18
Taiwan	12	7
total	73	42
As of August 2012		

