

## THE F/A-18 F404 ENGINE: GETTING LEAN (B)

In June 2003, Captain C. J. Jaynes sat in her new office at Naval Air Systems Command (NAVAIR) in Patuxent River, Maryland. The last few months had been hectic: She had received a promotion, transferred across the country, and assumed her new role at NAVAIR as the F/A-18 assistant program manager for logistics in PMA 265. She had just completed a tour as Officer-in-Charge of Aircraft Intermediate Maintenance Activity, Naval Air Station Lemoore, California (AIMD Lemoore). Her 816-person facility at NAVAIR was responsible for performing intermediate-level maintenance on F/A-18 components, systems, engines, hydraulics, and life-support equipment. Jaynes had been very successful in implementing Lean manufacturing concepts at AIMD Lemoore, particularly with the maintenance processes for the F404 engine on the F/A-18 Hornet. Her efforts had produced the standard by which production across all AIMDs was measured and had played an important role in determining her follow-on assignment to NAVAIR. Now she wondered if she could apply the lessons she had learned at AIMD Lemoore to the F/A-18 program—and potentially across the larger NAVAIR Enterprise.

### NAVAIR

NAVAIR included military members and civilian employees stationed at eight principal continental U.S. sites and two principal sites overseas (**Exhibit 1**). The Weapons division was split between China Lake and Point Mugu, California. The NAVAIR Aircraft division had sites at Patuxent River, Maryland; Lakehurst, New Jersey; and Orlando, Florida, and depots located at North Island, California; Jacksonville, Florida; and Cherry Point, North Carolina. Under the current structure, there were nine Intermediate Maintenance Activity (IMA) sites:

- Naval Air Facility (NAF): Atsugi, Japan
- Naval Air Station (NAS): Patuxent River, Maryland
- NAS Joint Reserve Base (JRB): Fort Worth, Texas
- Marine Corps Air Station (MCAS): Iwakuni, Japan

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- MCAS: Beaufort, South Carolina
- MCAS: Miramar, California
- NAS: Lemoore, California
- NAS: Oceana, Virginia
- Naval Air Depot (NADEP): Jacksonville, Florida

With an estimated 32,000 military and civilian employees, NAVAIR managed approximately 150 acquisition programs and maintained more than 4,100 aircraft in active inventory, including 96 individual type/model/series (T/M/S). Principal customers included the operating forces of the U.S. Navy and Marine Corps, joint programs of the U.S. Department of Defense, other activities of the U.S. Armed Forces, and foreign allies.

NAVAIR's objective was to deliver superior weapon systems, in order to contribute to the success of the U.S. Navy and Marine Corps. Its products and services included fixed- and rotary-wing aircraft, avionics, air and surface-launched weapons, electronic warfare systems, cruise missiles, unmanned aerial vehicles, launch and arresting gear, and training systems. NAVAIR's vision and goals are provided in **Exhibit 2**.

NAVAIR was made up of organizations that worked as an integrated team: Naval Inventory Control Point (NAVICP); Program Executive Office, Air Anti-Submarine Warfare, Assault and Special Mission Programs (PEO(A)); Program Executive Office, Tactical Aircraft Programs (PEO-T); Program Executive Office, Strike Weapons and Unmanned Aviation (PEO(W)); and Program Executive Office, Joint Strike Fighter (PEO(JSF)). The NAVAIR organization was committed to providing total life-cycle support: research, design, development, and engineering; acquisition; test and evaluation; repair and modification; and in-service engineering and logistics support.

## **PMA-265**

A multiplatform program office within PEO-T, PMA-265 acquired, delivered, and sustained the F/A-18 Hornet weapons system. The F/A-18 had evolved to three variants: A/B, C/D, and E/F. The A, C, and E models were single-seat aircraft, and the B, D, and F models were two-seat aircraft. The A/B and C/D models were currently in service with the U.S. Navy and the Marine Corps. Seven international allies had also procured the F/A-18. The E/F models were currently in the last year of engineering and manufacturing development. The development of the flight-test program began in January of 1996. A limited-production milestone decision was achieved in March 1997 for the first 12 aircraft.

PMA-265 customers were represented by the Hornet Executive Steering Committee (HESC) and by those foreign countries procuring F/A-18s. The HESC membership represented the entire Navy Enterprise, including the Fleet Commanders, Type Commanders, Strike Wings,

Marine Air Groups, and the CNO's staff. This executive forum was supplemented with fleet visits, postcruise debriefs, and an expanding electronic network that included more and more fleet connections. Electronic links were also established with the foreign military sales customers.

As the assistant program manager for logistics, Jaynes was responsible for logistics for 1,300 fielded F/A-18 A through F aircraft and the development of the EA-18G. She led a team of 42 military and civilian logisticians that worked with all the various products on the aircraft. The team was responsible for production and putting the aircraft in service, as well as attending to all the sustainment issues the fleet was experiencing with aircraft that were no longer in production (F/A-18 A thru D).

### **Building on the Success at AIMD Lemoore**

As the Officer-in-Charge at AIMD Lemoore, Jaynes's only financial responsibility was a \$385,000 per day repair-parts budget. Operationally, she was held accountable for F404 engine Turn-Around-Time (TAT) and Time-On-Wing (TOW). TAT was measured from the time the engine was inducted into the maintenance cycle until it was repaired and placed on the warehouse shelf in the supply system or returned to the squadron for installation back on the airplane. TOW was measured from the time the engine was installed back on the airplane until it was removed again for maintenance. AIMD Lemoore's Lean efforts on the F404 engine significantly reduced TAT, improved TOW, and reduced the number of personnel budgeted to perform the maintenance. In addition to the overall improvement to aircraft squadron readiness, AIMD Lemoore experienced improved morale and retention of its military personnel. By all operational measures, Jaynes and her team at AIMD Lemoore could consider their efforts highly successful (**Exhibit 3**).

Since arriving at NAVAIR, Jaynes had seen several presentations on NAVAIR's move to an Enterprise approach. More and more, NAVAIR and the U.S. Navy were focused on engaging leadership in the following objectives:

- Understand the true cost of their organizations/activities.
- Achieve continual improvement in the effectiveness and efficiency of business operations.
- Articulate risk.
- Deliver effectiveness/efficiency back to corporate Navy.

As Jaynes thought about these Enterprise ideas, it occurred to her that her experience at AIMD Lemoore could have an even broader impact. What would happen if the changes she had implemented at Lemoore were applied throughout the AIMD system? The financial impact at Lemoore had been dramatic (**Exhibit 4**), and the potential for the larger Enterprise approach appeared to be significant. She looked up the details on the nine AIMDs and was startled at the