Name of Program: K-MAX Cargo Unmanned Aerial System (UAS)

Name of Program Leader: Mr. Kevin Petrosky
Phone Number: Office: 607-751-5875, Cell: 607-759-5903
Email: kevin.petrosky@lmco.com
Postage Address: 1801 State Route 17C, Owego, NY 13827

Name of Customer Representative: Mr. Eric Pratson
Phone Number: Office: 301-863-0191, ex 324, Cell: 240-561-8007
Email: eric.pratson@navy.mil

Bio for program leader:

- Kevin Petrosky is a Lockheed Martin Qualified Program Management Manager with over twenty-eight years of program management experience. He has additional experience in Product Manufacturing and Control and Human Resource Management.
- Kevin has been K-MAX Cargo Resupply UAS (CRUAS) Program Manager since 2009. He is accountable for the $58 million program, and is dedicated to ensuring its seamless cost, schedule and technical execution. Kevin stays closely aligned with our strategic partner, Kaman Aerospace and manages all subcontracted efforts as well. K-MAX CRUAS is currently deployed to Afghanistan providing historic autonomous cargo resupply to the USMC.
- Kevin is also the Integrated Product Team Lead for the LM K-MAX business area, and has oversight of the US Army Autonomous Technology for Unmanned Aerial Systems (ATUAS) program. He is helming efforts to introduce the U.S. Army to the benefits of unmanned cargo resupply. The LM ATUAS program manager and engineering program manager have sought Petrosky’s guidance in developing and maturing reliable new technologies for the service.
- Prior to award of the K-MAX CUAS program in late 2010, Kevin managed all efforts associated with the development of the initial unmanned K-MAX capability. He was accountable for managing LM internal investment to prepare for a January 2010 unmanned K-MAX demonstration at the Dugway Proving Grounds in Dugway, UT. His responsible management of the portfolio resulted in a 10-month development that remained on-schedule and within budget all the way through the successful flight demonstration.
- Kevin is a natural leader, committed first and always to his team and the government customer his team serves. He is innovative and forward-thinking, constantly pursuing ways to make his programs more efficient and inspiring his team to do the same. He manages by inclusion, creating a cohesive, inclusive environment. Kevin is genuinely passionate about K-MAX and the mission to which he holds himself accountable: saving lives in-theater.
Value Creation - “USMC units operating in Afghanistan’s distributed Counter Insurgency Operations (COIN) environment require an organic, precision, unmanned, aerial resupply capability in order to minimize loss of personnel, equipment and supplies on ground resupply missions and to provide an alternate means of aerial delivery when weather, terrain or enemy poses an unsuitable risk to rotary wing (RW) assets.” Statement from JUONS CC0375 Validated 11 Jan 2010.

December 17, 2011 – On the 108th anniversary of the Wright Brothers’ first flight at Kitty Hawk, the government’s PMA-266 program office conducted a historic resupply mission in Afghanistan. The K-MAX Cargo Resupply Unmanned Aerial System (CRUAS), a Lockheed Martin-KAMAN creation, was in-theater less than one year after contract award, satisfying the needs stated in the Joint Urgent Operational Need Statement, (JUONS) CC-0375. In its first three months of operation, K-MAX demonstrated a capability, dramatically reducing the need for USMC personnel to travel in harm’s way – by thousands of hours. K-MAX has enabled the Marines to create an overhead supply route using an aircraft that can easily navigate Afghanistan’s high and hot operating environment and do it all autonomously.

The overall program began in January 2009 when the Marine Corps Warfighting Laboratory (MCWL) conducted a competition to for a Vertical Take Off and Landing (VTOL) vehicle that had the capability to carry resupply cargo to forward operating bases. LM successfully demonstrated the ability of the unmanned K-MAX to conduct resupply. Unmanned K-MAX was a company-funded development effort that provided significant value and savings to the Government. NAVAIR assumed program leadership in 2010, and was responsible for contracting and deploying the CRUAS capability to Operation Enduring Freedom (OEF). LM and NAVAIR began requirements discussions in early 2010, working together to satisfy the requirements of the JUONS while also refining the program to make it executable within a short time period. LM was awarded one of two competitive firm fixed price contracts on December 2, 2010. Realizing the critical need and value this game changing technology would bring the Marines, LM executed the K-MAX CRUAS program as proposed, on schedule and within cost, leading to the deployment of this first-ever unmanned Vertical Lift Cargo UAS capability into an active war zone.

Using an optionally piloted vehicle during the development test phases of both the Dugway Demo and the CRUAS testing phases added significant value and speed to the program, which provided significant cost savings to all stakeholders. The use of a safety pilot significantly reduced the risk of losing a multi-million dollar test asset, untold schedule delays, and cost increases to the program, as well as further delay in removing the US Marine from harm’s way.
Organizational Processes – The unmanned K-MAX Dugway demonstration and USMC K-MAX CRUAS programs required aggressive and unforgiving schedules that demanded flawless execution.

From the outset, the K-MAX program was organized to foster a work environment where team members were always aware of the importance of their work and how crucial their contributions were to the program. The government-industry team worked in synchronicity to make effective decisions because they identified each other as valued stakeholders with common goals.

Execution of the unmanned K-MAX began in January 2009, when LM Mission Systems & Sensors green-lighted significant resources to demonstrate the unmanned resupply capability being envisioned by MCWL and the NAVAIR community. The LM investment program was structured and managed just like a contract performance program, but with tailored processes using the already proven and uniquely capable K-MAX cargo carrying platform. The primary requirement was to staff the program with the right team. The staffing assessment was centered on developing a small, yet agile and experienced team. This team implemented tailored System Engineering and Program Management processes, controlling the program but not over-managing the individual elements. The program Integrated Master Schedule, (IMS) and resources funding profile were updated monthly to avoid even a slight schedule divergence. Program financial data was reviewed weekly, focusing on reviewing individual charging and open commitments for procured assets. Total focus on the IMS and staffing head count allowed the program to excel at achieving its schedule and managing head count allowed the program to achieve its financial budgets. The program business rhythm consolidated the typical program meetings into a twice-monthly program review that included the business area vice president. This process allowed for real-time communication with Executive management, removing the need for numerous other meetings.

The K-MAX CRUAS program was awarded in December 2010. This program was also organized with an agile team, which retained some of the members from the demonstration effort. In addition, the investment program processes were leveraged and modified only slightly to add additional rigor for a full-up fixed price contract. LM organizational responsibility was directly aligned to NAVAIR subject matter experts with full lines of authority allowed between the functional disciplines, enhancing the team’s agility. The business rhythm included weekly meetings with LM, NAVAIR, the local DCMA representatives and LM’s partner Kaman Aerospace, ensuring timely, open communications. This rhythm enabled the program to remain on track and facilitated LM to “do what it said it was going to do”, a program attribute so important to the NAVAIR customer. The program not only met the critical deployment timeline twelve months after award but is also performing in Afghanistan as promised, and in many cases surpassing requirements. In-theater performance was achieved by organizing and staffing the deployment team with highly qualified individuals previously deployed to the Middle East or highly experienced in maintaining K-MAX aircraft and ground control station equipment.
Adapting to Complexity – The team worked to identify challenges early, this is key to successful program execution. The K-MAX CRUAS program demanded a proactive approach, management of technical expectations and obtaining a NAVAIR Flight Clearance on a very aggressive timeline.

After the initial resupply capability was developed (prior to the demonstration flight at Dugway), the priority shifted to refining capabilities and addressing specific government requirements. Program tasks included incorporating a redundant control system, preparing two aircraft for sale to the Government, obtaining a NAVAIR Category III Interim Flight Clearance (IFC) and preparing for deployment. The team worked diligently to prevent the dreaded “requirements creep” while maintaining a steady push to achieve the mission within ten months. We also were responsible for generating and supplying reliable technical data to NAVAIR for flight clearance and training contractor and USMC personnel. Addressing each of these key areas required innovative management skills.

The strong, trusting relationship that already existed between LM and NAVAIR was instrumental in moving the project forward at a rapid pace without compromising quality. Both LM and NAVAIR made an uncompromising commitment to streamlining requirements and managing expectations. The goal for everyone involved was always at the heart of the daily program execution: deploy an unmanned VTOL resupply system on schedule in order to save lives.

Proactive management of the NAVAIR IFC began prior to contract award with the development and negotiation of the Engineering Data Requirements Agreement Plan (EDRAP). This document meticulously delineated the requirements plan to provide data to obtain the NAVAIR category III IFC. This agreed EDRAP document was included as a contractual attachment, solidifying the approach to obtain the IFC. Flawless execution of the EDRAP process ensured timely execution of the plan yielding an IFC a mere eight months after award.

Training of the deployment team was complex. The system was still being developed while we were training for deployment. LM was able to leverage the basic materials and experienced operators used during the investment program as a basis for operating, maintaining and training. Experienced operators were used at first to run flight tests, but were soon joined by the new cadre of operators, maintainers and USMC. The bulk of this effort was completed on site at the Government test facilities in Yuma, AZ, concurrent with the required development testing. This process was streamlined by providing a basic simulator training capability developed at LM’S expense, which proved to be extremely beneficial in training new operators. The LM Simulator was located at Yuma for the duration of the flight test, training and Quick Reaction Assessment, (QRA) phases of the program.
Program Metrics – Metrics matter. Metrics that are properly established and base-lined not only tell you where you have been, they provide the program a means to communicate status with all stakeholders and provide forecasts about where the program is headed.

Both the LM program manager and his counterpart at NAVAIR knew the importance of metrics collection and reporting and how it would affect the K-MAX CRUAS programs execution. The LM program manager solicited the help of the LM MS2 Program Startup Assist Team to get the program base-lined and off to a solid start. This included development of program metrics that were negotiated and agreed with the customer immediately after contract award. These metrics were broken into two categories, Program Management and Systems Engineering. Program Management Metrics included Cost, Schedule, Risk/Opportunity management and Supplier status. Specific metrics included CPI/SPI, Critical Staffing, IMS Critical Path, IMS Float, Schedule Risk Analysis, DCMA 14 Point Metrics, On-time CDRL Delivery, Risk/Opportunity Status, Major Sub-Contractor Status and On-time parts delivery. Systems Engineering Metrics included: Drawing Completions, Software SLOC, Problem Trouble Reports, (PTR’s), Requirements Burn-down, Flight Clearance Data Delivered and Approved; Functional Test Element status, Flight Hours and status of Technical Manuals and Training Material. Metrics were presented at all major reviews and provided to NAVAIR monthly or as requested.

While all metrics are important, some are more critical than others during program execution. The following summarize those metrics that allowed the K-MAX CRUAS program to execute flawlessly and deploy a critical capability just twelve months after receipt of order:

- Even though the CUAS program was a fixed priced competitively won contract, LM chose to provide NAVAIR with our monthly cost position (CPI/SPI and Management Reserve) thereby further building and maturing our customer’s trust and confidence in the program.
- Management of the program to the base-lined schedule was paramount to the success of the program. The schedule was developed with inputs from all stakeholders. It was the team’s schedule. Monthly schedule mitigation meetings were significant in allowing the program to achieve success. No program will attain every single task in the IMS on schedule. The art is to be able to mitigate divergence to the plan in order to attain overall program success. Program schedule float was divided amongst the major milestones and not lumped at the final milestone, thereby ensuring the program stayed on track though the entire period.
- We integrated all risk management mitigation steps into the program IMS, thereby driving the mitigations to closure per plan and allowing the program to meet the 12 month schedule.
- Each month a Schedule Risk Analysis was completed on the statused schedule, predicting the programs schedule completion.
- The PTR and FTE databases drove key technical aspects of the program. Reviewed weekly, these metrics were paramount in driving individual issues, regardless of type (e.g. software, hardware) to closure. Divergence from the plan dictated corrective actions or mitigations to achieve plan.
- Supplier status ensured both major subcontractors and material suppliers met the requirements and stayed on schedule.