

FLEET READINESS CENTER EAST



*Unsurpassed Service to the Fleet and Relentless Focus on
Quality, Environment, and Occupational Health and Safety*

Robert T. Mason Award For Depot Maintenance Excellence

March 3, 2008



*Colonel David A. Smith, Commanding Officer
Colonel L. S. Loch, Executive Officer*

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INFORMATION SHEET

1. Service: United States Navy
2. Specific Unit Designation: Fleet Readiness Center East
3. Identification of nominated program: Fleet Readiness Center East's H-1 Aircraft Production Program
4. Depot Facility Commander's name and nominee's mailing address: Colonel David A. Smith, Fleet Readiness Center East, PSC Box 8021, Cherry Point, NC 28533-8021
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6. Complete message address (SSIC) of the nominated program, the depot facility, and the responsible headquarters:

NAVAIRDEPOT CHERRY PT NC (6.0D, 6.0DB, 6.1, 6.2, 6.2.1)
COMNAVAIRSYS COM PATUXENT RIVER MD (AIR-00, AIR-6.0, AIR-6.0D/N00)

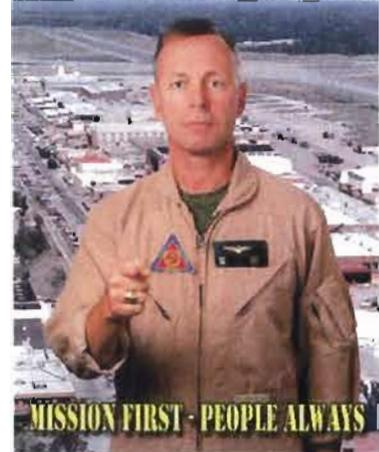
7. Background information for nomination program:

Program size: Total 134: Government civilians 82, Contractors 28, Military 4, and other 20

8. Mission statement for program: "Unsurpassed Service to the Fleet, Relentless Focus on Quality, Environment, and Occupational Health and Safety." The H-1 Aircraft Production Program provides extraordinary aviation logistics in support of its many and varied warfighters/customers around the world.

MISSION ACCOMPLISHMENTS

Fleet Readiness Center East (FRC East) Cherry Point, North Carolina, provides extensive maintenance and logistics support to Navy and Marine Corps aviation, as well as other armed services, federal agencies, and foreign governments. Beginning in 1943 as the Assembly and Repair Department, FRC East has grown to become eastern North Carolina's largest industrial employer and now employs approximately 3,800 civilian, military, and contractor personnel. Our employees take a great deal of pride in their work, and this professional spirit is evident in the high quality products for which FRC East has become well known. As one of the largest and most productive organic depot maintenance facilities in the Department of Defense (DoD), FRC East is crucial to the Global War on Terrorism (GWOT).



Within FRC East are a number of aircraft, engine, and component production lines that provide maintenance, repair, and overhaul (MRO) services to the fleet. **During Fiscal Year (FY) 2007, no program has been more vital to the success of the GWOT mission than FRC East's H-1 aircraft production program.** They have met and continue to exceed the warfighter's requirements in every measurable category. Through the implementation of Continuous Process Improvement (CPI) initiatives and a highly motivated workforce, the H-1 aircraft production program has become a world-class MRO activity recognized throughout DoD and private industry as the benchmark for organic depot maintenance operations.

The AH-1 is the world's first true helicopter gunship. The Marine Corps quickly realized the Cobra's combat potential and deliveries of the twin-engine AH-1J began in 1968. The AH-1 has



provided close air support and armed reconnaissance in theaters of conflict around the world. The AH-1W Cobra has been in service since 1986 and is being replaced by the AH-1Z. The AH-1W will remain in service until the upgrade program is fully outfitted with the new AH-1Zs.

The first Navy/Marine Corps H-1, the UH-1E, was introduced in 1964. Deliveries of the current version, the UH-1N, began in 1971. The UH-1N Iroquois, more commonly called the Huey, is used by the Marine Corps to provide all-weather, day-or-night airborne command, control, and coordination for assault support operations. FRC East H-

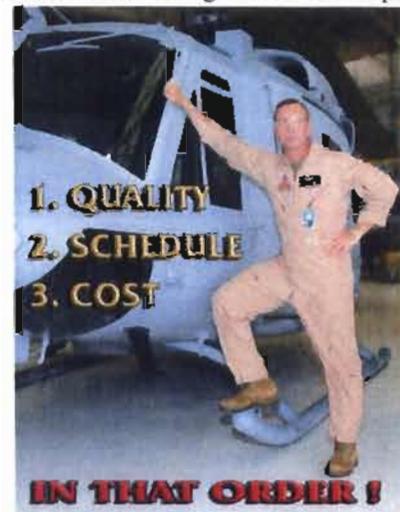


1 aircraft production program also reworks the HH-1N, Search and Rescue version of the Huey for the Marine Corps. The UH-

1N is scheduled to remain in the fleet until 2014 when the last UH-1Y is delivered.



As with all programs in FRC East, the H-1 aircraft production program is focused on providing the very best aviation logistics support to its many and varied customers. Aligned to the top-level strategic goals of the organization, the H-1 aircraft production program pursues excellence in depot maintenance operations at every level to meet constantly changing and increasing customer demands. FRC East's customers expect a quality aircraft, on or before the scheduled delivery date, and at or below the negotiated cost. To meet these requirements, the H-1 aircraft production program pursues a relentless focus on **quality**, is constantly finding innovative ways to meet **schedule** delivery dates, all the while reducing the **cost** to the warfighter. As the poster depicts, quality products to our customers are first and foremost; however, all FRC East employees have to remain focused on meeting schedules and reducing costs of our products and services to the warfighter.

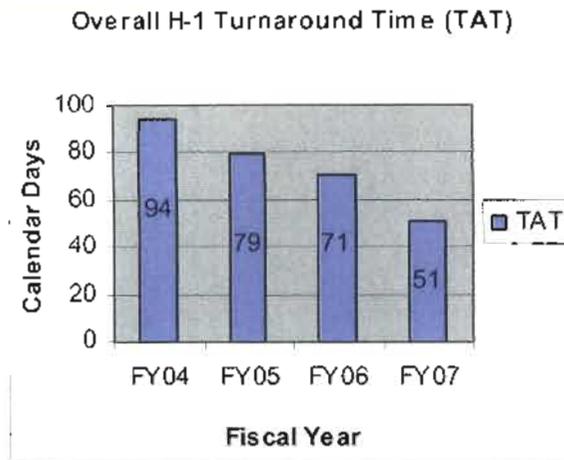


Quality – The structured process used by the H-1 aircraft production program to provide quality products and services to its customers is the concept of the Integrated Quality Teams (IQTs). This concept was implemented to ensure people worked together to proactively detect, prevent, and correct conditions that adversely impact quality products. The IQT is comprised of an assigned Quality Assurance Specialist, Engineer, Examiner and Evaluator, Industrial Engineering Technician, Production Controller, Planner and Estimator, Equipment Specialist, and Shop Supervisor. The participants represent the true experts for the products they produce. As a result, warfighter satisfaction with H-1 aircraft depot maintenance products and services has never been better. The quality team has many other tasks beyond performing inspections on aircraft and, over time, these were taking increasingly more time away from direct production support. A key improvement that the H-1 team applied was to place visual management tools on the shop floor indicating when quality inspections were required. Visual controls now ensure quality inspectors immediately take action to preclude any adverse impacts affecting the quality of the aircraft. This effort has resulted in the H-1 aircraft program providing a better quality product to the warfighters and helping to meet scheduled delivery dates. During FY 2007, there were only four accepted discrepancies from fleet Aircraft Discrepancy Reports for the 52 aircraft produced.



Schedule – “On time every time” is engrained in the culture of every artisan working on the H-1 aircraft program. During FY 2007, every H-1 aircraft destined to the warfront from FRC East met or exceeded customer on-time delivery expectations. The standard metric used for measuring service delivery is the negotiated delivery date. During FY 2007, the H-1 aircraft production program provided 20 aircraft (mixture of Cobras and Hueys) directly to the warfront. These aircraft were completed by the depot an average of 17 days earlier than the negotiated turnaround time (TAT) date of 59 days (a 29 percent improvement and 100 percent on-time

delivery for H-1s delivered to the war front).



A second metric, the evaluated delivery date is an internal deadline that is based on actual aircraft evaluation after induction and this date is communicated to the customer almost immediately. These dates are often expedited dates with very little wiggle room if things do not go as planned. However, they are still necessary in order to meet the urgent needs of the warfighter. In FY 2007, the H-1 aircraft production program met 96 percent on-time delivery of aircraft based on evaluation dates, providing 52 aircraft to the fleet, an average of 7 days ahead of scheduled delivery dates. Overall, the TAT was reduced from 94 days in FY 2004 to 51 days in FY 2007, a 46 percent reduction.

The structured process the H-1 aircraft production program used to reduce in depot repair time was an intelligent mix of Theory of Constraints (TOC) methodologies, Lean Manufacturing, and Six Sigma. This included, applying a full range of tools such as buffer management, task prioritization, value stream mapping (VSM), 5S +1, standard work, and several others to aggressively meet increasing customer requirements. In comparison, on-time delivery of H-1 aircraft has steadily improved from 49 percent in 2002, to 80 percent in 2006, to 96 percent in FY 2007.

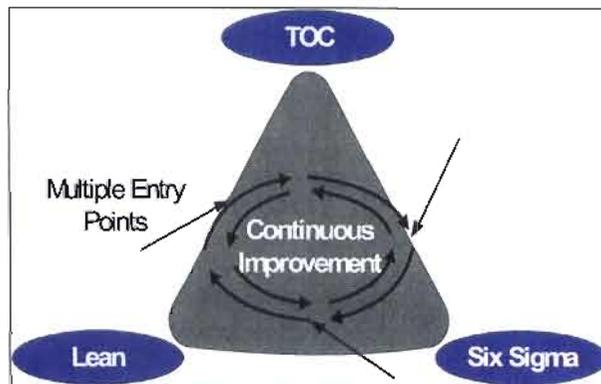
Because of their superior performance, the H-1 aircraft production program is constantly receiving positive feedback via email, phone calls, as well as formal communication for expediting aircraft and reducing TAT to meet the warfighter's urgent requirements. Below are excerpts paraphrased from a certificate of commendation and a letter of appreciation received from Rear Admiral H.D. Starling II, Commander, Naval Air Forces, U.S. Atlantic Fleet during this period:

- **Certificate of Commendation:** FRC East streamlined H-1 Integrated Maintenance Program resulting in a 25 percent reduction in overall TAT during 2007 in support of Iraqi Freedom, thus saving the fleet valuable time returning aircraft to the fight.
- **Letter of Appreciation** dated 13 Mar 2007 to the H-1 Integrated Maintenance Team, FRC East, Cherry Point: I wish to express my personal appreciation and thanks for expediting the rework of two AH-1W aircraft just returning from a Marine Expeditionary Unit deployment. Congratulations on a job well done.

Cost – Defense budgets to support legacy aircraft maintenance operations are constantly being scrutinized to ensure there is money available to purchase and field new aircraft and weapon systems. Cost control and CPI initiatives that lead to cost avoidance and savings are an extremely important focus within FRC East. As the steward of large amounts of public dollars, FRC East takes seriously the responsibility to deliver cost performance improvements. At the highest level in Marine Aviation, there was a push to move depot-level rework capabilities from FRC East to a site closer to theater operations. By performing scheduled H-1 depot-level

maintenance to support the GWOT at its FRC East facility, instead of building infrastructure or locating required resources in the desert as was initially planned, **saved taxpayers more than \$8M in FY 2007**, while providing critical warfighting aircraft directly to the warfront. As with any aging aircraft, more and more maintenance is required to keep them flying as they get older. This is certainly true for the H-1 aircraft, operating in harsh desert environments, in the middle of a war zone, while having to keep up with replacement aircrew training requirements stateside. As such, the workload standard to perform integrated maintenance has grown by more than 15 percent, depending upon the type work needed to be performed on the aircraft. The work scope for the UH-1N Huey currently ranges from 3,200 hours for a Planned Maintenance Interval (PMI) event to 5,000 labor hours for a Baseline event. The AH-1W Cobra ranges from 2,150 hours to more than 3,000 labor hours. With an increase in work scope, often comes the requirement for additional manpower resources. For the most part, this has not been true for the H-1 aircraft production program at FRC East. They have been able to compensate for increasing manpower requirements through the use of CPI efforts. However, had manpower requirements continued to grow to meet increased workload, hiring extra employees to keep pace with this effort would have cost taxpayers millions to provide the necessary maintenance and logistics support to the warfighter.

The H-1 aircraft production program's CPI (commonly referred to as *AIRSpeed* in the Navy and Marine Corps) journey began several years ago with the implementation of TOC, Lean, and Six Sigma methodologies. The goals of this effort were to increase throughput, reduce TAT, reduce work in process (WIP), and provide a better quality aircraft to their customers at a reduced cost. Critical Chain Project Management (CCPM) and Simplified Drum Buffer Rope (DBR), both TOC methodologies, were used to reduce WIP levels and sequence workload to ensure that artisans worked the aircraft in a logical order. This effort streamlined the production of the aircraft as it flowed through the repair process, as well as identified those areas that support shops needed to concentrate on to provide parts and materials to the artisan. To determine how the aircraft was going to flow, subject matter experts from every competency, sheet metal, airframes, and electrical, worked with support personnel to provide a structured process that reduced waste and provided value to their tasks from a customer perspective. Primarily, is the task they are performing required and is the customer willing to pay for it? Across FRC East, more than \$12M in savings has been realized through the implementation of CPI efforts and over the next five years is projected to avoid more than \$40M in costs as a result of the integration of process improvement initiatives. This effort has already saved customers of the H-1 program millions of dollars and will continue to do so for years to come.



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The Huey and Cobra aircraft have two completely different airframes and more than eight variations of work templates for performing H-1 depot-level maintenance. This means that artisans performing the maintenance are constantly being challenged to stay abreast of the changing workload. To meet increasing customer requirements, many of the artisans have been cross-trained to work both aircraft and have been able to reduce the aircraft in flow at any given time, providing additional aircraft back to the warfighter. The average H-1 WIP has been

reduced from as many as 16 aircraft in flow to just 6 aircraft at the end of FY 2007. This equates to an additional 10 aircraft available to the warfighter. At an average cost of \$8M per aircraft, this equates to an additional \$80M in critical assets available for operational forces to support DoD contingency operations. In addition to the achievements listed above, the H-1 aircraft production program is responsible for the superb accomplishments listed below:

- Provided 96 percent on-time delivery for the 52 aircraft completed in FY 2007 and 100 percent on-time delivery for the 20 aircraft in direct support of Iraq and Afghanistan missions
- AH-1W Cobra TAT has decreased from an average of 75 days in FY 2004 to 35 days in FY 2007, a 53 percent reduction. The UH-1N Huey TAT, over the same period, has decreased from 128 days to 81 days, a 37 percent reduction
- Avoided more than \$8M in infrastructure, manpower, maintenance, and material related costs by performing scheduled depot maintenance in CONUS
- Used continuous process improvement efforts to cope with an increasing workload that would have been required for additional manpower resources, saving taxpayers more than \$12M during FY 2007
- Developed Hazardous Material Carts that resulted in a cumulative reduction of 2.65 miles per day. This improvement resulted in the equivalent of nearly one fulltime artisan returned to production
- Implemented Point of Use concepts that resulted in a 259 percent decrease in motion waste for PEB items and special tools. This equates to over 4,318 miles in walking distance per year that has been eliminated
- Implemented a process to perform fuel cell leak checks that eliminated over 300 miles of waste per year contributing a one day cycle time reduction from transportation waste elimination
- Completed 122 ISR events accumulating more than 7,800 hours in direct support of unscheduled and unplanned warfighter urgent requirements
- Reduced overtime from a high of 13.8 percent in FY 2005 to a low of 8 percent for all of FY 2007, significantly reducing the cost of conducting business

Since FY 2004, overall TAT times on the H-1 production program have been reduced by 46 percent, from an average of 94 days to 51 days in FY 2007. This tremendous effort would not have been possible without highly dedicated and devoted artisans and production support personnel. The overwhelming success of the warfighters operating the H-1 aircraft in Iraq and Afghanistan can be directly linked to their superior performance.

As a direct measure of their superior performance in meeting customer demands for improving quality, meeting schedules, and reducing costs, the H-1 aircraft production program and many of their personnel have been the recipient of numerous awards and accolades during this period.

The command was less than 60 days into the new year when it was named one of two recipients of Aviation Week's 2007 Charles B. Ryan Maintenance Repair and Overhaul Award for Business Innovation. The superb performance by everyone on the H-1 aircraft production program was in large part responsible for the command being recognized for this distinction. Other awards include:

The H-1 aircraft production program was the recipient of the 2007 Gold Medallion from the Shingo Organization for Operational Excellence in the Public Sector. The H-1 aircraft production program was one of only four organizations to receive this prestigious award from among 25 nominees from the public sector. *"You have joined a very distinguished group of Shingo Prize Public Sector recipients,"* wrote Shaun Barker, Shingo Prize associate director, in notifying the facility it had earned the 2006-2007 Shingo Gold Medallion. The Shingo Prize is considered to be the "Nobel Prize" in manufacturing. Excerpt from the Shingo Organization press release:

- **Fleet Readiness Center (FRC) East, H-1 Helicopter Line, MCAS Cherry Point, NC** – The H-1 helicopter line is part of FRC East, a U.S. Navy facility performing depot-level aviation maintenance. Using Navy AIRSpeed tools, H-1 line personnel increased the mission readiness of AH-1W Super Cobra and UH-1N Huey helicopters that provide critical support in the global war on terrorism. AIRSpeed includes industry best practices in Lean, Theory of Constraints, and Six Sigma. With nearly double the workload, the helicopter line reduced costs and cycle times, met all delivery dates, created a safer workplace, empowered employees to change processes, and saved \$25 million.

The H-1 IQT was the recipient of the 2007 Joint Depot Maintenance Activities Group (JDMAG) Award for achieving effective and affordable support for the nation's weapon systems. Excerpt from the FRC East Readiness Reader:

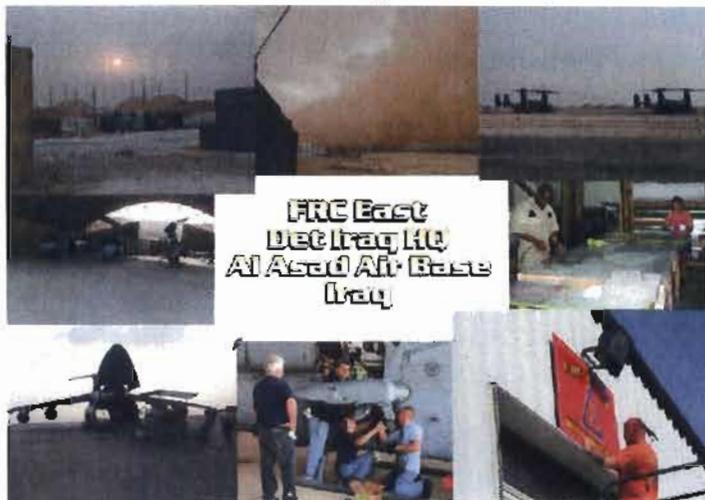
- **The Fleet Readiness Center (FRC) East H-1 Integrated Quality Team** won the 2007 Joint Depot Maintenance Excellence Award for significantly increasing H-1 aircraft readiness by reducing cycle time and work in process, and saving more than \$25 million in current and future maintenance and overhaul costs.

The H-1 aircraft production Program Officer was selected as the recipient of the 2007 Marine Corps Aviation Associations' Acquisition Officer of the Year award:

- **The Fleet Readiness Center (FRC) East H-1 Program Officer** was selected as the 2007 Mike Hough Marine Corps Aviation Association Acquisition Officer of the Year. Major Glen P. Lindstrom, the H-1 Helicopter Program Officer, was selected as the recipient for his leadership and management of the entire H-1 program for superior aviation logistics support to the warfighters.

EFFECTIVE SUPPORT TO WARFIGHTERS

Aircraft depot-level maintenance is never limited to the confines of the FRC East facilities. The H-1 aircraft production program has been instrumental to fleet operations by providing critical manpower and material resources to meet unforeseen demands and provide a surge capability to the warfighter. Depot-level maintenance is often performed onsite where aircraft are operating in the United States or deployed in combat zones. FRC East continually provides depot-level artisans as ISR teams that deploy on a moment's notice when and where support is needed. In FY 2007, the H-1 aircraft production program continued to demonstrate a real show of flexibility and agility in providing support to the warfighter. As unscheduled requirements were received from the H-1 program office, the artisans and production support personnel developed solutions to fleet problems; verified and validated technical directives; and provided parts, services, and people when and where their customer's needs arose. During FY 2007, the H-1 aircraft production program ISR team completed 122 ISR events accumulating more than 7,800 hours in direct support of unscheduled and unplanned warfighter urgent requirements. Almost 50 percent of these inspect and repair events were performed in-theater in direct support of combat operations in Iraq and Afghanistan, primarily Al Asad Air Base, Iraq. The ISR type work consists of unplanned and unscheduled depot-level work that the warfighter needs to return the aircraft back to an operational condition. It is often required as the result of an aircraft mishap or some maintenance action that is outside the scope of the organizational or intermediate level maintenance. It is different from the scheduled integrated maintenance type work being performed onsite at the FRC East facility.



In late 2004, it was evident that the demands from Operation Iraqi Freedom (OIF) were placing a large strain on Marine Aviation assets. In particular, the AH-1W Cobra and the UH-1N Huey airframes were subjected to an incredibly high operational tempo and would require depot-level



maintenance on an accelerated schedule. Since the H-1 airframes fulfill the roles of direct combat air support and battlefield command and control, the overarching requirement was to quickly perform scheduled depot-level work on the aircraft and return them to the battlefield. At the highest level in Marine Aviation, there was a push to move depot-level rework capabilities from FRC East to a site closer to theater operations. The initial, logical thought was to establish a depot capability at Al Asad Air Base, Iraq, in order to perform the work in-theater. The original

business case analysis established that this option would require an initial infrastructure

investment of \$5.2M and an additional \$25M over three years to operate. The FRC East leadership team realized that manpower and material resources would be severely constrained by providing scheduled depot-level work at both places. After reviewing the process improvements made on the H-1 aircraft production program, and establishing customer demand for OIF aircraft, they determined that it might be logical and cost effective to set up a scheduled depot-level repair site in Iraq. However, manpower and material resource constraints remained an issue.

After further analysis, the FRC East leadership team developed an “out of the box” solution. With a customer demand of 20 or more aircraft per year, FRC East proposed that two H-1s per month could be delivered to FRC East via C-5 heavy airlift, reworked onsite at FRC East Cherry Point, and returned to the customer in the desert. The C-5, on a 24 hour turnaround, would return to the warfront with two newly reworked H-1s. FRC East committed to 100 percent order fulfillment and to not delay the C-5 flight schedule. This was a huge commitment, and FRC East leadership convinced senior leadership at Headquarters Marine Corps and the H-1 Program Management Office that it could be done. Long story short, it avoided the creation of new logistics elements, including artisan deployment, equipment relocation, and supply chain management that must be maintained at an unknown annual cost. As a direct measure of the superior performance of everyone involved in the repair and return of these crucial war fighting assets, FRC East has NEVER missed a delivery date or delayed the departure of the C-5 aircraft. In FY 2007, FRC East returned 20 H-1 aircraft to the warfighters with 100 percent on-time delivery. This total commitment to meet the needs of the customer is evident throughout FRC East and is wholeheartedly embraced on the H-1 aircraft production program.



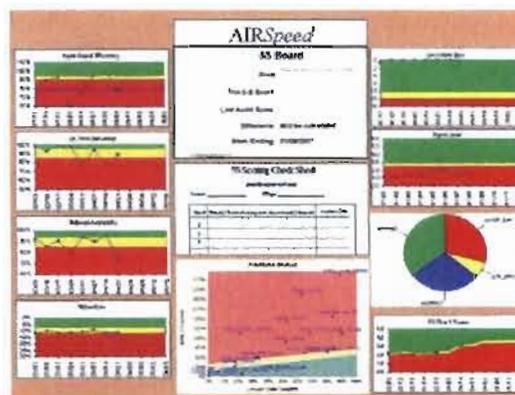
FRC East is also working with Bell Helicopter Textron to remanufacture the AH-1W and UH-1N to the latest upgrade, AH-1Z and UH-1Y aircraft. FRC East has begun a work-share agreement with PMA-276 and Bell Helicopter Textron to perform the disassembly and rework of AH-1W and UH-1N airframes and parts, prior to the delivery to Bell Helicopter Textron to perform the reassembly and upgrade to the AH-1Z and UH-1Y configurations. FRC East has processed eight ship sets of parts for the new UH-1Y, six ship sets of parts for the new AH-1Z aircraft, and processed or manufactured 43 parts for two additional UH-1Y aircraft. To date, FRC East has processed and delivered more than 6,800 reworked parts for this effort. The first UH-1Y Huey was delivered by Bell Helicopter Textron on 17 January 2007 to HMT-303, Camp Pendleton, California.



The H-1 aircraft production program uses a variety of metrics to determine how the overall program is progressing. As such, they use visual displays to align their production shop level maintenance metrics with FRC East's Strategic Plan and goals. This is accomplished via Metrics Boards. These boards are being displayed and artisans can use them as an indicator of overall performance. Numerous metrics are available to gauge the health of the H-1 aircraft program and can be viewed at any time by senior leadership and monitored closely by those managers and supervisors overseeing the program. In addition, the Corporate AIRSpeed Metrics Website also provides a variety of metrics for all type, model, series aircraft that include quality measures, TAT, WIP, financial, and many other telling metrics.

Metrics Included are:

- Input Output Efficiency
- Percent On Time Delivery
- Material Availability
- Overtime Percent
- Buffer Status (Concerto)
- Lost Work Days
- Sigma Level for Rejects
- Performance Summary
- 5S Plus One Score



Example of Metrics Board on display in the work area

Direct feedback from customers, regarding products and services rendered, provides a true and gratifying measure of how well a business is performing. It is extremely gratifying when a customer expresses their appreciation in writing to H-1 program support personnel. During FY 2007, numerous H-1 aircraft production program personnel received kudos from their customers for providing exceptional support. The following is an excerpt paraphrased from a letter of appreciation sent to a FRC East H-1 Sheet Metal Mechanic from Lt Col Steve Choate, Assistant Chief of Staff, Aviation Logistics Department 2nd Marine Aircraft Wing (Fwd), Al Asad, Iraq, dated 24 May 2007:

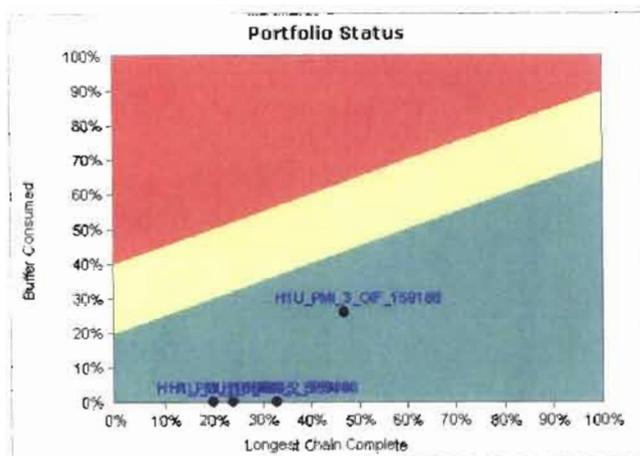
I would like to extend my sincere thanks and appreciation to Charles Andreucci, FRC East Detachment Team forward deployed for his exceptional knowledge, professionalism, and tenacity while supporting numerous squadrons in-theater. Working in an austere environment, he performed superbly under pressure to produce mission capable aircraft in a surge period characterized by a massive increase in operational tempo. His expertise and accomplishments were highly valued by 2nd MAW and greatly contributed to the Wing's mission. As one of the best Depot-level Artisans, he consistently displayed superior aircraft knowledge and expertise with both the organizational and intermediate maintenance activities. Despite the heavy workload, he worked diligently and tirelessly to beat the deadline and return the aircraft to mission capable status ahead of schedule. The 2nd Marine Aircraft Wing (Fwd) is grateful for your contributions and dedication in support of Operation IRAQI FREEDOM. Semper Fidelis.

Other H-1 artisans including William D. Lewis, Leon N. LaFreniere, and Jim Herriven received letters of appreciation from the Officer in Charge, Bureau of Naval Personnel, Sea Duty Component, Dallas, TX, Commander, C. A. Holtslander. Paraphrased excerpt:

It is with great pleasure that I express my appreciation for your diligent and conscientious assistance, which contributed greatly to the successful completion of our remote site detachment. During a period of high tempo remote site operations, we found a crack in our starboard leading edge which negatively impacted our ability to complete critical mission tasking. Your dedicated efforts to ensure we had a Ready-For-Issue leading edge in minimal time directly contributed to the successful accomplishment of our operational commitments. Your significant contribution and steadfast devotion in support of the Bureau of Naval Personnel, Sea Duty Component is sincerely appreciated.

LOGISTICS PROCESS INNOVATION

To meet customer requirements for cost, schedule, and quality products, and to ensure a safe work environment for employees, FRC East's H-1 aircraft production program integrated the AIRSpeed, TOC, Lean, and Six Sigma tools with Manufacturing Resource Planning II (MRPII) production management system, the Voluntary Personnel Protection (VPP) for Safety, and International Organization for Standards (ISO) quality processes. The H-1 aircraft production program was one of the first aircraft production programs in FRC East to truly integrate the process improvement tools, and other production programs in the facility have modeled themselves after the program's tremendous efforts. The implementation of process improvement initiatives and the degree to which employees have embraced this change, have transformed the H-1 aircraft production program into a world class MRO facility. To more effectively manage critical chain projects, a commercial off-the-shelf manufacturing software program, Concerto,



was procured and adapted for use in our MRO environment. Concerto project management software allows supervisors to staff and prioritize operations based on projects that show potential of being late. Instead of focusing on the aircraft with the earliest induction date, the attention was placed on aircraft that had the potential to miss scheduled completion dates. Buffer management is used throughout the course of the overhaul schedule as a tool to ensure that projects are completed on time. The picture depicts H-1 aircraft as they flow through the repair process and consume buffer.

Value Stream Mapping was used to identify all tasks in the entire production process from aircraft arrival to delivery back to the customer. A current state map was initially created which identified Non-Value added activities. From this point, a future state map was created in order



for the team to visualize what a fully improved process would look like. The “walk the process” portion of the mapping event was an eye-opening experience. For the first time, everyone got to visualize and put to paper (inset left) what waste in the production process really looked like. Some obvious forms of waste, such as transportation and motion, were particularly evident as the process was mapped and data was gathered. The results of the analysis process served as the guiding force for selecting Kaizen “rapid improvement events,” many of which are identified below.

After the value stream mapping process had taken place, the artisans and support personnel associated with the H-1 aircraft production program, set out to clean up and organize all work areas based on Lean manufacturing principles called 5S +1. This effort was focused on ridding waste from all production processes.

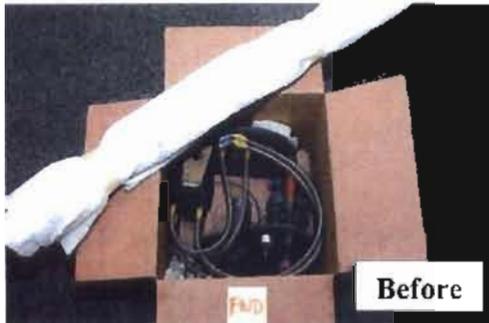
The 5S +1 – the Ss stand for Sort, Straighten, Shine, Standardize, and Sustainment, with an additional S to place an emphasis on Safety, was an early activity in the H-1s Lean implementation process. Because the H-1 aircraft production line shares a single maintenance hangar with a USMC AV-8 Harrier Squadron, work spaces are severely constrained and making the best possible use of all available work space was extremely important. The 5S+1 implementation ensured that “everything had a place and everything was in its place.” Increases in workload in FY 2006 and 2007 made this effort all the more important and the artisans who performed maintenance on the aircraft identified changes that needed to be made, and then began implementing those changes. With very little help from outside their immediate work areas, they eventually created a showplace and



established the H-1 aircraft production program as the model to be benchmarked by other aircraft, engine, and component production lines in FRC East. In addition, a demanding appraisal and scoring program was implemented that allowed the workforce to gauge their progress. This established a visual workplace that identified when something was out of place on the shop floor, potentially causing production delays.

After the initial VSM session and 5S +1 were completed, areas for improvement were identified and Kaizen events were scheduled to accomplish the changes. One area selected for improvement was the fuel cell leak check process. The process identified that five workers were

each traveling in excess of one mile each week in order to perform fuel cell leak checks. The event process identified a safe, suitable area that was closer to the production line. Approvals were obtained and the concept was validated and implemented. **The change eliminated over 300 miles of waste per year contributing a one day cycle time reduction from transportation waste elimination alone!**



A Fuel Cell Repair Team employed visual management systems in creating fuel cell repair kits for forward and aft fuel cell repair. All of the items required for overhauling fuel cells were identified and kits were designed using shadow box techniques. The technique allowed for a positive identification of all parts for the fuel cell, and provided a visual indicator if a part were missing from the kit. By issuing the fuel cell parts as a complete kit, the team eliminated flow time loss due to

part non-availability that was experienced prior to the kit formation. Importantly, the kits created a quality at the source check point. If any parts were still in the kit post overhaul, the fuel cell could not be passed on to the next process step. **The fuel cell kit provides protection of sensitive parts and decreases flow time during the build-up phase.**



Prior to Lean implementation, artisans were aware that they were losing time going to a central Pre-Expanded Bin (PEB) storage center to retrieve consumable parts needed to perform repair activities. By implementing a Point of Use (POU) concept, the team designed and installed PEB units in designated hangar space on the production line which reduced cumulative walking distance for PEB items, from 28 miles per day to 11. Additionally, this concept was used for special tools,

which further reduced artisan walking distance. **This resulted in a 259 percent decrease in motion waste for PEB items and special tools. This equates to over 4,318 miles in walking distance per year that has been eliminated, further streamlining the production process and leading to reduced TAT for aircraft in the repair process.** This team also identified that waiting time to check out Special Support Equipment at the central tool room was a major source of non-value added time. On average, 10 man hours per day were lost due to artisans waiting in line for special use items. The team created a POU storage area with appropriate control and inventory sheets and placed the common items in the workspace. **This effort resulted in saving almost 2,000 man hours of production time each year.** These initiatives freed up time equivalent to two fulltime workers per year.



One area that was quickly identified as an opportunity for waste removal was the hazardous material process. The hazardous material process required the H-1 aircraft production team to walk an average of 22.39 miles per day to draw required material. During the Hazardous Material (Haz Mat) event, a new cart was designed and a system was developed in partnership with the environmental team to create a new system that did not violate any regulations or release chemical compounds in the air, ground, or water. **This new process resulted in a team reduction to 2.65 miles per day. This improvement resulted in the equivalent of nearly one fulltime worker per year.**

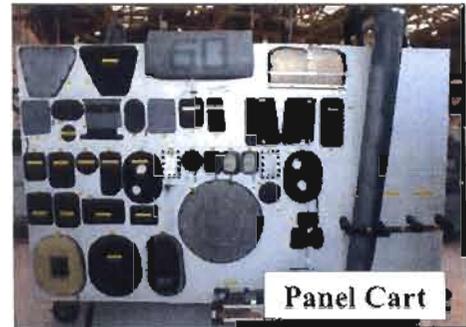


Access panels are a significant part of any H-1 overhaul. Panels are worked in the adjacent panel shop and stored until required for use. A significant issue is that the panels are not interchangeable from one aircraft to the next. Because the panels were stored in the panel shop instead of near the aircraft, they were often "misplaced", requiring the use of another panel that would then be reworked to fit that particular aircraft. This overproduction waste accounted for a significant amount of time for the Sheet Metal Team.



In addition to pure non-value added time spent on reworking a panel

to fit, the activity would interfere with the reassembly process inducing wait time into the cycle. The Panel Team designed panel storage carts that can store each panel in specifically designed slots. Standard work was created for removal, storage, tracking, and installation of the panels.



The visual management aspect of the cart ensures that a missing panel can be identified in real-time and returned to the correct place.

The H-1 production line has embraced the visual factory as a means of increasing productivity. Work data stands are placed at each aircraft repair station in the production area. The work data stands show the current progress of the aircraft to schedule and any issues impacting the production of the aircraft. There is a section on the data stand where flags indicate a Quality Assurance Specialist is needed. The Quality Assurance Specialist can see this signal and make the required inspection without delaying production. There is also a hangar status board that clearly shows the status of all work being performed on the aircraft.



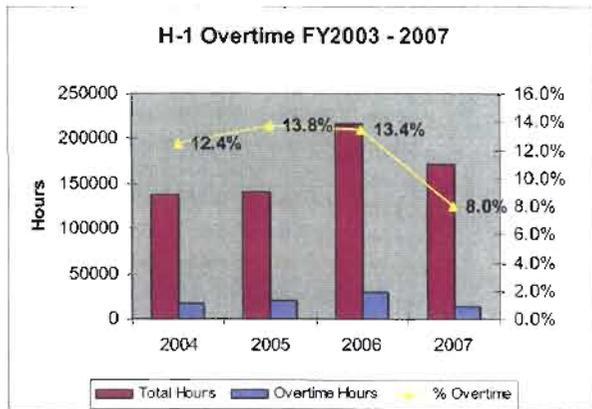
The tail rotor and gearbox event was focused on improving the work processes in the tail section of the aircraft. The team identified that a portable fixture was needed to process the tail section as it flowed through the repair process. The existing process required several artisans to physically move the tail section, often interrupting the tasks they were performing. Also, there was no set place to



perform this type of work in the hangar, which further complicated the production repair process. The team designed a tail section dolly that facilitated the movement and repair of the tail section. The new dolly is portable and safely holds the tail section as it is removed from the aircraft. This allows the tail section to be easily moved out of the production area without the use of excessive manpower.

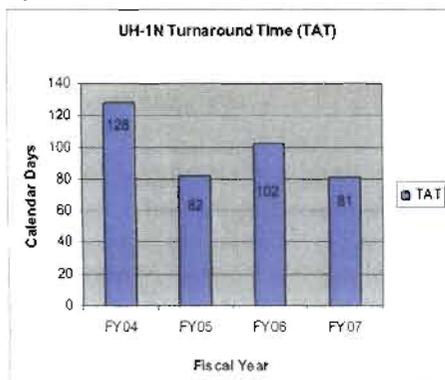
The implementation of logistics process innovations has made a tremendous impact on the shop floor. Artisans no

longer have to work as much overtime. The overtime trend for H-1 production workers had become a significant issue with the program experiencing a steady increase in overtime through the first years of the production line's existence. Reducing overtime was a critical point, since it created goal alignment between FRC East management and employees. H-1 production employees were excited to build upon the improvements that had been made since the beginning of the program. As the chart depicts, overtime has been reduced from a high of 13.8 percent in FY 2005 to a low of 8 percent in FY 2007.



The aforementioned logistics process innovations are just a few of the overall process improvements that H-1 production personnel have implemented to better support the warfighter. These efforts have positively impacted the overall production effort; reduced TAT, WIP, and costs; improved quality; and increased employee morale.

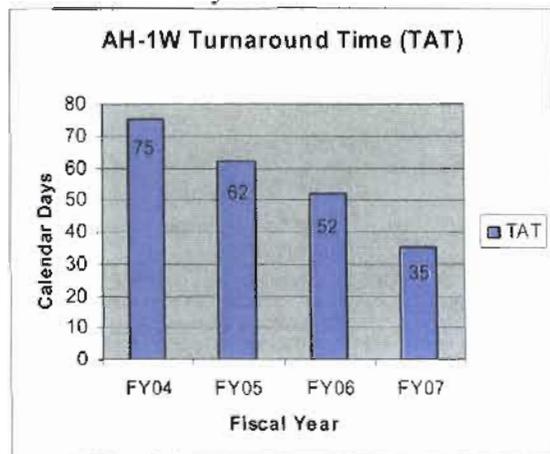
The H-1 aircraft production program has made a tremendous positive impact on the availability of critical combat aircraft to the warfighter. They have accomplished this by implementing numerous maintenance-related logistics systems which led to these accomplishments. The number of H-1 aircraft in the depot maintenance pipeline has been reduced from as many as 16 to just 6 aircraft at the end of FY 2007. This allows more aircraft to remain in the hands of operational forces, providing the warfighter additional aircraft for training and contingency operations



Overall, in FY 2007, H-1 TAT has decreased an average of 43 days for aircraft in the depot maintenance repair pipeline since 2004. In FY 2004, TAT averaged 94 days and has been reduced to 51 days. This is a 46 percent reduction in TAT, in spite of a 15 percent increase in workload standard hours due to an aging airframe and operating out of the harsh environments of Iraq and Afghanistan. The UH-1N Huey TAT has decreased from an average 128 days in FY 2004 to 81 days in FY 2007, a 37 percent reduction.

The AH-1W Cobra TAT has decreased from an average of 75 days in FY 2004 to 35 days in FY 2007, a 53 percent reduction. These changes increased the efficiency and effectiveness of the entire H-1 aircraft production program, improved safety awareness, and advanced technical proficiency throughout the command.

Combined, the changes have been instrumental in increasing customer satisfaction by providing warfighters with the assets needed for contingencies. The implementation of process improvements on the H-1 aircraft production program has produced unmatched results that benefit the warfighter. By implementing process improvements, the support structure is now in place to provide better support the H-1 fleet. As the customer's requirements continue to increase due to ever-changing global conditions, the H-1 aircraft production program has built in the capability, flexibility, and agility to meet these requirements.



Within the H-1 aircraft program in FRC East, are some of the best and brightest aviation logistics personnel in the DoD. They are highly skilled, totally devoted, highly motivated, and should be commended for their superb performance in supporting the warfighters around the world. As such, they are well deserving of the Fiscal Year 2007 Robert T. Mason Award for depot maintenance excellence.

PROPOSED CITATION

THE SECRETARY OF DEFENSE

takes great pleasure in presenting the

ROBERT T. MASON AWARD

for Depot Maintenance Excellence

to

FLEET READINESS CENTER EAST
H-1 AIRCRAFT PRODUCTION PROGRAM

for service as set forth in the following citation:

For superior achievement and unparalleled excellence in providing aviation maintenance and logistics support from 1 October 2006 to 30 September 2007. During this period, Fleet Readiness Center East's H-1 aircraft production program was instrumental in meeting and exceeding the requirements of their customers. Through continuous process improvement efforts and a highly motivated workforce, they were instrumental in returning 52 H-1 aircraft to the warfighters, while reducing turnaround time from 94 days in 2004 to 51 days in 2007, a 46 percent reduction. They achieved 100 percent on time delivery for aircraft in direct support of Iraq and Afghanistan operations, and a 96 percent on time delivery rate to all customers. Additionally, the In Service Repair Teams completed 122 inspection and repair events, accumulating more than 7,800 hours in direct support of unplanned and unscheduled warfighter requirements. Finally, the H-1 aircraft production program saved taxpayers more than \$20M through innovative logistics process solutions. Their professionalism and dedication reflected great credit upon themselves and were in keeping with the highest traditions of the United States Naval Service and the Department of Defense.