

Team Chinook — DCMA and Boeing Remanufacture the CH-47

by Ms. Katherine Crawford, Staff Writer



¹The pitch-hinge assembly on the helicopter permits the blade to rotate on its longitudinal axis and to control thrust, which dictates the pitch of the rotor blades and thus where the helicopter is going. In 2000 Boeing launched a redesign of the pitch-hinge assembly to replace the rolling bearings with a self-lubricated hinge. The pitch-hinge assembly lasts longer than bearings, which had to be manually lubricated and maintained, and is more efficient and cost-effective.

Source: Jean Thilmany, *Smooth Operator: Finite Element Analysis Helped Boeing Eliminate Oiled Bearings on its Chinook Helicopter*, 2002, *Mechanical Engineering Magazine* online, 8 June 2005, <<http://www.memagazine.org/backissues/july02/features/smoothop/smoothop.html>>.

Against the backdrop of a gray industrial complex, the pale green paint glows in the late afternoon sun. The long, black blades gleam, stretching out across the blue sky. The sleek bulk of the helicopter hunkers on the ground in the sharp wind, its fore angled slightly upward as though prepared to spring into action. Behind this extraordinary piece of machinery is a team that runs as smoothly as its self-lubricated pitch hinge,¹ “Team Chinook.”

The sense of teamwork is palpable when one visits with members of “Team Chinook,” the Defense Contract Management Agency (DCMA) Boeing Philadelphia and Boeing personnel working on the remanufacture of the U.S. Army’s venerable workhorse helicopter, the CH-47 Chinook. As team members speak, finishing one another’s sentences, it is clear that

they have great affection for both their aircraft and their work. Ask one person a question and others will join in, eager to explain the mechanics of the helicopter, or what their work entails or even business practices. All respectfully view Mr. Al Doreste, F-series program integrator, as the official expert and spokesman though each team member possesses vast amounts of knowledge. The combination of subject matter expertise, affability and reluctance for personal recognition has created cohesiveness between DCMA and Boeing personnel that allows for outstanding communication among the two organizations, the primary factor in the success of this program.

“Team Chinook,” comprising DCMA Boeing Philadelphia and Boeing personnel, is working on the remanufacture of the U.S. Army’s venerable workhorse helicopter, the CH-47 Chinook.

(Above) Members of Team Chinook at Boeing Philadelphia. From left: Mr. Herman Richardson, Boeing; Army Chief Warrant Officer 4 Jim Krueger; Army Master Sgt. Jim Kennick; Army Maj. Pete Ross; Army Chief Warrant Officer 4 Rob Morriss; Army Lt. Col. Mark Ballew; Army Chief Warrant Officer 5 John Smolka; Mr. Bill Gliem; Mr. Kenny Drummond, Boeing; Mr. Al Doreste; Mr. Frank Tipold; Mr. Bob Lawson; Mr. Bernie Rehill, Boeing; and Mr. Karl Meixner (Photo by Mr. Larry Ruggeri)

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The Remanufacture Program

The Chinook remanufacture program involves replacing the airframes of the existing CH-47D fleet with new ones that will include fuselages constructed in a one-piece frame rather than from several pieces welded together. “They’re taking one large piece of aluminum and machining it out, and this type of work is taking place all throughout the aircraft. It’s a huge effort,” said Mr. Doreste. The new structurally modified airframes will minimize harmful vibrations, reducing costs and improving crew endurance, and reduce by approximately 60 percent the time required for aircraft tear down and build-up after deployment on a C-5 or C-17 aircraft.² The dynamic components of the aircraft, such as landing gear, will be recapitalized and returned to “near new” condition. The finished product will be, essentially, a new aircraft, the CH-47F.

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The remanufactured F models are receiving state-of-the-art technology, including the installation of a new digital cockpit. The



(Above) Team Chinook members Army Chief Warrant Officer 5 John Smolka and Army Lt. Col. Mark Ballew with a Chinook helicopter at the Pentagon. (DCMA staff photo)

upgraded cockpit will have enhanced communications and navigation equipment for improved situational awareness and mission performance. A separate but complementary effort involves the installation of more powerful and reliable T55-GA-714A engines that improve fuel efficiency and enhance lift performance by approximately 3,900 pounds. Installation of an improved crashworthy extended range fuel system will enable Chinook self-deployment and extend the operational radius of all other missions.³

Challenges

Mr. Doreste joined Team Chinook in June 2004. During his tenure the program has been running smoothly, and the few challenges that have arisen have been mitigated. Chinook helicopters have been in service since 1962, providing troop and cargo transport across the globe. Since their introduction, approximately 1,180 Chinooks have been built, 437 of which are still operational. “Recently, the Chinooks have been the workhorse of the Army in both Afghanistan and Iraq,” asserted Mr. Doreste. “In Afghanistan they’ve been in a lot of heavy-duty flying situations that stress the dynamic components. As a result, we have aircraft in the fleet that need dynamic parts as well as the aircraft that [our group] has on the production line. It has been a challenge, but we’re working through it.” Another challenge is posed by the introduction of new technology. The updated F-series aircraft have an avionics suite and a flight control system that are being converted from analog to digital. The conversion entails software development and software integration, “which present pretty daunting problems,” said Mr. Doreste. However, Team Chinook seems to have successfully overcome this conversion challenge as flight tests of the digital avionics and flight control suites have all been successful

² Source: Army Fact File — CH-47 Chinook, U.S. Army, 6 June 2005, <http://www.army.mil/fact_files_site/chinook/>.

³ *ibid.*

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to date. The third challenge to the program is that “with the manufacture of new aircraft, Boeing, like many other manufacturers, has begun offloading a lot of the work they used to do internally. For this program they have offloaded

major subsections,” stated Mr. Doreste. For example, the aft fuselage is being manufactured at Boeing Macon in Georgia while Crestview Aerospace in Florida is producing the cabin, and then these two sections are spliced together. This presents a challenge for DCMA, because DCMA must delegate oversight of the surveillance process to counterparts at both Boeing Macon and Crestview.

Adding to these challenges is the overarching challenge of technology conversion. As part of the redesign, Boeing is taking traditional two-dimensional drawings and putting them into a three-dimensional, computer-driven “model-based definition.” Transferring the two-dimensional

drawings to the three-dimensional, computer-driven models requires considerable work. “It’s a huge challenge, lots of money, but there’s a huge payback, because the digital information is easier to produce, and all of the information is captured into



(Top) Army Chief Warrant Officer 4 James F. Krueger in a Chinook CH-47F helicopter at Boeing Philadelphia. (Photo by Mr. Larry Ruggeri)

(Above) A Chinook CH-47F at the Pentagon for a media event in January 2005. (DCMA staff photo)

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and the customer is extremely satisfied.*

that model — how to assemble, how to inspect, how to test, it's all there, based on the model," according to Mr. Doreste.

Successes

Overall, the Chinook remanufacture program "has enjoyed a tremendous amount of success, both on the field and in the manufacturing process," stated Mr. Doreste. All aircraft have been delivered ahead of schedule and under budget, and the customer is extremely satisfied. A significant component of this success is the coordination DCMA has had with the buying commands. The buying commands both discuss issues and coordinate solutions with DCMA, and DCMA's relationship with the Boeing personnel is just as good. "We are pretty well integrated with both Boeing and the Army — we work with both every day," reported Mr. Doreste. "We are embedded in most of Boeing's work [integrated product teams] and virtually attend all their meetings." Added Mr. Bob Lawson, CH-47 quality assurance lead, "We're constantly communicating with one

another to try and improve the process. We do [modification] centers, where we try and resolve problems by working with the Boeing people. If there's a problem or potential problem, we try to talk about it before it gets out of hand." It is this open communication that Mr. Lawson and Mr. Doreste consider to be a key factor in the strong relationship between the organizations.

With all team members enjoying their work and interaction with one another, it follows that the program would achieve great success. Overall, "the program status is very good," according to Mr. Doreste. "We've had recent program management reviews by both the F [series] and the G communities, and the [program managers] are satisfied with the progress Boeing has made in the remanufacture of their aircraft."



Stay Tuned to Local Listing

by Ms. Michelle Brignac, Public Affairs Student Intern, DCMA Boston

The Discovery Military Channel chose to feature the Chinook helicopter and the Defense Contract Management Agency (DCMA) for its special series, "GI Factory." The program, which first airs March 24, focuses on various products used by today's military and the manufacturers who supply the tools they need.

The Discovery Channel conducted a series of interviews with employees of the U.S. Army Product Manager (PM) Office Cargo, DCMA and Boeing. Army Col. Tim Crosby, PM Cargo, and Army Lt. Col. Mark Ballew, DCMA Boeing Philadelphia commander, collectively have 42 years' experience as Chinook pilots. Both were in the same company during *Operation Desert Storm* and have flown many current missions such as relief operations for Hurricane Katrina and expeditions throughout Europe.

During the interview, Lt. Col. Ballew was able to discuss DCMA's role in the production facility and how the Agency's personnel impact quality, engineering, supplier management, cost and price analysis, contract management and flight acceptance. Specifically, Lt. Col. Ballew enjoyed having "the opportunity to discuss the Chinook and the capabilities it provides, along with ... the DCMA team and our importance to the program." The purpose of this documentary is not only to show the technical side of how these highly essential products are made but also to convey the personal experiences that come with operating them. Check your local listing for the airing of the "GI Factory" episode, "Tools of the Trade," or go to: <http://military.discovery.com/tvlistings/series.jsp?series=114829&gid=0&channel=MIL>.

(Above) Army Lt. Col. Mark Ballew, commander, pilot and member of Team Chinook, with a CH-47F Chinook. (Photo by Mr. Larry Ruggeri)