

Volume 2, Number 3
Fall 2006
Feature

Keeping Helicopter Crews Safe

Through its "Reset" Program, the Army Wages War Against Corrosion

By Cynthia Greenwood

While Jim Roberts worked in 1982 as an assistant maintenance officer at Fliegerhorst Caserne, Hanau Army Air Field near Frankfurt, he watched Capt. Andrew Burgland, a fellow Army officer and close friend, prepare to fly a Huey UH-1 helicopter across the air field. As Captain Burgland took a right turn in the air, his aircraft's fuselage suddenly inverted and plunged into the ground. He was killed on impact.

"The Aircraft Accident Investigation Team flew over from the U.S. and pieced the aircraft together in my hangar," said Roberts, a senior technical specialist at Science Applications International Corp. (SAIC) who consults for the Army Aviation and Missile Command (AMCOM). "During their investigation, they determined that a single bolt in the helicopter's main rotor-system subassembly had failed due to corrosion."

While war exacts the greatest toll on Army aviators, corrosion has a significant impact on air crews who risk their lives daily. The Army Safety Center collects data on corrosion's adverse effects on safety. From 1989 to 2000 there were 21 aircraft mishaps where corrosion was a contributing factor. Nine deaths and 13 injuries occurred as a result of corrosion.

"Reset" Part of Broad-Based Army Effort

Corrosion also affects the ability of high-operations air crews to fight U.S. wars in Iraq and Afghanistan's harsh desert environments. "As airframes age, corrosion is becoming a more predominant safety factor," said Steve Carr, corrosion program manager at AMCOM.

To keep the helicopter fleet viable and minimize problems for air crews during flight, the Army and Naval Air Systems Command (NAVAIR) began scrutinizing the level of wear and damage to helicopters returning from the theatre as early as 2003. (See ["Three Military Services Fight Corrosion Together"](#).) Their investigation led to a broad effort to increase and improve corrosion prevention in the Army and Navy. Since 2003, the Army has been "re-setting" or refurbishing battle-weary, sand-drenched helicopters under the Reset maintenance program.

"The Army Aviation Reset program takes aircraft returning from southwest Asia and brings them back into pre-deployment condition," said Carr. "And because 50 percent of our soldiers are deployed in Iraq and Afghanistan, the National Guard and aircraft contractors have a large role in resetting aircraft."

Cold War-Era Fleet Takes a Beating in the Desert

Under the Reset program, the Army refurbishes every type of helicopter that gets flown over the skies of Iraq, Afghanistan, and other Persian Gulf regions, including UH-60 Black Hawks, CH-47 Chinooks, AH-64 Apaches, and OH-58 Kiowa Warriors. All of these helicopters take a beating in the desert, and the Army is working to assess the long-term effects of desert temperatures and sand on its fleet.

First of all, helicopters deployed for war get much greater wear and tear than other aircraft. And the demand for condition-based maintenance in a desert environment is much greater than it is in the continental United States. "In some locations in Southwest Asia, the air is saltier than the sea," Carr said. "The desert's sand abrasion, extreme temperature variations, corrosive sand salts, and moisture condensation accelerate corrosion on Army aircraft. Dust permeates everything and the corrosiveness levels are as much as seven times higher than in the continental U.S."



Under the Reset program, Army-sponsored mechanics refurbish Black Hawk helicopters returning from combat in Iraq and Afghanistan. Photo by Cynthia Greenwood, CorrDefense.



Built for European operations during the cold war, the Army's 60s-era Black Hawk was not designed to withstand the desert's salt, sand, and grit. Photo by Cynthia Greenwood, CorrDefense.

centrifugal filters are not designed to easily withstand the sand and talcum powder-like grit in the skies," said Dunlap. The corrosion prevention compounds traditionally used on aircraft flying elsewhere may not work as well in the desert, he added.

Since Reset efforts began, the Army has serviced more than 500 helicopters that have returned to depots across the U.S. The aircraft come home as each combat unit completes a one-year deployment. Within the past two years, more than 200 Black Hawks, 80 Chinooks, 100 Apaches, and 50 Kiowa warriors have benefited from the maintenance program.

"We're flying aircraft that were designed during the cold war with the European theatre of operations in mind," said Shanon Dunlap, a SAIC senior analyst and consultant for AMCOM. "It was never anticipated that we'd be using these same aircraft to fly and fight in the intense sand and grit of southwest Asia. We're fighting a brand new corrosion war."

While different aircraft have different service ceilings and altitude limitations, much of the Army's current helicopter fleet was designed in the 1960s and 1970s. For example, the Army's Black Hawk entered the helicopter fleet in the 70s, on the heels of the Vietnam War, said Dunlap. "This aircraft was built to generally carry the greatest payloads at elevations of up to 4,000 feet or less above the treetops of Europe's lush, green forests," said Dunlap.

The desert environment of Afghanistan presents a different set of challenges. Today, air crews flying across Kabul may need to reach altitudes of more than 8,000 feet, depending on their mission. "The rotor blades and

Resetting Black Hawks at Chase Field

Inside a blazing hot hangar on June 7 at Chase Field in Beeville, Texas, a team of Sikorsky mechanics worked on Black Hawks just returned from combat duty. As part of this particular Reset assignment, the group had grown accustomed to working long hours in order to finish refurbishing the helicopters within 75 days. In most cases, Reset aircraft maintenance must be completed within 6 to 12 months so they will be ready for re-deployment to southwest Asia, Carr said.

To prepare the Black Hawks for another tour of combat, the Sikorsky team cleaned and repaired various parts of the aircraft. When necessary, they got rid of blood, a highly corrosive substance that does considerable damage to interior surfaces. The Reset crews generally spend as much as three days on major cleaning, vacuuming out sand and debris, and then washing and drying the aircraft, Dunlap said.

Then the mechanics began various corrosion prevention measures as part of the overhaul. These included stripping the old paint off the exterior or doing spot touch-ups, where necessary. "The fuel cells are often loaded with mildew, which causes corrosion," Roberts explained. At Chase Field, mechanics used special Army kits to mitigate and remove all mildew.

The floorboards of Black Hawks and other helicopter models consist of tight, concealed sections that are vulnerable to corrosion. Once the Sikorsky team cleaned the floorboards, they installed a special floorboard tape to protect them from moisture and other corrosive substances. These nonconductive gaskets protect the floorboard interface, and come in rolls with adhesive on one side, allowing the applicator to roll it out and apply as necessary.

On all Army helicopter exteriors, the intersection of the helicopter antennae and aircraft skin is also vulnerable to corrosion. To protect the aircraft further, the mechanics applied a pre-cut, peel-and-stick gasket (made of polyurethane gel and aluminum mesh) between the antenna and skin. (See "[Antenna Gaskets and Floorboard Tape Lower Price of Aircraft Maintenance](#)," *CorrDefense*, Oct. 2005.) To protect the aircraft further, they also applied corrosion prevention compounds to vulnerable areas around the rotor heads, flight controls, and the floorboard and other areas where water is easily trapped.

Aircraft damaged through conflict face additional repairs under Reset, before cleaning and preventive maintenance, Carr said. These repairs can include replacement of aircraft skins or sheet metal, composite components, and occasionally structural members.

Under the Reset program, which is partially funded by the Pentagon-based DoD Corrosion Policy and Oversight Office, the Army takes its mission to fight corrosion seriously. At the Tri-Service Corrosion Conference in November 2005, Maj. Gen. James Pillsbury spoke to military corrosion experts about its importance. "We've reset 1,000 airplanes since the desert conflict started. These soldiers demand and need the best-performing airplanes, especially the men and women flying in the mountains of Afghanistan and Iraq."

"If I can reduce the burden on the soldier, that's all I want to do," General Pillsbury said.



During a Reset overhaul, mechanics inspect and repair every inch of the Army Black Hawk, using corrosion prevention materials to protect the antennae, skin, and the floorboard interface. Photo by Cynthia Greenwood, CorrDefense.