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THUMBS UP FOR T-50

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THUMBS UP FOR T-50

The patch of the Republic of Korea Air Force's 1st Fighter Wing features a hand giving a thumbs-up. The caption reads, "First and Best." That label aptly applies to the operations of the wing's 203rd Squadron, the world's first T-50 Golden Eagle training unit.

The 1st Fighter Wing is located 160 miles south of Seoul in Gwangju near the southwestern tip of the Korean peninsula. Gwangju AB, which shares its runway with the city's commercial airport, is also home to the 206 Fighter Squadron, which flies the F-5E/F Tiger II fighter.

"As the home of the first T-50 training squadron, the 1st Fighter Wing is devoting much of its energy to the integration of the Golden Eagle," explains Brig. Gen. Oh Sung Kwon, commander of the 1st Fighter Wing. "As soon as the integration is complete, we will concentrate on refining the training syllabus to get the most out of the T-50 and its associated ground training systems. We expect to establish Gwangju Air Base as the premier location for cultivating ROKAF fighter pilots."

FULL SWING

The wing's distinction as the first operational T-50 training unit draws international attention. "We have received many visitors," notes Kwon. "This week we are hosting a group of military attachés representing the air forces of nineteen other countries."

Visitors see a training operation in full swing. Twenty T-50s populate the ramps and shelters at the 203rd, with one new aircraft arriving every month from Korea Aerospace Industries, or KAI, the prime contractor. The wing expects to have two training squadrons flying a total of fifty Golden Eagles by 2009.

The twelve members of the first class of student pilots to fly the T-50 began

BY ERIC HEHS PHOTOS BY KATSUHIKO TOKUNAGA

training in February 2007, completed first flights in the T-50 in April, and are expected to graduate from flight training in November. A second class of fifteen students started ground training in August 2007, began flying the T-50 in October, and will graduate from flight training in the spring of 2008. The 203rd has approximately thirty instructor pilots fully qualified in the T-50.

Such progress is impressive considering the 203rd was established at Gwangju in June 2005 with eight pilots who had never flown a T-50. The first two T-50s arrived at the base the following December. Two pilots chosen from the initial eight were sent to Sacheon where the T-50 is manufactured. There the pilots received their ground and flight training simultaneously from ROKAF test pilots. These first two pilots trained the other six initial instructors at Gwangju.

Brig. Gen. Oh Sung Kwon

"Our progress is quick, but it is also deliberate," says Lt. Col. Bo-Hyun Kim, commander of the 203rd. "We will realize the full potential of the T-50 as we gain more experience operating it. We already have a sense that the effectiveness of the T-50 simulators is very high. The flight characteristics of the T-50 allow students to adapt to flying the trainer more easily than they adapt to flying other trainers in the ROKAF. This effectiveness will allow us to use flight hours for more advanced concepts. Eventually, we will provide operational squadrons with pilots who are better prepared to transition to our front-line fighters, such as the KF-16 and the F-15K."

The ROKAF, like many air forces around the world, uses a wide variety of aircraft to train its fighter pilots. Students progress from the prop-driven Cessna T-41 Mescalero, to the subsonic jet-powered Cessna T-37 Tweet, and then to the supersonic Northrop T-38 Talon and the subsonic BAE Systems Hawk Mk 67. The students then proceed to combat readiness training with the F-5 before finally entering the operational units. Nearly all of these training aircraft are very old.

Fighter pilot training in Korea is in transition as the ROKAF replaces all those training aircraft. After passing a screening test with the T-103 (ROKAF version of the Ilyushin IL-103), ROKAF students are to be trained only with two trainers—the KT-1 and the T-50. Reducing the number of aircraft used in a training fleet simplifies logistics and support and lowers cost. However, the savings are not strictly related to the elimination of aircraft types. The number of training levels can be reduced. "Before the T-50, we had three levels of training—basic, intermediate, and advanced," explains Kwon. "The KT-1 and T-50 allow us to reduce training to two levels—basic and advanced."

All fifteen students in the second ROKAF class to fly in the T-50 gather for a group photo in front of the T-50 Integrated Training Center at Gwangju AB. The modern center, constructed specifically for T-50 training, contains simulators and classrooms outfitted for computer-based training.

The full dome simulator in the Integrated Training Center allows students to conduct entire flights in a highly realistic training environment. Instructors monitor student performance from a control room next door. Scenarios and conditions can be adjusted easily with the touch of a screen.

A handful of technical representatives from Korea Aerospace Industries supports both training and aircraft maintenance at Gwangju AB. These personnel work closely with ROKAF and provide a direct line to the manufacturer.

GROUND TRAINING SYSTEMS

The ground training systems play an essential part in these improvements. "While the T-50 is an impressive trainer, a visit to our integrated training center shows visitors that the aircraft itself is only a part of a larger training system," Kwon adds.

The ground portions of the T-50 training system are contained in the silver, two-story T-50 integrated training center, the newest building at Gwangju AB. Lecture halls are wired for computer-aided instruction. Student pilots as well as student maintenance personnel work on individualized lessons at their own pace on computer-based training systems. These same systems also track the training performance of the students.

Student pilots fly the T-50 in two types of simulators: an operational

flight trainer and a full mission trainer. The former, used primarily as a procedures trainer, has a full cockpit and a large five-panel display. The latter is a full dome simulator used for training an entire flight. Student performance is monitored on both simulators from a control room that features a desktop version of the cockpit. Without ever having to leave the ground, student pilots learn to operate the T-50 from engine start-up to engine shutdown.

Capt. Young-Rock Ahn, an instructor pilot with the 203rd, touches his index finger on an image of the throttle quadrant on one of the screens. The image expands and shows minute throttle movements being made by the student pilot in the dome next door. "The system is very easy to learn because it's so intuitive," he says. Ahn presses another part of the display and types some numbers on his keyboard. "I just added a twenty-five-knot crosswind into Lieutenant Song's landing practice," he says with a slight grin.

Lt. Seung-Hwan Song, in the full mission trainer next door, deals appropriately with the sudden wind shift and executes a perfect touch and go. Ahn, Song's instructor for this flight, congratulates him over the intercom, "Good job."

Instructors can change more than wind direction. They can add storms, turn day into night, and introduce malfunctions and emergencies. Additional aircraft can be simulated in various scenarios. The simulators can also be connected over a network to practice formation flying or basic fighter maneuvering.

"The T-50 moves training into the digital age," says Colonel Kim, who has pilot instruction experience in both the F-16 and the T-37. "The system prepares students better for fourth- and fifth-generation fighters."

The squadron commander points to the advanced debriefing system as another example of the T-50's advantages. "Our T-38s don't have such a system," he says, "so pilots have to rely on their memories of the training flight for debriefing. The T-50, on the other hand, records every aspect of a training flight," continues Kim. "We can see everything that happened during a training flight. We can replay an entire flight during debriefing, pause it, view it from many perspectives, and archive it. We can get much more out of every mission. Our ground training and flight training systems and our logistics system are all interconnected, which allows us to work and train much more efficiently."

New students at the 203rd spend approximately seven weeks in a ground training and education squadron. They then move to a flight education squadron. The computer-based ground training and the simulator training continue into flight training syllabus. "Even after students begin flying the T-50, they spend an hour in a flight simulator for every hour they spend in the air," Kim notes.

Instructor pilots at the 203rd can attest to the effectiveness of this approach. "Some student pilots have landed the T-50 on their first try with no direct flight control input from the instructor in the back seat," explains Maj. Sung-Hoon Kim, the senior instructor pilot in the 203rd with 250 hours in the T-50. "Landing without any assistance on a first try never happens in our other trainers."

Major Kim credits realistic simulators and the basic handling qualities of the T-50 as the reasons for such quick learning. "It's an easy aircraft to land," he says. "It was designed that way."

The digital nature of the simulator and the T-50 controls makes both more suited for training pilots to fly modern fighters. "Our current generation of student pilots and our newest instructors were brought up on video games," explains Major Kim. "Training in the simulator makes flight controls seem more like a video game. The various systems on the T-50 are then easier to teach and easier to learn because the T-50 has digital controls. The transition to operational squadrons is also easier because the latest generations of fighters are digital as well."

FIRST FLIGHTS

Lt. Joong-Beom Bae is one of a handful of ROKAF student pilots who flew the T-50 on its first training sortie at Gwangju on 17 April 2007. "My most vivid memories were the speed of the aircraft and the technology in the cockpit," he recalls. "The simulator and ground training prepared me well for the first flight, even though being in an actual aircraft is always different."

Bae says the biggest differences he noticed during flight were the sensations of motion of the T-50 in flight, the voice from the instructor in the back seat, and the chatter of radio traffic from the controllers. "The environment in the cockpit was not quite as calm as in a simulator where we don't deal with other flights," he says. "Overall, the transition to my first actual flight was quite easy."

That first flight is not a back-seat familiarization flight. Students fly the aircraft from the front seat where they are at the controls for the entire flight, including during takeoff and landing. "Of course, the instructor in the back seat is prepared to take over if necessary," notes Major Kim. "We've heard some concerns about the jump of going from the KT-1 to the T-50," he continues, "but our first two classes of student pilots have had no problems with the transition. First and subsequent flights have gone very smoothly. The T-50 performs as an excellent training platform."

While the 203rd and its new T-50s may be the center of attention for the ROKAF, the success the unit is experiencing with the new aircraft and training systems is not the result of special treatment. "The initial students were not handpicked from the flight academy," notes Colonel Kim. "They were selected at random from all skill levels of the potential pool of students. We didn't want to handpick the initial students because doing so would skew our evaluation of this new training concept the T-50 represents."

PRIDE

"Our students are proud to be the first to train in the T-50," says Colonel Kim. "They realize they are making history here at the 203rd. They are also proud because the T-50 was developed and produced by Korea. Lockheed Martin and KAI did an excellent job with this airplane. We are excited to be the first to benefit from it. As the patch says, 'The first and the best.' "

Eric Hehs is the editor of Code One.

Lt. Col. Bo-Hyun Kim

Anatomy Of A Golden Eagle

The T-50 Golden Eagle looks much like a two-seat F-16 from an overhead perspective. A blended wing/fuselage, single vertical tail, and the general planform shape are similar. With a length of forty-three feet and a wingspan of thirty-one feet, the T-50 is about four feet shorter than the F-16. The control surfaces and tails are larger relative to the smaller size of the T-50. The extra area improves handling characteristics at lower speeds and makes the aircraft easier to land. Other distinguishing characteristics include a canopy bow that provides additional bird-strike protection; a narrower, more streamlined nose that corresponds to smaller radar requirements; and larger landing gear that absorbs harder landings.

The most distinctive features of the T-50 are its twin side-mounted inlets that direct air to a single General Electric F404-GE-102 engine. The afterburning engine is a proven, reliable design. The engine incorporates dual-channel full-authority digital electronic control optimized for safety and maintainability. More than 3,700 F404s have been delivered worldwide, accumulating more than twelve million flight hours combined. The engine produces 17,700 pounds of thrust, giving the aircraft an exceptional thrust-to-weight ratio.

The maximum takeoff gross weight is 29,700 pounds; the maximum rate of climb is 39,000 feet per minute; and the maximum speed is Mach 1.5. The service ceiling is 55,000 feet. The design load factor is eight g's; the trainer airframe is designed for up to 10,000-hour service life (8,300 hours for the lead-in fighter trainer version).

The T-50 has an onboard oxygen generating system that simplifies maintenance tasks and reduces the amount of necessary ground equipment by eliminating the need for liquid oxygen for the crew.

A triple-redundant electrical system increases safety. Relaxed static stability and fly-by-wire digital flight controls offer superior aerodynamic performance and handling qualities.

Modern cockpit features include hands-on throttle and sidestick mechanization, electronic flight instruments, head-up display, upfront controls, two five- by five-inch color multifunction displays, integrated advanced avionics and sensors, GPS/INS navigation, embedded training features, in-flight recording and post-mission debriefing capability, and a Martin-Baker zero-zero ejection seat. The seat-back angle is seventeen degrees—similar to the seat angles of the F-35 Lightning II and the F-22 Raptor.

The aircraft is designed for low-speed approach landings. A larger tail, flaperons, and rudder make the T-50 easier to control at lower speeds. In addition, the control surfaces move at faster rates to further improve handling characteristics. By design, the aircraft lands more easily than most fighters. The angle of approach is lower than that of an F-16 so the pilot has a better forward view on landing. The raised aft seat gives instructor pilots a much better view in front of the airplane as well. The flight control sidesticks in the front and rear seats move together so that instructor pilots can feel student pilot inputs.

The aircraft is designed to display the performance needed to support lead-in fighter training missions. This LIFT version of the aircraft, also called a TA-50, features an APG-67 multimode fire control radar, a modified M61 three-barrel 20 mm internal gun, a weapons management system, and seven hardpoints for carrying up to 9,500 pounds of a variety of air-to-air and air-to-ground weapons. (The standard T-50 has no radar or internal gun.)

The Republic of Korea has current contract commitment of eighty-two T-50/TA-50 trainers. The total includes ten Golden Eagles that will replace the A-37 Dragonflys flown by the ROKAF Black Eagle demonstration squadron. Beginning in 2010, Korea Aerospace Industries will begin delivering the first of twenty-two TA-50s, which will be used to teach tactics to new fighter pilots as part of their combat readiness training. TA-50 deliveries to ROKAF are currently scheduled to end in 2011. They will be followed by the FA-50. With current requirement standing at sixty, the total commitment to date is 142 aircraft for ROKAF. Deliveries of this combat version of the T-50 are scheduled through 2014. The production capacity at Sacheon can accommodate other customers for the aircraft. Several countries have expressed interest in the trainer so far.

T-50 GOLDEN EAGLE

Length: 43.1 ft / 13.14 m
Height: 16.2 ft / 4.94 m
Wingspan: 31 ft / 9.45 m
Weight (empty): 14,200 lb / 6,454 kg
Maximum TOGW: 29,700 lb / 13,500 kg
Engine thrust: 17,700 lb / 8,045 kg
Design load factor: -3/+8 g
Maximum speed: Mach 1.5
Maximum service ceiling: 55,000 ft / 16,764 m
Service life: Up to 10,000 hr