



One Great Save: San Diego's Justification and Journey to Acquire the S-70i™ FIREHAWK® Helicopter

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Plenty has been said and written about the Sikorsky Firehawk helicopter's prowess in wildland firefighting operations — mostly by the County of Los Angeles Fire Department, which has courageously and brilliantly pioneered the use of this exceptional aircraft for initial attack and year-round public safety operations.

I'm going to talk about the journey taken by the City of San Diego to acquire and enter into service the latest-generation Firehawk helicopter —

the S-70i — which we completed in time for the 2020 fire season.

I'll cover what justified the need, the steps we took along the way to customize the aircraft and train our crews, the overall cost and our assessment.

Before I dig into the details, I'll pre-emptively plant this thought in your mind: You only need one great save to justify every penny of investment I'm about to describe.

Larger fires

Megafires that burn more than 100,000 acres (404 sq. km) of land are increasing in southern California and in other western U.S. states, such as Colorado. While this upward trend is cyclical, there's no doubt that fire seasons are longer, extending almost year-round.

Another issue finds wildland fires intersecting with human habitation, the so-called wildland urban interface (WUI).



The S-70i Firehawk helicopter hovers 10 feet above a water source to refill the 1,000-gallon external tank in just 45 seconds.

WUI fires are the biggest threat to human lives, infrastructure and local economies.

The county's largest single fire occurred in October and November 2003. Started by a disoriented wilderness hiker signaling for help, the Cedar Fire took several lives, destroying 1,200 homes and 273,246 acres (1,105 sq. km) of land. More devastating fire activity across the county in 2007 forced 200,000 people to evacuate within the city limits.

The City of San Diego Fire-Rescue department had watched and learned as the increasing severity of wildland fires afflicted neighboring counties — San Diego County to our east, and Orange, Ventura, L.A. and Santa Barbara counties to our north.

The City's Bell medium helicopters (a 412EP and a 212HP) are highly reliable multi-role workhorses. Both are night vision capable.

For the all-important initial attack on a fire, each Bell carries a 375-gallon (1,419 liter) external water tank, though the actual amount carried is usually less than 300 gallons.

To protect our city, and assist our neighbors when requested, we needed a more capable helicopter for aggressive initial attack.

The twin-engine Firehawk helicopter — a military-designed Black Hawk



With a full load of fresh water, the Firehawk helicopter can reach speeds of 140 mph (125 knots) on its return to the fire line.

configured for aerial firefighting — can carry up to 1,000 gallons (3,785 liters) of water, almost three times that of our Bells.

The pilot also can fully control the amount of water released to suit the fire type.

Furthermore, the Firehawk cabin can easily accommodate 12 seated firefighters and their equipment.

Choosing an aircraft

Air operations are very expensive, so it's critical you do your research.

Both LA County and CAL FIRE (State of California Department of Forestry and Fire Protection) had hired outside consultants to assess

their options. CAL FIRE has bought 12 new S-70i Firehawk helicopters, while LACoFD has added two to their original three S-70A models.

Our city's Department of Finance took a similar path, commissioning a study by Conklin & de Decker to learn the best aircraft types for the mission, and the true cost of operations.

In early 2017, the consultant produced their study, recommending the S-70i Firehawk and a competing helicopter manufacturer's offering.

Ultimately, we chose the Firehawk for its ability to carry as much as 40 percent more water than the other recommended aircraft.

Cabin volume, speed, mission endurance, lower direct operating cost, reliability, situational awareness, 4-axis coupled flight director, and price, among other performance comparisons, also were considered in our decision.

Armed with this knowledge, Fire Chief Brian Fennessy (now with Orange County Fire Department) lobbied the San Diego City Council to purchase one S-70i Firehawk helicopter.

Council members gave unanimous approval. They also gave the go-ahead to contract with specialist companies for the aircraft's multirole and firefighting conversions.

Signed contract and possession

I spent the latter half of 2017 negotiating with Sikorsky for the baseline Black Hawk aircraft, pushing hard for its delivery in spring 2018. I also lined up the two principal aircraft completion specialists, who I'll talk about shortly.

The City signed the contract for one S-70i Black Hawk helicopter in January 2018.



Senior Pilot Chris Hartnell and Chief Macfarland (right) with the S-70i Black Hawk helicopter at Sikorsky's Florida training facility before its Firehawk conversion.

We purchased the new aircraft direct from Sikorsky, not through the U.S. Government. This meant it was made at PZL Mielec in southern Poland. Like Sikorsky, PZL is owned by U.S. defense contractor Lockheed Martin.

That same winter, senior pilot Chris Hartnell and I spent five weeks in transition training — first on Flight Safety International's S-70i Black Hawk simulator in West Palm Beach, Florida, followed by flight time in an actual S-70i aircraft at Sikorsky's training academy in nearby Stuart.

That spring, our aircraft arrived at the Port of Baltimore aboard an ocean freighter. It was trucked to Sikorsky's commercial facility in Coatesville, Pennsylvania where they returned the aircraft to service. In June, we formally accepted the aircraft one month ahead of schedule.

We were thrilled with the City's purchase. The S-70i has an inte-

grated digital cockpit and more power, payload, maneuverability, and flight safety enhancements than any helicopter we had ever flown. This was going to be a game-changer.

Aircraft customization

We kept it simple. Chris and I flew the aircraft directly from Coatesville to

Decatur, Texas where United Rotorcraft, a division of Air Methods, painted the aircraft in San Diego Fire-Rescue's eye-catching red, blue and white livery.

Because United Rotorcraft's Firehawk conversion slots were already committed to LACoFD and CAL FIRE, we returned our aircraft that autumn to San Diego. Our aircrews and maintainers became familiar with our helicopter.

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We started training with a Bambi bucket in the event we needed to support our Bells.

By early 2019, at the end of fire season, we flew the aircraft to avionics integrator Hangar One in nearby Carlsbad, California.

Hangar One is an outstanding completion center. Here's a list of what they installed on time for a fixed price:

- FM multiband tactical radios — and integration with the OEM-installed Telephonics intercommunications system
- Garmin GTN-750 GPS/Nav system on a custom-machined instrument panel
- ADS-B airspace positioning system — an FAA requirement
- Martin-Baker cabin crew seats and the floor pallets to secure them
- Breeze Eastern rescue hoist; and a Hangar One custom-designed-and-fabricated hoist operator station
- Trakka Beam search light
- Scene and down lights

United Rotorcraft

That summer we flew the aircraft to United Rotorcraft's facility in Englewood, Colorado.

They installed the external water tank made by Kawak Aviation Technologies of Bend, Oregon, integrating it to the cockpit so that our pilots have full control at their fingertips.



Chris Hartnell and Chief Macfarland with the painted Black Hawk helicopter before its Firehawk conversion by United Rotorcraft.

United Rotorcraft also installed the high landing gear, which raises the fuselage by 18 inches to accommodate the tank's attachment to the belly of the aircraft.

To take on water, the pilot hovers at 8-10 feet above the source and extends the snorkel, which takes just 45 seconds to pump 1,000 gallons into the tank. A cockpit display shows the fill status and other diagnostics.

The tank itself is rated for aggressive flight characteristics, such as 4 g turns with a full load of water. The depth of the tank and angular design of its doors build head pressure strong enough for water to penetrate dense brush and foliage.

Depending on the concentration or spacing of the fire, and its fuel source, the pilot can release water at different rates and drop patterns.

United Rotorcraft is authorized by Sikorsky to convert a Black Hawk to Firehawk configuration.

As I complete this article, they're busy converting more CAL FIRE Hawks for the state of California.

Extra Training

With a new helicopter on the ramp, you might be tempted to rush into firefighting operations. Resist this urge.

No matter how experienced your pilots are, your mantra should be: Crawl, Walk, Run.

Each of San Diego Fire-Rescue's four pilots, myself included, has many thousands of hours in helicopters. We retrain annually on FSI simulators.

For the Firehawk, we went an extra step. We brought in Kevin Bredenbeck, one of the best Black Hawk pilot trainers in the business, to teach the ways of the Firehawk.

A former U.S. Army Black Hawk aviator, Kevin excelled during a career at

Sikorsky where he rose to become chief test pilot.

Now retired, he offers flight test consulting and training as KLB Aviation Corporation.

I wanted my team to know and understand the flight characteristics of the Firehawk beyond what we learned in the simulator.

Kevin gave each pilot 10-12 hours. He taught ground runs and taxiing, ground handling, normal and emergency procedures.

Then Kevin would ‘walk us into the corner of the operational envelop’ — his terminology — to get us comfortable for one engine inoperative emergencies.

With 8,000 lbs. of water filling the tank, a Firehawk helicopter is operating at around 23,000 lbs., or close to max gross weight. Flying fully loaded into the drop zone is therefore never a good time to experience a single engine failure — you’ll need to dump water fast.

An engine failure conceivably also could occur while climbing away having just dropped water. In either scenario, you’ll need knowhow, calm piloting and extra power margin from the remaining GE 701D power plant.

Kevin taught us the techniques to continue flying safely in these close-to-ground situations. He would cut an engine so we could learn how to stay within the limits of the aircraft’s performance. And each pilot learned within his comfort zone.

Kevin coaches what’s saved his own life. He gave some of the finest training we’ve ever had. Our team loved it. He’s humble, shares his knowledge, and is a consummate pro.



Kevin Bredenbeck

Logistics Support

The consultant’s study recommended a guaranteed maintenance program for highest availability of the airframe and engines. I agree with this approach.

When the two-year parts warranty that came with our Black Hawk helicopter had expired, I received from the City Council a unanimous vote to enter into a 10-year Total Assurance Program (TAP) agreement with Sikorsky.

TAP places the onus on Sikorsky to manage parts inventory and anticipate our support needs based on our flight usage and other parameters.

Why a 10-year TAP agreement? Because when I retire, my successor will inherit the benefit of a successful sustainment program.

My last word on TAP: Your Firehawk is only as good as the parts you

need. It won’t look smart to have an aircraft unable to fly in an emergency.

We also entered into an agreement with General Electric for their True Choice maintenance program.

This program includes a spare new GE 701D engine so we can be flying within a few hours if there’s a sudden need for a replacement.

First major save

In the first week of December 2020, we received a request for assistance from the San Miguel Fire District, one of the fire agencies in San Diego County. Structures were burning, lives were at risk. Santa Ana winds were blowing at 30-40 knots. We responded.

It was our first time conducting aerial firefighting at night with the Firehawk. With our crew wearing night-vision goggles, we saved multiple structures. In fact, the incident commander thought we had sent two helicopters because the productivity of the Firehawk was so good.

The crew assigned to Copter 3, pilot Chris Hartnell, captain Bill Alton and rescue medic Barry Links made 14 drops of 750 gallons each during one fuel cycle. They hover-filled from a golf course pond close to the fire.

The San Miguel fire magnified the effectiveness of the mutual aid we can give to neighboring communities.



The City of San Diego and Los Angeles County can support one another.

Our night-flying Firehawk helicopter showed that San Diego Fire-Rescue has the means to protect lives and property across our city, and support our neighbors.

Our assessment

Bottom line, our night-time fire assistance to San Miguel proved you only need one great save, one time a year, to justify the expense of a Firehawk helicopter.

We paid \$18.5 million for the aircraft, including training. TAP and GE maintenance contracts were extra.

By my own estimate, I advise fire agencies to budget four percent more every year for air operations based on price escalations from the manufacturer and other suppliers.

More than just a firefighting asset, our new aircraft is multi-mission-equipped for hoist rescues and advanced life support.

In this regard, our Firehawk supplements our two Bell aircraft. The fleet flies 600-700 hours a year.

During regular fire season (mid-summer to early winter), we will dedicate our Firehawk exclusively to firefighting, staffing the aircraft round the clock with one pilot, fire captain/crew chief and a rescue medic.

In rescue mode, we can insert the rescue medic via the hoist, and transport patients to a trauma center.

All our crew are trained as EMTs or paramedics. The aircraft is equipped with advanced life support equipment.

We hired two additional maintainers specifically for the Firehawk, both veterans; one each from the U.S. Navy and the U.S. Coast Guard. We're very happy they're on board.

Plan, plan, plan

If you are in the market for a new Firehawk helicopter, or a used Black Hawk for that matter, do your research. Talk to partner agencies. Ask lots of questions. Use outside consultants.

We opted for a new aircraft for its enhanced safety and power margins, to significantly reduce the inevitable maintenance issues with older models, and to receive support directly from the manufacturer.

Will our Air Operations buy another Firehawk? Yes. Our 40-year-old 212HP is earmarked soon for replacement. A second Firehawk will be the ultimate force multiplier.