Rain And Sikorsky Test Advanced Aerial Firefighting Technologies Using Autonomous Black Hawk® Helicopter

California firefighters witnessed water drops from an autonomous Black Hawk® helicopter guided by Rain wildfire mission autonomy technology

A Black Hawk® helicopter equipped with Sikorsky MATRIX™ and Rain autonomy drops water onto a staged burn in Calif., April 24. A tablet shows an active suppression task with the fire location and suppression plan visible. Photos courtesy of Rain.

Hesperia, Calif., May 1, 2025 — Sikorsky, a Lockheed Martin company (NYSE: LMT) and Rain, a leader in the emerging firetech industry, demonstrated and tested autonomous wildfire suppression techniques on both propane and burning brush piles using Sikorsky's optionally piloted MATRIX flight autonomy system layered with Rain's wildfire suppression planning software. Performed in late April in Southern California, the flight tests familiarized firefighters with the potential of autonomy to help crewed and uncrewed firefighting helicopters find and suppress early-stage wildfires.

"Sikorsky and Rain have integrated two autonomy systems: our MATRIX technology that controls the flight of any crewed or uncrewed aircraft, and Rain's wildfire mission autonomy system that finds and tracks the fire, develops a suppression plan, and navigates the aircraft to drop water onto the target," said Sikorsky Vice President and General Manager Rich Benton. "With this layered autonomy system, incident commanders and pilots can choose a level of autonomy suitable for their mission, adding new features as they experience improved flight safety gains and enhanced suppression functionality."

The autonomous wildfire suppression tests in late April were the first performed by Rain and Sikorsky in California over live fires in wildfire-prone terrain; at 3,300-ft altitude; sometimes in wind gusts up to 30 knots (35 mph). The tests were performed in close collaboration with firefighters from the San Bernardino County Fire Protection District, who built and set fire to multiple brush piles for the aircraft to find and suppress with water.

Sikorsky's autonomous Black Hawk helicopter is equipped with fly-by-wire flight controls, MATRIX flight autonomy, satellite datalink, and on-board thermal and vision cameras. MATRIX allows operators to choose between fully autonomous and piloted modes.

For the fire suppression tests, Rain layered its mission autonomy onto the MATRIX system, enabling a ground operator to command the Black Hawk aircraft using a Rain tablet to assign specific tasks including: Guiding the aircraft to a water source; filling the bucket in a hover; searching and finding a brush pile fire with the aircraft's thermal sensor; determining the fire size; calculating the flight path, speed and altitude to the fire; accounting for wind speed and direction during suppression; and determining the precise moment to release water to achieve the desired water coverage level.

While in flight, sensors mounted on the aircraft geolocated the fire and streamed video to the ground operator's command tablet for situational awareness and mission planning decision making.

Sikorsky safety pilots were hands-off the flight controls as the Black Hawk aircraft flew with a 324-gallon Bambi Bucket attached to a 40-ft line. Wildfire Water Solutions provided the water source — a 189,000-gallon water tank installed less than a mile from three adjacent hilltop burn sites.

With the optionally piloted flexibility of Sikorsky's MATRIX technology, the Sikorsky and Rain team also demonstrated transition from autonomous control of the aircraft to piloted operation depending on the operational and environmental conditions.

In total, the aircraft flew 24 hours in California during two weeks of flight. Witnessing portions of the tests were representatives from CAL FIRE, San Bernardino County Fire District, Orange County Fire Authority (OCFA), and the U.S. Forest Service. During one series of water drops, a crewed OCFA Sikorsky S-76 airborne command helicopter operated alongside the autonomous Black Hawk aircraft. The joint flights demonstrated communication interoperability of the autonomous aircraft with a human-piloted helicopter in the same Fire Traffic Area.

"The technology that Rain and Sikorsky is demonstrating is a powerful part of the ecosystem of advancing fire service technology that is answering the year-round fire seasons we're facing throughout California," said Chief Dan Munsey, San Bernardino County Fire District. "Of all the tools we have to keep wildfires small, none are more effective than rapid suppression on initial attack of a wildfire. Autonomous aircraft—both crewed and uncrewed—can increase flexibility and capacity for on-the-ground incident commanders, ultimately saving lives and property for the communities we serve."

The Black Hawk helicopter is similar to Firehawk™ helicopters flown by CAL FIRE, Los Angeles County, Orange County and other local governments. CAL FIRE and local fire departments across California operate 24 Sikorsky S-70 Firehawk helicopters, each equipped with a 1,000-gallon belly-mounted water tank. Three more Firehawk helicopters are to be delivered to CAL FIRE this year.

"These initial attack flight tests on early-stage wildfires were of the highest value to Rain and Sikorsky as we mature our combined autonomy solution, and a great first step for aerial firefighters to learn how autonomy can help a pilot suppress wildfire with greater safety and accuracy," said Maxwell Brodie, CEO of Alameda, California-based Rain. "We thank California's firefighters for their considerable interest to help us showcase the benefits of autonomy as a tool to support the safety, efficacy, and efficiency of wildfire response."

The demonstration was supported in part by a PG&E research and development grant.

About Lockheed Martin
Lockheed Martin is a global defense technology company driving innovation and advancing scientific discovery. Our all-domain mission solutions and 21st Century Security vision accelerate the delivery of transformative technologies to ensure those we serve always stay ahead of ready. More information at Lockheedmartin.com.

About Rain
Rain, a leader in autonomous aerial wildfire containment technology, is helping fire agencies more rapidly suppress wildfires during the earliest stages of ignition. Rain software adapts existing military and civil autonomous aircraft with the intelligence to perceive, understand, and suppress wildfires, which enables numerous aircraft to be

prepositioned in remote locations resulting in accelerated response time. Developed in tandem with fire professionals, Rain is a privately held company headquartered in Alameda, California. Visit www.rain.aero for more information.

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