



2019
CASE STUDY



Using a Flex4K-GS high-speed camera, one filmmaker has captured breathtaking footage of supersonic fighter jets maneuvering midair—breaking new artistic and engineering ground.

Christopher Vasquez loves aviation. A former U.S. Air Force (USAF) F-16 pilot, the filmmaker has spent the last ten years capturing some of the world’s fastest aircraft. Over the years, his passion has landed him a variety of gigs, from commercials to Hollywood blockbusters. Recently, Vasquez worked with the USAF to capture unique footage of F-22 Raptors for marketing purposes—a project that took him from the subtropical heat of Florida to the sprawling glaciers of Alaska.

Because none of the cameras in the filmmaker’s arsenal were fast enough to capture the jets’ aggressive mid-air maneuvering, Vasquez utilized a Phantom Flex4K-GS high-speed camera—enabling him to capture the vapor formation on the jets in ultra-high-definition.

The result is a breathtaking visualization of velocity.



When it's too fast to see, and too important not to.®

NEED FOR SPEED

The F-22 Raptor is considered the most dominating fighter jet in the world—featuring a unique combination of stealth, speed, agility and lethal long-range weaponry. Given its impressive tactical resume, it's no surprise that capturing its aggressive mid-flight maneuvering would be a challenge. Since Vasquez would be filming the aircraft from the cockpit of a T38 jet trainer, his camera would have to handle several G forces and other demands of high-altitude aerial filming.

To gear up for his mission, Vasquez visited Vision Research headquarters in Wayne, NJ to train with the Flex4K—a high-speed professional cinematic camera that produces highly detailed 4K images at 1,000 frames per second (fps). Vasquez recalls “I was left with key information on how to make images look good, as well as how to comfortably swap lenses and switch between 400 and 938 frame rates.”

Shortly after Vasquez arrived in the Sunshine State to begin filming, forecasters were predicting a hurricane to pass through. These conditions prevented him from shooting an F-22 breaking the sound barrier—one of his original intents for the film. But fortunately, Vasquez did catch a break. “On the last day we were in Florida, the clouds cleared long enough to go up,” he says. “So we called in the F-22s to film their break turns. It was a really exciting catch, and we filmed like nine or 10 takes.”

Because of the small size of the T38 cockpit, Vasquez needed to save space and relied on the camera battery—giving him a 40-minute recording window. Depending on the angle of his shot, he also had to assemble and reassemble the monitor on top of the camera to make more room, which was possible because of the numerous mounting points on the camera body. “Meanwhile, the pilots were asking where to go for the shots, so it was stressful for the first few takes,” Vasquez says. “But I remembered my training with Vision Research, settled in and really started to enjoy myself. The camera was an absolute joy to use.”

THE FLEX4K-GS: GETTING THE JOB DONE

Vasquez selected the Vision Research Flex4K-GS for its durability, fast frame rates and ability to minimize motion blur in fast-moving aerospace applications. Designed for professional cinematography, the camera produces highly detailed 4K imaging at 1,000 fps, while its 35-mm CMOS sensor ensures each pixel is exposed to light at the exact same moment in time in global shutter mode. These features prevent motion artifacts with propellers, motors and other rotating objects while achieving precise timing throughout the entirety of each frame. “The Flex4K also gave me the option to switch between a rolling and global shutter—which was great because I wasn't sure how much motion blur I'd get,” Vasquez says. “But the sensor's rolling scan time was so fast, I didn't have to switch to the global shutter at all.”





Vasquez traveled to Florida to capture high-speed vapor formation on the F-22.

CAPTURING THE VAPOR FORMATION

Following the Florida shoot, Vasquez traveled north to film the F-16s, F-35s and others against Alaska's beautiful, mountainous backdrop. "We roped ourselves into the back of a large C17 military transport aircraft and dropped down to 10,000 feet," Vasquez recounts. "Then we opened the back and stood on the edge of the open aircraft to shoot the scenes."

The filmmaker's primary focus was to capture the vapor streaming off the aircraft during their break turns—creating a stunning visual reference point for speed. "Because its movements are so aggressive and intense, the jet ends up pulling apart the density of the air around it—forcing the water vapor to become visible," Vasquez explains.

Later, when Vasquez watched the 938-fps footage, he noticed the vapor sweeping off the aircraft in ways he didn't expect. "You expect to see the vapor on the wings and wing roots, but even the tail was delivering 50-foot strings—like a string bean tied to the back of the plane. It was a really cool phenomenon to see."

HIGH-SPEED VALUE

"The footage has more than just artistic value—which is the biggest thing I took away from this experience," Vasquez says. "The high-speed imaging gives you the rare ability to see what the air is doing as it passes over the aircraft at high speeds, which is not as well known—even for weapons. So even though it's artistically cool and gets people excited for aviation, it also leaves room for understanding how the aircraft is actually working."

BREAKING NEW GROUND—FROM THE AIR

Vasquez’s footage of the F-22 break turns and subsequent vapor trails marks one of the first times anyone has been able to capture high-speed video of mid-flight aircraft maneuvers from these vantage points. “While other high-speed aerospace footage does exist, it showcases things like weapons releases,” the filmmaker says. As a result of his accomplishments, Vasquez has already gotten more requests for this footage than anything else he’s done. For one, it will make its way into the publicity films generals and other officers show when they visit schools for recruiting. It will also be distributed among military bases that house the featured aircraft. Now, Vasquez is actively working on imaging a jet as it breaks the sound barrier—something the filmmaker has wanted to do for awhile. Obtaining this footage would benefit organizations like NASA, whose researchers have been working to limit the damaging sonic booms that supersonic aircraft create. “It’s one thing to study sonic booms in a wind tunnel,” Vasquez says. “But capturing them under real-world conditions would be a critical piece of research.”



A collection of Flex4K-GS frames of the jets, the F-22 firing a decoy flare, and behind-the-scenes stills showing Vasquez and the camera in use.



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