



You may recognize this scene from *Narcos* on Netflix. The drone: a DJI S1000 with a Panasonic GH4 camera.

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THE HILLS

# ARE ALIVE WITH THE BUZZ OF DRONES

By Zara Stone

Thirty-foot waves crashed less than 100 yards from where Ziv Marom stood shivering, his small boat rocking precariously. Spray flew into his eyes, and he pulled his black jacket closer around him. The swell rose again and he lurched to the side, stomach churning. But his eyes were locked to the sky, where his drone tracked champion surfers skimming over the breakers. The surfers were competing in the 2016 Titans of Mavericks competition, and each death-defying ride was recorded in HD video by the drone hovering 20 feet above their heads. The waves proved too much for Marom's partner, who vomited repeatedly and returned to shore.

But the footage they captured was worth the pain: dramatic aerial shots of crashing water with surfers weaving like ballet dancers between towering peaks. The video was live-streamed on Red Bull TV so fans could watch the real-time action from their homes.

Stunts like this have become the bread and butter for Marom's aerial cinematography company, ZM Interactive. For the last decade, drone footage has become increasingly popular in TV and film productions, often replacing the need for aerial shots using helicopters or cranes. Drones tracked Daniel Craig's James Bond as he chased villains across Istanbul's rooftops in *Skyfall*, panning wide to capture his motorcycle stunts. They've been used on *The Avengers: Age of Ultron*, *Game of Thrones*, *Jurassic World*, and a hundred more big-name productions. They're how we got that

stunning ocean shot of Leonardo DiCaprio's New York beach party in *The Wolf of Wall Street*. But the New York shoot violated FAA guidelines, because it took place in 2013. Up until late 2014, directors wanting to use drone footage had to go overseas, as FAA regulations didn't allow them to occupy airspace commercially.

Today's cinematographers can apply for an FAA Section 333 exemption to fly legally, and Hollywood's started paying major attention. Not only is America's homegrown drone business good for creatives trying to achieve the perfect shot, but it's also boosting the American economy.

"We have 111 permits with drone activity since the exemption," Danielle Walker from FilmL.A. told *Drone360* in March 2016. FilmL.A. is a nonprofit organization that issues film permits for filmmakers in Hollywood and the surrounding region.

The first six exemptions were awarded to American drone companies. San Diego-based Aerial MOB was in this batch, and they'll go down in television history as the first people to work on a Motion Picture Association of America (MPAA) drone shoot in the states. This took place on Dec. 14, 2015, for CBS' *The Mentalist*.

"We got a jib shot in one swoop," says Monica England, Aerial MOB's director. "We can get three shots on one swoop, you couldn't do that with a helicopter. We're educating the industry."

And business has been good: Since the exemption, 90% of their aerial

work has taken place in America, the majority in California. They've become a go-to company for Hollywood, and their credits include HBO's *The Leftovers*, *Supergirl*, *Criminal Minds: Beyond Borders* and commercials for Audi and Patron.

But working in the aerial world isn't straightforward, as every shoot is faced with different challenges. Earlier this year, England was on set for *The Circle*, a science fiction movie starring Tom Hanks and Emma Watson, that's scheduled for release in summer 2016. She was tasked with capturing aerial footage of a car chase taking place in Big Tujunga Canyon, CA.

The location's remote, the earth dusty. A narrow winding road curves through mountain passes, and it's impossible to see the whole route from the ground. But FAA rules mean the drone must stay within the operator's line-of-sight, so England and her team were hoisted into the air, a basket lift propelling them 100 feet above the ground. Using a headset, the director of photography notified the drivers to start the chase scene. The timing needed to be perfect; the camera attached to the drone was so heavy that the flight could only last ten minutes. And this is an example of when everything goes smoothly.

"It can get quite hairy," England says. FAA rules require all filming to take place on a closed set, and that the drone crew gives the production team a safety briefing. "It needs to be a lock-down set and we've had some instances where they were using

**HELICOPTERS COST \$15,000 TO \$30,000 PER DAY**

ROB GLUCKMAN/TEAM5 LLC

public areas and the production hadn't closed it down; we couldn't shoot till [the areas] were cleared."

"A drone on set gets a lot of attention," Team5 LLC pilot Kevin LaRosa Jr. says. Team5's a Marvel preferred vendor, and LaRosa's a familiar face on superhero sets. His film credits include *Iron Man* and *The Avengers* — a dream come true for the longtime Robert Downey Jr. fan. To keep things smooth, he starts planning up to two months in advance.

Recently, he worked on box office knockout *Captain America: Civil War* — he's directly responsible for that epic airport fight scene; the 17-minute superhero showdown of good versus misguided good. To get those long, swooping shots, he used the Gryphon Dynamics X8 drone, diving under aircraft and through baggage carts, which were mostly invisible as the majority of the scene was dressed with CGI.

## NEW TOOLS FOR AN OLD JOB

Aerial cinematography has existed long before drones were created. The first aerial photographs were taken in the 1800s by people in hot air balloons. Later, cameras were attached to kites and used to take mesmerizing black and white shots of cityscapes. The industry got an unfortunate boost in the early 19th century due to World War I, when cameras were mounted underneath planes and used for enemy surveillance. For motion pictures, this helped usher

in an era of daredevil stunt pilots who combined aerial escapades with shooting footage on handheld cameras. The content was shaky, but it gave people a new perspective of the world.

Then came helicopters,

which

offered a more stable filming platform that was also more maneuverable than a plane.

Columbia Pictures'

production of

*The Bandit of Sherwood Forest*, 1946, was one of the first feature films to use helicopter footage. Custom camera mounts were placed in the cockpit, and this soon became commonplace, with civilian helicopters the new standard for capturing aerial shots for movies.

But there were — and are —

downsides to using helicopters.

They're

notoriously

expensive

to

rent,

on average costing direc-

tors

between

\$15,000

and

\$30,000

a day. And with long blades

mercilessly

beating

the

air, they're

incredibly noisy and obtrusive.





The climactic fight scene in *Captain America: Civil War* between factions of the fractured Avengers team utilizes camera shots taken with a drone to capture the scope of the setting. Then the action was added in post-production.

As drone technology improved, more filmmakers started to consider how to utilize UAVs. One of the first companies to do so was Flying-Cam, a Belgium-based aerial company run by Emmanuel Previnaire. He built one of the earliest camera-mounted drones and his aerial credits include *The Beach* (2000), *A Beautiful Mind* (2001), and *Harry Potter and the Chamber of Secrets* (2002). He's received two technical achievement Academy Awards for his work, in 1995 and 2005, and shaped how other film professionals view drones.

Michael Tracey, who works at Contend, a Los Angeles, CA-based content studio that produces media for brands and films, says, "They can deliver amazing quality at a fraction of the cost of hiring a helicopter. I saw enormous potential in starting a drone department."

In October 2015, Contend expanded its business to include

an aerial division. "We can get angles and shots we could never get before," Tracey says.

And it's cheaper. A standard drone crew includes three people: a spotter to ensure safety, camera operator, and pilot. Contend charges \$3,000 to \$7,000 for a day's work. It's in talks with FOX and ABC about collaborations.

But Ziv Marom doesn't think drones will completely replace helicopters. There are some shots that need them, he explains, but what's becoming common is that directors are using helicopters or cranes in conjunction with drones.

The advantage of working with a drone versus a helicopter is you can fly close to talent, or between buildings," Marom says.

But a skillful director can make sure they get the

best of both tools. This happened on Marom's shoot for the 2016 *American Idol* auditions in San Francisco, CA. For the show's opening sequence, Marom's drone zoomed in on an actor holding a metal canister. The actor flipped it open, and red smoke streamed out. Turning from the camera, he ran down the street and vaulted over a wall. He headed toward the cheering crowd gathered outside Cow Palace arena, the drone whirring behind him.

The framing moved from eye level to bird's-eye view, and two skateboarders entered the scene, waving super-sized American flags above their heads. They

rolled into the center of the crowd. On cue, the throng looked straight up, unfurling colored streamers to create a huge stars-and-stripes banner, only visible

from the air. Using a wide-angle lens, Marom framed the scene, his drone positioned slightly to the side to avoid flying directly above them. A crane captured additional footage and the editor mixed the videos together. The final sequence is so seamless that you can't differentiate between the drone and crane footage.

## GOOD FOR BUSINESS

But the benefit to the movie industry is bigger than enhancing creativity and cost-cutting. As drones become more prevalent in productions, they're impacting the economic future of the industry.

In February 2016, Marom spoke on a panel at the Power of Collaboration Global Summit at the United Nations. He argued that technological innovation should be an economic priority, and discussed how it can boost jobs and long-term prospects for everyone involved.



Ziv Marom (left), owner of ZM Interactive, and Wesley Snipes on the *Expendables 3* set in Bulgaria.

hard to grow a business when the FAA says what you're doing is illegal," he said. "We lost potentially good clients because of this."

In 2007, the FAA prohibited most people from using drones commercially, figuring UAVs saw most use for military or research purposes anyway. There were a lot of gray areas surrounding the rules, and the requirements were complex and unfriendly to the entertainment industry. But as consumer drones became increasingly ubiquitous, organizations used their weight to petition the FAA to make changes.

In 2014, the FAA allowed businesses — which included aerial cinematographers — to apply for Section 333 exemptions. Once granted, an exemption lets companies operate drones for their requested business purposes. Companies who get the exemption need to adhere to certain rules, like using a qualified pilot,

**5,195 EXEMPTIONS GRANTED**

WALT DISNEY (L), ZM INTERACTIVE (R)



**Skytango has positioned itself to be the go-to source for epic stock aerial photos and videos. Here, one of the company's copters, a FreeFly CineStar-8 Heavy Lift, hovers north of the Cliffs of Mohr, near Doolin, Ireland. It's equipped with a MoVI M10 gimbal and Black Magic 4K production camera.**

no night flying, always having the drone in line-of-sight, and staying under 400 feet. And commercial filming must take place on a closed set: no public allowed. Rules for casual consumers differ, but if you're using a drone for monetary gain, you need an exemption. It's not the most straightforward process, but the returns can be high for everyone involved.

At the time of writing, 5,195 exemptions have been granted. More get filed every day. The FAA now has 17 employees and contractors working full time processing exemption petitions, with an additional 12 members of staff working part time, a spokesperson told *Drone360*.

"The speed they operate is not the same speed as the rest of the world," Austin says. He's struggled with FAA requirements — like giving notice when flying within five miles of an airport — as regulators' schedules don't

mesh with fast-paced TV shows that want everything approved, like, yesterday.

But he's had some great experiences. In 2015, he filmed the U.S. Open Championship golf tournament for FOX Sports. Austin configured his drones to share a live broadcast, and he flew from tee to green, adjusting the altitude as they buzzed across the fairways. "To be at golf's biggest tournament and have FOX trust us ... that was cool," he says.

He believes it's boom time for drones, and not just for Hollywood. Drones are also having a huge impact in agriculture and inspection industries. When you break down the first 1,000 companies that applied for exemptions by industry, the film industry made up approximately 10%. Today, it's closer to 30%.

Another way to measure drones' impact is looking at how many times they're discussed in

Congress. CapitolWords.org aggregates words using the Congressional Record, and the terms 'drone,' 'UAV,' and 'unmanned aerial' have spiked sharply over the last decade.

"Mr. President, have you ever flown a drone? This is a new technology, and it is great," Florida Senator Bill Nelson said to the House in January 2016. "Look at what we can do now with aerial photography, so we don't have to rent an airplane." He then addressed their negative uses, such as drug smuggling and violence, but his overall point was clear: This is great tech, we just have to make sure people use it properly.

#### ROOM FOR INNOVATION

But as more people get exemptions, the industry is having to address a surprising problem. The field is slowly becoming permeated with low-quality flyers: people technically qualified, but who



don't have the cinematography background needed to capture artistic vision. A number of drone operators told me they've lost business due to directors having bad experiences with novices.

However, this problem has pushed Steven Flynn and entrepreneurs like him to innovate. In 2015, Flynn launched Skytango, an online marketplace for drone footage. Flynn's a nine-time Emmy Award-winning director, producer, and editor, and has a good understanding of what film studios need. He wants Skytango to be the equivalent of Getty Images, a clearing house for stock photos.

Flynn started experimenting with drones in 2013, and the quality of video he was able to capture instantly hooked him. His first drone was a

FreeFly Cinestar HeavyLift. "The entire rig was \$30,000. It was like flying a nice car." When he started offering drone work to his clients, he was flooded with requests. He filmed sports footage for *60 Minutes*, worked on a Bollywood movie, and recorded landscape shots for history programs. "It used to be awful on set," he says. "We'd show up, and people wouldn't walk away — they'd crowd around."

Soon Flynn noticed that his novelty waned; the drone market was becoming oversaturated.

"Unlicensed flyers are a tremendously fast devaluation of what we were doing," he says. "People started paying less." Flynn's based in Ireland, which has similar regulations to America, but

**30% OF EXEMPTIONS BELONG TO THE FILM INDUSTRY**

**Skytango's Steven Flynn, pilot and director of photography, and John Hennessy, gimbal operator and camera tech, get ready work through their preflight checklist on a shoot for the Irish Lottery.**



**Aerial MOB's Heavy Lifter octocopter before a shoot in over the Los Angeles River near the Sixth Street Viaduct. Underneath is a MoVI 15 camera stabilizer and Arri Alexa Mini camera.**

times a beautiful sunset is worth \$1,000, sometimes nothing." His website is currently in beta, but Flynn is looking to launch later this year. Startups like Airstoc and Skyworks are hoping to get into the same market.

Brian O'lyaryz, co-founder of Cafeteria Films, a Miami production company, can see the value in Flynn's services. O'lyaryz's been experimenting with drones since 2012, when he worked as a producer for the Miami Dolphins. He thought it would be cool to get aerial shots of the players and show fans a different perspective.

He used a drone to document the team's training and charity work, like the Dolphins Cycling Challenge, a charity bike ride from Miami Gardens to West Palm Beach. "I remember the ocean looked gorgeous," he says. "We set up a shot pointing the camera down at the boardwalk and the cyclists. Then we pulled back really

quickly, so you saw the skyline ... it felt like a \$100,000 shot."

But when O'lyaryz uses drones, he hires a freelancer. It's easier to get someone who has all their paperwork and insurance in order than go through the exemption process. And he's hesitant about overdoing it with aerial footage. "It's such an exciting tool and everyone wants it," he says. "But it's a tool; use it only when needed."

#### NICE DRONE. GOOD DRONE.

Despite campaigns from the drone industry, a lot of unease still surrounds drones. People worry about safety and privacy. This is why FAA Air Traffic Control Supervisor Clay Coleman created the Bay Area Drone Film Festival, to help people view drones differently. He accepted submissions in ten categories. Alongside the expected landscape and natural wonders categories, he also included

comedy and a category benefiting humanity. He received 207 entries from 25 countries.

The two-minute short film that won the comedy prize was called Exploding Cows. A drone zipped above a farmyard as cowboy-hat-wearing Derek Klingenberg raced around in his truck, dispensing feed to 300 cows. On cue, farmhands would run into the cattle, scaring them till they scattered. From the drone's point of view, it looked like little explosions were forcing the animals to run around the field. Klingenberg cackled delightedly throughout. This entry was ridiculous, stupid, and very entertaining. And about as far from threatening as you could imagine. "Public perception [of drones] was negative. This has changed due to education and exposure of what drones can do," Coleman says.

And attitudes continue to shift. This year, Mattel announced it



TONY THOMPSON, AERIAL MOB (L), ROB GLUCKMAN/TEAM5 LLC (R)

**"SOMETIMES A BEAUTIFUL SUNSET IS WORTH \$1,000, SOMETIMES NOTHING."**

will sell a \$60 Barbie hoverboard drone, expected in fall 2016. Nobody's scared of a ponytailed plastic doll in a pink jumpsuit.

A number of schools have started offering drone classes, and half a million people have registered consumer drones since December 2015. But what about the thousands of YouTube #dronefail videos? "There will always be people doing stupid things with drones," Coleman says. "The same way they do stupid things with cars

— people do stupid things all the time. The press just sensationalizes drone stories."

Monica England at Aerial MOB has mixed feelings about Barbie's flight aspirations. On one hand,

Mattel is encouraging girls to fly and making drones mainstream. But she doesn't view drones as toys. "They can be potentially dangerous if a kid has no knowledge of flying it, and some people use them recklessly," she says.

But the benefits are just too good to give up on, and the possibilities for Hollywood are only just beginning.

Around an estimated 10% of all productions use drones, and this is predicted to rise dramatically as more pilots get licensed and the price for the technology keeps dropping.

And that opens up the market to experimentation and innovation.

Marom's at the forefront of this. His footage library might be full of gun-toting

villains (*The Expendables 3*) and dreamy aerial shots of Emma Watson driving from Silicon Valley to Marin (*The Circle*), but he's been hard at work experimenting with filming 3D footage using drones.

To do this, he mounted two cameras onto his xFold drone. The dual cameras capture images that can be stitched together, transported into virtual reality, and viewed through VR goggles. He worked on a 3D shoot for National Geographic, and one for a large studio with a strict confidentiality clause.

This type of drone/3D combo is still nascent, but as virtual reality becomes part of consumer lives and the world of interactive movie experiences keeps exploding, you can safely bet we're going to see a lot more swooping, whirring rotors in, both behind the scenes and in front of the camera, in Hollywood's future. **360**