

Filming over Venice... not
many options in case
of engine failure

Viewing the flying sequences from the BBC series *Earthflight* at the 2013 GTC Awards on the magnificent HD projection system loaned for the event by GTC sponsors Panasonic, was quite extraordinary. To see the world from a true 'bird's eye view' was a unique experience, brilliantly captured for the audience by GTC member and aerial specialist Richard Cook, in tandem with French 'birdman' Christian Moullec, who had trained flocks of geese and cranes to fly alongside microlight aircraft. This duo were deservedly presented with a GTC Award for Excellence, and here Richard, himself a very experienced pilot, explains a little of what it took to achieve these remarkable images.

Earthflight is a BBC wildlife series about bird migration made by John Downer Productions in Bristol. Its aim was to show birds in flight and to follow their migration paths using absolutely no video or special effects. The programme achieved this by filming both wild and trained birds from microlights and by mounting the latest miniature cameras onto birds and model aircraft. Christian Moullec was the expert bird-handler who helped us film the birds from the air. Christian has developed a great ability to imprint birds, for example geese, training them to follow while he flies an ultralight aircraft. The series would reveal six continents from the air, following the journeys of snow geese, cranes, falcons, eagles and other birds. As the aerial cameraman for the series, I would sometimes fly tandem with Christian alongside the trained birds, or when filming wild birds or scenic shots, would go 'solo' or fly with other pilots.

RED camera

For this demanding shoot we chose to use the RED One camera. At the time of filming this was easily the most advanced and capable video camera for the task, offering tremendous image quality (at nearly 4K) and able to shoot slow motion up to 100fps. It is also very flexible in terms of lens mounts, meaning I could choose from a vast array of lenses including both old and new Nikon and Canon primes. Most of the aerials were shot using Nikon glass. However, as is the case with all open-sensor cameras, keeping the sensor clean was a right hassle in the middle of a dusty airfield. Whenever possible, I would use my old film tent when changing lenses. In flight, focus was the biggest problem as I was often shooting at high speeds, meaning the lens was wide open. Being in an open cockpit swinging about all over the place it was very hard to even see an image in the viewfinder, so I made a shoulder mount that I could use like a trombone slide, which allowed me to move the camera backwards and forwards on my shoulder to adjust near-focus.

Getting off the ground

Having landed this dream job, which was perfect for me with my lifelong interest in flying (and 6500 hours experience as pilot and instructor), I found myself one morning at 4am, in a field, with bird-trainer Christian and his ground crew, James, for tests.

This first flight was to be full of technical problems... all of them mine! Christian's birds flew perfectly and I could not believe that I was flying so near the birds I could almost touch them. But my first problem was that the RED One camera was so close to the two-stroke engine that RF interference from its ignition was cutting through the camera's electronics, resulting in dropped frames and corrupted recordings. The weight of the camera was also causing problems, forcing Christian to fly a few miles faster per hour. We were already flying as slowly as we could without stalling but still it was making it hard for the birds to keep up. Many, many hours would be spent trying to solve these and other issues. However, the good news was that Christian and I immediately got on and have become great friends despite the fact I am an Englishman with no French and he speaks very little English.

The next test flights took place after a massive weight-saving exercise, camera and aircraft having been stripped of absolutely everything not strictly necessary. We ended up with no instruments, minimum fuel, and everything down to the last unnecessary cable-tie had been removed. The cameras themselves had also been pared right down, with many parts having been modified to save weight and size.

Those magnificent men
in their
flying
machines

ALL PHOTOGRAPHS BY RICHARD COOK

I was used to being in the air, having filmed many times in aerobatic aircraft and even sitting in the front facing the pilot to film backwards (very disorientating on a stall turn!). However, in order to film these birds and avoid getting the aircraft's superstructure in shot, I had to lean right out, which required great physical effort. To keep the birds in formation and in the correct position for the shots, we had to perform very tight turns. With the cameras weighing 15 to 20kg, it was sometimes incredibly hard to hold the camera steady in a 60 degree turn with the birds darting about all over the place and turbulence chucked in for good measure. With no superstructure to work against, all I could do to counteract



Filming at Mont St Michel

the plane's movements was swing my legs around. Christian thought I was crazy and kept telling me to be careful. However, it helped enormously that I am very used to flying and could sense what the plane was about to do. I also used various customised harnesses to keep both the camera and myself attached to the plane, plus a quick-release system for the camera in case we needed to ditch it in an emergency.

Beginning to get it right

Subsequent flights started to go more smoothly and after a while I was able to capture some lovely shots of geese flying past Bass Rock and Tantallon Castle. Viewing this footage I finally began to believe we were doing something very special. However, there were still quite a few problems to solve. On occasions the birds would suddenly decide to fly back to the runway, or would hover above the wing where I couldn't see them. Or sometimes, after hours of preparation, we would take off only to find we had to land because a bird had pooped on the camera lens!

At the time of filming, the RED One was easily the most advanced and capable video camera for the task, with tremendous image quality (at nearly 4K) and able to shoot slow motion up to 100 fps. It is very flexible in terms of lens mounts, enabling a vast range of lenses to be used

In my enthusiasm to save weight and make things easier to move in the air, I had gradually removed more and more of the front seat. One morning we took off and I found I was wobbling all over the place. Christian thought I was just being my normal crazy self and thought nothing of it, but suddenly I found the seat was offering no support and flexing all over the place, leaving me feeling as if I was balancing on top of a beach ball. You live and learn. It was funny in hindsight but not so amusing at the time!

By this time I believed so much in the *Earthflight* project I really wanted to perfect both the camera and filming techniques, so I flew down to Christian in France and we spent a great deal of time practising and capturing more footage. One early morning on a recce, just after takeoff, I looked down to see two cyclists staring up at us in amazement. One of the riders was so fascinated to see a plane with 12 birds flying in formation just over his head at 250ft, he cycled right off the track into a ditch, tumbling straight over the handlebars into the mud. I couldn't help but roar with laughter while Christian, who hadn't seen the incident, kept asking what had happened. It was a while before I could compose myself to reply.

Spreading our wings

As we learned from our experiences, we could take on more difficult species of wild birds and started to travel all over Europe. Some flights would go very well, while others were all over the place. The Carmargue shoot, for instance, nearly had to be abandoned when the local mayor refused to let us fly from a local field. Not to be defeated, we took the trike apart and carried it to the beach (sometimes at head height to clear obstacles).

Apparently the mayor had no control over the beach so we were free to take off from the sand. Our persistence paid off as, in one of the most spectacular sequences of the series, we were able to film cranes flying over the marsh with the famous Camargue horses running below. Mike Richards, a superb cameraman, was meanwhile filming from the ground. Timing the plane, the cranes and the horses for this sequence was a real challenge!

Turkey was a big shoot for the production company, involving many cameramen covering different areas of Istanbul for the stork migration. Helicopters, radio control aircraft, microlights, as well as crews on the ground were all employed. In Turkey (as in many of the locations) Christian was not there as we would be flying with wild birds, so I had to work with pilots I didn't know and in aircraft I had never seen before, which meant some quick decisions to evolve a system that would work. I had built up a good rapport with Christian by this time and so it was tough having to start again with new people. It always takes a while to make a shoot work with a pilot who is not used to filming: speeds and heights need to be hit right on the button and, in particular, accurate slow speed – the norm for filming – must be mastered. Many pilots

Filming from microlights

Ultralights or microlights are basically a development of hang-giders. They are lightweight powered aircraft and many different types are built worldwide. Modern microlights can be relatively fast and capable, often cruising at 80mph and climbing at 1000fpm with a good 4-hour range.

To obtain the pictures for this series we had to fly at the same speed or slower than the birds. This presented quite a few problems as aircraft tend to become sluggish and generally awkward to handle when flying very slowly, plus, as birds never fly in a straight line, manoeuvring was constantly required. Even the extra weight of the camera was enough to change how the plane flew, adding to these challenges.

Microlights are safe, however I was sitting on the very front of Christian's plane, a vulnerable and potentially dangerous place to be in the event of something going wrong. The box section my seat was bolted to was only 5x4cm. Great care was taken on pre- and post-flight checks, as this airframe did multiple take-offs and landings. Some parts on microlights are very lightweight and if worked hard need to be replaced more often than on a larger, heavier plane.

For many of the landscape and POV shots of the birds I used Ben Ashman's wonderful little Dragonfly SDR coupled with an Aeros 15 wing. With the right pilot this machine can fly very slowly and very accurately low level (e.g. round trees); it is ideal for hedgehopping. Low and slow is some of the best flying you can get!



Filming from the Dragonfly microlight



IBC BOOTH #7.H37
WWW.RED.COM



fly very well but with one purpose... A to B as fast as possible. If pilots are not patient and don't understand the tedious repetitive and accurate nature of filming, it can be a real battle getting the footage.

Tales from the jungle

To film macaws in Peru we shipped a Polaris seaplane out to the jungle. This was a very demanding trip full of technical issues, one of the biggest being just getting the plane there. I was accompanied by my good friend and ace pilot Robert Stalker. Typically Scottish, Robert wore a shellsuit the entire time as he would come up in a massive reaction to bites. Along with the rest of the crew, Robert worked very hard in Manu and really did not deserve to wake up one morning to find a python crawling over his chest! I told him he should have slept in a hammock... but I'm not sure he's very keen to follow me back.

The macaws proved very hard to film. We used a boat for close-up shots and aircraft for wide shots and aerials of the jungle. Again, there were many issues to overcome but the funniest was trying to fly at midday. The very high heat and heavy all-up weight of the Polaris, despite its massive wings, meant two of us flying together would struggle to get airborne. Sometimes we would belt past everyone on the river trying to take off, then (much to the amusement of all) disappear around the bend of the river, every so often climbing just a few feet, only to gently sink back down again. This plane was a hoot to fly solo though so I rigged the camera on the nose for many of the aerials.



Richard filming with the RED One

On one occasion, very early in the morning, I was flying at about 800ft, high above the tree canopy, when, very suddenly and without any warning, I was hit by what can only be described as the most massive jolt of turbulence, rotor or moving air. I will never really know what it was but it stopped the plane stone dead. I was at full throttle, perhaps about 10 degrees climb angle and about 10 degrees of bank, when the aircraft suddenly fell sideways, port wing-tip leading the way. Flexwing aircraft have no rudder

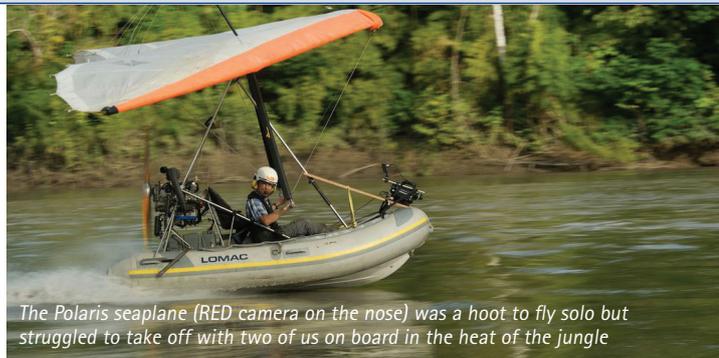
so I kept full power on and leant forwards over the bar hauling it as far into my guts as possible. Just missing the trees, I was careering towards the river, everything happening so fast, until finally, slowly, the nose of the aircraft came round and the wing started to fly again. I had control... just... and managed to get the aircraft rounded out about 10ft above the river. I landed, told Robert what had happened, waited for a minute or two going through everything in my head... and then took off again. This time I flew to a totally different area and the flight was fine. I kept looking at the heavy RED camera on the nose of the trike. That thing had probably played a major part in helping to get the aircraft to recover its attitude and hence some speed. It had maybe even saved my life!

Over Venice, we were particularly worried about the lack of places to go if the aircraft engine quit with all the water below us but the cranes looked fantastic over the city... a special filming moment

Rain, rain

One of the most difficult and memorable things Christian and I had to attempt to film was geese flying in rain. In real rain showers there was never enough water in the air to show up on camera. If there had been, I suppose the plane, and possibly the geese, wouldn't have been able to take off, so we had to supplement the real rain with a water-jet system fitted to the trike. Several days were spent planning, designing and drinking tea at the airfield, and after a bit of bodging with rope, ratchet-strap cable-ties and a couple of garden-sprayers, the DIY crop-sprayer (or bird-soaker) was ready.

We were shooting with a Photron SA2 camera, neither a light nor very ergonomic piece of kit, which featured (along with aircraft modifications I had made up) an entire viewfinder system shoulder mount with handles for the camera. I had also modified my flying helmet and glasses. The Photron SA2 is a very high-speed camera, recording at about 2000fps and generating only about 6 seconds of record time at the very high speeds. The shot had to be lined up and focused, and we were working on long lenses wide open on a very unstable platform plus, to boot, Christian and I had to fire the water jet at just the right time or we would have to land and reset the camera. It was an extremely difficult shot to achieve with the plane, birds, water jet and camera all needing to be in just the right place. Everything gets much heavier in a high-G turn so I



The Polaris seaplane (RED camera on the nose) was a hoot to fly solo but struggled to take off with two of us on board in the heat of the jungle

would land every time totally worn out with a compressed spine and grooves in my shoulder from the camera. We did succeed in the end, but I still have moments when I think back and can't believe we even attempted it!

Venice was also a difficult shoot. We were particularly worried about the lack of places to go if the aircraft engine quit with all the water below us. We had tried flying with the seaplane but it could not fly slowly enough for these birds, so Christian's trike was our only option. After days looking at charts and a huge amount of planning from Tilly, our producer in the office, we arrived in Nicelli, Mussolini's airfield on Lido island, a gorgeous place. The Italians had placed all sorts of restrictions on where we could fly but, as the days went on, we gradually gained their trust and managed to get closer and closer to Venice itself. We also found some more very small places to land in the event of an engine problem. It would not have been pretty if this had happened but at least we would have a chance of walking away alive. The cranes we flew with looked fantastic over the city and it was one of those filming moments you realise is very special as you look through the viewfinder.

At certain points on this series, I would watch the footage back in the evenings and pinch myself that we were getting such unique views of flying birds. Truly special. For me, the Venice and France sequences summed up *Earthflight*.

Fact File

I have to say a very big thank you to John Downer Productions and everyone I worked with as, without them and their massive hard work and support, I could never have achieved the footage I ended up getting.

Since the programme has been shown, the camera team, Christian and I have been delighted to win several awards:

- Royal Television Society: Cinematography
- Guild of Television Cameramen Award for Excellence: Richard Cook/Christian Moule
- Bulldog Award: Richard Cook/Mike Richards
- Nominated for two Emmys: Best Nature Programme and Cinematography

See more about GTC member Richard Cook's work at: www.cameramanscotland.com

See more about the series *Earthflight* at: www.bbc.co.uk/programmes/b018xsc1



Richard and Christian before the BAFTAs