



The team, from left: Bob Keene, Reese Keene, David Broom, Paul Dewhurst, Chris Saysell and Mark Fowler

# FAI World Air Games



**Bill Brooks, Technical Director at P&M Aviation, goes to Dubai in support of Brits chasing medals in the 2015 World Air Games**

Looking out from my office at a dull and rainy November day, our chairman, Andrew Cranfield languidly observed from his chair, 'Are we not the microlight flexwing world speed record holders? Do we not have three aircraft entered in the World Air Games? Well then Bill, better get over to Dubai and make sure everything works and the pilots are supported! Not accustomed to being let out unsupervised very often, I jumped at the chance.

I had actually been out there in December 2014 at the invitation of the FAI – the World Air Sports Federation – to survey possible venues for the first FAI world, human-powered, flight competition. All the ingredients were in place except the only runway available at the desert DZ (drop zone) was bordered by fences and the kind of moonscape injurious to such lightweight craft. So, that's one to look forward to at a future WAG when there's acres of smooth grass; the FAI are very keen to make it happen.

Dubai is the most bizarre place, it's a crazy futurist's dream come to life, fuelled by money.

Such strange places are the homes of unusual people. The one we are interested in is His Highness Sheikh Hamdan Bin Rashid Bin Mohammed Al Maktoum, otherwise known as Fazza. He's also the Ruler of Dubai.

Fazza, as well as being a poet, is a sporty kind of chap and has developed a love of skydiving and flying. Whereas you or I would settle for an old microlight or a share in a Cessna, he has grander schemes. He has his own astro-turfed airfield with instructors to train him and maintain his aircraft. He even has a hangar for his radio-controlled models including a large scale Airbus A380 with four gas turbines. His own airfield, known simply as The Farm, is next to the camel racing track and strictly off-limits.

Starting in 2010, His Excellency Nasser Al Neyadi, President of the Emirates Aero Sport Federation, set up the Skydive Dubai organisation which has two drop zones, the desert DZ and the Palm. If you want to learn to skydive, the desert DZ is the place to go, complete with a huge parachute packing hall with trolleys where spreadeagled

skydivers practise their moves. Nearby is the biggest vertical wind tunnel in the world, where 24 people can 'skydive' simultaneously. The DZ has artificially watered grass with a pool for the jumpers to water-ski through when landing – spectacular to watch! It's about 40 miles from Dubai off Route 66.

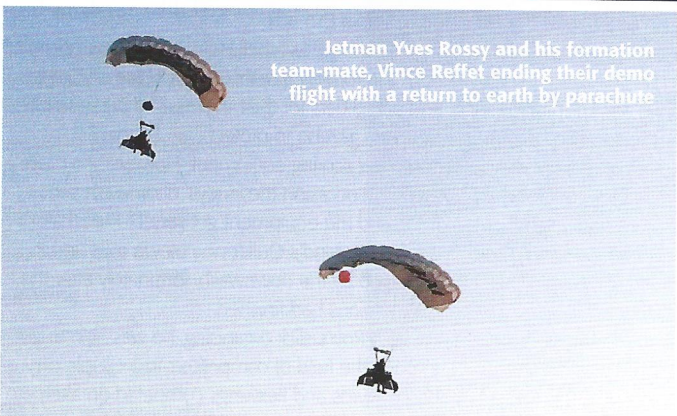
About 10 miles towards Dubai from the desert DZ is the model-flying field. Whereas you or I would use a rough bit of common, here there is a 350m x 30m tarmac runway, sunshaded pits for the aeromodellers, artificial grass, a luxurious clubhouse and a model shop!

To complete the setup, the jewel in the crown is the Palm DZ. This is at Dubai Marina, close to the Palm luxury housing development in the bay, beloved by football stars. The Palm DZ sports a tarmac runway about 1km x 75m which projects out into the bay, a large watered grass area and another pool. As an arena for air sports it is hard to beat. Little wonder that Jetman Yves Rossy has chosen to base himself here.

Rob Grimwood, microlight sky-god, had been



Spectacular opening ceremony for the Dubai World Air Games



Jetman Yves Rossy and his formation team-mate, Vince Reffet ending their demo flight with a return to earth by parachute



British microlight maker P&M supplied QuikR aircraft for the team. UAE Air Force supplied impressive Al Fursan display team

selected by the FAI to run the flexwing microlight and gyro flying competition. (The FAI decided the public would get confused with aeroplane-like fixed-wing microlights which were not represented.)

At the last World Air Games in Italy in 2009, there had been a race around two pylons, a bit like a bicycle pursuit race, when the QuikR dominated the competition. This time Rob sought to level the field by introducing a short take-off task, followed by a tight zigzag course around eight pylons timed to a finish gate and a climb to 1,000ft for an engine off-spot landing. It was thought that the short take-off, precision landing and high manoeuvrability requirements would take the emphasis away from pure speed.

The British team comprised David Broom, Paul Dewhurst, Chris Saysell, Mark Fowler, Rob and Reese Keene. All are seasoned competitors and most gathered at Oakley for some practice in October. A CAA dispensation to exceed the normal 60° bank limit was granted on the basis that the aircraft would be flown solo, get fully inspected in critical areas and that data was gathered about g-loading.

For this I found an application called Sensor Kinetics for an iPhone 6. The pro version costing a whole £1.50 enables output from the internal phone sensors to be put into a file which can be emailed to any computer in the world and read by an XL spreadsheet! The iPhone 6 has a 16g sensor in it. The app shows the output from the x (sideways), y (up) and z (in/out) accelerometers v. time. The app also allows for a low pass filter which I selected to cut off everything above 3Hz, otherwise engine vibration would mar the results. I'm sure it would be interesting for aerobatic pilots.

## Tweaking the machines

Before I get too geeky, the boys did some cranking and banking around a typical course and found it was near impossible to exceed 4g. The QuikR was originally developed with winglets to damp out high-speed Dutch roll oscillations and uncommanded rolling tendencies. During the development of the larger GTR wing this was found to be quite a severe problem, which was traced to asymmetric inflation of the undersurface at speed. Venting the undersurface at the low-pressure peak just behind the leading-edge stopped the inflation, greatly improving high-speed stability to the extent the winglets could be removed. Without winglets there is more adverse yaw in turns but the roll rate is noticeably faster.

The venting modification was applied to the QuikR so that performance around the course could be compared with winglets on or off. At the Oakley trials, the pilots found that the roll control forces with winglets on were higher but they could turn tighter. The short take-off requirement meant a search for some more lift. The PulsR composite trike has a more cambered set of rib profiles because I could not initially demonstrate the stall speed was below the microlight 40mph limit at 472.5kg max weight. Fitting these profiles to the QuikR wing, after a little development to get the trim speed right, resulted in a 2mph reduction in stall speed, a sharper but straighter stall break and no reduction in the maximum level speed of around 112mph. The propeller pitch was adjusted to give 5,600rpm at that speed and an initial climb rate of 2,000fpm.

Equipped with this knowledge, the two aircraft with glorious Union Flag undersides were shipped off to Dubai along with another yellow QuikR

demonstrator aircraft.

Rob had organised the desert model aircraft strip for practice prior to moving up to the Palm. The desert was laid out with inflatable cone pylons, each one occupied by a marshal frying in the sun. These white cones growing out of the desert looked surreal like a Salvador Dali picture. Machines were prepared; I sorted out brakes and tuned a wing.

Other aircraft included an Apollo trike from Hungary, which had a wing equipped with split flaps. There was a team of Chinese pilots flying two Air Creation Tanargs with Bionix wings. The French team fielded an Air Creation Skypper/Bionix machine and an unusual trike with a La Mouette wing and a modified, fuel-injected Rotax 912S engine, later to fail and result in a ditching. The only non-Rotax engine was a BMW R1200 motorcycle based powerplant, on an Eagle trike with a Bautek wing, flown by Ferenk Burkus. The British team was sharing the two Union Flag QuikRs whilst the yellow one was shared by Todd Ware from the USA, Manuel Rey from Spain and Jiri Zitka, a Czech pilot. Per Hoyland, the Viking biker, was competing in a black QuikR, which he had previously flown from Scotland to Norway.

The contest began and the French La Mouette machine had the shortest take-offs to clear the tape, 42 metres, and was getting around the course in 85 seconds or so. The QuikRs were taking 10 metres more to take off but a good pilot could get around the pylons in 10 seconds less. Assuming the same spot-landing score, Rob's intention to level the field seemed to be working.

Some of the over 90° banking had me quaking in my sandals but all was well and I found it looked quite normal after a while. Mark 'Foggy'

Fowler had been pushing out so hard on the control bar in the steep turns that he broke his seat backrest. He also stalled the wing rounding the pylons a couple of times, which gave him some exciting moments, judging by the video. Fortunately at a high g-loading the additional washout ensured a straight wing-root first stall, with no tendency to flick.

The gyroplanes had also arrived, organised by Kevin Woods. It was fascinating to see these machines operate in a contest and how they measure up to the trikes on the same task. Magni M16, MT-03 and Calidus gyros were represented. The Magni had the shortest take-off run, but even this was 15m longer than the QuikR and using 15 more hp. The Calidus, despite looking like a supersonic rocketship, had the worst take-off performance and was no faster than the rest around the pylons.

It surprised me that the gyros were all slower than the QuikRs around the course. Then it came to spot landings. I had thought a gyro ought to be able to land in very little distance with great accuracy. In fact, they seemed to have much more difficulty in touching within the 5m zero points box than the flexwings. The landing rollout was sometimes shorter but not by much. Without collective pitch control like a helicopter, a gyro has to be flown into the approach on a glide with enough energy to flare for landing.

One machine approached too slowly, resulting in a high descent rate, no landing flare and a bent axle. The times to get around the pylons seemed to be more consistent than the flexwings, possibly because control is less physical. The gyros may have done better in gusty conditions.

After getting the competition organised and the first races done, it was time to move out to the Palm DZ. The lucky pilots got to fly to The Farm, then on past the tall buildings of Dubai including the famous 2,700ft Burj Khalifa. We were staying on the 38th floor of the 56-storey Jumeirah Emirates Towers hotel. I have no fear of heights when flying but the low balcony rail and transparent elevator pods made me weak at the knees for the first couple of days. A steerable parachute would be a good means of escape – perhaps they should be provided!

The WAG opening ceremony was spectacular, with ‘parachutists’ and mythical figures zooming through the air on trapeze wires. There was a model helicopter being flown in the arena with LED lights on the blades, which acted like a projection screen. The ceremony ended with a barrage of fireworks.

Early next morning when we arrived to ready the course, 70 hot air balloons took off and headed out to sea! Their pilots obviously knew something because as they rose they contacted an on-shore breeze which blew them back inland. Their competition was to precision land which they can do with great accuracy, steering by exploiting different airflow at different altitudes.

Having set up the QuikRs, no modifications were allowed and I was employed as a landing marshal for the 10 penalty points box. This was a hazardous occupation. Dave Broom decided he could get a shorter take-off distance score by using a diagonal run. This put him at 1m altitude coming straight for me; he then had to straighten his flight path to get through the start gate. The adverse yaw from his enthusiastic control input resulted in him

passing through the gate rather sideways. Chris Saysell pushed the control bar out a bit too vigorously on take-off, marginally cleared the tape and then stalled, recovering just in time. The Hungarian machine had an instability under heavy braking resulting in severe oscillations but fortunately it stayed on the runway.

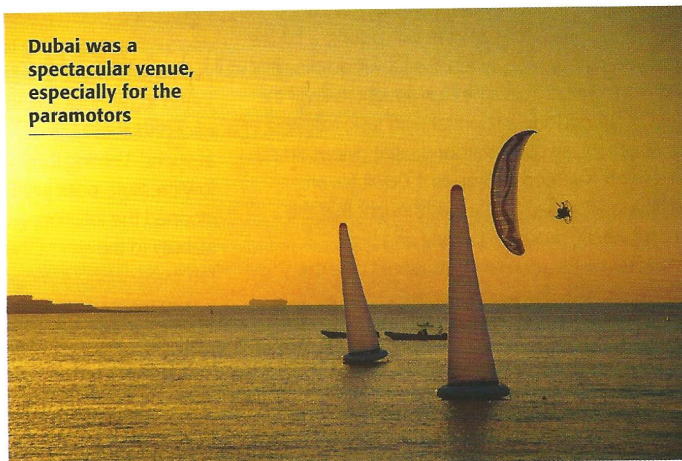
The power-off landing task was really a spot touch. The best technique seemed to be to approach at between one and two feet above the ground with some excess speed, then dump the aircraft onto the 5m box and stop within the 100m deck. A little harsh on the undercarriages but BCAR Section S regs showed their worth! The standard shown by the top pilots was very high. Most of us would be happy to get into a field power off, let alone into a 5m box.

There were two Bell Huey helicopters operating from the runway threshold area, lifting skydivers and paragliders for their events. The organisers had bought a gazebo to protect Dan Subhani’s computer scoring equipment. However, on more than one occasion the Hueys’ downwash sent it flying and the equipment got sandblasted. Later on, Per Hoyland’s QuikR was blown over and damaged by the downwash, fortunately after the competitions had finished.

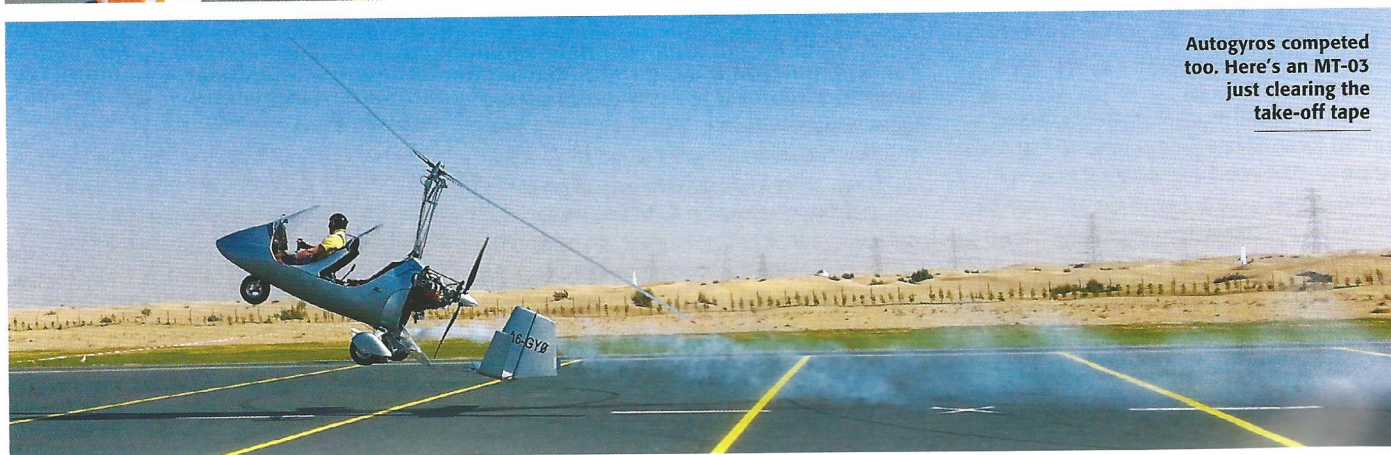
With Rob’s slick organising, he was able to get through the field of competitors in a couple of hours. Gyros and flexwings competed on alternate days. Rob’s idea of penalising the take-off run to compensate for a purely speed machine was not enough to stop the QuikRs gaining the first eight places and the British Team the first four with David Broom winning a well-deserved gold. A truly terrific result for everyone involved! ■



**QuikR in the desert, just after take-off and heading for the pylon course**



**Dubai was a spectacular venue, especially for the paramotors**



**Autogyros competed too. Here’s an MT-03 just clearing the take-off tape**