

FLY YOUR MUSHROOM WITH PRIDE

At this time of the year we all take stock of what has been achieved and what are the possibilities for the future. One of the most intriguing ideas of this year was the story of the biodegradable drone. Yes, I too read the story with some incredulity. However, upon reading the detail (not just the headline) we find out that it's only the chassis, made from a root-like fungal material called Mycelium, that biodegrades, leaving the motors, props, ESC's and battery intact! However, researchers at Stanford say that they are working on this problem next.

The word 'Drone' is not a term I particularly like to describe small unmanned air vehicles or if you prefer Unmanned Aircraft (UA) or even Remotely Piloted Aircraft Systems (RPAS); however it is the 'only' term that news and media agencies will use, so we had all better get used to it! Whatever you call them, they are starting to proliferate into every aspect of our daily lives, from entertainment to agriculture and from deliveries to search & rescue missions.

One of the big news stories of 2014 was the introduction of so called 'drone' deliveries. Amazon (Prime Air), Google X (Project Wing) and DHL (Parcelcopter) all claimed to be developing multirotor systems for deliveries to customers in the 1-3 kg range. However, DHL won this particular battle in September by introducing urgently needed goods to the car-free island of Juist, off Germany's northern coast. The crossing distance (7.5 miles) will seriously test such platforms and the company admits that crossings will only be made in calm weather conditions. Having tried unsuccessfully to cross the Solent with a Y6 in May of 2014 in 30 knot wind speeds, I can personally testify to the challenge that this poses. It will be interesting to see how the Amazon drone delivery trial in Cambridge works out in early 2015.

If 2014 was all about spin, then 2015 will be all about legislation. The FAA in the States have finally realized that they cannot hold back the tide any longer and have started the formal process of issuing exemptions to fly, mainly as a result of hard lobbying from film production companies and others. Of course, here in the UK, we have a regulator in the CAA who have been at the forefront of promoting a more sensible and measured approach to legislation of such systems. However, be in no doubt that agencies such as the CAA have only one agenda: safe flying and flying safely. The recently reported near misses here in the UK and in the US have highlighted the fact that many operators of small multi-rotors have had no training and have no understanding of the rules of the air. The current generation of drones are so easy to fly, that they can give the pilot the illusion of infinite capability, which can lead to unexpected consequences. It would only take one serious accident to set this fledgling industry back

several years. Imagine the headline 'Drone Downs Jet at Heathrow'



By the way, I have heard of testing aircraft against bird strike (a rather common phenomenon), but I haven't heard of any research being conducted on the effect of a multi-rotor being sucked into a jet engine! The recent MoD call (2011) for a small battlefield drone (won by Prox Dynamic of Norway) concluded that anything less than 60 g would be safe to fly without direct ATC permission.

Whatever the conclusion of this, it is fairly certain that new legislation, on the way from Europe and in the US will place greater emphasis on pilot qualifications and airworthiness standards for small unmanned aircraft below the current 150 kg threshold. Better join the BMFA (British Model Flying Association) now to benefit from their newly introduced multirotor qualifications A & B!

So who has done well this year? The winners have definitely been DJI and GoPro with their range of multi-rotors (Inspire 1 and Phantom) and camera systems (Hero 3 and 4). Taking a look at GoPro first, the company grew 125% in 2012 and 87% in 2013 to \$985.7 million in sales. But unlike most young and growing companies GoPro also made a profit of \$60.6 million last year. The challenge comes when you look at 2014. Sales were down 7.6% in the first quarter to \$235.7 million and net income dropped by more than half to \$11.0 million. In light of these results, GoPro (who listed on the stock market in June 2014) has recently announced that it will be developing its own range of multi-rotor platforms in 2015. Now

turning to DJI (spun out of a research project from HKUST) who are based in Guangdong, Southern China, probably the most successful drone company in the world, generated sales of US\$130 million last year. Revenue is expected to rise at least threefold this year. Their latest product, the Inspire 1 quadrotor, released in November 2014 and which sells for around £2k has been met with rave reviews due to its HD video streaming capability.

So to summarize, 2014 was a big year for drones and 2015 will be even bigger and more challenging. Fly safely and enjoy!

Dr Stephen D. Prior
Reader in Unmanned Air Vehicles
The University of Southampton
20 December 2014