AEROBATIC PILOTS ARE SAFER PILOTS

By Matthew Kitson. With additional anecdotes from aerobatic pilots of the BAeA.

Adrenaline, excitement, g-force. The sound of the air rushing by and the engine revving hard as I loop and roll over the countryside on a beautiful summer's day. All the ingredients to become highly addicted to the unlimited sport of aerobatics! Apart from the senses and emotions that are engaged while flying an aircraft close to its limits and pushing your own personal boundaries, what has it done for my flying skills and what can it do to make you a safer pilot? This article aims to explain my journey to becoming an aerobatic instructor, the opportunities that have opened up and why I now believe that I am a safer pilot. It will also

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show how you can get into aerobatics and start a journey that will lead to you not only becoming a better and safer pilot, but also give your flying a real purpose!

I was first introduced to aerobatics as an air cadet in that venerable old lady, the AEF Chipmunk. This was to become the driving force for my starting a PPL course and soon going on to learn how to perform aerobatics for myself. For me aerobatics very quickly came to represent the ultimate freedom in aviation and also the most fun you can have in an aeroplane. With my license still wet in my hand, I started learning loops and rolls in a Slingsby Firefly. I loved the training, but due to instructor availability never quite finished the full course and so had some large gaps in my training and knowledge. I had learnt to do basic figures, along with cubans, reverse half cubans and a variety of rolls, but had a fear of spinning and stall turns and therefore a fear of what might happen if I ever messed up. I had once nearly been bitten when trying a figure I had not had demonstrated to me first. A close look at Vne when I got it horribly wrong made me vow never to try anything new on my own again! Of course, I now know that trying new things is the key to development, but only building on a sound understanding of the basics. More of this later.

For a few years I just flew these simple manoeuvres on my own, not having the confidence to take others up with me. Soon I stopped all GA flying and joined the ranks of the commercial pilots to learn to fly the 737 with a well known low cost carrier . I could neither afford aircraft hire nor did I have the time after being initially based out in Europe. On my return to the UK I re-joined my local flying club in 2016 and finally completed the AOPA basic aerobatics certificate, the foundation for most pilots' EASA aerobatic ratings. I was taught by ex-military instructors so learnt the 'military' way of doing aerobatics. Precise, structured and by the numbers. I then took another 6 month gap from private flying while I completed my training with a new airline and only then returned to the flying club's Slingsby and to my aerobatics. This time I decided I needed an aim, so at the start of 2017 I joined the British Aerobatic Association (BAeA) and somewhat nervously committed to enter a Club competition at what is very much the beginner's level. With that came a sudden

realisation that I now had but a few months to learn how to actually fly competition aerobatics.

My first coached flights were in a Great Lakes bi-plane at Chandler airport in Phoenix, AZ while on a layover there. Suddenly, I had graduated from the Firefly and was flying my first open cockpit classic taildragger and really learning what my feet were for. Although I had entered at Club level, I really wanted to practice the Sports level routine to stretch myself. This sequence involved a one and a quarter spin and I was keen to learn how what I had previously perceived as a dangerous manoeuvre to be avoided, could be flown to the accuracy required in a competition and potentially down to a relatively low base height of 1000'. The light winds and clear skies of Arizona provided the perfect training ground and in the two days I was there I flew 5 hours in the Great Lakes and left much more confident and already noticing a massive improvement in my flying and understanding of aerobatics. I had experienced my first inverted spin, rolling circle and was flying the Sports routine to a reasonable level. I had also flown my first taildragger and enjoyed the challenges that had presented. Heel brakes – easy (not)!

I spent every spare moment reading Alan Cassidy's 'Better Aerobatics' book, only to find that the Firefly was struggling to keep up with the later chapters. So I booked a week at the British Aerobatic Academy at Peterborough Conington to learn to fly their Extra 200 (a bucket list aircraft!) and get my tailwheel endorsement. I was taken aback by the sensitivity of the Extra's controls and much faster roll rate. After my first couple of flights I thought I would never be able to fly this aircraft accurately, repeated g-stalling it with every ham-fisted pull and having my mental capacity eaten up by basically relearning how to fly even the basic manoeuvres to a competition standard. By the end of the week I had completed my taildragger wings on the Academy's Cessna 140 and was slowly starting to get a feel for the Extra. My personal envelope had been extended and I was able to try new things like flick rolls and negative g manoeuvres. I had also learnt one of the most valuable lessons - the stick is in fact the angle of attack indicator – the aircraft will always stall with the stick in the same position, no matter what the speed. This light bulb moment is essential in going forward in aerobatics and to learning new things and is key when putting a sequence together. I was now flying by feel rather than by numbers and my brain soon caught up and my mental capacity increased.

I started the season with the BAeA Club event at Little Gransden, the perfect environment for a budding aerobatic pilot. The event is set up to allow you fly two flights with an instructor. The first in the morning has a half hour practice period before returning to the competition box over the airfield to fly the Club sequence in front of the judges for some valuable feedback. The second flight in the afternoon is straight into the box to fly the sequence to be officially judged and scored by the judges. I found flying in the box exciting and challenging, especially with a sporting twenty knot plus crosswind. We all compared scores eager to find out where we had come against our fellow beginners. I was pleased to finish mid table, but most of all that I had improved significantly from my first flight.

That was it. The first competition was complete and I was hooked! I spent the rest of the summer training on the Extra 200, including going solo, practicing and attending every

competition my work roster would allow. The move up to Sports class at my next competition introduced unknown sequences which had to be learnt on the day with no practice. This is a real test of aerobatic skill, memory and discipline. What became very clear now was that the entry level AOPA course and aerobatic rating only really introduces you to the basics. There are in fact thousands of figures and it's impossible to practice all of them. What this means is that during unknown sequences you will fly figures that you may never have flown before. This takes skill, planning and an understanding of energy management and of the limitations of your aircraft. It also means aerobatics is a sport where every pilot at every level is constantly challenged and pushed to their limits and at times the aircraft is flown close to its limits as well.

By the end of my first season I was training at Intermediate level, along with some Advanced figures and now trying new things on my own. I constantly got things wrong especially avalanches (a flick roll at the top of a loop) and often ended up in an incipient spin or some other unusual attitude. The difference is that now I don't care – I have the skills to sort things out. I am no longer scared or nervous of the unknown. In fact I enjoy getting things wrong as it leads to a greater understanding of control effects and increases my confidence in my own abilities to recover the aircraft. It's the confidence needed to progress in flying and to develop my aerobatic skills. You have to be comfortable to try new things in a controlled manner as this may well be required in flying those unknown sequences. Having said that it is wise that any major new skill is demonstrated by an experienced instructor first. I needed an instructor to teach me flick rolls, inverted and flat spins, tail slides and more recently gyroscopic figures. It requires a sensible approach and an understanding that altitude is definitely your best friend!

At the end of the season I completed a Class Rating Instructor (CRI) rating and aerobatic instructors' course. I am now teaching aerobatics as well as tailwheel and complex types for EASA ratings. Aerobatics has given me the confidence to push myself and be comfortable in new flying situations. I find that I am always within my comfort zone when teaching no matter what the student does, allowing me to stay calm and deliver effective coaching whether in aerobatics or general flight training. The experience I have built up over the summer of competitions and training means that I am now able to work towards a display authorisation on a 450hp Yak 50 - an aircraft which even last year I could only have dreamt of flying. The Yak 50 is a single seat aircraft so there was no dual training. I had to approach learning to fly this aircraft safely in a sensible and controlled manner, relying on all my newly acquired aerobatic and taildragging skills.

So why does aerobatic training make you a safer pilot?

With the basic flying skills acquired during your PPL flying from A to B in a Piper Warrior or similar for a tea and a bacon sandwich you will be using this much (red circle) of the aircraft's capability, if the grey square is available performance:

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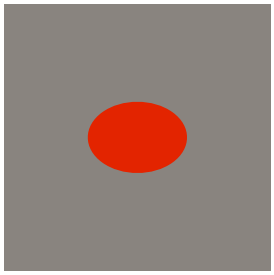
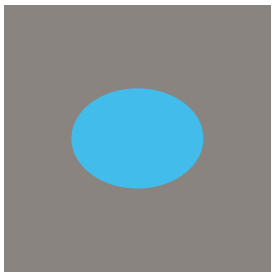
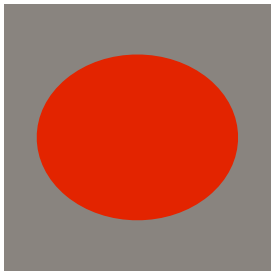


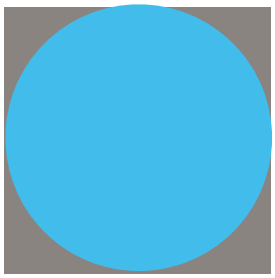
Once you have been doing it for a while it also requires much less of your mental capacity than when you were learning and you are always flying well within your limits. So you are using this much capacity (blue circle) out of the total available in the grey (matter) square.



One day on your return trip you get caught out by the weather and inadvertently fly into a cloud in which there is unexpected turbulence and icing. The aircraft is shaking and being thrown about and the stall warner is constantly going off. The aircraft rolls violently beyond 60˚of bank while simultaneously starting to descend. You're now using this much of the aircraft's capabilities:

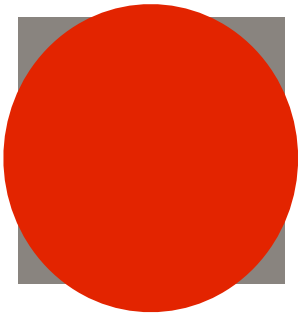


…….but this much of your mental capacity:



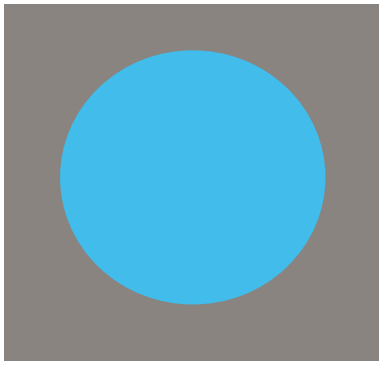
You've never been in this situation before and in this banked slow speed descending condition you pull back sharply to try and regain straight and level flight. The aircraft stalls and rolls further into the turn. You try to pick up the wing using aileron and the aircraft begins the rotation into the spin and potentially the last few moments of your life…..

…….and you are now using this much of the aircraft's capability:



Now consider you have recently completed an aerobatic rating in the club's Firefly or similar. Nothing high performance and not too dissimilar to the Piper Warrior in everyday handling. You have spun the aircraft many times, you've flown steep turns to the edge of the accelerated stall and you have experienced several unusual attitude recoveries. You've been upside down more than once!

In the same situation, the aerobatic skills in your locker mean that your personal envelope - that grey square - is that much bigger. Why ? Well, you've experienced more and your handling skills and understanding are that much better. You know that in a 60 degree level turn the stall speed increases about 1.4 times and you know what it feels like. You also know what happens if you persist with pulling the yoke back in that scenario. You're better equipped to deal with the situation. You're still shocked by the circumstances - who wouldn't be, but you've seen these bank angles and speeds before. You've flown an aircraft repeatedly on the edge of the stall until your muscle memory and instinct have made you comfortable with recovering from unusual attitudes and incipient spins. It keeps you away from the edge. This time you unload the controls reducing the angle of attack, roll the wings level and gently raise the nose to the horizon. Calm is restored.



Loss of Control (LOC) is by far the biggest killer amongst GA pilots and a CAA analysis of GA accidents shows that over 60% of serious injury or fatal accidents involve loss of control. Conversely, the number of GA pilots with an aerobatic rating who suffer LOC accidents is very small – almost zero. Why ? Is there a genuine link ? Well, after aerobatic training when you fly your personal envelope really is considerably larger than before and that does have tangible benefits. You do have noticeably more mental capacity allowing you to deal more readily with new or unexpected situations. You are now actually a safer, more skilled and better equipped pilot. You've flown an aircraft throughout its operating range, so when using it for normal A to B flying you are well within both your own and the aircraft's envelope. I guess this is why upset recovery training is now one of the fastest growing training focusses for commercial pilots and training organisations. Stick and rudder skills do matter.

Aerobatic training is great fun and opens up a whole new world of aviation. It will give your flying a purpose. There will be new aircraft to fly, ranging from classic aerobatic trainers to high performance mounts like the Extra 200 and 300 series and ultimately warbirds. Aerobatics is a recognised sport and entering competitions is a great way to push yourself. The challenge is never ending as no one has ever flown a perfect sequence, so you're always trying to beat your previous best plus outperforming the other pilots. You will meet like-minded people, share some fun and enjoy your passion in a friendly environment. Above all, you will be a safer and better pilot and who doesn't want that?

To get involved search the British Aerobatics website www.aerobatics.org.uk *for recommended flying schools offering training. Complete the AOPA basic and standard courses and gain the aerobatic rating, then enter one of the Club level competitions. The only reason you would regret it is because it is highly addictive!*

Alongside Alan Cassidy's 'Better Aerobatics', there are many good books available to further your understanding, but as a beginner always seek professional instruction first and don't try teaching yourself basic aerobatics! Remember when practicing altitude is your best friend!

Matt Kitson is a long-haul First Officer on the Boeing 747 and part-time aerobatic instructor with the British Aerobatic Academy.

A close view of the hedge (at the near end)

I am recovering from the local area in a T67A, having spent most of the last hour alternating between blue and green in the view through the top of the canopy. I am tired, but happy

and relaxed because I feel very much in tune with my mount. Approaching the circuit there is little traffic, so I call a run and break and position on long finals for the run in. At the appointed time I bank sharp to the right and focus on flying a continuous turn from downwind onto a short final approach, keeping away from the housing on the extended approach path. I notice that the trees appear to be passing by much faster than usual, so I reduce power and raise the nose slightly to slow the aircraft and my descent. It's still happening quite quickly so a little less power and tad higher nose angle. Suddenly the aircraft descends quickly. I instinctively push forward TOWARD the rapidly approaching ground, unloading the wing and adding a generous handful of power. By a whisker we brush over the hedge and pull off the shortest and firmest landing of the day. Impressive from the tower, but only I know just how close I came to planting my wooden wonder into that hedge and most likely me into a hospital bed or worse. My aerobatic training saved the day, but I definitely learned about unexpected tailwinds from that.

Steve Todd – BAeA Chairman

Glider in a spin

I had travelled to Poland to learn aerobatics from a master, former glider world champion Jerzy Makula. It was a fortnight of intense training, mostly dual in the prototype Mdm Fox, the only two seat glider capable of flying unlimited aerobatics. This was the actual machine in which Makula had won multiple world championships and training from scratch up to unlimited in two weeks was demanding to say the least. All was going well until something happened which was to prove to me the value of disciplined aerobatic training. On a strong thermal day and flying solo I managed to climb quickly to 6000' from a lower release. My brief was to practice the figures already learned, including a full positive flick on a horizontal line. It was an early solo flight and I must have been nervous. I used far too much up elevator and the glider started to auto rotate rapidly. In spite of my using the correct recovery control inputs, it just wouldn't stop spinning. Full forward stick and opposite rudder weren't having any effect at all. The stick was lifeless in every direction, almost as if it had become disconnected. Jumping for it was starting to look like my only realistic option. As I was about to release my harness I suddenly remembered my basic aerobatic spin training and with the voice of my old CFI in my head forced the stick onto the front stop one more time and held it there. Round and round she went and then - bang, suddenly we were flying again. We now teach recovery from this unusual situation as standard in the Fox. Experiences like this can only serve to increase a pilot's confidence in themselves and their aircraft.

Paul Conran – British Glider Aerobatic Team Manager