



## Des Barker

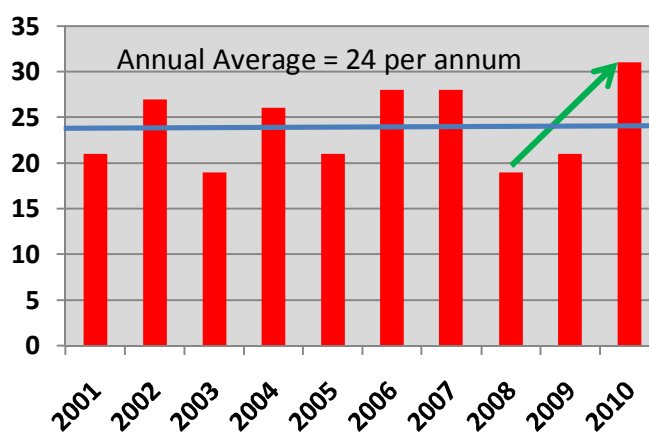
### Air Shows 100<sup>th</sup> Anniversary Year

While many industries may have some trouble pinpointing a single date that marks the moment they began, that is not the case for the air show business. In January 1910, aviation enthusiasts gathered at the Dominguez Air Meet in southern California, an event that drew an estimated 175,000 spectators to a hilltop mesa outside of Los Angeles to watch aviation pioneers showcase their aircraft and create a new kind of entertainment industry.

The Los Angeles air meet was the first of three major air shows in 1910. September would feature the Harvard-Boston Aero Meet in Atlantic, MA that included the Wright Brothers and aviation pioneers Glenn Curtiss and Claude Grahame-White, dispersing \$90,000 in fees and prizes and featuring a mock bombing run where plastic ordnance were dropped on warships.

During the intervening 100 years, the air show business has evolved into the ultimate platform for

### Airshow Accidents/Incidents 2001 to 2010



A sharp increase in annual accident rate over the past three years with 2010 being the worst safety year in the history of airshows worldwide. What risk management or mitigation can be introduced to reduce these statistics? Are these rates sustainable? Where will this all end if no rectification actions are implemented worldwide? Is this a case of improved reporting or reduced safety oversight or even reduced display flying standards?

showcasing airplanes, pilots and world-class airmanship. The industry would never look back, not only playing host to millions of spectators each year, but also becoming a compelling recruitment tool for the armed forces worldwide.

According to John Cudahy, President of ICAS; "Although it is true that airplanes helped to create the airshow business, it is equally true that airshows helped to create and define the aviation industry". "The pioneers of the air show industry knew exactly what they were doing. They knew that airplanes, flight, and aerobatic performances were captivating to the public. And they knew that an engaged public would help to drive new developments in aviation." But, to what extent have airshows been safe public events over the past one hundred years?

### 2010 Summary

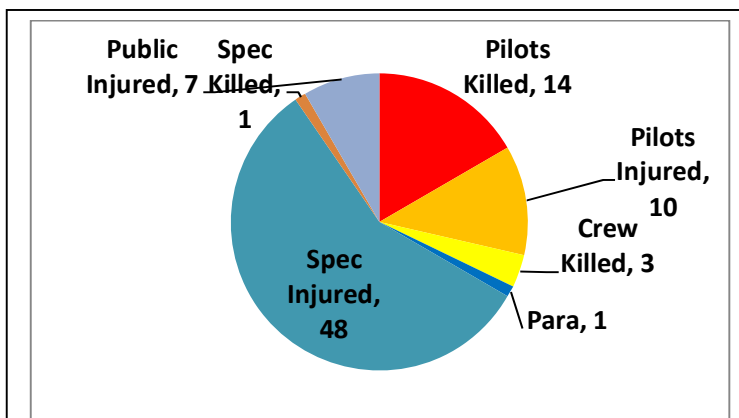
Sadly, history will reflect that statistically, the year 2010 was the worst year for airshow safety in 100 years in terms of the number of accidents/incidents. Sadly, a total of 84 people were killed or injured as a result of airshow accidents or practices while 35 aircraft were destroyed or damaged by the associated accidents.

Formation aerobatic teams were particularly involved during the first part of the season. New Zealand's *Red Checkers*, then India's *Sarang Team*, then their *Sagar Pawan Team*, then the British *Red Arrows*, then the French *Patrouille de France*, left many wondering just what was going on; by April, formation aerobatic teams had made up seven of the first eight airshow accidents and incidents in 2010.

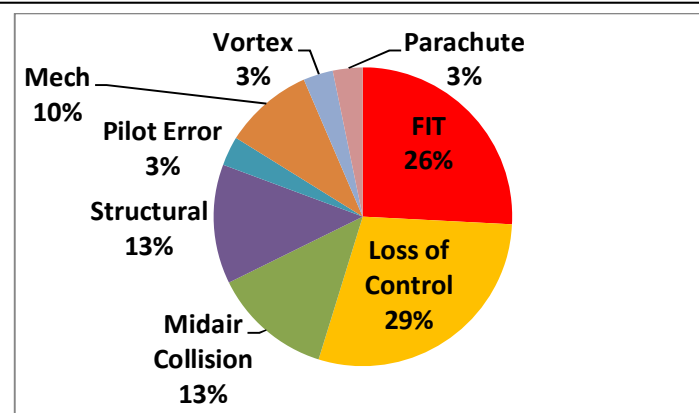
2010 was also the turn of the *Red Bull Air Races* to be exposed to the vagaries of human judgement errors that by 31 July, *Red Bull Air Races* announced that they would not be back in 2011. Some late-in-the-game venue changes and cancellations disrupted the race schedule for 2010 and two near-accidents raised safety concerns. Brazilian pilot Adilson Kindlemann flew into the Swan River in Australia in April, and in June, Australian pilot Matt Hall slammed into the Detroit River in the Windsor Race, though he managed to fly out from the water impact and remain airborne. Neither pilot was hurt.

Following ten years of rapid growth, the organization decided that it needed to make the tough decision to take a break for 2011 in order to implement the changes required with regard to the restructuring of the organization and, importantly, to develop the various commercial areas of the business. Leaders in several of the host cities expressed dismay at the loss of the event, which brought in millions in tourist revenue.

Had the rest of the display pilots and safety officers worldwide sat up and taken note of the actions taken by the Royal Air Force in grounding their Hawk display pilot for 2010, the increase in the



Accidents by Fatalities. A total of 84 fatalities and injuries annually is unsustainable and unacceptable.



Accidents by Causal Factor. For the first time since the early 1900s, structural failure has featured prominently as a result of experimental/-homebuilt/LSAs entering the display environment at a structural disadvantage.

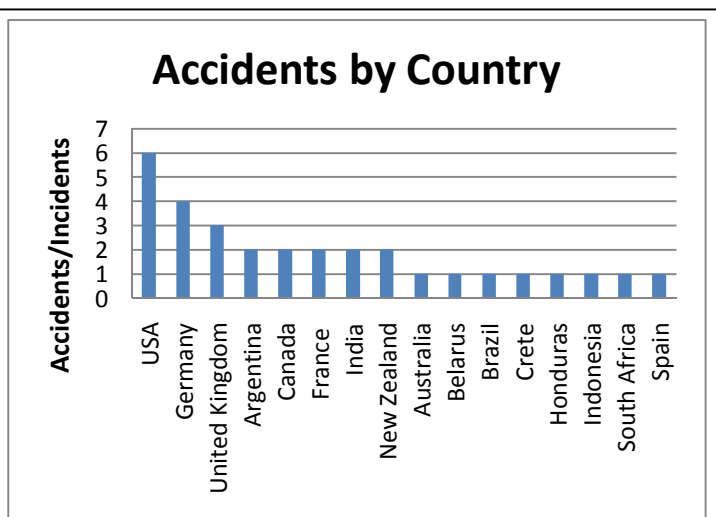
number of structural failures could possibly not have been so high. In an unusual first for the display circuit, the stern action taken by the RAF removed a display pilot from the circuit, at least temporarily, for putting a little too much extra into his job. Flt. Lt. Tom Saunders was sent off to flying a desk after someone had a look at the flight data recorder in the BAE Hawk jet he flew in airshows and concluded that he was flying too aggressively. According to the London Daily Telegraph, the RAF was apparently worried Saunders could have blacked out during his routine because of the Gs recorded. "What he was doing was not particularly safe and by not telling people about it, was not a good thing to do, explained an RAF spokesman. The Hawk aircraft is certified for +8/-4Gs and it's not known which parameters were allegedly exceeded.

The official line from the Defence Ministry was that they're very sorry but there was nothing else that could be done. "It is with considerable regret that Flt. Lt. Tom Saunders has been withdrawn from his role as the Hawk solo display pilot for the remainder of the summer display season," the Ministry said in a statement. The RAF apologized for any disappointment caused by removing the Hawk solo display from the airshow circuit."

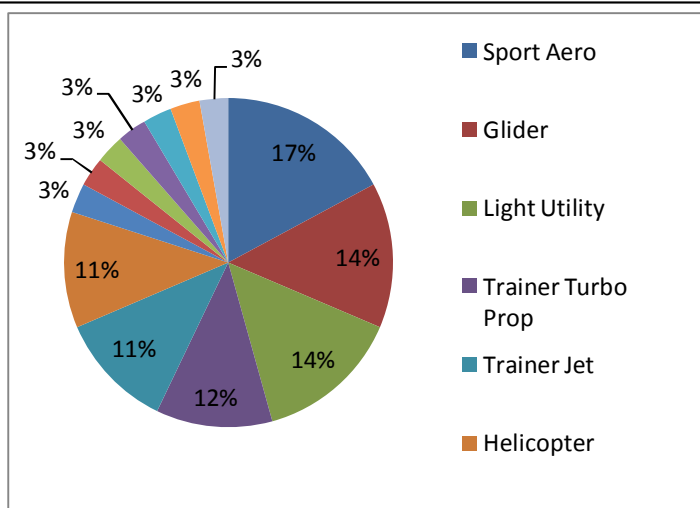
Had there been a similar emphasis on structural limit exceedence in private street maybe the four unnecessary structural failure accidents would not have occurred, and there would not have been a requirement for the first emergency use of the Ballistic Recovery System (BRS) following structural failure during an airshow routine.

The rate of increase of experimental homebuilt, light sport utility, and microlights onto civilian aircraft registers worldwide, has increased by 50% over the last ten years. Many of these vehicles are sold with impressive Vn capabilities which makes them aerobatic, which in turn allows all pilots to instantly become display pilots. There does not seem to be a unified, coherent strategy on how to deal with these new kids on the block with the catastrophic results clearly evident in the statistics.

On the first occasion, structural failure of the RANS, one of the aircraft of the acrobatic team "Argentine Hangar of the Sky", suffered catastrophic wing failure during an aerial demonstration in August. Fortunately, the ballistic parachute that equipped this light sport aircraft, operated as advertised,



16 Countries suffered airshow accidents. The USA once again experienced the highest number of airshow accidents/incidents but this is considered acceptable by virtue of the overwhelming number of airshows annually held in the USA.



Accidents by Aircraft Type. 35 Aircraft were involved in airshow accidents in 2010. For the first time ever, Sport Aero, Glider and Light Utility aircraft surpassed Fighter and Trainer Jets as the highest contributors to airshow accidents, 46% of the total. Is this a sign of the times? Is this going to be a feature of the future?

allowing 22-year old pilot, Dino Moline, to exit the scene of the accident, unharmed. A second structural failure in September 2010, saw a repeat use of the BRS when the *Archaeopteryx Glider* lost a wing during a loop because the pilot exceeded the structural limitations of the glider. Talk of some lucky escapes! What is it that makes display pilots press the structural limits of their aircraft? Could it be the thought that it won't happen to me just this one time? Do these pilots have a full understanding of the Vn limitations imposed on airframe design?

Once again, sadly, 2010 also saw the first fatal crash of the giant McDonnell Douglas C-17 practicing for the Arctic Thunder Airshow in which the Accident Investigation concluded that the pilot had flown the aircraft aggressively and placed the aircraft outside established flight parameters and capabilities.

2010 could easily be termed: 'the year of the Great Escapes'. There were certainly some miraculous escapes for some very lucky airshow performers, the Shoreham Swift glider accident, Adilson Kiddleman's and Matt Hall's Red Bull accidents and incidents, and George Giboney's Reno Air Race crash, being cases in point. Others were not so lucky.

### Spectator Safety

Major planning efforts worldwide have been implemented to provide maximum safety to spectators at airshows, but it is clear that not all countries comply, regulate and police, spectator safety criteria. The question is 'how safe is safe?' Where does one draw the line on spectator protection? Regulations exist for safe distances of the show line from spectators, but all the possible permutations of control loss cannot possibly be catered for as was evidenced by spectator enclosure incursions and approach wake dispersion.

Loss of control during takeoff once reared its ugly head in Germany where one spectator was killed and thirty-eight injured as a Tiger Moth lost directional control during takeoff and careened into the spectator's enclosure just 50 metres from the runway. Seven members of the public, not even at the airshow, were injured when the Indian Navy HAL HJT-16 crashed into an adjacent neighbourhood; once again raising questions regarding the safety of remotely located persons and property. 10 spectators were injured by the landing rotorwash from an Osprey MV-22 on Staten Island, USA.

What sort of risk mitigation would have been considered to cater for aircraft loss of control during takeoff? The USA and UK record for spectator safety is praiseworthy, they have not had spectators killed at airshows in the past 58 years. There are certainly lessons to be learnt!

### Tabulation of 2010 Accident Statistics

Ser	Date	Aircraft Type	Category	Causal Factor	Fatalities/Injuries	Event	Location
1	14 Jan 2010	Pacific Aerospace CT 4E Airtrainer <i>Red Checkers</i>	Turboprop Trainer	LOC (Fishtail)	1 Pilot	Display Practice	Ohakea, New Zealand
2	27 Feb 2010	HAL Dhruv <i>Sarang</i>	Helicopter	Mechanical (Power Loss)	0	Display Practice	Rajasthan, India
3	01 Mar 2010	Pacific Aerospace 2 x CT 4E Airtrainer <i>Red Checkers</i>	Trainer Turboprop	MAC (Unknown)	0	Display Practice	Ohakea, New Zealand
4	03 Mar 2010	HAL Kiran Mk II <i>Sagar Pawan</i>	Trainer Jet	FIT (Downward Bomb-burst)	2 Pilots 7 Public Inj	Airshow	Hyderabad, India
5	20 Mar 2010	RANS S-10 Sakota	Light Utility	FIT Flag Pickup	0	Airshow	Buenos Aires, Argentina
6	23 Mar 2010	2 x BAe Systems Hawk <i>Red Arrows</i>	Trainer Jet	MAC (Opposition Pass)	1 Pilot Inj	Display Practice	Kastelli, Crete
7	02 Apr 2010	Embraer T-27 Tucano <i>Smoke Squadron</i>	Trainer Turboprop	FIT (Split-S)	1 Pilot	Airshow	Santa Catarina, Brazil

8	13 Apr 2010	Dassault Alphajet <i>Patrouille de France</i>	Trainer Jet	FIT (Barrel Roll)	1 Pilot Inj	Display Practice	Vaucluse, France
9	15 Apr 2010	Edge 540 <i>Red Bull</i>	Sport Aero	LOC (Positioning Turn)	1 Pilot Inj	Air Race	Perth, Australia
10	31 May 2010	MV-22 Osprey US Marines	Helicopter	Landing (Rotor Downwash)	10 Spec Inj	Airshow	Staten Island, USA
11	05 Jun 2010	MXS-R <i>Red Bull</i>	Sport Aero	FIT (Positioning Turn)	0	Air Race	Ontario, Canada
12	05 Jun 2010	Hang Glider	Hang Glider	Structural (Loop)	1 Pilot	Airshow	California, USA
13	05 Jun 2010	Litespeed Hang Glider	Hang Glider	Structural (Loop)	1 Pilot Inj	Airshow	California, USA
14	19 Jun 2010	Extra 300	Sport Aero	LOC (Spin)	1 Pilot	Airshow	Yorkshire, UK
15	16 Jul 2010	Parachutist C47-TP	Transport Propeller	Tailplane strike	1 Para	Display Practice	Durban, South Africa
16	23 Jul 2010	McDonnell Douglas CF-18	Fighter Jet	Engine Fail (High Alpha Flypast)	1 Pilot Inj	Display Practice	Alberta, Canada
17	28 Jul 2010	McDonnell Douglas C-17	Transport Jet	LOC (Level Turn)	2 Pilot Killed 2 Crew Killed	Display Practice	Anchorage, Alaska, USA
18	08 Aug 2010	Hughes 500D	Helicopter	FIT (Loop)	1 Pilot Killed	Airshow	Minsk, Belarus
19	15 Aug 2010	RANS S10	Light Utility	Structural (Pullup)	0	Airshow	Santa Fe, Argentina
20	17 Aug 2010	MXS-R	Sport Aero	LOC (Flat Spin)	1 Pilot	Display Practice	Toledo Del Monte, Spain
21	22 Aug 2010	Swift S-1 Glider	Glider	LOC (Landing)	1 Pilot Inj	Airshow	Shoreham, UK
22	27 Aug 2010	Beech Premier Jet	Business Jet	LOC (Landing)	1 Pilot Inj	Airshow	Oshkosh, USA
23	04 Sep 2010	Mooney M20B + RANS RV4	Light Utility	Midair Collision (Air Race)	1 Pilot 1 Crew	Air Race	Isle of Wight, UK
24	04 Sep 2010	Hang Glider	Hang Glider	LOC (Unknown)	1 Pilot	Airshow	Bavaria, Germany
25	05 Sep 2010	Sukhoi Su-26	Sport Aero	Pilot Error (Prop Swing)	0	Airshow	Langenselbold, Germany
26	05 Sep 2010	De Havilland DH-82 Tiger Moth	Vintage Trainer (Propeller)	LOC (Takeoff)	1 Pilot Inj 1 Spec 38 Spec Inj	Airshow	Nuremburg, Germany
27	18 Sep 2010	Extra 300 + Extreme	Sport Aero	Midair Collision (Free Flow)	1 Pilot	Airshow	Warngau, Germany
28	18 Sep 2010	Bell 206 B	Helicopter	FIT (Unknown)	1 Pilot	Airshow	San Pedro Sula, Honduras

29	19 Sep 2010	¾ Scale <i>Thunder Mustang</i>	Racer	Mechanical (Engine Failure)	1 Pilot Inj	Air Race	Reno, Nevada, USA
30	19 Sep 2010	Archaeopteryx Glider	Glider	Structural (Loop)	0	Airshow	Saint Hilare, France
31	24 Sep 2010	Super Decathlon	Trainer, (Propeller)	FIT (Straight Roll)	1 Pilot Inj	Airshow	Jakarta, Indonesia

## AIRSHOW ACCIDENT REVIEW

### 1. 14 JANUARY 2010; CT/4E AIRTRAINER (*RED CHECKERS*, OHAKEA, NEW ZEALAND)

The New Zealand Air Force (RNZAF) aerobatic team *Red Checkers*, sadly, suffered their first ever fatal accident during a routine practice over the Raumai Weapons Range near to Ohakea. Squadron Leader Nick Cree, aged 32, lost his life which resulted in the team's scheduled displays being cancelled due to the accident.

As in most formation aerobatic sequences, the *Red Checkers* display involved a series of formation manoeuvres interspersed with solo manoeuvres, and it was during one of the solo manoeuvres being practiced, that the accident occurred. While the four-ship *Red Checker's* were practicing their sequence, he was performing a level *fishtailing* manoeuvre at approximately 100 ft agl and low speed. The manoeuvre involved yawing the aircraft using full rudder deflection with the necessary amount of 'opposite' aileron to keep the wings level during the *fishtailing*. The manoeuvre, although not difficult to fly, generates cross coupling aerodynamic and inertial effects. It is complicated by the fact that the ASI indications are not valid due to the significant sideslip forces on the static vents while yawing the aircraft around the normal axis; the pilot therefore needs to establish a safe airspeed using attitude and power. Uncoordinated application of full rudder vs aileron at high angle of attack, could provide conditions for departure.

Unfortunately, the practice took place away from the airfield in an isolated spot and the lack of witnesses to the accident and onboard flight and engine data measurements, provided a challenge to the accident investigators. The other members of the team were at that point, positioning themselves for another manoeuvre and were not in a position to watch the solo. However, a rudimentary equivalent to a flight dynamics recorder, in the form of a G-meter recording device, allowed the construction of a flight history in yaw, pitch, roll, TAS, AoA, etc. As the aircraft was burnt-out, the amount of data recoverable, was limited. The initial theory was that it was not unlikely that the aircraft departed controlled flight about half way along the imaginary *crowd-line*.

This is an unusual manoeuvre given of course that it has no operational significance and was only included in the sequence as a 'crowd-pleaser' a philosophy that the RNZAF reviewed. Also, the RNZAF did not regard a high yawing manoeuvre as an aerobatic manoeuvre whereas the FAA suggest that other regulatory authorities would regard it thus. Issues such as the propensity for spatial disorientation from the effect of accelerations in this plane, the effect of head movements and other factors such as aerodynamics, required exploration.

### 2. 27 FEBRUARY 2010: DHRUV HELICOPTER (*SARANG*, RAJASTAN, NEW DEHLI, INDIA)

An advanced light helicopter, Dhruv, of the Indian Air Force's *Sarang* helicopter display team, crash-landed in Rajasthan's Jaisalmer district while rehearsing for the *Maya Shakti* air power demonstration scheduled for upcoming Sunday. Both pilots were uninjured after they made a forced-landing due to loss of power. Despite the crash, the IAF helicopter display team *Sarang*, performed the next day at Pokhran.

### 3. 01 MARCH 2010: CT/4E AIRTRAINER (*RED CHECKERS*, OHAKEA, NEW ZEALAND)

The RNZAF Aerobatic Display Team *Red Checkers* was grounded for the 2010 season following the second incident for 2010 when two of the team's aircraft clipped each other during a training flight. Both aircraft landed safely, but this accident raised the question whether the *Red Checkers* were in fact, able to safely display in front of the public.

### 4. 03 MARCH 2010: HAL HJT-16 KIRAN MK II (*SAGAR PAWAN*, HYDERABAD, INDIA)

This was the first accident of the *Sagar Pawan* aerobatics display team since its inception in 2003 and in a span of just three days, the second mishap involving aerobatic display teams of the Indian armed forces, occurred. An Indian Navy trainer of the *Sagar Pawan* formation aerobatic team, crashed

during the official opening of the Indian Aviation 2010 Expo Airshow in the city of Hyderabad, killing both pilots. *Sagar Pawan* is one of the only two naval aerobatic teams in the world along with the US Navy's 'Blue Angels'. The disaster occurred minutes after the Union Minister for Civil Aviation, had opened the 5-day Aviation Airshow at the old Begumpet Airport.

Footage showed the four-ship entering the vertical downline for the bomb burst. The No. 4 slot aircraft appeared to pass through very close behind No. 3 and seemed to take evasive action possibly leading to an accelerated stall before entering a steep trajectory from which no specific recovery pull-out was observed; the aircraft crashing into a densely populated area adjacent to the airfield. Seven people were injured, a three-storey house was destroyed and other buildings damaged. The other three aircraft landed safely.

The pilots killed in the crash were Commander S K Maurya, and the co-pilot, Lt Commander Rahul Nair from Delhi. Nair ejected but his parachute, sadly, did not fully deploy because of the low height, while Maurya went down with the aircraft. This accident was the fourth fatal mishap involving Indian aerial display teams in the last four years.

#### 5. 20 MARCH 2010: RANS S-10 SAKOTA (BUENOS AIRES, ARGENTINA)

For the lesser known RANS aircraft type, the year 2010 would be the year in which to make a name for itself, for all the wrong reasons. In what was to become the year of great escapes the pilot was very lucky to be able to fly away from a ground impact. While attempting to pick up a flag as part of the display sequence, the wing clipped the ground but luckily the gods were kind to him as no significant damage was caused; the pilot successfully managed to pick up the flag in the second attempt.

The question that needs answers is, why was the display not terminated after the ground impact? Who knows what structural damage could have been caused during the first failed attempt? The question of why, comes to mind. Was ego or even the psychological term, practiced completion syndrome at work here?

#### 6. 23 MARCH 2010: BAE SYSTEMS HAWK T MK 1 RED ARROWS (KASTELLI, CRETE)

In another episode of the great escape a Red Arrows pilot was taken to hospital after a mid-air collision between two Hawks during the winter pre-season training exercise over Hellenic Air Force Base in Kastelli, Crete. The Red Arrows Synchro pair Red 6, Flt Lt Mike Ling, was forced to eject from 1000 ft agl and suffered a dislocated shoulder, head and arm cuts, after colliding with Red 7, Flt Lt Dave Montenegro, who landed his Hawk with tail and fin damage. The runway was temporarily closed while the aircraft was removed; the remaining eight Red Arrow Hawks landed safely at Iraklio airport, some 22 miles away. The Red Arrows were forced to delay the launch of their 2010 display season by over two weeks.

Not for the first time and certainly not for the last time, a judgement error during an opposition pass. The risk for making a dramatic impression by high speed opposing elements increases the risk significantly, as several other accidents by *Patrouille de France*, *Blue Angels*, *Roulettes* and *Red Arrows*, can bear witness to over the years. Flt Lt Paul O'Grady rejoined the team as a replacement for injured Flt Lt Mike Ling to lead the Pair; O'Grady previously flew with the team between 2006 and 2008.

#### 7. 02 APRIL 2010: EMBRAER T-27 TUCANO SMOKE SQUADRON (SANTA CATARINA, BRAZIL)

The Brazilian Air Force announced the provisional suspension of aerobatic shows by its *Aerial Demonstration Squadron* following an accident that resulted in the death of the 33-year old pilot, Capt. Anderson Amaro Fernandes during an aerobatic show for 10,000 spectators to commemorate the anniversary of the local flying club. Capt Fernandes was the most experienced pilot on the team with 3,700 hours and more than 200 airshow performances. Displays by the group, popularly known as the "Smoke Squadron", because of the smoke the aircraft use to draw figures in the sky, were suspended while investigations were underway.

The formation routine had split with the singleton pulling into the vertical; on reaching the inverted position, two consecutive horizontal left aileron rolls were completed before converting to the downline. With insufficient altitude available to complete the pullout, the aircraft, Tucano #7, impacted in a shallow angle of approximately 15° adjacent to the runway that was being used as the show line. The pilot did not eject; with the shallow trajectory being flown during the downline, coupled to the very low height, could it be that he left the decision to eject too late? Could it be that he thought he stood a better chance of survival, remaining with the aircraft?

The last air accident suffered by the *Aerial Demonstrations Squadron* occurred in 2004, when two T-27s collided midair during a training session in Sao Paulo State, but on that occasion, the pilots managed to escape without serious injury. The squadron, which began operations in 1952, had put on more than 3,000 aerobatic shows in Brazil and other countries.

**8. 13 APRIL 2010: AVIONS MARCEL DASSAULT/DORNIER ALHAJET (PATROUILLE DE FRANCE, PLAN DE DIEU, FRANCE)**

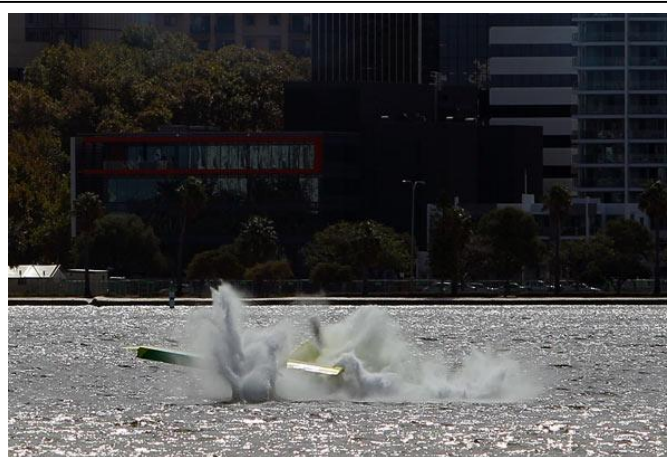
As in the case of the *Red Arrows*, the French Air Force's *Patrouille de France* also had to delay the start of their new season, because of accidents. The recent spate of mishaps involving military aerobatic display teams in 2010, continued with the #8 pilot, Capt Sylvian Courtot, having to eject from his AlphaJet during a low level barrel roll at an airfield near the civilian airport of Plan-de-Dieu, Vaucluse, an area over which the team trained almost daily. The reason for the ejection is not known. The pilot was taken to hospital after sustaining injuries. Fatal crashes also affected display teams from the air forces of Brazil, United Kingdom, New Zealand and India.

**9. 15 APRIL 2010: EDGE 540 (RED BULL AIR RACES, PERTH, AUSTRALIA)**

The *Red Bull Air Races*, arguably, has the most scientifically designed safety plan and well practiced emergency response team of any airshow organisation. Their response team had to be activated for the first time in seven years when *Red Bull Air Race* pilot, Adilson Kindlemann, the first Brazilian to compete in the *Red Bull Air Races*, crashed into the Swan River in the first morning training session for the upcoming weekend's race. He had reason to thank his rescuers as he was plucked from the river by emergency rescue crews within one minute and taken to Royal Perth Hospital where he remained overnight in a stable condition after miraculously suffering only whiplash.

Kindlemann had clocked up more than 11,000 flight hours, and about 700 hours of aerobatics. He had 18 years of aerobatics experience, performed at more than 300 shows in Brazil, and was a three-time Brazilian aerobatics champion. Kindlemann had expressed his frustration with Perth's wintry weather not allowing as much time for practice as he would have liked. "It is very important to fly with this weather changing so much," Kindlemann said. "Flights were different from each other, since the second one was windy, but this type of training is essential for us to face different situations and to be prepared on the race day." "The people who rescued me from the water were unbelievable. The water rescue training we had the previous day really prepared me for this," he said.

Video footage showed an accelerated stall with a sharp wing drop as the pilot pulled into a hard turn around a pylon. *Red Bull Air Race* pilots train for emergencies like which Kindlemann experienced in the Swan River, and each one flies with an oxygen bottle in the cockpit. This year, training on how to use the bottle and escape an inverted flooded cockpit was provided prior to the race. According to Kindlemann's own words: "I used the air bottle and started to escape, opening the canopy about 20 centimeters, then I started to go out and the divers were coming towards me like fish." *Red Bull* rescue team member Jeff Williams said: "He did a great job inside, which made my job a lot easier." The only snag was literal: "He got hung up a little bit on something, a seat belt strap or something," said Williams. "We figured it out quickly and got out."



Adilson Kindlemann's plane crashes into the Swan River during a training session ahead of the *Red Bull Air Race* in Perth. (Photo: Anthony Howie.)

**10. 31 MAY 2010: MV-22 OSPREY, STATEN ISLAND PARK, NEW YORK)**

A hovering MV-22 Osprey is certainly a sight that will attract the attention of any crowd. But a group of spectators on a ball field at the park for a 2010 Fleet Week and Memorial Day celebration, got more than they bargained for when the strong downwash from the Squadron 236 "*Thunder Chickens*"

Osprey on approach knocked several people down and tore the branches from several trees before dumping them into the crowd. In the process, ten spectators amongst a crowd of several hundred, were injured. Having seen what was being caused by their landing, the Marines aboard exited the aircraft immediately after touchdown and rendered aid.

As the aircraft slowed, its rotorwash began to stir up picnic blankets like tornadoes. Trees were bending and then branches broke. People were injured by those tree limbs that broke free and were thrown off their feet by the rotorwash as others ran, screaming, said a witness. "At some point I wanted to take my son to an airshow, but after this I don't see that happening," said a disappointed witness; it took seven stitches to close a wound on his head.

The event was approved by Naval Aviation, the FAA, and the city's parks, police and fire departments, the last of which were clearly in attendance and quickly attended to the injured. Such incidents leave one wondering about the safety plan and the separation distance between spectator enclosures and approach paths. There have been numerous injuries over the years to spectators and also damage caused by wake vortex interference with spectators and also aircraft, more recently in 2008, the Indian *Sarang Team's* air taxiing overhead the Dornier Searay taxiing for takeoff at Berlin ILA was another case in point.

Safety officers must consider the safety plan holistically and not only cater for the airshow flying, but all air traffic operating within the confines of the airshow. Could it be that since this event was not held at an airfield, that inadequate attention was paid to approach path clearances?

#### 11. 05 JUNE 2010: BREITLING MXS-R (RED BULL AIR RACES, WINDSOR, ONTARIO, CANADA)

Pilot Pulls Off Amazing Recovery After Water Collision is how one newspaper described the accident. Wingtip Grazes Water, But Pilot Matt Hall Recovers, was another. The report continued: "It really doesn't get closer than this... but you gotta wonder what kind of rabbit's foot Australia's Matt Hall was carrying around. Matt, you see, had a scare during the first Qualifying session at the *Red Bull Air Race* in Ontario, when his aircraft clipped the surface of the Detroit River, but instead of what usually happens with these things, the former RAAF pilot pulled off an unlikely recovery and returned safely to Race Airport.



WOW!... was not exactly the words Matt Hall might have used to describe this misadventure during the *Red Bull Air Race* in Ontario. This one was as close as it gets with a fly away

As in the case of Adilson Kindleman crash in April in Perth, during which he experienced an accelerated stall during the chicanes, Hall was challenging for the lead in the first of two qualifying sessions when he suffered an aerodynamic wing stall during a tight manoeuvring turn. The left wing skimmed the surface of the river, the right wheel cover hit the water as well, but Hall was able to regain control of his MXS-R aircraft and climb away. "I felt I was having a fairly good run," Hall said. "I might have skipped twice on the water. It's a very disappointing result for me." "Everyone in aviation has been in some fairly tight situations before. I'm disappointed in myself for putting myself in that situation."

Hall's plane was inspected in the air by Nigel Lamb, another pilot who was in a holding pattern who said the damage all appeared to be superficial. Hall then landed safely back at the Race Airport in Windsor. "The main damage is on the right aileron," Hall said. He joined the race in 2009 and became the most successful rookie in race history last year when he took third place overall.

A former display pilot, Dudley Henriquez comments: "We've been 'concerned' about an aspect of the Red Bull scenario that this near crash tends to demonstrate quite well. The coupling of the requirement for extremely fast roll rate due to the supplied distance between pylons defining the manoeuvring area vs the availability of extreme roll rate to the aircraft being used. This combination produces an almost constant asymmetrical angle of attack situation by the two wings being in almost

constant roll transition left and right. I see a tremendous potential in this for asymmetrical high speed stall.

The scenario becomes even worse with any cross-control coordination (out of ball centre application). Granted, these guys are some of the best, if not the best pilots in the world at what they are doing, and I'm quite sure they are not only aware of what I'm saying, but acting constantly in real time in-flight to avoid the above, but the margin for error is SO small, these pilots are on the extreme ragged edge of performance to a point where the ability to cope continuously at these limits has to come into question.

#### 12. 05 JUNE 2010: LITESPEED HANG GLIDER (SAN BERANDINO, CALIFORNIA, USA)

The *Crestline Soaring Society* catered for hang glider and paraglider pilots and hosted their first aerobatics competition in June 2010 at the Andy Jackson Air Park but this special event was spoilt by two nearly identical accidents. A 60-year-old hang glider pilot, Thomas Mayer of Carpinteria, died after his craft failed catastrophically during a loop and he fell 300 feet to the ground; the wings of his glider collapsed and he was unable to deploy his parachute. Mayer was taken to Community Hospital of San Bernardino, where he died less than two hours later;

When he was finished performing the loop, there was more strain on the glider than it could handle, and the glider broke, said the president of the Crestline Soaring Society, which hosted the competition. He's a 38-year veteran of hang gliding, and he loved doing loops. It's not like he was doing something new. It's just things went wrong this time.

Minutes later, hang glider pilot Bill Soderquist of Temecula crashed after a similar situation except, in this case, Soderquist, 56, managed to deploy his parachute before he hit the ground.

#### 13. 05 JUNE 7, 2010: HANG GLIDER (SAN BERANDINO, CALIFORNIA, USA)

Bill Soderquist, suffering the ignominy of a second structural failure on a hang glider in one hour, sustained four broken ribs. The alleged cause of the structural failure was side wire failure just outboard the Nico-press sleeve. He suggested that hang glider pilots check their reserve handle multiple times with each hand while gliding out to do their routine; quick thinking, he managed to get his deployment bag in his hand before his wings had completely folded but neglected to secure the buckle on his helmet which explained why it fell off his head in flight.

#### 14. 19 JUNE 2010: XTRA 300 (YORKSHIRE, UK)

Chris Penistone, an experienced commercial airline and aerobatic pilot and a member of Sherburn Aero Club, was killed at the Methley Bridge Boatyard Festival when his Extra 300 crashed while doing an aerobatic display as a favour for the Boatyard's second annual festival.

Horrified spectators, including the 31-year-old's mother, could only watch in horror as the Xtra 300 plummeted to the ground. The display started with the pilot waving to the crowds during a fly-past, but the accident happened as he performed a spin, from which he could not recover. The pilot was pronounced dead by paramedics at the scene of the crash in a field close to the River Calder.

#### 15. 16 JULY 2010: PARACHUTIST (DURBAN, SOUTH AFRICA)

A highly-experienced parachutist of the South African Air Force's elite *Golden Eagles Parachute Team*, died while preparing for the Virginia Air Show in Durban. Warrant Officer Brian Slade, a founding member of the team, jumped from a SAAF C-47TP Dakota and his head struck the tail plane as he exited the aircraft. Most probably knocked unconscious by the impact with the stabilizer, he was incapacitated and unable to open his parachute.

The airshow spokesman said: "He had 6,000 jumps to his credit, so he certainly was no rookie." He pointed out that the Virginia Air Show was the second longest running civilian airshow that had been



running for fifty-four years: it's really sad. You have a whole lot of aviation enthusiasts getting together, it's a horrible way to open it. But the show will go on, the spokesman said.

#### 16. 23 JULY 2010: MCDONNELL DOUGLAS CF-18 HORNET (LETHBRIDGE, ALBERTA, CANADA)

Setting the debate raging amongst display pilots worldwide, the question of the value of a high alpha pass below  $V_{mca}$ , was once again the catalyst for heated debate of risk versus spectator entertainment. During a high alpha pass at low level, in preparation for the Alberta International Airshow upcoming weekend, the CF-18 Hornet started rolling to the right as the pilot, Canadian Air Force Captain, Brian Bews selected maximum afterburner for a steep climb away. He ejected at the very last moment, the chute opening simultaneously with landing; nobody on the ground was hurt.

Bews was about 100 ft agl from the ground when he ejected, and could be seen coming to rest just outside the ball of flame that erupted when the aircraft impacted. The parachute canopy didn't have time to fully inflate and Bews landed hard, compressing three vertebrae but made a full recovery.

An eye witness watching the practice runs noticed something was wrong. "He came in right over us, probably only 100 to 200 feet high, he said. It looked like he lost power out of his right engine. Only one afterburner was on and it was burning red hot. He looked very close to stalling. I knew what was going to happen: he wasn't going to make it out of this one," he said.

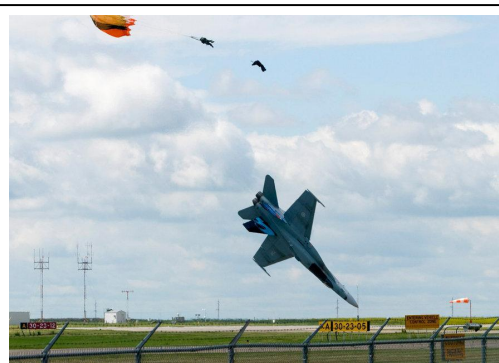
Bews, had accumulated more than 1,400 flight hours since his military career began in 1999; 1,200 of those hours on the CF-18 Hornet. The President of the airshow association, said the decision to continue with the event Saturday and Sunday, as scheduled, was made after organizers met with the Department of National Defence officials.

Bews said he had no reservations about returning to the cockpit; he told reporters he felt buffeting and a downward vector and tried to abort the manoeuvre by adding power and climbing out, something he'd done dozens of times before. "It became immediately obvious to me that the jet was not acting like it normally acts," he said. "I was not in control of the aircraft anymore. I knew where the jet was going and I didn't want to be there with it."

The Canadian Forces cancelled the remainder of the season for the CF-18 flight demonstration team, but CF-18s continued to take part in airshows doing flypasts, taking part in tactical demonstrations and on static display.

#### 17. 28 JULY 2010: MCDONNELL DOUGLAS C-17 GLOBEMASTER III (ANCHORAGE, ALASKA)

Another ~~de~~ ja vuq sadly, not an unusual phenomenon when studying airshow accidents. A plume of smoke was the first indication of the accident as the USAF C-17 crashed into a wooded area shortly after takeoff at the Elmendorf Air Force Base, killing the four air force crewmembers practicing for the Arctic Thunder Airshow and Open House which attracted more than 170,000 people. Sadly, the trajectory of the aircraft was very similar to the heavy jet B-52 accident at Washington State in 1994 and



The high alpha flypast below  $V_{mca}$  on a multi-engine jet remains an evocative issue. Why below  $V_{mca}$ ? Do spectators even notice the difference? Is the risk of departure acceptable at engine fail?

conjured up the images of the BAe Nimrod in 1995 impacting Lake Ontario at the Canadian International Air Show in 1995.

It was the first fatal crash involving the Long Beach-built C-17 since the massive cargo jet went into Service around the globe in the mid-1990s. Local media quoted several eyewitnesses who saw a huge fireball extending 750 feet into the air, when the jet transport went down. The decision was made to continue with the airshow despite the accident.

The USAF released the results of its investigation into the destruction of the \$184 million C-17 Globemaster III accident. The accident investigation board found clear and convincing evidence the cause of the mishap was pilot error. The investigation concluded that the pilot placed the aircraft outside established flight parameters and capabilities. During the mishap sortie, the pilot aggressively flew the aircraft in a manner inconsistent with established flight procedures, resulting in a stall during a tight turn. The pilot failed to take required stall recovery actions. Furthermore, the board concluded the co-pilot and safety observer failed to recognize or address the developing dangerous situation. As a result, the C-17 stalled at an attitude and altitude from which recovery to controlled flight was impossible.

The C-17 climbed away steeply after takeoff demonstrating the excess power available to the huge jet, pushing over to level off at approximately 500 feet agl, a left 90° turn was followed by a right 270° turn to line up with the show centreline. During this positioning turn at a very steep bank angle, the nose dropped below the horizon and unbelievably, the huge jet just continued downwards, still with a large amount of bank applied, until impact. There was no significant change in roll attitude during the final moments of the plunge.

Studying video footage of the accident, one cannot but be reminded of a similar accident trajectory of the B-52 bomber crash in Washington State in 1994 in which the accident was also attributed to pilot error by flying excessively aggressively, outside established parameters; the entire crew was killed in the accident. The question of competency arises. Is it possible that some transport pilots are not adequately trained in the art of display flying? Do they fully understand the aircraft stability and control characteristics in the dynamic manoeuvring environment? What about energy management? Do they receive the necessary low level display training?

#### 18. 08 AUGUST 2010: HUGHES MD-500 HELICOPTER (MINSK, BELARUS)

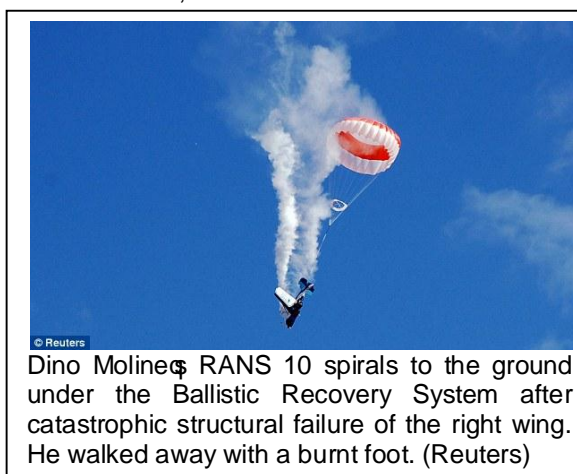
A Hughes MD-500 helicopter crashed and immediately caught fire on impact while recovering from an oblique ~~semi-loop~~ killing the 74-year old pilot, Gunter Zimmer at Borovaya Airfield, during the Commonwealth of Independent States (CIS) Helicopter Sports Open Cup 2010. Video footage shows the helicopter committing to the downline from the ~~semi-loop~~ and with insufficient height to effect recovery, the aircraft impacted on the airfield a few hundred metres from the spectators without causing any collateral damage.

Zimmer had 4500 flight hours in his logbooks and was a previous German aerobatics champion several times during his more than 20 years in helicopter aerobatics. The FAI had chosen to reward him the Rotorcraft Gold Medal 2010 in October, which was subsequently awarded posthumously.

#### 19. 15 AUGUST 2010: RANS S10 (SANTA FE, ARGENTINA)

It what must be regarded as a first for the airshow circuit, one of the RANS aircraft of the acrobatic team *Argentine Hangar of the Sky*, suffered catastrophic wing failure during a display. Fortunately, the ballistic parachute that equipped this light sport aircraft, operated as advertised, allowing 22-year old pilot, Dino Moline, to exit the scene of the accident, unharmed.

The accident happened at El Trebol Aviation Club, where Dino Moline was performing aerobatics, when the left wing suddenly broke off and the aircraft plunged towards the ground. The 3,000 onlookers could only watch in shock as the wing snapped off the *RANS Air Brigade* aircraft at 1,600 ft agl, while it was inverted during the manoeuvre. The aircraft began to spin out of control but Moline managed to deploy the parachute, which slowed his sickening fall to the ground.



'I don't know what happened to me, 'I believe it was metal fatigue', he said. I felt an explosion. I saw a shadow passing to the side of me - it was the wing. In what surely qualifies as the understatement, he added: I saw fire inside the plane and I despaired a little. My foot got burned, but I'm fine.'

'An example of senselessness, saved by the ballistic parachute emergency recovery system' was how this accident was described by one display pilot. The Rans S-10 is sold as being aerobatic, however, as a microlight, the structure is, to say the very least, fragile. As a microlight in the UK, it was not cleared for any aerobatics and the permit to fly restrictions, imposed the US definition of aerobatics, not to exceed 30° in pitch or 60° in roll. The aircraft was however, cleared to +6/-4g.

The Zvezda company in Russia developed a 30 kgs pilot extraction system which could be fitted which in erect level flight at 50 feet and inverted level flight at 300 feet, would deposit the pilot safely on the ground under a fully deployed personal parachute.

#### 20. 17 AUGUST 2010: MSX-R (TOLEDO CASARRUBIOS DEL MONTE, SPAIN)

Alejandro Maclean, the only Spanish pilot in the *Red Bull Air Race*, was killed at age 41, while performing a spin overhead the aerodrome of Toledo Casarrubios del Monte in the air boxqin preparation for the *Air Il Festival de Málaga* scheduled for 5 September. Maclean was to have been one of the main attractions at the event. Reasons for not effecting recovering were unknown.

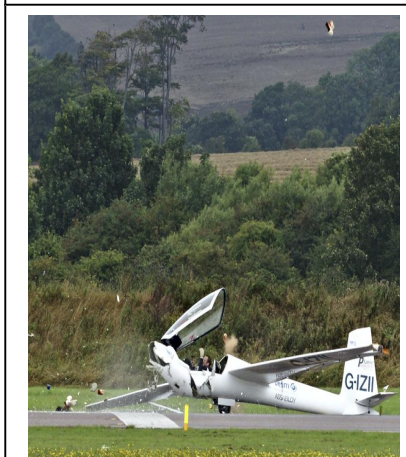
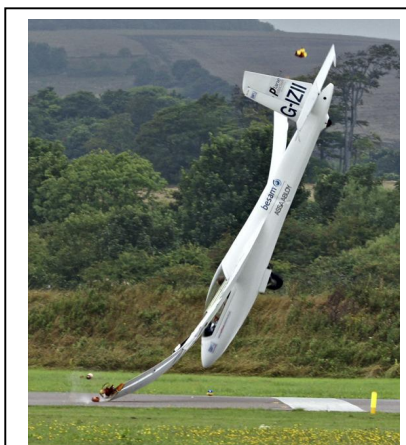
#### 21. 22 AUGUST 2010: SWIFT S-1 GIZII GLIDER (SHOREHAM, UK)

Another amazing escape! A Swift S1 GIZII glider, one of only thirty-five ever built and the only one in the UK, was badly damaged in a crash at Shoreham Airshow around midday; the pilot, Mike Newman, emerged from the glider before emergency services arrived at the scene. He was taken by ambulance to hospital where his condition was described as 'not serious'. The airshow was disrupted for more than an hour by the crash and by rain. Organisers confirmed that just under 30,000 visitors were present despite the worst weather in the event's 21-year history which caused havoc with the flight programme.

The glider was supposed to perform an aerobatic display with two powered aircraft, but because it was very overcast with low cloud, this was cancelled. The glider was airborne for only a few minutes before being released from its tow line and then flew downwind and turned to make its final approach to land. An eyewitness stated: 'As he turned, I realised the glider was at the wrong angle as its nose went down. He had lost airspeed and headed straight into the ground, not far off vertical when it hit the runway. The nose section just crumpled. It was an awful thing to see.'

'Lucky to be alive' is not an exaggeration, but the factors leading to it, like thinking nothing of displaying under 300ft of cloud, and landing to roll up to the take off point, possibly over extended pilot capabilities since he ended up overshooting the turn in point and had to turn too low and too slow. 'More interesting to note though, was where he chose to release from the tow in the most awkward position possible, because of the mindset of rolling out to touchdown point' was the commentary from a UK glider pilot: 'No UK gliding club would tolerate any of that, but airshows end up with their own laws...norms actually. Landing towards the take-off point has been a particular point of concern to glider pilots and it is banned in some glider groups in the UK', he said.

There was a silence from the crowd as people took in what had happened around 400 ft in front of them. An eyewitness's comment: 'I felt a real sense of relief when the pilot crawled away. I had feared the worst because it was such an awful crash. Two ambulances and a couple of fire engines were on the scene very quickly and he was taken away on a stretcher.' Mr Newman, a



Landing in very strong winds, would certainly have added pilot workload while attempting to rollout on landing at the exact starting point of the takeoff. (Photo Rob Yuill)

gliding instructor and aerobatic coach, has been flying since 1996 and was the UK unlimited aerobatic gliding champion in 2008 and 2009.

**22. 27 AUGUST 2010: BEECH PREMIER JET (EAA AIRVENTURE, OSHKOSH, WISCONSIN, USA)**

The question can quite rightly be asked: %How safe is safe enough? Can the airshow organizer and safety officer possibly cover all permutations of crisis on offer at an airshow? Not only did the media/photographers enclosure come under threat when an arriving Premier Jet lost control on landing and charged down on the photographers enclosure, but also the visiting aircraft park.

On arrival into Oshkosh, the aircraft was put in conflict with the flight plan of another airplane close to the ground. ATC recordings indicate NASCAR racing legend, Jack Roush questioned air traffic control. Seconds later the controller began ordering traffic on final to go around. The NTSB issued its preliminary report which said, based on amateur video, the pilot apparently overshot the centreline of the runway and made several course corrections.

"The airplane appeared to overshoot the runway centreline during this turn and then level its wings momentarily before entering a slight right bank simultaneously as the nose of the airplane pitched up," the report says. "The airplane then turned left toward the runway centreline and began a descent. During this descent, the airplane's pitch attitude increased until the airplane entered a right bank and struck the grass area west of the runway in a nose down, right wing low attitude." Roush was out of the hospital after two weeks of surgery and treatments for severe facial injuries. Sadly, he lost the sight in his left eye in the accident and suffered multiple broken bones, including a broken jaw.



How safe is safe? Can spectator safety be guaranteed 100%? What about media enclosures which are usually closer to show centre than the spectator enclosure?

**23. 04 SEPTEMBER 2010: MOONEY 20B + RANS RV4 ( ISLE OF WIGHT, UK)**

The midair collision occurred in the late afternoon in a handicapped air race as a Mooney crashed into dense woodland, killing both the pilot Michael Willis and his son, James, the navigator, after colliding with the RANS RV-4 which was able to carry out a forced landing at Bembridge Airport without casualties.

Nineteen aircraft were taking part in the Rolls Royce Merlin Trophy Race, a precursor to the Schneider Trophy event, due to start the following day. During the final run towards the finish, the Mooney M20 collided with a Rans RV4, near Havenstreet, Isle of Wight. The Mooney 20B lost a wing in the collision and broke up in midair before crashing inverted into the Rowlands Wood. An eyewitness said the aircraft hit the ground nose first with a violent impact after spiralling out of control.

The two men in the other aircraft, the 32-year-old pilot from Ryton, Coventry, and the 55-year-old navigator from Iwer, Buckinghamshire, were both taken to hospital and later released following a belly landing. The Schneider Trophy Race was cancelled.

**24. 04 SEPTEMBER 2010: HANG GLIDER (HESSE, BAVARIA, GERMANY)**

What is the probability that four airshow accidents could occur in one country over a two-week period? Extremely rare, but not impossible as was the case in Germany; it experienced its blackest airshow month ever, Black September 2010 with four airshow accidents occurring over a period of 14 days. A 50-year-old woman died after she lost control of the hang-glider she was flying during the display and plummeted into a parked glider. She was flown by rescue helicopter to a hospital, but sadly passed away that night.

**25. 05 SEPTEMBER 2010: SUKHOI SU-26 (HESSE, LANGENSELBOLD, GERMANY)**

Like all things in life, there is a rule of thumb for complex operations, particularly in aviation, get the basics right, and the complex issues will take care of themselves. For the second year in a row, an aircraft was damaged due to pilot error.

During the airshow in Hesse, Langenselbold, a SU-26 ran rogue after having its engine hand started without brakes being applied and running out of control. Safety marshals spent several minutes trying to get into the cockpit of the Sukhoi as it spun dangerously around and around in circles before the pilotless machine rolled across the airfield and ended up in a hedge.

Once again the gods had to intervene and protect innocent spectators from pilot error. Fortunately, no one amongst the several thousand spectators was injured. In this case, the safety zone between the spectators and the aircraft was sufficient to mitigate risk.

## 26. 05 SEPTEMBER 2010: DE HAVILLAND DH-82 TIGER MOTH (NUREMBERG, GERMANY)

During a three-ship takeoff, the pilot of a Tiger Moth lost control of his aircraft at an airshow in southern Germany and crashed into a group of spectators, leaving one person dead and 38 injured, five seriously. The crash occurred at the Lillinghof Airfield near Nuremberg, where up to 5,000 people attended the airshow.

The 68-year-old pilot was not hurt in the incident, but a 46-year-old woman died from her injuries sustained from the propeller. "We were drinking coffee when suddenly tables and benches were flying through the air - and suddenly the plane's propeller was right in front of us," one witness said. One 43-year-old woman told reporters: "I ran for my life."

An eyewitness recorded that he was maybe 70 metres from the accident site. "The three biplanes took off together and the accident aircraft took off on the right and appeared to get airborne early and was about one metre off the ground with the wheels in the air as a wing dropped and the wingtip clipped the ground, which consequently turned the aircraft through approximately 90°, directly in the direction of the spectator enclosure. There was insufficient distance available to the pilot to bring the aircraft to a halt before the spectator enclosure. The whole episode lasted only 2-3 seconds." The pilots were all experienced pilots that had been flying together for years.

A contributory factor to the accident statistics was the close proximity of the runway to the spectator area, estimated at approximately 50 metres. The event was cancelled immediately following the accident and a large contingent of rescue workers were at the scene to treat minor injuries and provide emotional support to spectators, some of whom suffered from shock. The Lauf-Lillinghof airfield was shut down for investigation by experts from the German Federal Bureau of Aircraft Accidents Investigation (BFU) while authorities set up a hotline for relatives of victims of the accident. Legally, following such accidents, authorities are obliged to interrogate the event from the angle of manslaughter, which could put display pilots at risk level for which they have not fully considered.

## 27. 18 SEPTEMBER 2010: EXTRA FLUGZEUGBAU EA300 + EXTREME 3000 (WARNGAU/ROSENHEIM)

The Oldtimer Flugtage Warngau (Classic Car Show) at the Warngau Flying Club Airshow, had a fifty-year long successful and safe history which was spoiled by a fatal accident as two aircraft collided with each other in midair during their display routine. From the video footage, it is clear that the pilot of the Xtra 300 lost visual contact after having performed a high speed barrel roll over the Extreme 3000; the Extra 300 closed from above and lost visual on the Extreme, the right wing colliding with the left wing of the Extreme, sending the Extra 300 spiralling to the ground; not for the first time, and certainly not the



Number 2 in the formation takeoff, lost directional control and ploughed into the spectator enclosure.



Loss of visual remains the single biggest threat to formation routines. (AFP)

last time.

The cardinal rule of any formation sequence remains visual contact during every single milli-second of the sequence. The Extra 300 impact left the pilot with no survival chance while the Extreme was able to make an emergency landing; the pilot suffered shock, but was physically unharmed. The Xtra 300 crashed into a meadow about 500 meters away from the airfield, missing the tracks of the Munich-Lenggries train line by a few feet and only about ten metres from a house. The show was stopped immediately after the accident.

**28. 18 SEPTEMBER 2010: BELL 206 HELICOPTER (SAN PEDRO SULA, HONDURAS)**

1,500 children of police, fire-fighters and street cleaners were invited to watch the exhibition of a Bell 206 helicopter of the Honduran Air Force when it crashed inside the military base of the La Mesa Airport, killing the pilot Rommel Ortega, and injuring a six year old boy when a branch fell onto him. A military communiqué said the accident occurred when the Bell 206 helicopter descended suddenly and hit a tree bordering the La Mesa Airport in San Pedro Sula.

**29. 19 SEPTEMBER 2010: ¾ SCALE THUNDER MUSTANG (RENO, NEVADA, USA)**

A single-engine, kit-built ¾ scale Mustang replica, the Thunder Mustang, is a high-performance, V-12 powered replica of the famous North America P-51D Mustang; it crashed during an emergency landing attempt at the 2010 National Championship Air Races and Air Show during the final laps of the Super Sport Class Gold Race at the Reno Air Races. George A. Giboney Jr., the pilot of his own P-51 Thunder Mustang, miraculously escaped the accident with minor injuries only.

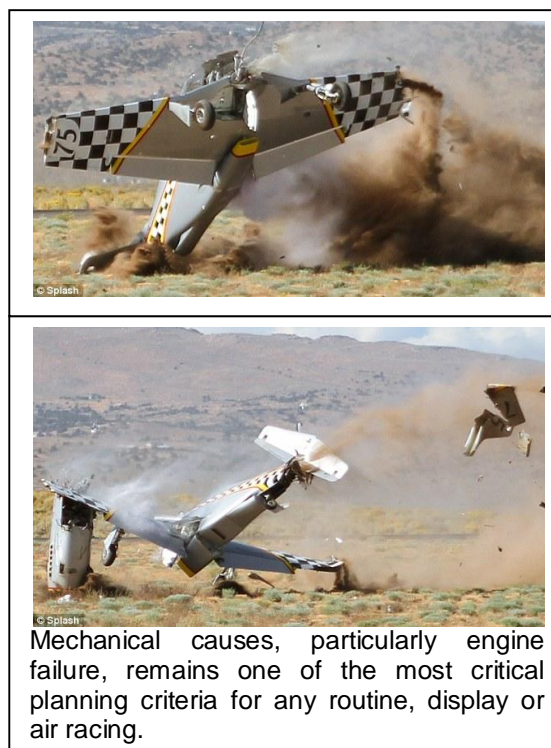
Thunder Mustang *Rapid Travel* was in second place during the Super Sport Class when the pilot reported the engine misfire just before it quit running. Giboney positioned the aircraft for an emergency landing near the intersection of runway 26 and 14 and managed to land the aircraft, but appeared to have some difficulty keeping it under control before a bump (possibly as it hit a runway edge) forced the aircraft back up into the air.

The pilot subsequently lost control completely and the aircraft cart-wheeled before coming to a stop in numerous pieces. The pilot emerged from the aircraft on his own accord and to a resounding cheer from the crowd, indicated that he was OK. Winds were gusting at 30 knots at the time of the accident and making a dead-stick landing at the time, really provided no margin for error.

Giboney says he heard the engine misfire a couple of times, and then the engine cut out and stopped completely. He called a "mayday," and then attempted to land on nearest most available piece of the airfield. The aircraft hit the runway and bounced; that's when a wind gust took the plane off course and into the dirt, the plane then hit a bump and shot up into the air. The plane began to cartwheel and the plane came almost completely apart as it tumbled. Giboney got out of the plane without help and, was attended to by onsite emergency personnel; he was released shortly thereafter.

**30. 19 SEPTEMBER 2010: ARCHAEOPTERYX GLIDER (SAINT HILARE, FRANCE)**

The Archaeopteryx creates the symbiosis between today's hang gliders and conventional gliders, in striving for minimum weight, while structural integrity is relatively low within the context of dynamic manoeuvring flight associated with low level aerobatics. In fact, the vehicle is not cleared for aerobatics so, is it any wonder that at Coupe Icare 2010, the glider being flown outside of structural design limits, resulted for the second time ever, in the pilot being called upon to activate the Ballistic Recovery System after the glider's wing snapped off during a display.



Mechanical causes, particularly engine failure, remains one of the most critical planning criteria for any routine, display or air racing.

The pilot Philippe Bernard was performing a double-loop when the right wing failed catastrophically, sending the hang-glider into high angular autorotation before the left wing failed. With the wingless fuselage descending rapidly to the ground, the pilot activated the emergency parachute and landed in wooded area. The glider was completely destroyed.

An honest and forthright description of events from Bernard: "During the towing, I hear at the radio some remarks from the organization that I had to clear the area as fast as I could, because an aerobatic airplane was coming to perform a demo. I released as soon as possible and started a demo willing to be fast in order not to disturb the progress of the event. Quickly, I start with a first looping with proper speed and a spin. I fly away from the slope and initiate a sequence of two loopings+ "

"At the end of the first loop, properly done, I check my speed and see 80 km/h, which is not enough for the second one. Therefore, I increase my speed without finding out that I am overshooting the  $V_{ne}$  130 km/h because the speed indicator display is always late with respect to reality. I was certainly already beyond 110 km/h when I accelerated even more. Before, during other looping sequences, I ended up slow at the top of the loop, so I tried to make sure I had enough speed+ "

"During the next resource, I pulled unusually too much on the stick and feel directly the Gs; I overshoot all the load factors that the sailplane can withstand. This is a catastrophe!. The right wing breaks with a horrifying explosion noise, which will stay for life in my memory. Afterwards, I am shaken everywhere, so I cannot analyze what is happening. I only understand that I am in a great danger, because I receive chocks on my face and I feel suddenly some wind, I am outdoors I have to react quickly, because my only and last chance is the rescue system+ "

"Things go very fast, when the cabin start to fall nose-down I can finally concentrate on my safety handle that is smartly placed at the right side of my right hand. I pull with no hesitation. The rocket quickly extracts the reserve parachute with a deafening noise. After a short frightening second I feel the drag of the parachute. At this moment, I understand what happened. I see all the broken parts falling around me. I cannot hold on shouting "Shit" + I directly think about my son who is on the take off area who is down in the valley. I am invaded by a feeling of great shame, and I directly ask myself why did I was so brutal during my resource. Everything falls in my head and around me. I stay powerless under my parachute and wait to impact the earth+ "

"I am high and above a forest, I don't panic and prepare my position placing my legs in safe position as described in the aviation procedures. The landing must end up correctly, which was the case. The trees branches break my trajectory and I end up on the ground without chock. I unfasten, half asphyxiated because my demo smoke candle is still burning. The forest is so dense that it feels like in the night. I look for my radio in order to inform the rescue team that everything is OK. The batteries have no charge and I don't receive any answer, but the message was received. The helicopter was already vertical from me two minutes after the crash. They couldn't see me because the forest was too dense. I called my son directly to tell him I was OK. He shouted at me, with good reasons, but he was happy that I was OK+ "

### 31. 24 SEPTEMBER 2010: SUPER DECATHLON (BANDUNG, JAKARTA, INDONESIA)

The second day of what was to be a very special day for the City of Bandung as it celebrated its 200<sup>th</sup> anniversary, turned for the worst, instead, several thousand spectators witnessed a catastrophe as a Super Decathlon crashed and burst into flames at an airshow; miraculously, the pilot, Alexander Supelli, survived, but was rushed to hospital in a critical condition.

Just short of show centre, Supelli commenced a left hand aileron roll at approximately 100 ft agl. On reaching the inverted position, alongside another aircraft piloted by Esther Gayatri Saleh, for some inexplicable reason, the rolling moment stopped, the aircraft hesitated in the inverted position during which time the nose dropped downwards. The roll then seemed to accelerate slightly, but the right wing struck the ground before the aircraft had reached wings-level attitude; it cartwheeled and quickly burst into flames. The question that comes to mind is in such a case, why the pilot elected to continue the roll rather than push out into an inverted climb; could this be the physiological syndrome of planned completion?

The two pilots had conducted thorough preparations before the demo and had performed the stunt perfectly and impressed thousands of spectators during the opening of the air show the previous day. Supelli reportedly had more than 2,000 hours of flight experience.

### Conclusion

One is left with no other alternative but to reach the same conclusion as in 2009. As an international airshow community, we seem to have plateaued in our ability to reduce accidents and incidents at airshows. The question is: can we afford then to just continue and accept an increasing average of 24 accidents/incidents per annum. Can we afford to just accept what the dice have dealt with the associated loss of life?

Are we doing enough worldwide to reduce the number of airshow accidents/incidents? Based on the fickleness of human judgement in the low level display environment, is it realistic to believe that zero accidents are possible in a given year? If not, what is an acceptable loss rate? Should one even consider anything else but a target of zero accidents per annum?

It is clear that regulatory oversight worldwide is in serious need of an overhaul and that airshow display pilots and airshow organisers will have to make a concerted effort to improve safety at airshows lest aviation legislation and insurance costs are brought to bear with dire consequences for this sport type.

At the expense of melodrama, there is nothing new under the sun. Highly experienced pilots making the same errors in judgement over the past 101 years. Or is it the case as Earnest Gann implied in his book: "Fate is the Hunter". We can only do is our best. We either make it, or not? Maybe it's just time to revisit the marriage vows again with the realisation that low level display flying is for the professionals only!



After a hesitation in roll passing inverted, the roll rate increased but with downward vector established, the right wing struck the ground before the wings level could be achieved. (Reuters)