RACING THE WIND

Red Bull Air Race – San Diego – September 2007

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This past September, San Diego got to experience the thrill of the world's newest and arguably most exciting motor sport: Red Bull Air Racing. Much like Formula 1, Red Bull Air Races are held in many cities all over the world throughout the year, with pilots earning cumulative points at each location based on their times, leading to a champion at the end of the year. Unlike Formula 1, however, each circuit is defined only by inflatable gates, and therefore is modular enough to be transported and set up in any large open space, typically over water. Some cities have hosted Red Bull Air Races for all three years of the competition's existence, while others (such as San Francisco) only host races once or twice, thus allowing more locations to be exposed to this event. Each city's circuit is different, taking advantage of the unique shape of different bodies of water, and considering safety and airspace limitations of each area. Pilots race one at a time around the circuit, and time penalties are added for flying too high, hitting a gate, or going through a gate in the wrong orientation (wings-level or knife-edge). Their times are used first to disqualify the overall slower racers, and then in a one-on-one death match elimination round once only 8 of the 13 racers are left. The event itself consists of 4 days of practice flights, qualifying rounds, and elimination runs. For a few hours each afternoon, aerobatic pilots push their Edges and Extras - and themselves - to the limit as they fly around the twisty course, quickly snapping their aircraft this way and that. Making precise tight turns 50 feet off the water, between obstacles less than twice as wide as their aircraft's wingspan, at over 250 mph, these racers are responsible for some of the most extreme flying you'll ever see.



- The Airshow

At each Red Bull Air Race, local pilots entertain the crowd before, between, and after the races. Aerobats, warbirds, and local military aircraft are often featured. San Diego was no exception, especially since so much of the US Navy's air fleet is based there. Several bases house a great variety of military aircraft, including transport airplanes, helicopters, radar airplanes used for patrol and control-and-command, electronic warfare jets, aggressors, fighters, and mid-air-refueling tankers. The Navy did several fly-bys, including a C-2 transport, an E-2 Hawkeye radar airplane, four aggressoes (F-16, F/A-18, and two F-5s), an EA-6 Prowler, and a SuperHornet configured as a tanker, which refueled the EA-6. Blackhawks and Seahawks simulated the insertion of SEALs and a rescue mission.


There was also helicopter flying by a civilian pilot, Chuck Aaron. Much to everyone's wide-eyed amazement, Chuck flew loops and rolls in a stock Eurocopter BO-105. Only five pilots worldwide fly aerobatics in the BO-105, and Chuck is the only pilot in the United States cleared to fly aerobatics in a helicopter. This required him to register it as an experimental aircraft and to assemble a team of experts who performed a series of special structural analyses. Ever since the FAA finally approved this act, Chuck can reliably make everyone in the crowd to go "A helicopter is not supposed to do that!"

Two warbird formations also flew by, one featuring Navy aircraft (F6F, F8F, AD1) and one featuring Army Air Corps aircraft (P-40, B-25, and two Mustangs). Skydiving and parachuting were also demonstrated. And last but certainly not least, Bill Reeseman did a few fast passes in his bright red MiG-17, bright afterburner flames justifying how this aircraft earned the nickname "the world's biggest Zippo lighter." All in all, a great mini-airshow to complement the air racing.



- Red Bull Air Race History

Air races are not a new idea. Since the dawn of aviation, airplane races have encouraged and rewarded advances in aeronautical technology and piloting skill. One of the very first airshows, the 1909 Reims Air Meet in France, was home of the Gordon Bennett Cup race, won by Glenn Curtiss. During the Schneider Trophy seaplane races of the 1920s, many design features were developed that were later used in World War 2 aircraft. Over the past 45 years, the Reno Air Races have kept this tradition alive, featuring 500-mph piston- and jet-powered raceplanes in the world's fastest motor-sport.

However, it was only in 2001 that a Red Bull sports, a marketing think-tank, came up with the idea of combining aerobatics and air racing. Similarly to what they had accomplished with their FlugTag competitions, Red Bull aimed to promote its brand by creating a new and popular aviation event. No air race thus far had made use of the agility of aerobatic aircraft or of the precision and skill of aerobatic pilots, or required racers to fly twisty courses analogous to the tracks driven in Formula 1. Red Bull approached two-time World Aerobatics champion Peter Besenyei, who helped them to develop the concept into an event defined by rules that ensured an exciting and memorable yet safe aerobatic race. "Red Bull told me about their idea of organizing an airplane race against the clock, a type of slalom race in the air," Besenyei recalls. "I too had been thinking of a way to make flying even more interesting for the public and when they described their idea to me, it sounded perfect."

Perhaps most remarkable was the development of inflatable air pylons, strong enough to stand up in moderate winds but fragile enough to cause no problems when struck by a small aerobatic airplane. Austrian designer Martin Jehart was approached in 2002 to design the air gates. With the help of Peter Besenyei, his team developed and tested a variety of prototypes, including arches and cylinders. They eventually settled on the cone design, which is stiffer but can be made of thinner material. Each pylon is 20 meters tall and about five meters wide at the base. Most gates are made up of two pylons, either ten meters (knife-edge) or fourteen meters (wings-level) apart. Keep in mind the aircraft have eight-meter wingspans! Each cone is made of several rings held together with Velcro. When a gate is hit, the damaged rings can be removed and replaced with new rings in less than 5 minutes. It is especially important that a blown gate be repaired quickly, since as one pilot races, the next pilot is already circling overhead waiting his turn, and they take off with less than 15 gallons of fuel.

Since the courses require racers to make extremely tight turns and fast rolls but also to fly very precisely through gates, Red Bull decided to invite only the top aerobats in the world, pilots who had won international aerobatics competitions. While very few pilots consistently win these competitive international tournaments, Besenyei did not have much trouble signing them up for the air race: "I didn't have to say much to convince them - they were immediately enthusiastic."

In 2003, the Red Bull Air Race made its debut at AirPower in Zeltweg, featuring six pilots. It was a tremendous success, and another Air Race was organized shortly thereafter at Tököl Airport near Budapest. In 2004, Red Bull held three air races: Kemble in the UK, back to Hungary in Budapest (where nearly one million people lined the banks of the Danube to catch the action), and finally at the Reno Air Races. In 2005, the racing was formalized into the Red Bull Air Race World Series, consisting of seven events all over the world, with the cumulative points system still in use (racers ranking sixth through first earn one to six points respectively). In 2006, eight races were held, and eleven pilots competed. The 2007 circuit includes ten races, of which San Diego was the 9th, and thirteen racers competing for the championship.

- Winning an airplane race

It may surprise some to learn that the aircraft used in the race are not all identical, and that pilots are free to modify them. That is because the pilots are already making the tightest turns the human body can stand. The courses are designed so that, at the speeds typically held by these airplanes, turns would require pilots to pull nine or ten gs. When a pilot is accelerated into a turn at ten times the force of gravity, their blood tries to flown down away from their head into their feet, and this can lead to tunnel-vision and loss of consciousness. A faster airplane making these turns would either pull more gs (causing the pilot to black out) or need to make a wider turn (making for a longer course). In fact, during practice, one of the main thing pilots need to determine is at what speed they want to cross the start gate. Go too fast, and they have a harder time turning into those gates. Go too slow... and they lose the race. This crucial start-speed is also a function of wind speed and direction, since the wind will make some turns easier and some turns harder. Each course is different; some require an aerobatic maneuver at one end, others are flat; some are twistier, others have wider turns. So a pilot must develop a new target speed for each new course.

Once the pilot flies through the gate, however, he rams the throttle forward and does not pull the power back until after the very end. That's because all the turns cause the airplane to gradually lose speed, so there is no risk of going too fast. All the modifications that make raceplanes differ from regular aerobatic airplanes are done to minimize this loss in speed over time: more power, less drag. Aerobatic airplanes are not built with speed as a primary requirement. In fact, good aerobatics are performed at exceptionally slow speeds. The fact that these airplanes can fly fast at all is a consequence of them being small enough and powerful enough to perform vertical maneuvers at airshows. These airplanes have many features that would reduce their fuel efficiency and top speed but that increase aerobatic agility, and it is these features that are modified for racing. For example, external struts and cables that help to brace the wings and tail are replaced by internal structures. Non-essential protrusions are either reduced, removed altogether, or covered over by custom-made aerodynamic fairings (or just duct tape). These include bolts, antennas, sensors, and the paddles and weights that balance and center the control surfaces. Wings are given winglets and non-symmetrical airfoils so as to reduce drag during high-lift turns. Even air intakes and radiators are made smaller and more aerodynamic: An airplane flying forwards at over 200 mph does not have nearly as much trouble aspirating air as do aerobatic airplanes that need to work through hovers, tailslides, tumbles, and other maneuvers where airflow comes at slow speeds and from odd directions. These raceplanes would probably overheat their engines if they were put through an aerobatic performance, although at slow speeds they probably would not get enough air for the more thrust-intensive manouvers.


Castrol


Etation

- The pilots

Each pilot that flies in the Red Bull Air Race has won international aerobatic competitions, i.e. they can all be said to be literally "the best in the world". They have twenty to thirty thousand flight hours each, although some of them confess to having stopped logging their hours accurately after 15,000 or so. Do the math, and that's about 4 hours per weekday for 20 years, which is about how long many of them have been flying. Experience is key: if a pilot has to deliberately think about the position of his airplane in the air, then he will not have the reflexes and intuitions to quickly turn into those gates. And these pilots are athletes: Withstanding g forces and pushing those airplanes around are activities that require precise control over lean, muscular bodies. The diet and exercise regimens followed by these pilots can be compared to many professional athletes. And like any top-notch athlete, successful air race pilots are the ones who can dedicate their whole lives to the pursuit of extreme aerobatic flying. A Red Bull Air Race is held every three or four weeks once the series starts, and pilots are at each location for an entire week (setting up, flying recon flights, practicing the course, then racing through the qualifying and elimination rounds), so this championship is a major commitment.

In the first two to three years of Red Bull Air Racing, Kirby Chambliss was one of the consistent winners. Chambliss was the overall champion in 2006, and is still consistently seen on the podium following each race in 2007. A Texas native who currently lives in Arizona, Chambliss has had a joystick in his hand since the age of 13. At 24 he became the youngest commercial pilot in the history of American Airlines. His wife is also a pilot, and she and their young daughter provide plenty of motivation and support. A true aviation fanatic, he even has a private runway right in his backyard. Despite his extensive experience, he recognizes that the top-notch pilots and carefully-tuned aircraft will make it very hard for him to earn the title again in 2007. "And to be honest, I don't really care about anything else."

This year, Paul Bonhomme has been standing out by being on the podium every single race, and by winning many of the races. He won the San Diego race, although Chambliss jokes that he let Bonhomme win since it was his birthday. Bonhomme grew up around an airport, his father was a British Army Air Corps pilot and his older brother is an airline captain. By the age of 17 had a flying license and was learning aerobatics, and he eventually became a 747 pilot himself. In his off-duty hours he enjoys mountain biking, motorcycling, and of course aerobatics in a Sukhoi or in his Edge raceplane. His technician is always tweaking the Edge for higher performance, and this has allowed Bonhomme to earn better and better results as the Red Bull Air Race championship progresses.

Nigel Lamb, sole member of Team Breitling, is the only pilot who flies the new MX2 rather than the widely preferred Extra 300 or Zivko Edge 540. This cutting-edge aerobatic airplane is made using advanced composite materials, allowing for a lighter weight, fewer parts, higher reliability, and hopefully a faster time around the course. How has that been working out for him? Well, he won third place at San Diego, closely behind Chambliss and Bonhomme. Born and raised in Zimbabwe, Lamb is an enthusiastic deep-sea diver, plays squash, flew fighter jets for the military, and now applies his piloting skills in air races, airshow aerobatics, and motion pictures. His face is not well-known, but he was the one flying the aircraft in many of the most famous aviation movies such as *Memphis Belle*. He insists that he will win a Red Bull Air Race sometime in the future, as he learns the intricacies of his airplane. Judging from the results in San Diego, he is well on his way.

Another star of the Air Race circuit is Peter Besenyei, who helped to develop the race. Besenyei is one of the most famous pilots of his generation, and one of the most well-known athletes in Hungary. His flight under a suspension bridge in Budapest, upside down, has become part of air racing lore. A pianist, fisherman, avid photographer, and wine connoisseur, Besenyei has been flying since the age of 15, when he earned money for his flying lessons by working at construction sites and as a salesman for curtains and sun blinds. This hunger for flying eventually led to more aerobatic championship titles than just about any other pilot, and to a very special invitation by Red Bull to help pursue a crazy new idea and develop it into aerobatic air-racing. Despite his early wins, he came in second overall in 2005 and 2006, and is headed towards another impressive ranking at the end of the 2007 championship. he may not make it to the podium every time, but it's hard to forget that if it were not for Besenyei's creativity and enthusiasm, we would probably not have Red Bull Air races at all.

- The future of the sport

As more countries in the world are exposed to Red bull Air Racing, more people come to appreciate the excitement of aerobatic competition. Some Red Bull Air Races have drawn over 800,000 people to the water's edge, many of whom had never been to an airshow or contemplated the capabilities of an aircraft designed specifically for aerobatics. The Red Bull Air Race championship is now televised in sports networks to over 60 countries, and its popularity keeps increasing. What does the future hold for this new sport?

San Diego race winner Paul Bonhomme has a few thoughts about this. If he could change one thing about the sport, what would it be?, I asked. He said that the one-on-one elimination-style rounds cause the race results to depend greatly on luck, rather than skill, so he wishes that this aspect be changed. He said that it's very easy for a fast pilot to make one mistake and have a slower time during the qualifiers, and this greatly unbalances the quarter-finals lineup. It would make more sense to eliminate the slowest times from the whole group, rather than the slowest pilot from groups of two, especially since this is one of the only sports where racers do their thing one at a time against the clock rather than at the same time.

As for the future of the sport, Bonhomme figures that nitpicking the world's best aerobats is not the best way to select racers in the long run. This selectivity was crucial in order for the sport to be born and developed safely, but once the sport is fairly mature, there should be a way for less-experienced pilots to work their way in. There should be a class of racing for less experienced pilots, featuring courses that are less twisty and perhaps with wider gates. In that class, pilots could develop the skills needed for the premier class, and the best ones may be invited to move up. It might even be possible to design courses that are easy to fly with the gates in a certain order, but harder to attack once the gates must be crossed in a more complicated pattern.

One last suggestion, which is compatible with this multi-tiered racing event, is to have pilots that represent their countries rather than their teams. A maximum of one pilot of each nationality would increase the number of countries represented, and would cause more people in the world to tune in and cheer for their nation's representative rather than for one foreign pilot or another. These and other changes might be what keeps the Red Bull Air Races popular for years to come.

Whether or not the Red Bull Air Race continues for another ten years, spectators all over the world are glad that the championship series is currently such a success. Enjoying tremendous popularity (and unprecedented marketing opportunities), Red Bull plans to hold even more races in more places around the world. And it's no wonder, as no one could fail to be excited by such intense and skilled flying, by such a select group of world-famous pilots, in front of such beautiful and internationally-recognized skylines. It is probably safe to say that the world's newest and most exciting (and arguably most photogenic) motor sport is here to stay!