Paper plane champion – DLR aviation researcher Kai Wicke

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By Falk Dambowsky

He is the German paper plane champion, having achieved the longest flight, and has already flown a glider high over Australia. The passionate and vastly experienced competitive glider pilot discovered his love of the sport and of flying in general early on. Now, Kai Wicke researches how tomorrow's planes can best be used within flight operations and the complex air transport system.

With a large stature, an affable gaze and a strong chin, Kai Wicke is not one to blend into the background. A smile crosses his face when I meet him in a Hamburg cafe, soon followed by a warm greeting. He has travelled especially from Hamburg-Harburg to meet me. In the south of the metropolitan area, this is where Kai Wicke works as a researcher at DLR Air Transportation Systems.

Glider pilot on the junior national team

He quickly orders coffee – a tall latte macchiato. His dress is casual: shirt, black jumper and jeans. He wears a pilot's watch with a metal strap on his left wrist. Kai Wicke picked up flying at a tender age. But as he starts to talk, I notice that his enthusiasm for everything that flies over roofs, trees and fields emerged even earlier. One day, one of his father's colleagues said: "Take your son out to the glider airfield." Kai Wicke was 15 years old at the time. "So I started the next day," he says, smiling. His pilot's license was acquired by age 17; he specialised in sport at high school, training in javelin and pole vaulting, but gliding was never far away. He competed in the German championships and qualified for the junior national team. And it was high times at the training camp in the south of France; equipped with an oxygen mask and holding special license from air traffic control, Kai Wicke ascended to over 6000 metres in his glider. But what sounds so special, he recounts quite unassumingly: "At times I travelled eight hours and 800 kilometres by glider without taking a break."

Leaving school meant the start of a very special time for the gliding enthusiast with the German military. After boot camp, he was assigned to the special section within the military tasked with promoting gifted athletes, in his case glider pilots. He travelled to competitions throughout Europe and finally to Australia. He remained there with his fellow draftees for three months, the only foreign team involved. A photographic memento shows him together with an Australian farmer after landing unexpectedly on red sand. But even at this early stage he knew where he wanted to go in his career: "Studying aerospace engineering in Berlin; that's what I dreamed of." So Kai Wicke followed the road from placid and rural Hofgeismar, nestled at the heart of the Republic, to the capital city, where he enrolled at the Technical University.

Thinking of the big picture

Kai Wicke moved from Berlin to Hamburg after graduating in 2009, thrilled at the job offer from DLR Air Transportation Systems. Since then, he has been part of the Systems Analysis Department for Air Transport. "My job is all about thinking in terms of the big picture, using computers to examine possible scenarios," is how the 32-year-old describes his work. "I take a look at new aircraft developments and use a variety of different computer models to simulate what they would look like in the overall air transport system." Counting with his fingers he lists components in the overall system, among them everything that happens up in the air, also on the airport apron areas or in the terminal. And what is the point behind this analysis of aircraft developments in terms of the overall system? "We want to find out the extent to which

modifications made to aircraft are worthwhile in a practical sense. For instance how much fuel really can be saved if airlines deploy improved aircraft under real environmental conditions." This only works if – when possible – every single complementary effect is included in the account, for instance additional servicing, the ratio of short and long haul flights or the reductions in emissions of any kind. In this way, Kai Wicke and his colleagues seek to ensure that aircraft innovation is as beneficial as possible in everyday operation.

One main thrust of the research that that young scientist engages in is found not far from his hobby as a glider pilot. Modern gliders are fitted with very smooth wings without any large gaps or unevenness, ensuring ideal, turbulence-free flow – referred to as laminar flow. There are plans to fit commercial aircraft with these kinds of smooth, low-drag wings as well. Colleagues at other institutes, among them the DLR Institute of Aerodynamics and Flow Technology, deliver detailed proposals and developments, detailing how these wings of the future could be constructed. The ultimate goal is to cut back on fuel consumption by enhancing the flow geometry and reducing drag. "My job is to calculate how much of these fuel savings and therefore also cost reductions will be available once the system goes live," says Wicke to explain his work. "One of the things I'm looking at in laminar flow wings is how far the aircraft has to travel before their use pays off and what effort is required to clean insect residue off the surface." Kai Wicke is all too familiar with this phenomenon. Often enough he has had to take the so-called bug wiper and scrape the remains of insects off of the wings of his glider. Bug wipers are devices with which the pilot can clean the leading edge of the wings while in the air.

The right folding technology

Kai Wicke quite unintentionally encountered an entirely different aspect of unpowered flight in 2006, while still a student. Red Bull, the manufacturer of a caffeinated energy drink, held the first paper aeroplane championship. It did not exactly captivate Wicke: "Adults throwing paper airplanes – I gave that up as a kid." But some of his fellow students are very excited and spend their time experimenting in the aerodynamic hall at TU Berlin. And a smile creases his face when he admits: "One day I just tagged along, folded a paper plane and chucked it. And in its very first flight it sailed straight through the hall and banged into the far wall." That was a distance of at least 22 metres. One assistant was already registered for the competition. He called immediately: "You'll do it. You've got a chance!"

Kai Wicke promptly won the qualification round. From then on, he threw in halls big enough to match his skill. At the German championships in the terminal building of Tempelhof Airport, he reached for the freshly folded paper plane. Using skilful technique honed in schooldays spent lobbing javelins he catapulted the five-gram aircraft across a distance of 34.82 metres – and walked away with the title of German Champion. Pitted against 48 competitors at the following World Championships in Salzburg he threw what was, and has remained, the undisputed German record of 37.36 metres, sixth place among the best the world had to offer.

And then the media came. Kai Wicke sat next to science journalist Ranga Yogeshwar and entertainer Frank Elstner in the Johannes B. Kerner talk show. Galileo and PurPlus from the children's broadcaster Kinderkanal knocked on his door. He gave radio interviews; newspapers printed his photo. Journalists never tired of asking how he thought up the perfect form for his handicraft airplane? But humble as he is, Kai Wicke answers that the basic concept is the same as in his schooldays. "But a lot of it actually was trial and error – fold the wings a bit smaller, sometimes bigger." The rules of the competition do not permit any additional materials like glue or scissors. It all comes down to a blank sheet of A4 paper, folded by skilful hands. At the end he held an almost dart-shaped paper plane, now carefully hidden away in a drawer at home, next to his bed. But the qualified engineer does manage to throw in a few terms from his student days as he explains: "What was effectively needed was to create an aerodynamically mature, symmetrical model with sufficient directional stability." And it was his studies that stopped him defending his title the next time the championship came around. Instead, he finished his thesis and launched his career with DLR.

A doctorate and a flying instructor license

Kai Wicke usually cycles to work when the weather permits. It helps him to get focused for the tasks ahead and to play through some of the ideas in his head. He is currently occupied with collecting the final results for his doctoral thesis, naturally also connected to the analysis of laminar flow wings within the air transport system. "At the moment, I am developing the last simulation stages for the computer model we need," he explains. He hopes to receive his doctorate next year and then to focus on new research questions.

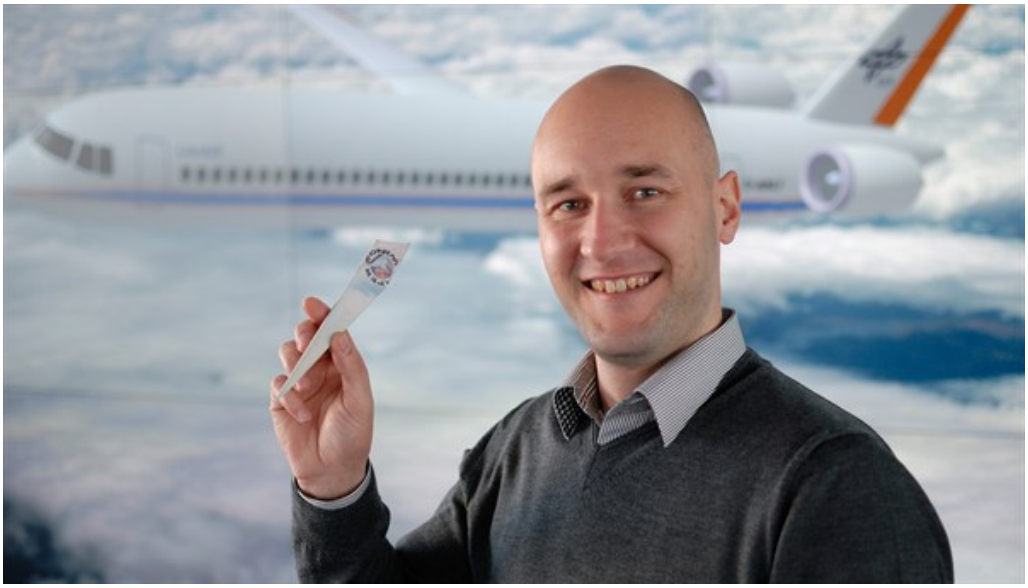
But Kai Wicke will always be faithful to gliding. In summer, he drives home to Hesse and the Dingel airfield every other Sunday. He received his flying instructor license at the young age of 21. He is happy to pass on his knowledge and finds it particularly rewarding to act as a mentor to enthusiastic younger pilots. No doubt he tells them too how he discovered his love of flying, and maybe the odd anecdote about his not quite so run of the mill championship title. It is an exciting place alongside Kai Wicke, full of unusual stories and insight. Once he has his doctorate there seems little doubt that he will be pleased to use his inspirational style to encourage other young scientists.

Contacts

Falk Dambowsky
German Aerospace Centre (DLR)
Media Relations, Aeronautics
Tel.: +49 2203 601-3959
falk.dambowsky@dlr.de

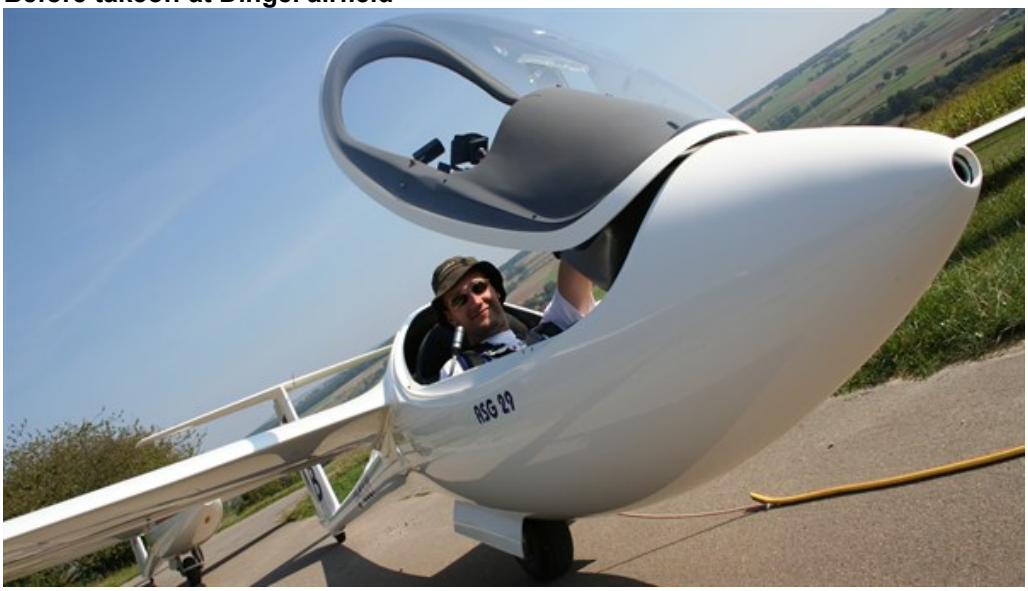
Kai Wicke
German Aerospace Center (DLR)
DLR Air Transportation Systems
Tel.: +49 531 295-3827
Kai.Wicke@dlr.de

DLR aviation researcher Kai Wicke



Kai Wicke is an experienced glider pilot and also German paper aeroplane champion. In his work at DLR, he researches how tomorrow's planes can best be used within flight operations and the complex air transport system.

Before takeoff at Dingel airfield



Kai Wicke remains faithful to gliding. In summer, he drives home to Hesse and the Dingel airfield every other Sunday.

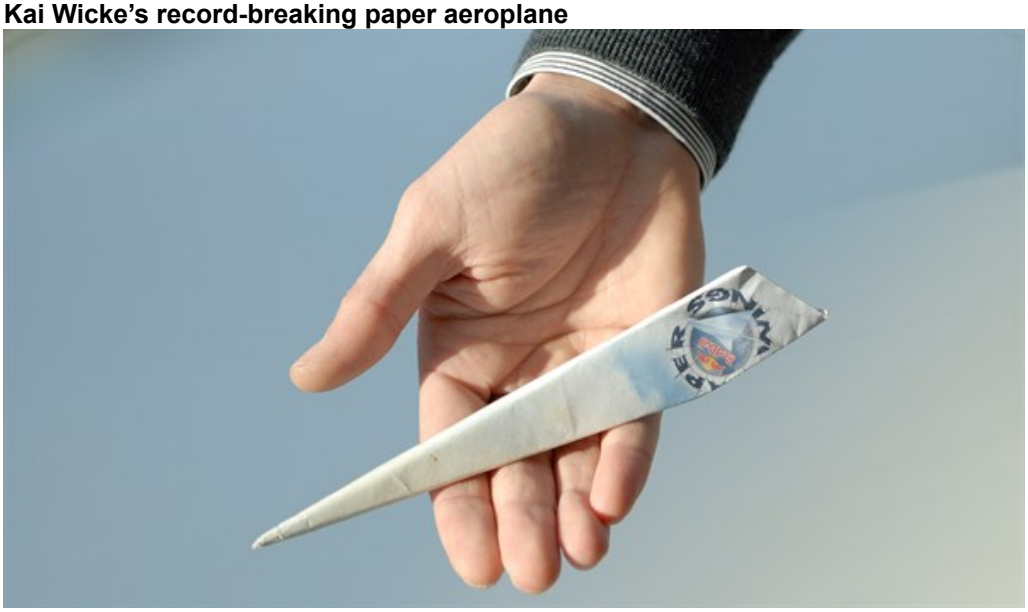
Credit: DLR (CC-BY 3.0).

Kai Wicke at his workplace

Since 2009 Kai Wicke has been working in the Systems Analysis Department for Air Transport at DLR Air Transportation Systems in Hamburg-Harburg.

Credit: DLR (CC-BY 3.0).

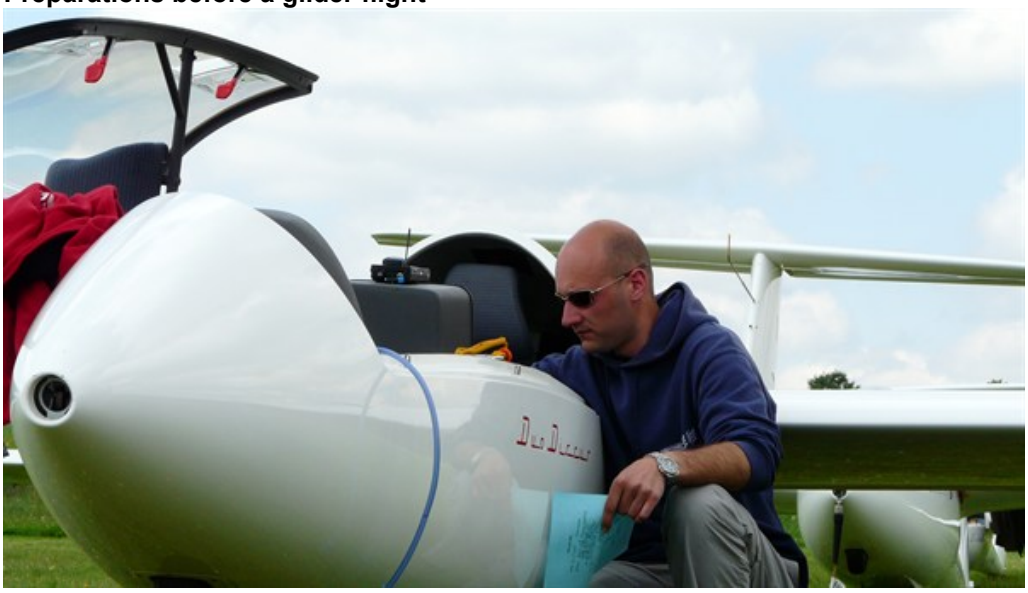
Kai Wicke’s record-breaking paper aeroplane



The almost arrow-like, record-breaking paper aeroplane from the 2006 World Championship, today kept careful at home in a drawer. For the construction, just a simple A4 sheet of paper and skilful hands were permitted. Tools such as glue and scissors were not allowed.

Credit: DLR (CC-BY 3.0).

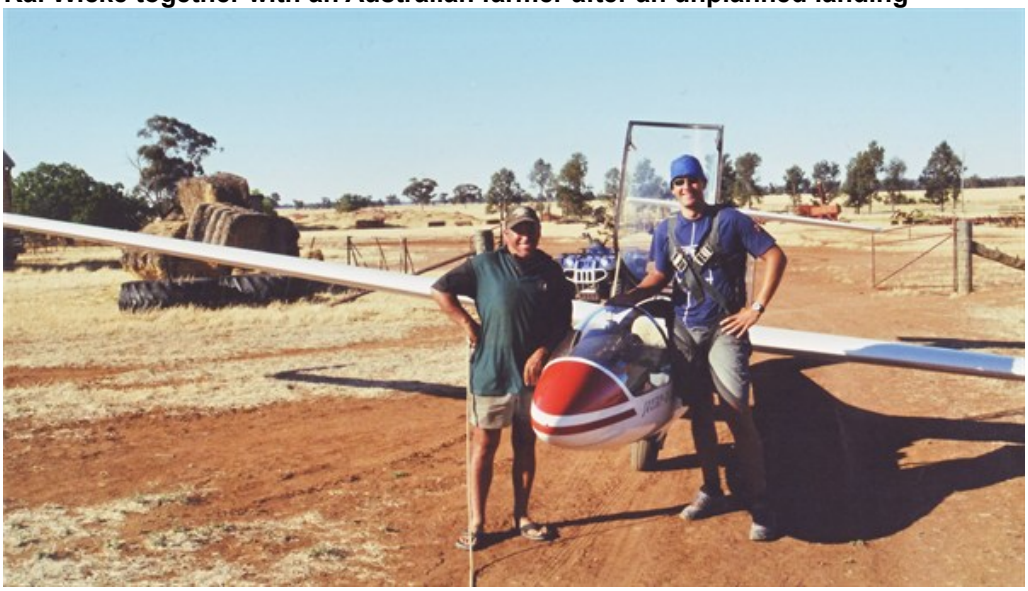
Preparations before a glider flight



Kai Wicke prepares for a flight at the 2009 German Gliding Championships in the two-seater class. He flies frequently in national competitions.

Credit: DLR (CC-BY 3.0).

Kai Wicke together with an Australian farmer after an unplanned landing



During his military service, Kai Wicke was assigned after basic training to the sports group for glider pilots. He travelled to competitions throughout Europe and eventually to Australia. He remained 'Down Under' with his comrades for three months.

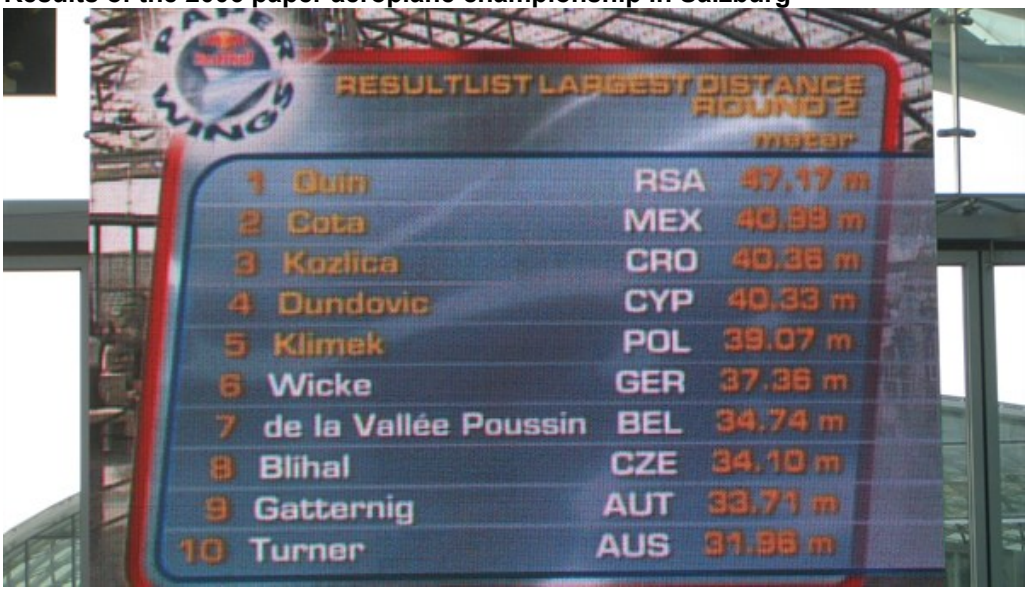
Credit: DLR (CC-BY 3.0).

In the air over northern Hesse

Kai Wicke was 15 years old when he first sat in a glider. At 17, he obtained his pilot's licence. Since then, he has flown regularly – sometimes for eight hours and 800 kilometres without a break.

Credit: DLR (CC-BY 3.0).

Results of the 2006 paper aeroplane championship in Salzburg



During the 2006 paper aeroplane championship in Salzburg, Kai Wicke went up against 48 competitors – setting the current German record and securing sixth place amongst the best in the world.
