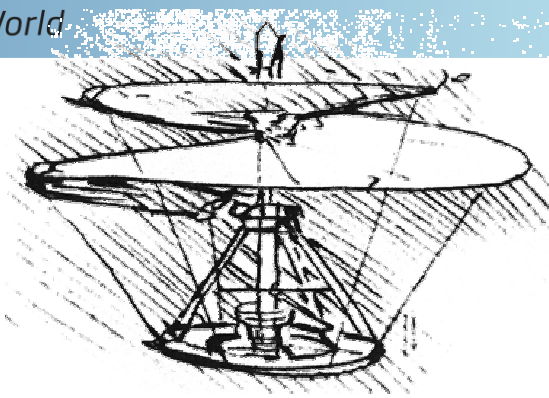
CIAMFlyer
The Introduction to the Modelaircraft World
FAI AEROMODELLING COMMISSION

Helicopters - Complex Technology Takes Longer



Functional principle and technology of helicopters are fairly complex. It's no coincidence that flight trials with helicopter-like aircraft were conducted over a number of decades, with the main developments taking place sometime between 1935 and 1950. The term "Helicopter" originates from the Greek "helix" (= spiral) and "pterion" (= wing). Looking at Leonardo da Vinci's initial studies from around 1483, the relationship with a spiral is easily seen.

First helicopter of Paul Cornu 1907

A Short History of the Helicopter

Paul Cornu is now recognised as the inventor of the first helicopter. It is reported that the bicycle manufacturer, born in 1881 in Lisieux, France, successfully achieved the first helicopter free flight with a hovering height of 1.5 m as early as 1907. The aircraft was equipped with two rotors and was powered by a 24 hp Antoinette engine. Flights – some even with a passenger – apparently lasted for 60 seconds and reached speeds of up to 11 km/h.

About 30 years later, the Focke-Wulf Fw 61 was presented in

Fock-Wulf Fw 61 1937

Berlin. This aircraft, that was also twin rotored, was the first that could be accurately steered and hover in one place.

One of the possibly greatest helicopter pioneers is undoubtedly Igor Sikorsky, born 1889 in Kiev. The aircraft designer emigrated to France in 1917 and later to the US, where he was awarded a government

Igor Sikorsky 1942

contract to develop a helicopter. Various trials finally resulted in a design with one main rotor and a vertically positioned tail rotor which is still the most common design today. This made Sikorsky the first designer to succeed in building a helicopter with a single rotor. The R-4 was handed over to the US Army on 18th May 1942, following a flight of 760 miles in 16 hours.

The first turbine-powered helicopter was Kaman's K-225 (H-22). It was derived from the piston engine version – which was already being successfully used by the US Navy – and fitted with a Boeing 502 Turbine in 1951.

K-225 with a gas turbine

Radio Controlled Model Helicopters Came Later

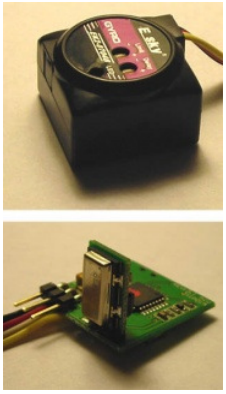
It was not until 20 years later that the era of radio controlled model helicopters (or RC helicopters) began. The German Dieter Schlüter is inextricably linked with this development. As a trained car mechanic and later engineer, he started initial trials and flights of a few seconds in 1968.

Bell Huey Cobra de Schluter

His breakthrough came with the Bell Huey Cobra in Harsewinkel at Whitsuntide 1970. This was the trigger for an unimagined worldwide boom for model helicopters. Initially, pilots mostly practised hovering and neat circular flights. With increasing technical perfection of the rotor heads, their linkage and control, increasingly precise flights became possible. The desire to measure the technical capabilities of one's helicopter as well as one's flying skills against those of others soon led to the first competitions. 1985 saw the first FAI RC Helicopter World Championships with 37 competitors from 17 countries being held in Canada.

The Gyro – a Small Miracle

The "gyro" consists of a sensor and a microcomputer. The sensor registers even the smallest positional changes of the helicopter tail and corrects these through computer commands to the tail servo. This does not, of course, include commands given by the pilot through the RC remote control. The tail servo is nothing other than a tiny electric motor that mechanically alters the tail rotor blade pitch and thereby keeps the helicopter facing in the desired direction. This small electronic device makes flying radio controlled helicopters a lot easier. The latest electronic devices for model helicopters go even further and include three or more such sensors. They can keep the helicopter in the air more or less independently, however, only one sensor acting on the tail rotor is permitted in championships.



Heading-hold Gyro from the inside and the outside. The silver rectangular component is the rotation sensor itself

Aerobatics with RC-Helicopters – the Big Challenge

Today's generation of model helicopters lets practised pilots perform the most extreme flight manoeuvres that would have been unimaginable just a few years ago, such as loops and rolls, somersaults, inverted flight, unpowered, so called auto-rotation landings and many more. FAI World Championships for RC helicopters (Category F3C) require the completion of fixed routines. Then there are 3D events with even more complex manoeuvres as well as freestyle events with undefined routines, usually flown to music. The F3C World Championships has grown to 74 competitors of 25 countries. More detailed information about RC helicopter competitions can be found under www.fai.org/aeromodelling/documents

Making Things Easier for Beginners

Whereas 25 years ago, getting started with flying helicopters required many hours of practise and often several spare parts, huge technical improvements have made learning to fly a helicopter siginificantly easier. There are PC simulation programmes that let you practise flying helicopters with amazing reality. Then there are coaxial helicopters, autopilots, etc.

Technology Never Stands Still

In early 2000, electric propulsion conquered virtually all model flying categories and established itself particularly well for RC helicopters. In the last few years, gas turbines have also been used to power model helicopters. However, this rather complex technology requires high levels of skill and experience. The reward is a very realistic flying aspect along with the scent of the big wide world – of kerosine.

RC helicopter with gas turbine