The helicopter is probably the most flexible aircraft that we know today. Although its history dates back to around 1500, the first practical helicopter wasn’t manufactured until the 1940s, roughly three decades after the Wright brothers’ first powered human flight. Today, helicopters fulfil a wide range of tasks both in the civil and in the military sectors. Rescue missions requiring high precision, surveillance or quick transport are all possible due to this wonder of vertical flight.

The first helicopter-like machine was envisioned by the revolutionary inventor Leonardo da Vinci in the mid 1500s in the form of the sketch of an aerial screw. Based on the principle of compressing air through its rotational motion to generate lift, it was supposed to undergo vertical flight according to the same principle as today’s modern helicopters.

Before practical helicopters as we know them were actually able to lift off and sustain flight for a remarkable period of time, more than three centuries had to pass by until the final breakthrough at the end of the 19th century with the invention of the internal combustion engine, providing the required power for full-scale models. Intensive experimenting throughout the 20th century lead to the major problems presented to vertical flight being resolved. One of the main issues lay in the torque created by the rotor blades on the fuselage, leading to an unwanted spin of the main body opposite to the direction of the rotor. This problem was resolved by either including a vertical tail rotor able to counterwork this undesired motion or by using two oppositely spinning blades on the main rotor shaft. Another difficulty that was faced by early helicopter engineers was the dissymmetry of lift. As the rotor blades turned in a fixed direction, the rotor blades would alternately spin in the direction of the airflow and against the airflow, leading to an unequal generation of lift due to the difference in speeds. Again, a solution was quickly found in the form of the swashplate, which allowed for equal lift on each side of the central rotor shaft by alternating the rotor blade angles. Cycling controls were introduced to control the helicopter’s roll and pitch, making sure the pilot didn’t unexpectedly face the horizon upside-down.

Through the work of different pioneers from Europe and the USA the first practical helicopter came to life in 1936, the Focke-Wulf Fw 61, designed by the German professor Henrich Focke. The Ukrainian-American inventor Igor Sikorsky had designed the successful VS-300 model by 1940 which managed controlled flight forwards, backward, up, down and sideways. Sikorsky’s design laid the foundation for modern single-rotor helicopter designs. Other pioneers in the field included the American Stanley Hiller, Jr. who invented the first helicopter to have all metal rotor blades that were very stiff and made it possible to fly at much higher speeds. Another American inventor in the field, Arthur Young of the Bell Company, made significant contributions to the design of the world’s first commercial helicopter, the Bell Model 47.

Today, helicopters find a wide range of application with great variety in individual design, both for civil and military uses: be it in the public sector for police operations, rescue missions with air ambulance or for industrial purposes such as shuttle services between an oil platform and the mainland. The world moves more and faster than ever before and desires more flexibility. The demand for rotorcraft increases as better utility helicopters allow for the access of more remote drilling locations in the oil industry. The market
research company Lucintel predicts a steady growth in the helicopter market due to increased military demand from emerging economies and the recovering global economy. It places an estimate of the rotorcraft industry value at $24.7bn by 2017. Dividing the global helicopter manufacturing industry into the four different sectors [North America, Europe, Asia Pacific (APAC) and Rest of World (ROW)], APAC is predicted to be the dominating sector by 2017 which is explained with the expected rising military expenditures in the report by Lucintel. Their forecast of the 2012-2017 Global Helicopter Industry also predicts the following challenges that the helicopter industry will have to face in the coming years: high import tax for aircraft, budget cuts in the defence industry, great availability of second hand helicopters and on top of that unfavourable terms of financing. Hence, it becomes clear that there are a number of difficulties manufacturers will have to deal with. Nonetheless, the report also indicates important industry growth drivers such as global economic growth, new technological developments, rising demand for multi-purpose helicopters and freshly emerging markets. These new market sectors will lead to an increased demand of helicopter use both for industrial and civil purposes. In particular, the military market is expected to expand faster than other market segments.

Rolls-Royce also predicts a ‘strong long term demand for vertical lift’ in their Helicopter Market Forecast 2011-2020 driven by technology advancements (such as digital cockpits, autonomous cargo delivery and re-supply for military types) and changing global market requirements. Their turbine rotorcraft deliveries are estimated at a value of $140bn with the turbine engine market amounting to a predicted value of >$12bn. The number of rotorcraft to be produced as predicted by Rolls-Royce is placed at 16970+. An analysis of the trends in the civil market indicate that although singles and light twin helicopters lead the market by units, intermediates and light twins lead the market by value. Market drivers as identified by Rolls-Royce are emerging markets such as in India, Brazil and China as well as the existing fleet demographics. Currently, about 43% percent of the global fleet is aged 25 years or above, according to the statistics presented by Rolls-Royce. This presents new opportunities to helicopter manufacturers, since with the replacement of the old models latest technologies can be incorporated into various new designs.

Figure 1 indicates the major players in the global helicopter market in 2009. In the civil sector the largest manufacturers are Eurocopter, AugustaWestland (AGW), Bell and Sikorsky and in the military sector Sikorsky, Eurocopter, Russian Helicopters, Boeing, Bell and AGW. The civil helicopter market is dominated by European companies, whilst American companies are prominent in the military helicopter market. Eurocopter is the leading helicopter manufacturer worldwide by revenue and units of turbine helicopter deliveries in the civil sector. A subsidiary owned 100% by EADS, Eurocopter was formed in 1992 from the French company Aérospatiale and Daimler-Chrysler Aerospace AG from Germany with its current headquarters located in Marignane, France. AugustaWestland is an Anglo-Italian helicopter company which was formed as a 50:50 joint venture company from the British company GKN and the Italian industrial group Finmeccanica. Bell Helicopter was formed as early as 1935 and specialised in the manufacture of fighter craft in its early days and holds its headquarters in Fort Worth, Texas. Based in Stratford, Connecticut, the Sikorsky Aircraft Corporation was founded in 1925 and is a leading defence contractor. With a history that dates a long way back to the early work of pioneer Igor Sikorsky, the company remains one of the main manufacturers in the USA, including the manufacture of the presidential helicopter, currently the models VH-3 and VH-60. Research carried out by Frost & Sullivan forecasts an expenditure of the helicopter market until 2015. The company predicts that over one fifth of the helicopters produced worldwide will be sold to customers outside the US and Europe, namely to the Middle East, Africa and Asia Pacific. The helicopter industry remains a fascinating sector of the aviation industry with many new technologies to be looked forward to in the coming years. Future helicopter models are designed to be faster, more fuel-efficient and safer whilst noise and particle emission levels are reduced and capacity is increased. The helicopter has become one of human’s most flexible tools and a life without flexibility has become almost unimaginable for most of us.

**Global Helicopter Market Share (2009)**

**Figure 1. The global helicopter market in 2009, broken up by manufacturer**

References

http://www.flightglobal.com/Features/ helicopters-special/census/
http://inventors.about.com/od/ hstartinventions/a/helicopter.htm
http://www.prweb.com/releases/2013/1/prweb10296613.htm
http://www.flightglobal.com/Features/ helicopters-special/census/
http://www.imap.com/imap/media/re- sources/Aerospace_8_1FED752787A1E.pdf
http://bellhelicopter.com/Company/ AboutBell/History/History.html
http://www.agustawestland.com/
http://www.sikorsky.com/INDEX
http://en.wikipedia.org