Ukrainian Ultralights Begin to Grow

By Ian Frain and Mike Hirschberg

Although Ukraine is well known for its aerospace industry — particularly Antonov airplanes and Motor Sich turboshaft engines — the former Soviet Republic is a relative newcomer to the helicopter industry. After an early false start, three companies now have lightweight helicopters to offer.

Vertical Beginnings

In the late 1990s, the new country initiated a indigenous light helicopter effort to free itself of dependence on more expensive helicopters from Russia and Poland. The state-controlled TVT Corporation formed an aviation division, Aviaimpex. In March 2000, the company held a competition for a light helicopter and selected Design Bureau Aerokopter, which had been formed in December 1999 in Poltava. After the two companies briefly had a tie-up, Aviaimpex formed its own design team and the two companies split in May 2001. In August 2001, the Aviaimpex team, now dubbed the Vertical Design Bureau (“KB Vertical”), unveiled its three-seat demonstrator, the KT-112 Yashol (“Angel”). It was the first helicopter developed and built in Ukraine. The aircraft was built at state-owned AVIANT production plant (now known as The Antonov Serial Plant) and ground testing began in March 2002. The helicopter made its first flight on Jan. 18, 2004.

Later that year, KB Vertical flew a second KT-112 — a four-seat production prototype called the Kadoet. This aircraft used two 95 hp (70 kW) Rotax 912 ULS piston engines, and had a 1,200 lb (545 kg) empty weight and a 2,040 lb (925 kg) maximum take-off weight. The Kadoet received experimental certification in April 2004, and began testing to the Ukrainian AP-27 certification (harmonized with the European CS-27 standard and FAR Part 27). By September 2004, the two prototypes had flown 120 and 15 hours, respectively.

The Ukrainian government had intended to purchase 27 Kadets for the national highway police, while the military and oil companies in Ukraine and Russia also expressed interest. A production line was planned for up to 50 helicopters per year for missions such as agriculture, training and rescue.

Certification of the KT-112 was finally completed in 2006, but bankruptcy proceedings and a criminal investigation into missappropriation of funds shut down the company in 2010.

Aerocopter

Design Bureau Aerokopter — now known as “DB Aerokopter Ltd” or just “Aerocopter” — later designed a 3-bladed helicopter, dubbed the ZA-6, with a Subaru EJ22 automobile engine that produced 160 hp (119 kW). First flight was in October 2001.

A more advanced prototype, the AK1-5, was displayed at the 2002 Kiev Manufacturing and Security Exhibition. At the same time, an incomplete three-bladed version, the AK1-3 Sanka, was also exhibited, if flown in July 2003.

The AK1-3 Sanka light utility helicopter is powered by a Subaru EJ25 four-cylinder, water-cooled, four-stroke automotive engine, which produces 156 hp (114 kW) on 95 octane automotive gasoline (“petrol”). The AK1-3 has a simplified system for starting up and shutting down the engine, removing the need for priming the engine or mixture control. Other advantages of the engine are its high reliability and the low price of gasoline versus aviation fuels.

The airframe construction of this two-bladed helicopter combines both modern composites and titanium alloys, using computer numerical control (CNC)-machined parts, and is built to CS-27/FAA-27 regulations. The flex bearings main rotor head consists of three blades made of composite materials, and as such the blades can be detached and re-attached in 15 minutes by only two people. The same is true of the tail rotor, which also consists of composite materials.

In terms of performance, Aerocopter says the AK1-3 design has good flight control and stability and low vibration, because of having a neutral collective counterbalance and light control forces. The company notes that the AK1-3 Sanka has a power-to-weight ratio of 3.75, and can thus out-climb the Sikorsky (formerly Schweizer) S300CBi by 500 fpm (150 m/min), both with two people onboard. Aerocopter says the AK1-3 also has a low noise signature and “ease of maintainability.”

The AK1-3 is operated in 17 countries: Austria, Australia, Belarus, Belgium, Georgia, Italy, Canada, China, Korea, the United Arab Emirates, Russia, Slovakia, Sudan, Uzbekistan, Ukraine, France, and the Republic of South Africa. The French civil aviation authority (Direction générale de l’aviation civile, DGAC) has approved and certified the helicopter for flight training in Africa, the South African Civil Aviation Authority (CAA) has certified the AK1-3 for commercial operations (flight training, crop spraying and photography).

In Sudan, the aircraft company Safat Aviation Group assembled the Safat 02, which is based on the Aerocopter AK1-3. Rotor F/X in Van Nuys, California, is the distributor for the Americas, where it is available as an experimental helicopter in kit.

In 2009, Dubai-based Perla Group acquired Aerocopter. The company is now exploring an unmanned version of the AK1-3 and a five-seat helicopter.

What’s in a Name?

On the company’s website [www.skyline.ua], they refer to themselves as Horizon Research and Engineering Center, “a team of professionals with years of experience in the development of aviation [in] Ukraine and abroad designing and building helicopters and multi-purpose aircraft, engines and automated control systems.”

The Kiev-based company previously built a twin-engine helicopter, the SL-222. The aircraft used two water-cooled, three-cylinder inline two-stroke Hirth H37E engines that produced 90 hp (67 kW). The SL-222 was sized for 2-3 seats and was planned for single-engine operations as

Safat 02 cockpit and engine assembly during the static display at Dubai Airshow 2015. (Ian Frain photos)
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The AK1-3 Sanka light utility helicopter kit is powered by a Subaru EJ25 four-cylinder, water-cooled, four-stroke automotive engine, which produces 156 hp (116 kW) on 95 octane automotive gasoline (“petrol”). The AK1-3 has a simplified system for starting up and shutting down the engine, removing the need for priming the engine or mixture control. Other advantages of the engine are its high reliability and the low price of gasoline versus aviation fuels.

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In Sudan, the aircraft company Safat 02 (Photo courtesy of Viktor Vashchenko)

Safat 02 static display at Dubai Airshow 2015. (Ian Frain photo)

SL-222 (Photo courtesy of Viktor Vashchenko)

What’s in a Name?

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The Kiev-based company previously built a twin-engine helicopter, the SL-222. The aircraft used two water-cooled, three-cylinder inline two-stroke Hirth H317E engines that produced 90 hp (67 kW). The SL-222 was sized for 2-3 seats and was planned for single-engine operations as
well. The maximum weight was 1,404 lb (637 kg) and maximum speed was 105 kt (194 km/h). It made its first flight on Feb. 14, 2012, but the design was later abandoned. (194 km/h). It made its first flight on Feb. 14, 2012, but the design was later abandoned.

The SL-231 Scout was designed for
the conceptual design of a low-cost personal helicopter. After detailed discussions of objectives, and reviewing current light helicopters — such as the Robinson R44, Rotorway Exec and the Safari (formerly the ‘Baby Belle’) — Lebedev drafted numerous ideas of what the helicopter should look like before Skyline approved the SL-231 Scout design.

In 2015, the company created an official US representative and Scout kit manufacturer, Scout Aero, LLC. Headquarters in Coatesville, Pennsylvania, the company promotes a price tag of $19,000 for the completely ready-to-fly 3-seat helicopter, stating “Assembled in USA! Made from US materials, powered by legendary US Lycoming Engine!”

The SL-231, which is very similar in size (and appearance) to the Schweizer S-300CB, is powered by the supercharged 225 hp (168 kW) Lycoming IO-379 engine and flies at a comfortable cruising speed of 101 kt (187 km/h), and a maximum speed of 113 kt (209 km/h). It has an airframe constructed of riveted duralumin alloy, and energy-absorbing landing gears and seats.

The five-seat, twin-engine V-52 is expected to fly in 2017. Vashchenko is on the left with the pilot, Mark Kochergin. (Photo courtesy of Viktor Vashchenko)
Ukrainian Light Helicopters

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<th>Manufacturer</th>
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<th>NumberOfBlades</th>
<th>Max Speed</th>
<th>Engine</th>
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**The SL-231 Scout**

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Born in Kiev in 1965, Viktor Vashchenko began designing helicopters in school, then flew the Antonov An-2 for Aeroflot, and later the An-24. He designed and built his first aircraft, a single-seat glider at the age of 14; he flew it four years later in Kiev that September. It first took to the air on Jan. 9, 2015 and was debuted that summer at AirVenture in Oshkosh, Wisconsin, USA.

The SL-231, which is very similar in size (and appearance) to the Schweizer S-300C, is powered by the supercharged 225 hp (168 kW) Lycoming IO-379 engine and flies at a comfortable cruising speed of 101 kt (187 km/h), and a maximum speed of 113 kt (209 km/h). It has an airframe constructed of riveted duralumin alloy, and energy-absorbing landing gears and seats.

The aircraft flies at a maximum cruise speed of 140 kt (260 km/h) with a never-exceeded speed (VNE) of 155 kt (280 km/h). The SL-231 Scout is compatible with JET A, A1, B, TS-1, T2, and RT fuel.

The V-52 is a high-speed, five-seat, all-composite helicopter with the sleek airframe slightly resembling the Airbus Helicopters H145 from the front. The heart of the V-52 is two 830 hp Softex Invest motors, which are V-6 piston engines running on automotive gasoline, producing 250 hp (185 kW) in cruise and 300 hp (220 kW) as an emergency rating. The aircraft maximum take-off weight is 3,200 lb (1,450 kg).

The cruise speed for the V-52 is 135 kt (250 km/h) with a VNE of 155 kt (280 km/h). The avionics fit is predominantly a glass cockpit with two large displays, complete with autopilot and the latest navigation equipment. First flight is expected in 2017.

The VV-2 is a four-blade, two-seat tandem helicopter that the company also proposes as an unmanned option. The design started in 2013, with fabrication beginning in 2014, and the first flight took place on June 10, 2016. The first public flight demonstration of the VV-2 took place during the 8th International Iran Airshow, in November 2016.

**About the Author:**

Ian Frain runs an aviation research consultancy in Cambridge, United Kingdom, called Helian. He has a BSc in engineering studies — aerospace and mechanical — from University of Natal, and has worked in offshore and parapublic helicopter maintenance, as well as researcher in an aviation publishing company. He can be reached at ian@hel-ian.eu.

**Mike Hirschberg** is the Executive Director of AHS International.