

# The e-volo VC200 Volocopter

## The World's First Certified Multicopter

By AHS Staff

Karlsruhe, Germany-based e-volo GmbH conducted the first flight of its VC200 Volocopter on March 30 at nearby Bruchsal Airfield. After receiving its "Permit to Fly" as an ultralight aircraft in February, e-volo called its VC200 "the world's first certified Multicopter."

### Technical Description

The Volocopter is made of lightweight composite fiber material and runs on nine independent batteries, powering 18 electric motor-driven variable-speed/ fixed-pitch propellers. The redundancy ensures stability in the event of component failures.

Control about the roll and pitch axes are produced by differential variation of motor speeds across the propeller plane, while yaw control is via appropriate combinations of motor torques. Collective speed/thrust is used to control altitude. In combination with tilting the aircraft thrust plane, the VC200 is able to control flight in all six rotational and translational degrees of freedom.

The triplex-redundant flight control system comprises several completely independent units, each containing a complete set of positioning sensors, including pressure gauges, gyroscopes, accelerometers and magnetometers, for all three spatial axes. The VC200 is operated with one hand, using a joystick: the pilot controls all flight axes through rotational movements of the joystick's axes. Up/down commands are given through an altitude control thumb button. To land, the pilot presses and holds the button down until the aircraft is on the ground; once it nears the ground, the control system automatically slows down the Volocopter to ensure a gentle landing.

### Flight Testing

Following testing of previous models and subsystems, the VC200 was first flown unmanned in November 2013



The first manned flight of the VC200, registration D-MYVC ("My Volocopter"). The prototype was dubbed the "White Lady." (e-volo photo by Nikolay Kazakov)

in the 12,500 m<sup>2</sup> (129,000 ft<sup>2</sup>) indoor "dm-arena" in Karlsruhe.

Remote-controlled outdoor testing commenced in November 2015, and more than 100 flights were made to receive the unrestricted German Permit to Fly. Using the remote control unit, e-volo conducted extensive tests on the entire system, as well as individual modules and components. Failures were simulated by shutting down components — including propulsion motors, batteries and flight controls — in flight; erroneous data from "defective" sensors were also fed into the flight control system.

The VC200 is designed for flights at 100 km/h (54 kt), an altitude of 2 km (6,500 ft), a maximum take-off weight of 450 kg (1,000 kg), and more than an hour of flight time. The first flight, conducted by e-volo managing director Alexander Zosel, marks the first phase of the Volocopter manned test program, which will conduct low altitude flights up to 25 km/h (13.5 kt). Next, flight maneuvers at a speed of 50 km/h (27 kt) at medium altitude will be executed. The third testing phase aims to validate the system at higher altitudes and across the full speed range.

e-volo says the next goal is "to receive a type certification and to produce the Volocopter in large quantities." The company plans to enter the air sports market in the next two years, and eventually find utilization for air taxi services.

### Intel on Ascending Technologies

In July 2015, e-volo received a capital investment from sk ventures GmbH and its longstanding development partner, Ascending Technologies GmbH, which itself was acquired by Intel Corp. in Jan. 2016 for its "best-in-class drone auto-pilot software and algorithms."

"Intel congratulates e-volo on this accomplishment," said Josh Walden senior VP and general manager of the New Technology Group at Intel. "Technology developed by Ascending Technologies enabled the flight controls, motor electronics and key elements that extend multi-rotor UAV technology to this new type of aircraft. We look forward to aiding the development of more manned and unmanned vehicles in the future."

