



Steady progress in aircraft design despite covid-19 disruptions

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The **Aircraft Design Technical Committee** promotes optimization of aircraft systems, including analysis of their future potential.

▲ **The Delft University of Technology** tests its subscale novel Flying V aircraft.

Joep van Oppen/TU Delft.

It was a tumultuous year in aircraft design due to the impacts of covid-19. The year began normally enough with **first flight of Boeing's 777X** in January. The aircraft is the largest commercial twin engine transport and is powered by **GE Aviation's GE9X** engine. Its composite 71-meter-span wing utilizes a novel folding wingtip for easier airport operations.

The pandemic forced considerable replanning of numerous test and development programs. Boeing slowed its 777X testing, Embraer did likewise with its **E175E2**, and Mitsubishi restructured its **SpaceJet Regional Jet** family. General aviation developments continued, including the first flight of **Gulfstream's flagship G700** in February in Georgia. Cessna conducted its first flight of the **Cessna 408 SkyCourier** twin turbo-prop in May. Powered by Pratt & Whitney Canada PT6A-65SC engines, the SkyCourier targets a 200-knot cruise and range up to 900 nautical miles. It will be offered in both passenger and freighter versions. In July, the **Stratos 716X** kit aircraft made its debut flight in Redmond, Oregon. The six-seat, single-engine light jet is powered by a Pratt & Whitney JT15D-5 engine.

In the military and defense sector, Dynetics had its first free flight test in January of the DARPA-funded **X-61A Gremlins** experimental unmanned air vehicle. The UAV can achieve airborne launch and recovery, and by August it demonstrated a free flight of two hours, rendezvousing with a C-130 Hercules aircraft and concluding with a parachute recovery. In Italy, the **Falco Xplorer** medium-altitude, long-endurance drone from Leonardo flew for the first time in mid-January. Midyear, Taiwan's **Aerospace Industrial Development Corp. T-5 Brave Eagle** advanced jet trainer had its first flight. Designed to replicate the F-CK-1 Indigenous Defense Fighter, the T-5 has 80% new parts and is oriented specifically for training. The U.S. Navy delivered the first **Bell Boeing CMV-22 Osprey** tilt-rotor to an operational squadron in mid-June. In September, Boeing powered up the engine of its **Airpower Teaming System unmanned loyal wingman aircraft** in preparation for a first flight. Possibly the biggest surprise of the year was the U.S. Air Force announcement in September that it had designed and flown a **secret fighter jet** in only a year, but it released few details.

The tremendous enthusiasm around electric-powered vehicles continued into 2020. Momentum slowed as many major players (such as Airbus, Rolls Royce and Boeing) replanned to new financial realities. Steady developments continued, though, including China's **EHang**, which conducted the first U.S. flight in North Carolina of its autonomous air taxi, the two-seat **EHang 216**. In May, the **magniX All-electric Cessna 208B** first flew at Moses Lake in Washington. Billed as the "largest all-electric commercial aircraft," the modified C208B uses a 750-horsepower electric motor and was developed by magniX and AeroTEC, both based in Washington state. Slovenian company **Pipistrel** blazed new territory when its two-seat **Velis Electro** trainer received the first European Union Aviation Safety Agency's light sports aircraft certification in June.

Research and development vehicles also advanced. A subscale **Flying V aircraft**, a joint endeavor between Delft University of Technology and KLM Royal Dutch Airlines, was flown mid-year. Weighing 22 kilograms with a 3-meter wingspan, the vehicle flew from an airbase in Germany. At scale, the large, long-range commercial transport concept targets a 20% reduction in fuel consumption when compared with today's aircraft. California-based Swift Engineering flew its solar-powered, long-endurance UAV in July from Spaceport America in New Mexico. In Cranfield, England, ZeroAvia flew the first hydrogen fuel cell-powered flight of its modified Piper M350 test aircraft. ★