Lighter electric aircraft engine with Silicon carbide

A hybrid Cessna 337 taxied down a Southern California runway and lifted into the air. The plane, a type commonly used as an air taxi between islands, had a traditional gas-powered motor in the nose and an electric engine in the back. The electric motor was equipped with an experimental silicon-carbide inverter (motor drive) designed by the UA Power Group.

The test flight proved that a smaller, more efficient silicon carbide-based motor drive system could replace a hybrid plane's traditional silicon-based system. The UA Power Group is a recognized leader in the research and application of silicon carbide. Despite its superior performance, the higher cost of silicon carbide has hindered its wider adoption.

For the airplane project, the UA Power Group built a silicon carbide-based inverter, which converts the direct current of a battery to the alternating current needed to drive a motor. The reduced size of a silicon carbide-based system is particularly advantageous on a small airplane, where space is at a premium.

The lighter weight of a silicon-carbide system also means the plane uses less energy to take off and cruise. Planes are challenging vehicles for electrical engineers. The electrical systems must have mechanical supports to withstand vibrations and the shock of landing. At higher altitudes, the drier air increases partial discharge, which can degrade insulation and cause electrostatic issues. The higher switching speed of silicon carbide also creates more electromagnetic interference, which can affect other systems on the airplane. (Source: *IEEE Transactions on Power Electronics* (2025). DOI: 10.1109/tpel.2025.3597905).