

Research work on peregrine falcons inspires future aircraft technologies

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Credit: BAE Systems

Scientists at BAE Systems and City, University of London have revealed how research work on how falcons fly is inspiring new technologies for aircraft that could contribute to their safety in the air, aerodynamics and

fuel efficiency. The technologies could be applied within the next 20 years.

The scientists have developed several concepts following research into how the peregrine falcon – the world's fastest bird - is able to stay in control and airborne at speeds of up to 200mph, even in high winds. The technologies being developed include 'sensory feathers' - 3-D-printed polymer 'hair' filaments which would act like sensors on the body of an aircraft, providing an early warning system if it began to stall. Similarly, more densely packed passive polymer filaments may also be capable of changing the airflow very close to the surface of the aircraft which could reduce 'drag' on the aircraft wing-skin. Aerodynamic drag ultimately slows aircraft in flight.

A further [technology](#) has been inspired by the falcon's ability to stabilise itself after swooping or landing by ruffling its feathers. Small flexible or hinged flaps on an aircraft could allow the wing to manoeuvre quickly and land more safely at lower speeds. The added safety margin gained using this approach could allow future aircraft of a more compact design or to carry more fuel. In addition, the research so far has shown that the flaps could potentially lower aircraft noise pollution.

Falcon's Flight

Nature inspired future aircraft technologies.

BAE Systems and City, University of London are using research on falcons' flight to consider new technologies for aircraft.

Peregrine Falcon Facts

- The peregrine falcon is the fastest bird in the sky. When diving for prey, the bird can fly at speeds over 200mph
- The fastest speed in a dive of a falcon recorded was 242mph in 2005
- The falcon's wingspan is 74 to 120 cm
- The falcon can withstand diving at high speeds due to its one-way breathing system.



Sensory Feathers:
In Nature: A peregrine falcon's feathers alert the bird that it has lost airflow and is in danger of stalling.
On Aircraft: Directly 3D printing polymer hair filaments onto the wing of an aircraft could give the plane real-time data on its aerodynamics, allowing it to take early evasive action if needed. More densely packed filaments could also help reduce the aerodynamic drag on wings as this is what slows aircraft in flight.

Safe Swoop:
In Nature: When a peregrine falcon swoops to catch prey, its feathers bristle upwards to help it stay airborne.
On Aircraft: Hinged flaps on an aircraft's wing could allow the wing to manoeuvre quickly and land at lower speeds more safely, allowing for more compact design or it to carry more fuel.



BAE SYSTEMS
INSPIRED WORK

Credit: BAE Systems

Professor Christoph Bruecker from City's Aeronautical Engineering department, said: "The peregrine [falcon](#) is the world's fastest bird, able to dive for prey at incredibly steep angles and high velocities. The research work has been truly fascinating and I am sure it will deliver some real innovation and benefits for the aerospace sector."

Professor Clyde Warsop, a specialist in Aerodynamic Flow Control from our military aircraft business based at Filton in Bristol and Warton in Lancashire added: "Working with Professor Christoph Bruecker and his team at City, we've investigated how we could apply the unique abilities

of the [peregrine falcon](#) to [aircraft](#). Bio-inspiration is not a new concept; many technologies that we use every day are increasingly inspired by animals and nature."

Provided by BAE Systems

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