FORTISSIMO PLUS

FFPLUS SUCCESS STORY:
BUSINESS EXPERIMENTS

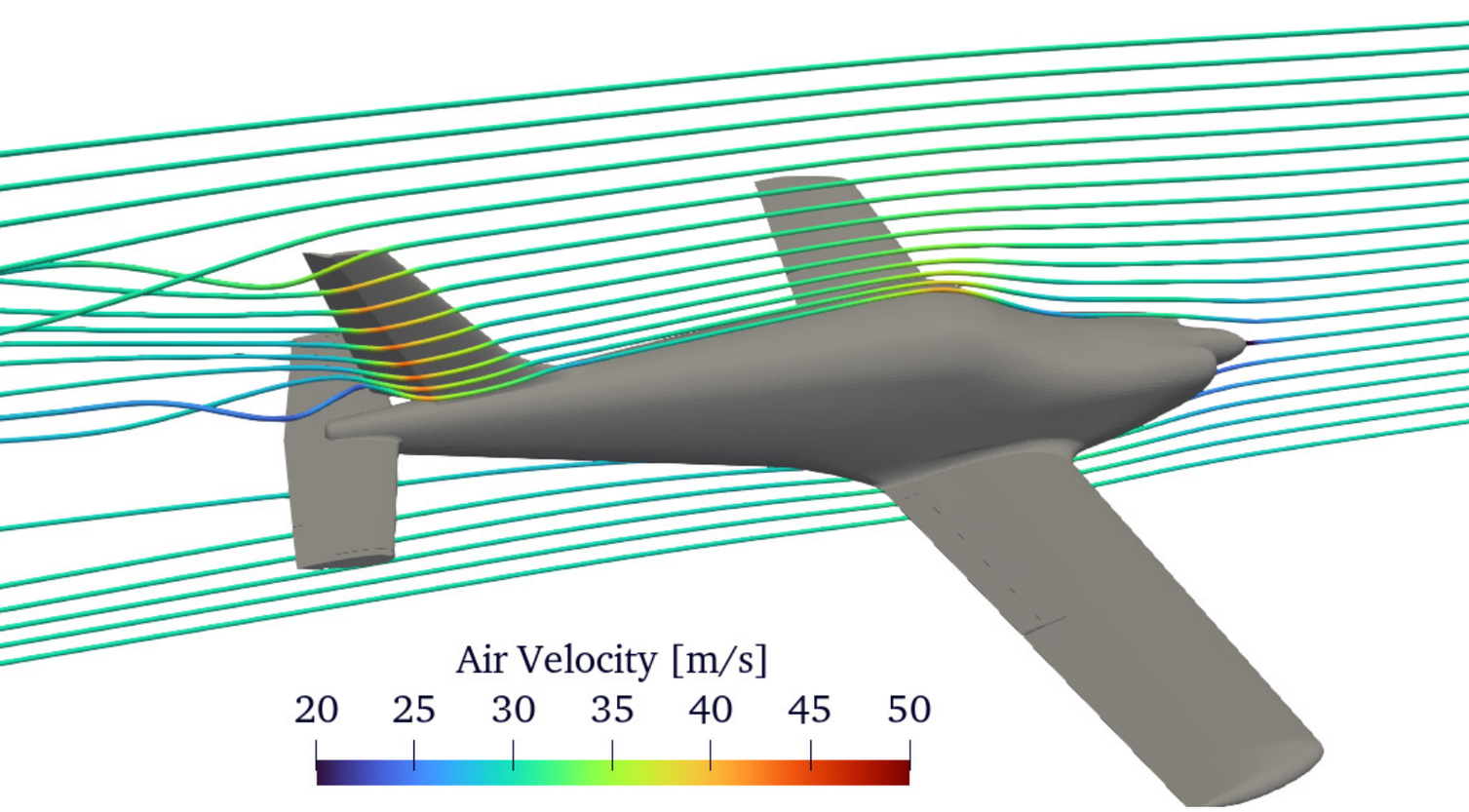
AI-DRIVEN AIRCRAFT FLAP OPTIMISATION FOR SAFER AND FASTER FLIGHT

ORGANISATIONS

BRM AERO is a Czech aircraft manufacturer and owner of the BRISTELL development programme. **AIRMOBIS** is an aerospace engineering SME specialising in advanced aerodynamic design and optimisation. **IT4Innovations** at VSB-Technical University of Ostrava is HPC and technology provider, supplying supercomputing and AI expertise through the Karolina system.

THE CHALLENGE

Aircraft designers must balance low-speed safety with high-speed efficiency. BRM AERO sought to improve their BR66 model flap and wing performance without compromising CS-23 certification, handling or safety margins. Manual CFD-led redesign could assess only a limited number of options, while evaluating thousands of configurations on standard work-stations would take months. HPC was therefore essential to make rigorous optimisation practical.



Technology used: HPC, AI, CFD
Industry Sector: Aerospace

THE SOLUTION

The partners created an HPC-enabled workflow combining high-fidelity CFD and AI. Karolina supercomputer resources ran thousands of virtual wind-tunnel simulations across alternative wing and flap geometries, producing the dataset needed to train a fast surrogate model. The model predicted aerodynamic behaviour in seconds, allowing promising designs to be screened automatically before validation with full-aircraft 3D CFD. The result was an optimised BR66 flap design and reusable workflow.

THE IMPACT

HPC made it practical to explore thousands of aerodynamic configurations at a fidelity and scale beyond conventional engineering workstations. The optimised BR66 design reduced structural mass by 13.7 kg, cut specific fuel consumption by 6.4% and increased cruise speed from 335 km/h to 351 km/h, lowering operating costs and environmental impact per flight. BRM AERO also gained a validated HPC- and AI-based methodology that can be reused across future aircraft programmes, replacing slower manual iteration with rapid, data-driven screening and targeted CFD validation. This can shorten development cycles, reduce engineering and certification risk, and accelerate time-to-market.
The company estimates that the improved methodology could support a gain of 1% in the European CS-23 market and enable annual production to rise by more than 40%. Across over 50 export markets, this strengthened competitiveness could generate approximately €14 million in profit over five years.

BENEFITS

- HPC enabled thousands of high-fidelity aerodynamic design evaluations.
- Aircraft structural mass reduced by 13.7 kg.
- Specific fuel consumption reduced by 6.4%.
- Cruise speed increased from 335 km/h to 351 km/h. Potential 40%+ production growth and EUR 14 million profit over five years.

Funded by the European Union

EuroHPC Joint Undertaking