



# ULTRAFAN 80 DEMONSTRATOR

The world's largest aero-engine demonstrator

As the world's largest aero-engine demonstrator, the UltraFan® 80 is the blueprint for the next generation of widebody applications.

By integrating decades of Trent heritage, we are aiming to achieve a 25% fuel efficiency leap over first-generation Trent engines and a 10% gain over the industry-leading Trent XWB.

- The UltraFan 80 demonstrator features a new architecture and light-weight composite materials as well as the world's most powerful aerospace gearbox.
- It also offers a 40% improvement in NOx and 35% lower noise.
- In addition, it is compatible with 100% sustainable aviation fuels from day one.

The first phase of testing took place in 2023 at our £90 million purpose-built facility – Test Bed 80 – in Derby using 100% sustainable aviation fuel. Product representative testing was carried out with full power and 85,000 lbs achieved in November 2023. The heavily instrumented demonstrator (2,800 parameters) allowed us to record 35TB of useful data.

Following forensic strip and inspection, a second build of the UltraFan 80 demonstrator has been defined with further testing planned later in 2026.



## Technology and architecture – The UltraFan 80 demonstrator features:

- A new engine core architecture to deliver maximum fuel burn efficiency and reduce emissions.
- A CTi Fan System with carbon/titanium fan blades and a composite casing.
- Advanced manufacturing, materials and technologies such as Additive Layered Manufacturing (ALM) to save on waste and allow for more intricate designs and CMC materials to withstand higher temperatures.
- A geared design which will deliver efficient power for the high-thrust, high-bypass ratio engines of the future. The power gearbox is the world's most powerful aerospace gearbox.

## Performance:

- 25% more fuel efficient than first generation Trent – the Trent 700.
- 10% more fuel efficient than the Trent XWB. Currently the most efficient aero-engine in service.

## Engineering fun facts:

- The UltraFan 80 demonstrator is the world's largest engine demonstrator with a fan diameter of 140 inches - a London tube train could run through a circle the size of the engine's fan case.
- The power gearbox is approximately one square metre and can produce over 50 MW - enough to power 500 family cars.
- Testbed 80 is the largest and smartest indoor aerospace testbed in the world. With an internal area of 7,500 square metres, it is larger than a football pitch.

## Funding organisations:

- Clean Sky/Clean Sky 2, Aerospace Technology Institute, Innovate UK, LuFo, Brandenburg State.

## Images:

- Available in a dedicated UltraFan folder on the Rolls-Royce flickr.com account.

