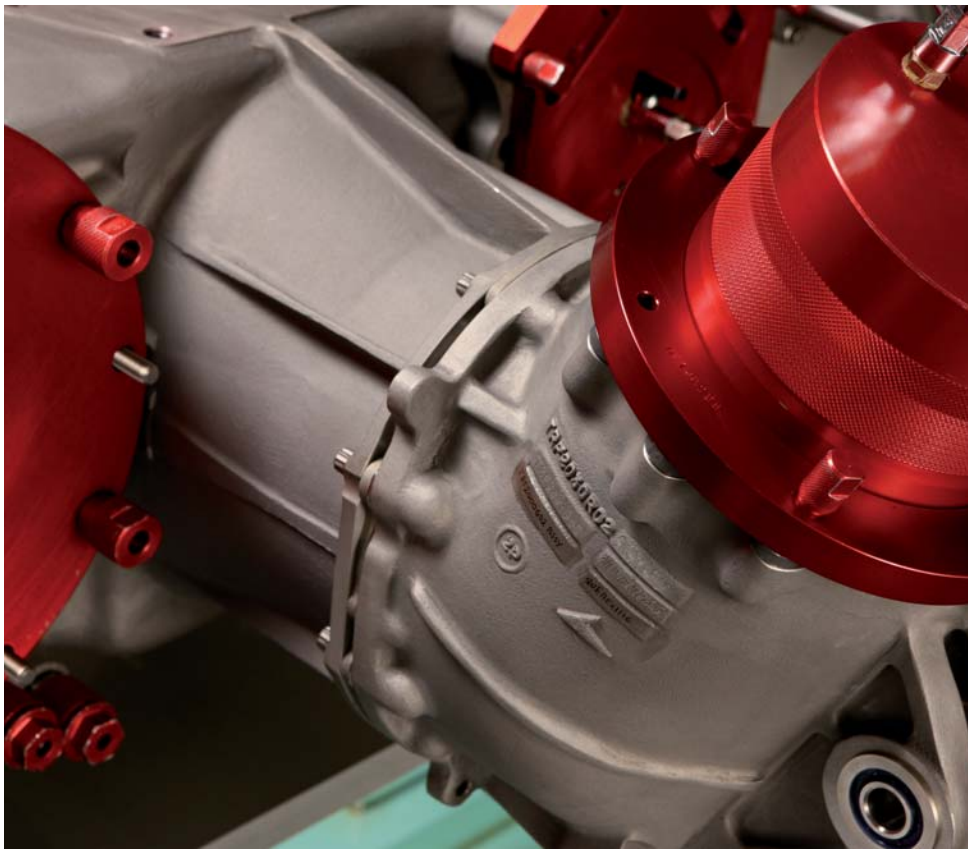
Trent 900

The Trent 900 programme

The Trent 900 was selected as the lead certification engine for the Airbus A380, the largest four-engine civil aircraft ever designed by Airbus Industrie. The engine was designed to become the reference for all the new high-capacity, long-range, four-engine aircraft.
On 29 October 2004, the Trent 900 obtained the EASA Type Certificate on schedule.
On 27 April 2005, the first flight of an A380 powered by Trent 900 engines was carried out successfully.
Four Trent 900s powered the A380 flight test aircraft. In 2005, the A380 flew daily at the Paris, Dubai and Singapore Air Shows. A tour of Asia and Australia successfully completed Q4 2005. Testing included a cold weather campaign in Northern Canada and high-altitude performance tests in Columbia, together with hot weather testing in the United Arab Emirates. The aircraft entered into service with Singapore Airlines in October 2007.
Nine out of the seventeen customers who have made engine selections to date on the A380 (i.e. Singapore Airlines, Virgin Atlantic Airways, Thai Airways International, Qantas, Lufthansa, Malaysia Airlines, British Airways, China Southern Airlines and Airbus Executive & Private Jets) selected the Trent 900, which has a 42% share of the market.
Currently, there are 16 airplanes in service and around 355,000 engine flight hours accumulated.



Brief engine description

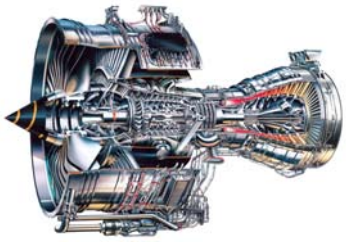
The design of the Trent 900 is the result of the experience gained on other engines of the Trent family, in particular, the Trent 500, including new features (contra-rotating shafts) and technical solutions to improve the reliability, fuel consumption and noise reduction.
The Trent 900 was certified at EIS, at 70,000, 76,500 and 80,000 lbf thrust.

Avio for the Trent 900

In the Trent 900 programme, Avio is Risk & Revenue Sharing Partner of Rolls-Royce, and is responsible for the design, development, testing, production and product support of the Accessory Drive Train (ADT), Oil Pump (OP) and Oil Tank (OT), for a programme share of 3%.
The ADT encompasses:

- step aside gearbox: mounted on the intermediate casing, it is mechanically connected to the radial drive shaft and drives the angle drive shaft
- angle drive shaft: mechanically connected to the step aside gearbox, it drives the accessory gearbox
- transfer gearbox: provides the mechanical connection between the angle drive shaft and the accessory gearbox
- accessory gearbox: mounted on the fan, it drives all the accessories requested by the engine, including the air-oil separator, providing also fluidic connection (oil and fuel) between the accessories

The OP is driven by the AGB and combines the pressure and scavenging functions into a compact, highly reliable and efficient unit.
The OT is a weight-optimised unit, which is fitted to the engine fan case and incorporates the scavenge oil filtering unit.



The challenges of the Trent 900 ADT design

Due to the experience gained in the development and production of accessory gearboxes for several civil and military engines presently in service, Avio accepted the challenge to design this new product facing very aggressive targets. The technical requirements that provide the ADT with innovative design characteristics are the following:

- high level of integration between the ADT/engine modules, particularly with the air/oil subsystem, in order to reduce the number of parts and optimise engine reliability, maintainability and costs
- maintenance intervals doubled with respect to previous Trent engines
- improved reliability
- improved power/weight ratio
- reduced Time-to-Market

In order to guarantee a reduced number of parts, increased reliability at system level and an improved approach to the maintainability operation, most of the pipes coming from the engine subsystems (e.g. air, oil and fuel) are cored into the ADT castings. In addition, an extensive use of the sophisticated simulation and calculation techniques, FMEA/FMECA, are fundamental to fulfil programme requirements.
The ADT design uses state-of-the-art material and processes, and makes the most effective use of the lessons learned by Avio from its large installed product base, which has so far accumulated millions of flying hours on most of the small, medium and large modern turbofans currently in service.

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