

**Concorde - Souvenirs of Supersonic  
Transport Design and Development**  
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Lecture Synopsis

In this lecture the aerodynamic design and development of the CONCORDE will be presented, based on Mr Collard's direct involvement with the Programme.

He recalls his beginnings as an aeronautical engineer in 1955, working in the aerodynamics department of AVRO (CANADA), on the ARROW supersonic interceptor fighter.

He then moves on to describe the early work done at BOEING on their first SST, the BOEING 733, and presents his own analysis of the evolution of their configuration.

From there he looks at the beginnings of the CONCORDE in France, and how its unique configuration was discovered.

To meet the very difficult mission requirements continual improvements to the aerodynamic configuration had to be made, as more was learnt about the real problems involved in designing a fully certified supersonic airliner. This meant that the production aircraft differed significantly from the prototype, and some of these differences are described in detail.

Theoretical supersonic wing optimisation is shown both with respect to its failures and ultimate success, and the implications to the overall aircraft Programme.

High incidence lateral stability will be discussed, with particular emphasis on the effect of the modified, production, wing shape. Flexibility and thermal heating problems are treated.

After describing the evolution of the fuselage geometry, in the same way a concise description of the aircraft's structure is given. This is necessary to highlight the difficulty of designing the very thin wing required to meet performance requirements, and to point out the major difficulties of the certification of an SST from a structural fatigue point of view.

In the second part of the lecture Mr Collard describes the CONCORDE'S powerplant, with particular reference to the air data system (used to control the intake variable geometry) and the intakes themselves. These intakes, of unique aerodynamic conception were fundamental to the success of CONCORDE. How they were modified in detail to allow operation throughout the aircraft's entire flight envelope is presented.

On reaching  $M=2$  the first prototype suffered a 4 engine surge at low incidence. This led to an urgent complete redesign of the wing inboard leading edge. This was done by the lecturer and full details are given.

Time is taken to give an account of the exemplary study made of water spray from the CONCORDE'S landing gear, leading to the water deflectors that equip the aircraft and prevent engine surge on an inundated runway.

Some post entry-into-service problems are described.

The lecture is concluded by showing the development potential of the CONCORDE, how two detail improvements led to significant performance gains, and how a developed version, the CONCORDE B, having enhanced performance at both low and high speeds, could have led to much lower noise levels as well as increased range.

Throughout the presentation the lecturer will remember those individual people on both sides of the English Channel, who were responsible for the creativity necessary to the success of the aircraft.