The technical case for the A-300B

The conventional appearance of the A-300B belies its advanced design. The volume of traffic to be handled by this type of aircraft naturally demands the utmost in aerodynamic, structural and mechanical efficiency: thus every facet of the design is being backed by a detailed research programme. It is now well known that large aircraft of this type, because of scale effect, tend to be structurally less efficient in terms of weight per pound of payload and, therefore, demand not only strict weight control, but also justify the use of advanced materials and manufacturing processes. This, however, constitutes only one aspect of the overall design task which must optimise the configuration, the aerodynamic sections and the high-lift devices, and evaluate in detail the systems and components to minimise engineering costs whilst achieving the highest standards of "maintainability" and reliability. It is a combination of these factors which produces a marketable aircraft capable of holding its own in a competitive market.

Aerodynamics

The A-300B wing will benefit from important improvements in aerodynamic design which have been achieved over the past seven or eight years as a result of Hawker Siddeley Aviation work on new high-speed aerofoil sections.

The high-speed characteristics of the 28° swept wing have been improved significantly by further development of the rear-loading concept, which increases the lift developed over the rear half of the aerofoil by undercutting the lower surface and extending the higher-velocity flow further aft on the upper surfaces. The extent to which this technique can be used is limited by the rate of pressure recovery which the boundary layer can accept without flow separation and buffetting, and by the resultant pitch-down moment which must be accommodated.

Areas on which there has been a special concentration of effort concern the engine nacelle, pylon and wing relationship and interference and the fuselage shape at both the forward and aft end. This identified the critical areas at an early stage of the design and led to a number of changes, one of the most significant being the lengthening of the rear fuselage. This rearward extension reduced the size, and hence the weight, of the tailplane and fin and resulted in lower trim drag, with an overall improvement in performance.

Fuselage

The fuselage cross-section has also been the subject of extensive investigation. At an early stage, both horizontal and vertical double-lobed fuselages were investigated, but all were eventually discarded in favour of a range of cylinders measuring 18-21ft in diameter and provides two aisles with seven, eight, nine, or even ten abreast seating. From a strictly technical standpoint the smaller-diameter fuselages show most advantages, and provide improved stability in high-altitude cruise conditions, whilst the overall performance capability and operating economy are better because of the lighter structure and reduced drag.

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