Powerfully quiet

The McDonnell Douglas MD-90 is likely to meet any Stage 4 requirements

HARRY HOPKINS/**LONG BEACH**

McDonnell Douglas intended the MD-90 to be a re-engined MD-88, with quiet high performance to meet future noise regulations. The International Aero Engines (IAE) V2500 engine met the bill, with 10-25% more power than that of the Pratt & Whitney JT8D-200 of the MD-80 series, and with noise levels 4dB below Stage 3 limits.

The MD-90 looks ready, therefore, to meet any likely future Stage 4 requirements. Launch customer Delta Air Lines typifies the customer which McDonnell Douglas is targeting with the MD-90: one with a long-term interest in being a friendly neighbour — and which is able to avoid the 2300 curfew at Washington National, for example.

There are two engine versions to match two variants of the MD-90: the V2525-D5 of 111kN (25,000lb) powers the MD-90-30, while a V2528-D5 of 125kN powers the extended-range MD-90-50. The new engines and associated strengthening added 2,500kg to the rear of the aircraft, so the forward fuselage was stretched by 1.5m, thus avoiding the need for ballast and giving the benefit of an extra seat row.

Detailed improvements to reduce drag and weight were described, with a two-page cutaway (*Flight International*, 9-15 June, 1993). Significant changes also include the re-profiled stabiliser and fin of the MD-87, with a reduced-throw rudder now powered; strengthening of the mainplane and tailplane skins; and a new 420kW (565shp) AlliedSignal GTCP 131-9 auxiliary power unit (APU).

Design life is now 60,000, rather than the 50,000, landings for the MD-88 and 90,000h, instead of 50,000h. The original DC-9 airframe was designed for 40,000 landings and now the lead one has logged over 95,000.

The MD-90 certification programme is now more than three-quarters complete and US Federal Aviation Administration certification, which is based on the earlier DC-9 and MD-80 standards, with 16 current conditions added, is scheduled for 18 November, with 120min extended-range twin-engine operations clearance by the end of 1995.

Back-up systems

The elevator actuators are fed by two 215bar (3,000lb/in2) hydraulic systems in series, but with each reduced to 110bar. If one fails, the other is brought up to full pressure. A two-way cable system is selected automatically on complete hydraulic failure: it can also be selected by an overhead switchlight.

Feel in the powered elevator is tailored to be close to that of the manual control on the MD-80 at various airspeeds and loads, using a variable-ratio-change mechanism.

THE COCKPIT

Prototype aircraft N-901MD, with 1,250h accumulated, was allocated for this evaluation. The only obvious indications in the cockpit of its prototype status were dual angle-of-attack (alpha) gauges, a sideslip gauge and a control-force meter.

Experienced DC-9/MD-80-series pilots will notice the improved binocular view forward, which results from a 30mm slimmer centre windscreen frame. Clever geometry allows the side clear-vision panels to be moved easily one-handed when the pilot wishes to see back to the wing-tips.

Few of the cockpit controls have been altered — even the large yellow wheel and lever for manual pressurisation are still there. That is reflected in a common type-rating: pilots transferring from the earlier types will need only a five-day differences course — only one day if they are familiar with electronic flight-instrument systems (EFIS) and flight-management systems (FMS).

As on the MD-88, small, 150 x 130mm, EFIS screens, flanked by separate altimeter and airspeed and vertical-speed indicators, include pilot's flight displays (PFDs) which show radio altitude and navigation display (ND) arcs spanning just 90°. If an EFIS screen fails, the PFD and ND can be compacted onto