Dash 8 wing lifts more

The Hawillard Canada’s Dash 8 test programme is on time despite weather setbacks and the fact that some supplier equipment needed more development time than expected. In some cases this had delayed data collection for certification but, because of extra work, DHC says that “the net effect is to assure correct configuration of aircraft systems earlier in the programme”. The manufacturer adds that “the tight Dash 8 schedule is being achieved with relative ease partly due to the low incidence of structural problems encountered to date”. There are orders for 54 Dash 8s, plus options on 57 more, from civil, military, and executive customers. Canadian carrier norOntar takes the first delivery on September 30.

DHC says that as this issue appears aircraft No 1 will have carried out tests to maximum diving speed, and will have precisely defined stall and other reference speeds. Aircraft 2 will be at an advanced stage on system tests, but work will continue on some aspects of the fuel, hydraulics, pressurisation, and digital engine control systems (ECS). The same aeroplane will be carrying out airfield performance tasks in Arizona. Aircraft 3 will be in the middle of natural ice accretion certification tests. Aircraft 4 has just begun cold weather systems evaluation in Northern Canada, having until now been working on the ground on the control system load limit tests and as a flight trial installation for furnishing fittings. The Dash 8 aerodynamic configuration is now frozen, but not without some modifications en route. To lighten or adjust control forces the elevator horn span was increased by 3in early in the programme, and elevator spring tab rate was adjusted. Lateral control at low speed needed adjustment, and this was accomplished by modifying spoiler gearing—aileron control is used at higher speed.

A major beneficial modification has been the incorporation of a droop on the inner wing leading edge. This delays stall to a higher angle of attack and causes the stall to begin further out on the wing. Maximum lift coefficient (Cmax) has increased, and both power-on and power-off stall speeds have reduced. The effect of the Cmax increase is a 300ft reduction in take-off distance, or the ability to lift over 1,800lb (816kg) more payload from the same field length.

There have been a series of minor problems with the Pratt & Whitney PW120 engines, including oil leaks, oil pressure fluctuations, inadequate flow of oil to cool the AC generator, and inadequate motive fuel flow from the engine fuel pumps to operate the airframe ejector pump system. These are now resolved. Engine modification was also needed to improve cold weather starting: P&W changed the design of the fuel nozzles and fuel heater. The engine achieved type approval last December, and the first production engine is flying on Dash 8 No. 4.

Sperry had unforeseen development problems with its DEZ 800 strapdown attitude heading reference system, but this and the flight control system are operating now on aircraft 3. The EFIS (electronic flight information system) is completely ready for operation in aircraft 4. Dash 8 brakes are now adjusted for smooth taxiing. Early problems had been encountered here because the brakes are designed to be powerful for short landing under hot-and-high conditions. They are fitted with a Hydroaer Mk3 antiskid system. Performance is working out as predicted or better. Despite an operating weight empty (OWE) increase, lower drag means that cruise speeds are as forecast, and the improved wing gives the choice of better field performance or increased payload. The c.g. range is extended; it is currently 15.5-35 per cent, and may yet go to 38. The Dash 8 will initially be certified at 33,000lb (14,970kg) take-off weight, and up to 38,600lb (17,490kg), with zero fuel weight increased from 28,000lb to 31,000lb (14,062kg); OWE is 21,590lb (9,793kg). These figures “include an allowance for any anticipated and unanticipated modifications between now and entry into service”, DHC says. There will be no further weight changes, the manufacturer says, except that the disposable load may improve if the allowance for weight growth is not fully utilised by service entry.

The PW120 engines are delivering power and SFC “as advertised”, says DHC. “The engines are smooth and start reliably now that they are fully developed. The engine electronic/hydromechanical control system provides predictable, smooth response under normal operation.” More development is required for the electronic control unit, though. DHC explains that “control development is required to improve the linearity of control under reversion to manual control after ECU engine control unit failure”. The manufacturer adds that the ECU is intended to be on the minimum equipment list for the Dash 8. Seating arrangements remain as planned for the aircraft—36 seats at 31in pitch, four abreast. But the aircraft can take 39 seats and still provide facilities for buffet service. When the fifth airframe joins the others in June it will be used for testing passenger facilities and safety. Structural and fatigue test programmes have shown no problems, and significant ultimate tests for all major components are complete.