

Regional power



GE is stretching the definition of a derivative with a regional jet version of its CF34 turbofan

The uprated CF34-8 is under development to power the CRJ900

GRAHAM WARWICK/WASHINGTON DC

THE ENGINE that launched the regional jet age is powering the next phase of the RJ revolution. Already the leading powerplant in the 50-seat jet market, General Electric's CF34 is to power all major contenders in the 70- and 90-seat markets.

While the CF34-3 powers the 50-seat Bombardier CRJ100/200, the uprated -8 is under development for the stretched 70-seat CRJ700 and 90-seat CRJ900. The CF34-8 will also power the 70-seat Embraer ERJ-170 and Fairchild Dornier 728JET, while the -10 growth derivative has been selected for the 90-seat ERJ-190 and 928JET.

Covering a thrust range from 8,750lb to 18,500lb (38.9-82.3kN) is no mean feat for an engine, but in the CF34's case it involves stretching the definition of a derivative. "The CF34-10 is a new centreline engine," admits Frank Klaus, general manager of GE's small commercial engines operation. "But, from a customer's viewpoint, the accessories are the same as the -8. They are in the same place, for quick removal and replacement."

The CF34-8 is, itself, substantially different from the baseline -3. Thrust is increased by 50%, to 14,000lb, and parts count is reduced by 30% - largely due to the use of a high-pressure (HP) compressor derived from that in GE's F414 fighter engine, with 10 stages instead of the -3's 14. Specific fuel consumption, noise and emissions are all reduced from -3 levels. The -8 also introduces full-authority digital engine control (FADEC) to the CF34.

The -8 programme is on track, says Klaus. The -8C1 for the CRJ700 was certificated in

November last year and Bombardier has selected the 5%-uprated -8C5 to power the yet-to-be-launched CRJ900. Ground testing of the -8C5 has begun and certification is planned for the second quarter of 2002. "It's a very aggressive schedule," says Klaus.

The first wing-mounted versions of the CF34 - the -8D for the 728JET and the -8E for the ERJ-170 - are also progressing. Ground testing of both versions begins in the third quarter. The -8E is uprated by 5% from the -8D, which shares the turbomachinery, accessories and FADEC of the -8C. The major difference is the nacelle: the wing-mounted unit for the -8D/E is produced by Aermacchi and Hurel-Dubois, while the fuselage-mounted nacelle for the -8C is produced by Bombardier's Shorts.

GE is introducing its "chevron" nozzle on the -8D/E and is speaking to Bombardier about fit-

losophy of using proven, derivative technology.

GE has completed conceptual design of the -10 and will begin detail design by mid-year. Klaus says two main drivers guided the initial design: the need for a core large enough to provide the take-off thrust margins that will be required to meet increased range and payload targets, and the desire to assure low-risk, low-cost development.

The resulting design draws on technology from a range of GE engines: from the CF6, the retention system for the wide-chord fan blades and the composite swept and "leaned" fan outlet guide vanes; from the CFM56, the three-dimensional HP compressor aerodynamics, single annular combustor and single-stage HP turbine; and from the CF34-8, the four-stage HP turbine and FADEC.

The first engine to test is planned for the first

Covering a thrust range from 8,750lb to 18,500lb (38.9-82.3kN) is no mean feat for an engine

ting the noise-reducing device on the -8C. The companies are also talking about standardising on the -8C5 for both the CRJ700 and CRJ900. The -8C5 uses the uprated turbomachinery of the -8E, and would be derated to power the 70-seat CRJ700, offering maintenance benefits.

Selection of the -8C5 to power the CRJ900 gets the engine into the 90-seat regional jet market, but the CF34-10 represents a "dramatic move forward", says Klaus. The need for 30% more growth in thrust, to 18,500lb with the potential for 20,000lb, has resulted in an essentially new engine which follows the CF34 phi-

quarter of 2002 and the -10 is set to fly on GE's Boeing 747 engine testbed in mid-2002. Certification is set for early 2003. The first aircraft to be powered by the -10 will be Embraer's 110-seat ERJ-190-200.

GE, meanwhile, is not neglecting the CF34-3. Durability and repairability improvements will be introduced into production engines in the third quarter, with upgrade kits for in-service engines available in the fourth quarter. These are expected to increase time "on wing" by 30%, says Klaus, and will keep the CF34 at the front of the regional jet revolution. □