

member of the General Electric/Snecma joint venture's best-selling CFM56 family of engines which powers current- and next-generation Boeing 737s and some Airbus A319/320/321s.

CFMI says that it plans to certificate the engine, which will have thrust ratings of between 82-102kN, within three years of the launch of the AE-100. The CFM56-9 will use the same core as that of the more powerful -7, which has been selected to power the Next Generation 737, but with a 1.42m-diameter, solid titanium, wide-chord fan.

"CFMI sees a potential market for 1,200 aircraft of this size over the next 20 years and is holding ongoing business and technical discussions with all of the participants in the joint Asian development programme," says the firm.

Germany's BMW Rolls-Royce plans to offer its BR715 turbofan, which has already been selected to power the McDonnell Douglas (MDC) MD-95, for the AE-100 and N2130. The BR715 is a more powerful version of the BR710, the initial applications for which are the Gulfstream V and Bombardier Global Express business jets. BMW R-R is far ahead of its rivals in terms of engine-development timescale, with the BR710 having this month received its European Joint Aviation Authorities type-certification ready to power the Gulfstream V.

The 82kN BR715 is due to be run for the first time in March 1997, with certification planned for September 1998. It is expected to enter service on the MD-95 the following year. The engine uses the standard BR700-family core, consisting of a ten-stage HP compressor and a two-stage HP turbine, coupled with a two-stage booster compressor, three-stage low-pressure (LP) turbine and a 1.47m-diameter fan.

COMPETITION PARAMETERS

Competition between the PW6000, CFM56-9 and BR715 is likely, however, to be about more than just technical specifications, performance and price. The potential for Chinese participation in the manufacture of engines is likely to figure highly in the fight to power the AE-100. BMW R-R and CFMI have made it clear that they will offer China significant workshare if picked, possibly including final assembly.

Some work on the CFM56, which is extensively used by China's airlines, has been subcontracted to Chinese companies, while BMW R-R hopes that the recently announced venture between Rolls-Royce, AVIC and Xian Aero Engine will bolster its chances. R-R's joint venture will manufacture nozzle guide-vanes and turbine blades for all of its commercial turbos, plus the BR700 series. It will also allow AVIC to promote the engine in Asia.

China is thought to be interested in taking on production of the HP system of the AE-100's engine, which could raise technology-transfer concerns for whichever company is selected. AVIC has already selected AI(R) as its Western partner for development of the airframe.

IPTN, meanwhile, has indicated that it



BMW R-R hopes a pair of BR710s will power AI(R)'s planned 70-seater

expects to decide by the end of 1997 whether to offer a single engine type on the N2130, or a choice of two. One possibility is that a shortlist of two would be narrowed down to one in line with the decision of the launch customer, the route chosen by MDC with its MD-95.

IPTN plans to follow up the baseline 100-seat aircraft with a stretched 130-seat version, which will require higher-thrust engines. A decision on the development of a smaller, 80-seat derivative is to be made by the end of this year. The Indonesian company is also requesting offset work, including involvement in the design of the engine's nacelle and pylon.

Competition between engine manufacturers is just as fierce in the 70-seat regional-jet market. Snecma has formed a joint venture with Pratt & Whitney Canada to plug the gap below the CFM56-9, bringing the French company into direct conflict with General Electric, its partner on the CFM56 and GE90.

Snecma and P&WC are developing the 53-71kN SPW14 to power the proposed AI(R) family of regional jets, which would offer seating capacities of 58-85 and could enter service by 2000. The baseline aircraft will have 70 seats and require 62kN engines.

Although AI(R) is thought to favour the SPW14 as it is an all-new design, powerplants from Allison, BMW R-R and GE are also being evaluated. Selection of a single engine type is likely to follow a survey of potential airline customers by AI(R).

The SPW14 is configured with a wide-chord solid-blade fan, driven by a three-stage LP turbine. The compressor has four axial LP and one centrifugal HP stage, driven by a two-stage HP turbine. Significantly, Snecma has won responsibility for the "hot section" of the engine, enabling it to draw on technology developed for its military M88 powerplant.

P&WC says that the SPW14 is being designed around a requirement for low cost of ownership, and a minimal parts count. Another target is "out-of-the-box" 10,000h on-wing reliability levels, avoiding the need for reduced

inspection periods until operational experience is gained. Initial component testing is due to begin later this year, and a launch decision is expected in early 1997. Snecma and P&WC are expected to bring in more outside subcontractors as the project progresses.

CO-OPERATION TALKS BREAK DOWN

MTU has already been approached to join the SPW14 programme, following the failure of co-operation talks between the German engine manufacturer and rival BMW R-R. The latter had hoped that MTU would build the LP turbine for the BR715, work which is now thought likely to go to R-R.

GE is offering AI(R) its CF34-8C turbofan, which has already been selected to power the yet-to-be-launched Bombardier RJ-X 70-seater. The -8C is a 58-67kN-thrust growth version of the -3, which is used on the 50-seat Canadair Regional Jet. The company says that the -8C will be ready to enter service on the RJ-X in February 1999.

Allison Engines is offering its AE3012 turbofan, a 45-62kN growth version of the AE3007, which powers the Embraer EMB-145 50-seater. The engine is now effectively a joint programme with R-R, following the UK company's take-over of Allison in 1995. Allison says that the AE3012 will have a 1.1m-diameter fan, a derivative of the AE3007's core, and a new LP system. Also on offer for the AI(R)70 is a derivative of the BMW R-R BR710.

Meanwhile, R-R's Tay family of turbosfans remains in production, although its future is tied to a successful rescue bid being mounted for the bankrupt Fokker. The engine powers Fokker 70 and 100 regional jets. The Tay is being superseded by the BMW R-R BR700 series.

It is clear that when, or if, AVIC, IPTN or AI(R) decide to launch their regional-aircraft projects formally, there will be no shortage of powerplants from which to choose. With six engine programmes under way, however, it is less clear which engine makers will achieve a return on their investments. □