Son of JT9D takes shape

EAST HARTFORD

The first run of Pratt & Whitney's follow-on to the JT9D, the PW4000, is set for next April. All design work is completed, and the new, 11-stage, high pressure (HP) compressor was successfully tested in August. Certification of the first of this family of new turbofans in the 48,000-60,000lb thrust range is set for July 1986. Pratt & Whitney says that the PW4000 will burn "at least" 7 per cent less fuel than the PW2037.

Results so far have shown extremely good correlation with computer predictions, the HP compressor proving some 3 per cent more efficient than that of the PW2037, due to be completed in December. The improvement results both from the use of "second generation" controlled diffusion aerofoils with thicker leading and trailing edges, and the introduction of three-dimensional design and manufacturing techniques not available at the time of the PW2037's design.

The PW4000 has benefited even more than the PW2037 from Pratt & Whitney's NASA-sponsored work on the recently completed Energy Efficient Engine programme (Flight, October 1, page 907). Component efficiencies throughout the engine have been increased, both by pushing up the rotational speeds of the turbomachinery and by better computer modelling. The core, for example, now spins at 10,000 r.p.m. - 2,000 r.p.m. faster than that of the JT9D-7R4. This means that more work can be wrung out of fewer components, resulting in a 30 per cent reduction in the number of HP compressor aerofoils, and a 50 per cent reduction in the aerofoils of the HP turbine which drives it.

The PW4000 is to be certified at 56,000lb thrust—the level demanded by the airlines. At this thrust, the use of powder metal HP turbine discs is set for July 1986. Pratt & Whitney calls the PW4000 a "radically new engine". Asked what this means as far as certification is concerned, it notes that many of the engine's features are consistent with those of the JT9D. "We've made a fresh start only where it makes sense," says Bruner. "The PW2037 is soon to be certificated," he notes, "proving that many of the new technologies incorporated on its bigger brother have already met with FAA approval!"

It had looked as though the PW4000's first new airframe would be the McDonnell Douglas MD100, in which application it would have been competing with General Electric's CF6-80C2. But now the engine is aimed at a market of 4,000-5,000 aircraft through to the end of the century. This covers new versions of the Boeing 747 and 767, Airbus A300-600 and A310, and retrofit to aircraft currently powered by the JT9D-7R4.