Microjets

Engine technology has been key to the emergence of entry-level jets. Initial impetus was provided by Williams’ NASA-sponsored FJ22, a 700lb-thrust turbofan that promised to be smaller and cheaper than any other business jet engine available. As the FJ22, the engine was central to Eclipse’s plans to produce a personal jet costing less than $1 million — so much so that, early in the programme, Williams was to be responsible for design and certification of the aircraft as well as the engine. The task of developing such a small turbofan proved too difficult and, after just one flight, Eclipse terminated its agreement with Williams on the FJ22 and began the search for a new, more powerful engine.

Head-to-head

By then, Cessna had entered the field with the Mustang, conducting a powerplant competition between Williams’ FJ33, a scaled-down derivative of the FJ44 powering the CitationJet family, and P&W’s all-new PW600. In January, the 1,350lb-thrust (6kN) PW615 won through. A month later, Eclipse announced it had selected the 900lb-thrust PW610F and P&W became overnight leader in the small-jet market. The company ran a PW625F demonstrator in 2001, but the new engines will not be available before late next year, which fits Cessna’s plans to fly the Mustang in mid-2005, but has forced Eclipse to delay certification to early 2006. Meanwhile, flight testing of the first Eclipse 500 has resumed with surrogate drone engines.

Williams has put the FJ22 on the back burner, continuing with technology development but with no plans for certification, and is focusing on the FJ33. After its reversal of fortunes with Cessna and Eclipse, the engine company has come back strongly, and the FJ33 has been selected to power three of the six entry-level contenders.

Adam’s twin-boom A700 is powered by two 1,200lb FJ33s mounted on the rear fuselage. Diamond’s D-Jet will be powered by a single 1,400lb-thrust FJ33-4, while Safire has selected a 1,100lb-thrust version of the same engine to power its twin-jet. ATG’s Javelin, if it is ever built, will also be powered by the FJ33-4, certification of which is planned by year-end.

Safire, like Eclipse, originally tried to break the business-jet mould by going for a non-traditional engine – selecting the 800lb-thrust TT800 developed by Agilis Engines — a small West Palm Beach, Florida-based engineering company — to power its S-26 personal jet. In February 2000, Safire announced it had executed a purchase agreement for 1,000 engines. The thrust requirement was later increased to 1,000lb, and the Agilis engine redesignated the TF100, but last year Safire reopened the competition to the FJ33 and PW600. In February, the company selected the 1,100lb-thrust FJ33-4, and in April it unveiled the redesigned, more capable, but also more expensive Safire Jet.

Honeywell has participated in at least some of the entry-level jet engine competitions with the LTF101 – a proposed turbofan derivative of its LT101 turbine family – but has yet to be selected.

The personal jet market has broken with tradition in at least one other area — avionics. While the majority of business jets have integrated avionics suites from one of the big two manufacturers – Honeywell or Rockwell Collins – the new lights jets have broken ranks. Eclipse selected newcomer Avidyne, teamed with BAE Systems, to develop the Eclipse 500’s Avio integrated avionics and aircraft systems management package. This set the standard for systems to follow, with large liquid-crystal displays (LCD) – two primary flight displays (PFD) and a central multifunction display (MFD) — autopilot, autothrottle, flight management system with aircraft performance computer, and a full suite of sensors and radios, plus weather radar. The basic elements of the Avio system are already flying on the Garmin’s G1000 avionics for the Mustang sets a new standard for cockpits

Garmin’s G1000 avionics for the Mustang sets a new standard for cockpits

Praet & Whitney Canada came from behind to win key contests with the PW600

Integrated flightdeck

Avidyne’s FlightMax Entegra integrated flightdeck, meanwhile, has been selected for the Adam A700 and Safire Jet. Both will feature two large-format flat-panel PFDs — each with an integrated solid-state air-data and attitude/heading reference system. Diamond has selected Entegra for its DA40 DiamondStar, but has yet to announce the flightdeck supplier for the D-Jet.

So far unsuccessful in penetrating the entry-level jet market, Honeywell has targeted development of its Apex system towards turboprop and light-jet retrofit applications. Goodrich was also pursuing the light end of the market with its SmartDeck integrated avionics, but early this year sold its Avionics Systems division to L-3 Communications. No SmartDeck applications have been announced.

In airframes, engine and avionics, light-jet manufacturers are breaking new ground. But, while the outlook is positive, questions remain over the ultimate size of the entry-level market, and how many manufacturers it can support. Owners moving up from pistons to jets face insurance issues, and the emergence of a robust all-taxi market remains uncertain. But, for now, the light jet sector remains one of the few bright spots in business aviation.