

A400M: engines

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fray with details of its proposed M88-2 derivative, now called the M138. From 1995, the engine effort stabilised, with only the entry of AlliedSignal (later Honeywell) with a proposed AS812 turboprop variant of the TFE1042 turbofan, to distract the studies of the two main teams. In February 2000, Snecma, MTU, FiatAvio and ITP of Spain formally established Turboprop International (TIP), to develop the M138 for what had now become the A400M.

Although the team, based in Munich, was fully established and was competing against the BR700-TP then being proposed by BMW Rolls-Royce, the political need for a pan-European solution remained. Responding to political pressure, R-R opened negotiations with the TIP alliance members, but the stumbling block was Snecma's preference for its traditional twin-shaft M88-based core, versus R-R's three-shaft design.

By mid-2000 a compromise was agreed under which R-R would formally join TIP with the understanding that the core would remain a heavily modified M88-2 based design, but incorporating three-shaft technology. In September that year, the newly expanded TIP, also including Belgium's Techspace Aero, signed a memorandum of agreement to submit a joint powerplant proposal for the A400M. At the same time, the separate bids from TIP and the original BR700-TP bid by R-R remained valid.

The joint bid was selected by AMC and the revised partnership was formally reformed as the Aero Propulsion Alliance (APA) joint ven-

ture the following June in recognition of its new role. MTU, R-R and Snecma each took a 24.8% share, ITP a 13.6% share, FiatAvio 8% and TechSpace Aero 4%. Although all seemed well, disaster was to follow when, within only months, APA admitted that preliminary figures showed the modified M88-based engine would not meet the A400M's weight or specific fuel consumption targets.

The event led to a frantic year in 2002 as AMC re-opened the competition and the APA team hastily went back to the drawing board. In the meantime FiatAvio and Techspace Aero pulled out of APA, the former because of Italy's decision to bale out of the A400M programme. Pratt & Whitney Canada, sensing an opportunity, entered the fray with a 16,000shp-rated turboprop based on its PW800 gas generator called the PW180, while the reconstituted EuroProp International (EPI) presented details of its all-new three-shaft concept. The EPI team included Techspace Aero, now majority owned by Snecma, while Avio would later assume a key role as gearbox supplier.

Delayed by the financial attraction of the P&WC bid, the AMC decision slipped into May 2003. The award, however, finally went to EPI, which had been forced to make serious changes to meet the 20% lower price tag of the PW180. The announcement provoked fury across the Atlantic, where the US Congress and United Technologies accused the European group of making political rather than price-based decisions. Unperturbed, EPI continued its build-up and in November 2003 opened its headquarters near Madrid.

The ZMKB/Progress D-27 propfan was an early powerplant contender



FLIGHT INTERNATIONAL/MARK WAGNER



RATIER-FIGEAC

"This technology gives much higher efficiency than a turbofan at low speed"

GUNTHER KAPPLER, EPI

Above: The A400M's electrically de-iced 8-bladed propeller is made from composites protected by a polyurethane shell

TP400-D6's expected efficiency in the M0.55-0.72 speed region, where propeller performance is traditionally poor. "We need this technology like the propeller of the Saab 2000, a combination that gives much higher efficiency than a turbofan at low speed, yet keeps this up without dropping efficiency at M0.5 and beyond."

Propeller system

The spinner contains the propeller control module, an auxiliary feathering pump, main pump, pitch change actuator and transfer tube, electronic overspeed governor, the hub and the beefy brush block assembly. The entire propeller system, which weighs around 650kg (1,430lb) and which is designed for either left or right rotation, passed a preliminary design review in June. The first propeller system is due for delivery in October 2005 to the engine test cell.

The engine will be certificated to civil standards by the European Aviation Safety Agency, making it the first propulsion system of its type to be approved by the recently formed multinational authority. Although it will not be undergoing specific additional tests for US FAR 25 certification, the process will otherwise clear the engine for standard parallel US Federal Aviation Administration certification. ■