FAMILY TIES

Airbus is building on the systems approach it is taking with the A380 for the A400M – and the two aircraft have a lot in common

GUY NORRIS / TOULOUSE

On close inspection it would not take the average aerospace engineer long to see the direct lineage between many of the major systems on the A400M and the A380 airliner now in final development just across the airfield at Toulouse.

Although a large proportion of the 80 significant systems on the A400M share design heritage and, in some cases commonality, with the A380, this does not automatically mean common suppliers. As part of its commercial approach, AMC is conducting a rigorous competitive evaluation and is on track to complete its selections by March 2005. "The programme is going according to plan, and so far we have about 50% selected," says systems aircraft component management team (ACMT) head Jean Michel Billig.

"The A400M is clearly an Airbus programme, so we're taking advantage of the family concept wherever we can. We don't want to reinvent the wheel so, for example, we have the systems architecture based on the A380, and half the spoilers are from the A340," he says.

However, Billig says the military role of the A400M means "clearly it makes sense to adapt where we can, but in certain cases because of the demanding EMI [electromagnetic interference] and vibration environments we have to revalidate the concept. We have been running tests of the A380 IMA [integrated modular avionics] with Thales to validate it, and see it copes with the tough operating conditions. The results were positive, but in some areas it has not been possible, so we have had to run a development programme for additional military features such as the radar, surveillance and navigation."

A400M central programme office engineering systems director Sergio Llamazares adds: "We're also trying to use the A380 example as much as possible to keep development time down." A prime example of this is the automatic flight system (AFS), which builds heavily on the A380 flight-control system to provide flight guidance, envelope protection and flight management functionality. "It's almost exactly the same technology, apart from some changes tailored specifically for the A400M's particular military needs," he says.

Flight management

One of these changes is the unusual use of the flight-management system (FMS), and the specially developed military mission management system (M-MMS), to provide low-level flight guidance to the AFS. "Low-level flight will be implemented in the FMS, in conjunction with the M-MMS, that's a novelty for this particular aircraft," says Llamazares, who adds that the same systems will also work together to provide guidance for air refuelling. For low-level flight, the system is designed to allow safe flight at 500ft (150m) above ground, in instrument meteorological conditions on a pre-defined route and altitude.

Developed by EADS Defence Electronics in Ulm, Germany the M-MMS feeds the AFS and Thales-developed FMS with digital terrain elevation information for the low-level flight mode, as well as providing the optimum release point for air drops. The M-MMS is a key part of the aerial delivery system as it computes the drop point from the cargo loads and cargo loading/unloading databases, as well as providing the best cargo loading and unloading arrangements for both tactical and strategic missions.

The flight-envelope protection feature, which allows the crew to get the maximum performance from the aircraft without over-controlling or over-stressing the aircraft, is also a key feature – particularly in an aircraft tasked with so many potentially unusual manoeuvres such as the A400M. "We are still discussing this with the customers," says Llamazares. "Obviously we will be allowing it to go further [than the A380], but it still has to offer protection and we are still defining exactly what this will be – both in automatic and back-up modes."

The final limits are due to be defined at the turn of the year before the end of the aircraft definition phase in the first quarter of 2005, but they are expected to allow bank angles up to 120°, or double that of the commercial aircraft.

The M-MMS also hosts several other functions, including the mission planning and data retrieval system, the tactical ground collision avoidance system

ALL IMAGES: AIRBUS MILITARY