



sponson shape. The concept also lends itself to better performance on semi-prepared strips, and supporting a low cargo floor. Tight turning capability is also enhanced by a selector valve that allows the front leg to be raised away from the ground.

This changes the load distribution of the forward main gear and, together with selective actuation of the multi-disc carbon brakes, gives the aircraft an undercarriage turn radius of 15m and an overall turn radius of 28.6m. The A400M will also be able to reverse up a 2% slope on hard ground using its own power, or up a 1% slope in soft ground at its tactical maximum take-off weight in hot and high conditions.

Kneeling feature

Another feature of the main gear is a set of hydraulic chambers that can be filled to raise and lower the rear fuselage by around 2°. The main gear, together with its unusual "kneeling" ability, will be tested in a separate rig to be created by Messier-Dowty, says Llamazares. The nose gear is relatively conventional, but does have an unusually large 600mm (23.6in) stroke.

The gear is designed to provide sufficient flotation to carry useful loads on 925km (500nm) tactical missions into unpaved forward airstrips with load-bearing ratings ranging from four (usually turf surfaces) and six to eight (moist sand) all the way up to crushed rock/concrete surfaces with ratios of 80-100.

The tactical utility of the A400M is also reflected in the sophisticated lighting array carried by the airlifter. In addition to the standard civil European JAR 25 compliant navigation, anti-collision, wing and engine inspection lights and landing lights, the aircraft is fitted with a suite of military-unique illuminations. These range from fuselage, wing- and tail-mounted formation flying lights to external and internal cockpit light-

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BRUNO TAFFETT

ing and is compliant with night-vision-goggle (NVG) operations. Lighting is the overall responsibility of TAI of Turkey.

Based largely on the Airbus cockpit philosophy, the A400M flightdeck is designed for two-crew operation and features sidestick controllers, and up to nine full-colour, large-screen interchangeable displays.

The design incorporates an optional position for a third flightdeck crew station immediately aft of the centre pedestal. The position is provided for complex tactical missions, and is augmented by space for a fourth crew position in a folding seat by the side of the flightdeck, adjacent to a crew rest area with two bunks. Aft of the bunks and an avionics rack is a galley area.

Thales and its German subsidiary Diehl Avionik Systeme are supplying the control and display system (CDS), which is derived directly from the A380 flightdeck.

Comprising eight 150 x 200mm multi-function liquid-crystal displays (nine if the optional third crew station is installed), the system provides the primary flight display, navigation and flight management display, communication and surveillance management, engine and warning display, systems and tactical display, tactical situation management, digital map, video, an air-to-air refuelling display dubbed "give and take" and a formation-keeping system display.

Thales, which is developing the CDS at its Bordeaux site, is also providing the cockpit's two foldable head-up-displays (HUD). The units, which are being developed in

France and the UK, use active-matrix LCD technology and provide guidance for parachute dropping, in-flight refuelling and threat warning in addition to the standard flight guidance and landing information.

The flightdeck design is close to being frozen, and a "Class 2" mock-up will be complete in October 2005 to aid development of the NVG-compatible lighting and other systems. The development simulator, which will help in the development of flight-control laws and crew workload evaluation, enters service at the end of this November.

Although modelled on the Airbus flightdeck, there are several detailed differences as a result of input from the national customer group and the extra military system features. For the first time on any Airbus flightdeck, for example, the airbrake control is mounted on the throttles "because there is just not enough room on the pedestal", says mock-ups and simulator concepts manager Bruno Taffett.

Evaluations of the flightdeck ergonomics have taken place with customer test pilot group, with pilots dressed for the "worst case scenario in oxygen mask, and wearing NVGs", says Taffett. "They wanted a few changes, and all of them wanted to move the emergency fire extinguisher control panel further forward." Other details such as the cursor control device (a joystick with a lever) and the modified nose gear steering handle have yet to be installed on the simulator. ■

Flight controls and other systems will be checked out on an "iron bird" rig similar to the A380 test device shown here