

THE INDISPENSABLE A400M

The A400M programme is certainly the most significant European programme of the last decade. Drawing on the latest technological and operational expertise, this new strategic transport aircraft produced by Airbus Military will improve the fluidity and efficiency of military operations. Its versatility and manoeuvrability, which meet operational specifications, are real assets to the aircraft's military projection role. Capable of carrying heavy loads (twenty A400Ms can carry more than 3,000 tonnes to a distance of 4,500 km in five days), the A400M can, unlike its competitors, carry out both strategic and tactical airlift assignments. With its flexibility and its capability to "break the distance and challenge time," the A400M is a European "technical" answer that takes into consideration the "new forms of war" conceptually outlined by U.S. military strategic thinking.

The A400M, which carried out its maiden flight in December 2009, was designed to meet a wide range of combined needs expressed by several European countries in terms of air transport. It is the ideal transport aircraft to meet the most diverse military,

humanitarian and public interest missions. It fulfils the roles of three distinct types of aircraft, and therefore provides more comprehensive services with fewer resources. Larger, it can carry more payloads in fewer flights, more closely meeting armed forces' requirements. Faster, it can perform more missions over greater distances in the same period of time. To sum up, with fewer aircraft, the operator can perform a greater number of missions, with a much higher productivity and better return on investment. It can be refuelled during flight and only two hours are needed to transform it into a tanker aircraft.

Thanks to its design, the A400M has low vulnerability, a low signature and a high level of survivability that guarantee excellent self-protection. With its "clean" engines and a reduced infra-red emission, a very sensitive electrical flight control system, four independent control computers, a comprehensive defensive devices, the A400M is difficult to identify and detect, and thus difficult to destroy.

The A400M, highly anticipated in the forces

General Palomeros (French Air Force chief of staff) and his predecessor, General Abrial, have repeatedly emphasised during public hearings their "impatience" for this aircraft to enter service with the Air Force. Replacement of the ageing fleet of Transalls is becoming urgent in a highly unstable geo-strategic context. They have always believed in the success of the A400M, while noting that, as with any complex programme, delays are almost inevitable. Through test campaigns, the aircraft was developed in full cooperation with France and all the participating nations. Both simulations and real trials have provided common feedback to maximise systems. The four A400Ms dedicated to tests have, to date, accumulated some 1,650 flight hours and more than 500 flights. The fifth aircraft is complete and has entered its final phase of control for a first

flight planned in early fall. Civil certification is expected by the end of the year. Airbus Military now has 174 firm orders from eight countries, including 170 for the seven launch customer countries (Germany, Belgium, Spain, France, Luxembourg, the United Kingdom and Turkey) and four for Malaysia. According to the current schedule, Airbus Military will deliver its first A400M to the first customer, the French Air Force, in early 2013. During the same year, the industrial is expected to deliver four A400M military transport aircraft. From 2016, the aircraft manufacturer expects to deliver 25 aircraft per year to its European customers. The first public presentation of the A400M was held at the Berlin Exhibition (ILA) in June 2010. The next Paris Air Show will be its first public exhibition in France.

A400M: EUROPEAN VERSATILITY

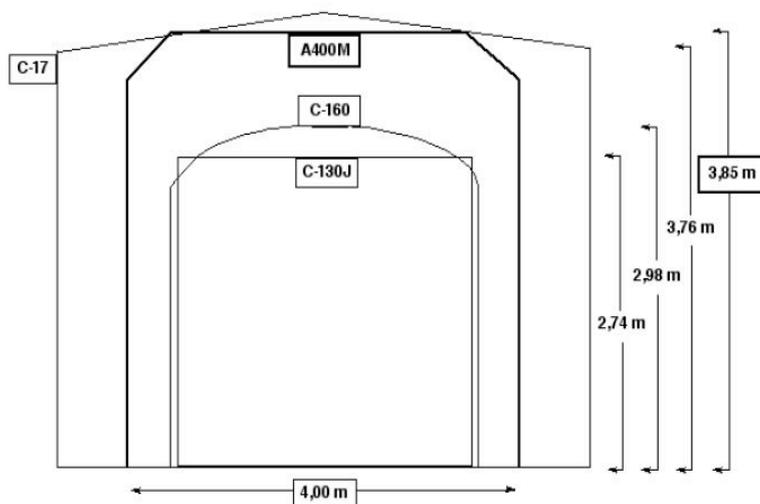
Does the A400M have a competitor? Larger than the C-130 Hercules, closer to the C-141 Starlifter Lockheed (first flown in 1963), this massive transporter, both on strategic and tactical levels, is also capable of in-flight refuelling and, depending on customer needs, can be

transformed into a tanker. It will be a serious competitor for the Antonov An-70 system that Russia had already tried, unsuccessfully, to sell to Europe (the programme is currently being questioned).

Designed to replace aircraft such as the C-130 Hercules and Transall C-160, the Airbus A400M CSA

(Common Standard Aircraft) is a response to the specific requirements of seven nations: Germany, Belgium, Spain, France, Luxembourg, the United Kingdom and Turkey. These countries stated their requirement for versatility. The A400M will meet that need.

A400M: Capabilities comparison



► Specifications

Cargo area: 92 m²

Cargo volume: 340 m³

Max. take-off weight for logistics mission: 141,000 kg

Max. take-off weight for tactical mission: 131,000 kg

Max. payload for logistics mission: 37,000 kg

Max. payload for tactical airlift missions: 30,000 kg

Max. internal oil: 50,500 kg

► Size of the payload bay

Compartment length: 17.7 m

(versus 20.8 m on C-17 and 12.2 m on the C-130 J)

Rear ramp length: 5.4 m (versus 6 m on C-17 and 3.1 m on the C-130 J).

TP400: one of the most powerful engines

One of the key elements guaranteeing the versatility of the A400M is the choice of a dedicated engine, a triple-body turboprop that integrates the latest technologies developed and proven in other commercial and military engines of the four partners of EPI (EuroProp International), a group formed by Rolls Royce, Snecma, MTU and ITP.

The TP400, one of the most powerful turboprops ever built (11,000 hp) can operate at a wide range of speeds and altitudes, with reduced power consumption. With four of these engines, the A400M can navigate at 11,300 meters (37,000 feet) at speeds between Mach 0.68 and Mach 0.72. It can fly above turbulence, which means greater comfort for paratroopers,



and fly into commercial airspace, to reach the theatre of operation more quickly. The position of the propellers (five metres in diameter with eight blades), which feature a

counter-rotating propulsion, ensures the symmetry of the aircraft with four engines running and decreases any imbalances in case of engine failure.

A400M, SYMBOL OF A TECHNOLOGICAL LEAP

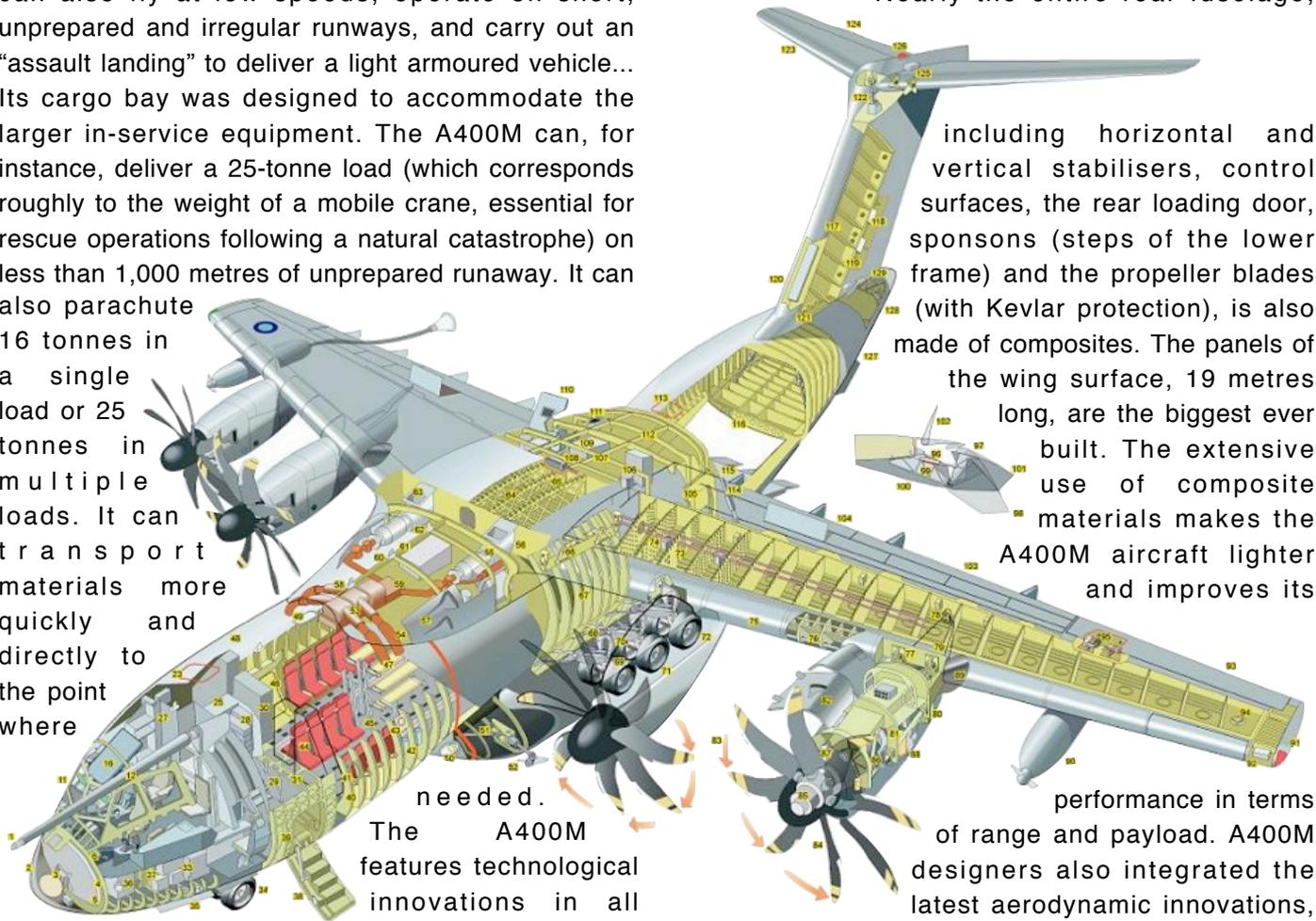
Technology in service of the customer

The A400M is a compendium of innovations produced by the teams of Airbus Military. It is a type of dual aircraft, versatile, well adapted to the new requirements of military operations. Thanks to its advanced technology, it can fly higher, faster and farther, while featuring excellent manoeuvrability. It can also fly at low speeds, operate on short, unprepared and irregular runways, and carry out an "assault landing" to deliver a light armoured vehicle... Its cargo bay was designed to accommodate the larger in-service equipment. The A400M can, for instance, deliver a 25-tonne load (which corresponds roughly to the weight of a mobile crane, essential for rescue operations following a natural catastrophe) on less than 1,000 metres of unprepared runway. It can also parachute 16 tonnes in a single load or 25 tonnes in multiple loads. It can transport materials more quickly and directly to the point where

somewhat of a dual aircraft. Regarding its structure, in order to reduce the mass, the A400M uses more composite materials than any existing airliner or military aircraft. Thirty per cent of its structure is made of such materials. The wings have, for the first time in history, main beams made of composite materials.

Nearly the entire rear fuselage,

including horizontal and vertical stabilisers, control surfaces, the rear loading door, sponsons (steps of the lower frame) and the propeller blades (with Kevlar protection), is also made of composites. The panels of the wing surface, 19 metres long, are the biggest ever built. The extensive use of composite materials makes the A400M aircraft lighter and improves its



needed.

The A400M features technological innovations in all areas. Civilian technologies have been incorporated where they are useful to

the "military customer" and meet expectations, particularly in the ergonomic and functional details of the cockpit for the flight controls, making the A400M

performance in terms of range and payload. A400M designers also integrated the latest aerodynamic innovations,

allowing it to fly in a more comfortable and more effective way. The A400M is one of the few aircraft in the world to feature a "back up control" mode, which allows the aircraft to fly in case of complete electrical failure.

Ergonomic electrical flight control

The cockpit of the A400M is similar to that of a new-generation civilian aircraft (electric flight controls, reconfigurable screens that can receive every kind of infor-

mation -flight control, navigation, tactical datas- according to the crew requirements). The central control handle, which traditionally takes a lot of space, is now replaced by a

small control stick on the side that is lighter and easier to handle. It provides pilots with unobstructed visibility on the large TV-type screen in front of them.

A PROJECTION TOOL

Dropping airborne troops and cargo

► Projecting equipment

To carry out its logistics function, the A400M has a 340 m³ cargo hold. The diameter of the fuselage, similar to a commercial A330 (cabin and cargo), has a cargo section of about 4x4 metres. It allows the A400M to accommodate large pieces of military equipment, such as infantry vehicles and attack helicopters, or heavy civilian items, such as lifeboats, excavators or cranes, which are essential following a natural disaster or during a humanitarian mission. The A400M

bay, offering more space between rows, can carry the same number of paratroopers and their equipment. Capable of flying at very high speeds, the A400M can quickly take paratroopers to a theatre of operation, and, on arrival at the destination, drop them rapidly over a limited area, reducing the dispersion factor and allowing a rapid regrouping of the force.

The A400M has been specifically designed for this type of quick airborne drop. Its flight capability at low speed (110 knots/200 km/h)

or aerodynamic fairings, located near the landing gear and forming a step on which a parachutist can position himself before jumping. Aircraft fairings have been lengthened in order to reduce the turbulence behind the aircraft, so that the airflow keeps paratroopers away from one other. Capable of flying at high altitude (normal cruising altitude is 11,300 metres / 37,000 feet), the A400M can drop elite troops at altitudes up to 12,200 metres (40,000 feet) for special missions.



can carry 30 tonnes to a distance of 4,500 km (2,450 nautical miles) or 20 tonnes to a distance of 6,400 km (3,450 nautical miles). Its modular bay can hold a combination of these materials while offering 54 seats for soldiers to be deployed, search and rescue teams, medical support, engineering, etc..

► Projecting soldiers

The A400M can accommodate up to 116 soldiers sitting face-to-face throughout the compartment, and back-to-back along the centreline of the aircraft. The width of its cargo

allows easy exit from the aircraft. Moreover, the A400M allows two paratroopers to jump simultaneously, either through the loading door or via the two side doors. This feature reduces jump time by 50 per cent, decreasing the dispersion factor between the first and last paratrooper. Simultaneous jumps are made possible thanks to the exceptional aerodynamic characteristics of the A400M, which prevents paratroopers from colliding behind the aircraft during simultaneous jumps. When using the side doors, paratroopers can use the “sponsons”

► Deliveries without landing

At very low altitudes (up to five metres) up to three individual loads with a combined weight of 19 tonnes can be extracted at once with parachutes specially designed for this purpose. A computed air release point (CARP), connected to the automatic load release system provides information to the crew, who can better control extraction of the equipment. This system is also integrated into the front viewing screen (HUD), enabling monitoring of the dropping sequence.

FLIGHT TESTING: A WELL DESIGNED AIRCRAFT

Towards civil certification...

On 11 December 2009, the first A400M carried out its maiden flight at Airbus Military's test centre in Seville, Spain. Two years after that first flight, the fifth aircraft will make its maiden flight, in November 2011. It will be the first A400M configured as series production standard. Since 2009, the four test A400Ms, called MSN 1 to 4, have flown approximately 1,650 flight hours in more than 500 sorties and nearly 1,000 take-offs and landings under various conditions. Among the trials, some have been spectacular, such as those in extreme cold weather conditions. After having simulated frost on the aircraft in order to understand its flying

characteristics, the A400M was taken to Kiruna, in northern Sweden. Put through two campaigns, the Airbus remained at temperatures as low as minus 38 degrees for more than 24 hours. All pilots who have had the privilege of piloting the new transport aircraft have praised the behaviour of the aircraft, underlining its agility and stability. The entire flight envelope provided was fulfilled without any change or structural modification on the plane. EASA, the E.U. agency responsible for civilian aviation safety regulations, should give the A400M type certification before the end of the year.



... And the validation of military capabilities

Although on the short-term, the priority remains civilian certification, the test campaign is also devoted to the validation of military capabilities. Numerous tests have been carried out in various configurations, including the addition of aerostructures, fitted on doors or landing gear to test characteristics of the airflow. Various situations were tested: two A400Ms flew in formation, the aircraft was refuelled during flight by a Royal Air Force Vickers VC10 in April 2011, it landed on an unprepared airstrip (in order to measure the impact on the cell), and night flights were also carried out (NVG, military radar, Enhanced

Vision System). Other tests included the brakes and minimum take-off speed.... Extensive tests were also performed on the parachute and cargo release. Last November, French and British teams were parachuted from the aircraft (side door and rear ramp) to study the behaviour of airflows. This test was followed by tests of pallet airdrops at low altitude, an important capability today, as the Afghan theatre has shown. Starting next year, tests will be carried out on the aircraft's self-protection systems in the hot weather conditions of the U.A.E. The goal is to get military standard IOC (Initial Operational Capability) by next year.

► Words of a pilot

"Every pilot who takes orders for the A400M has a smile on his face," said Ed Strongman, chief test pilot at Airbus. The A400M "behaves well. The maximum speed of the aircraft was reached in the early trials, which is unusual. We had no bad surprises," he continued. "The electric flights controls make the aircraft very responsive and easy to control."

► 55 pilots

To date, 55 pilots have flown on the A400M. In addition to the core of a dozen Airbus test pilots, flight test pilots of the first air forces that will receive the aircraft have flown on the European transport aircraft. English and French officers took the control of the plane in March and April in Toulouse. German and Turkish pilots have also flown on the A400M. Finally, in order to obtain civilian aircraft certification, pilots of the EASA (European Aviation Safety Agency) will soon make flights in order to evaluate the aircraft for certification by the end of the year. In total, 40 flights have already been carried out with certified and "non-Airbus" pilots.

► European test centres

The tests were performed at two dedicated Airbus centres, including Seville and Toulouse. In addition, other telemetry stations are being used for the test campaign: Getafe (Spain), Bremen and Hamburg (Germany) and Filton (U.K.).

A400M FOR EXPORT

► Birth of a success

The A400M is not yet in service, but it already represents one-third of current sales of tactical transport aircraft on the world market. Understanding the benefits of Airbus aircraft and the current needs of modern air forces, eight countries have already chosen the aircraft (174 planes ordered). Although until recently the market for tactical transport aircraft was dominated by the U.S.-made C-130, air forces are now aware that

► Changing need

The proliferation of operations increases the need for military transport. Projection of forces but also permanent logistical means are required to supply to theatres that are sometimes very distant (Afghanistan, Ivory Coast, Haiti...). Especially since the armed forces must, in addition to their presence in conflict zones, provide emergency humanitarian operations. During the last decade, more than two billion people have been

220,000 personnel. The UN and NATO respectively account for 48 per cent and 44 per cent of these deployments.

► Complementary products

Airbus Military offers a highly complementary range of aircraft to meet these needs. Besides the A400M, Airbus offers light carriers (CN235 and CN295), while the A330 MRTT, in addition to being a tanker aircraft, can fulfil strategic airlift missions.

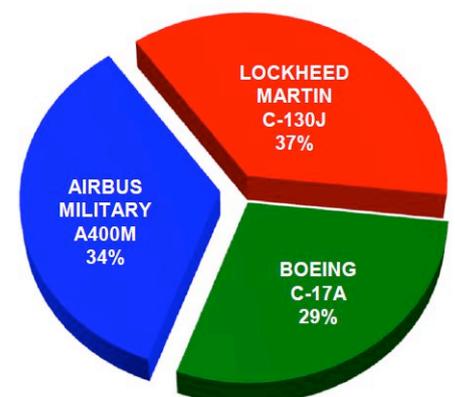


“This is a well born plane that will serve the French defence strategy of mobility, projection capability and versatility; it will be an important asset within the coming 40 years. (...) Its design in its entirety makes it a fundamentally new aircraft.” – Gerard Longuet, French Defence Minister, visiting Airbus facilities in Toulouse, April 2011.

the A400M is well beyond it in terms of capabilities. Interestingly, the A400M has stirred the interest of the U.S. armed forces and U.S. Air Force is closely following the development and progress of the European programme. Over the next 30 years no less than 800 heavy transport aircraft should be purchased worldwide. While the fleet of heavy transport aircraft today totals 2,500 planes in service, the world fleet is on average more than 25 years old!

affected by natural disasters (tsunamis, earthquakes...), resulting in the deaths of 60,000 people per year on average. In these situations, the humanitarian response must be rapid. The last decade has also seen a dramatic increase in peacekeeping missions: four-fifths of staff who perform these missions are deployed in Asia and Africa. As an illustration, in 2009, nine international organisations conducted 54 different operations, representing a deployment of

Market share in the Heavy Aircraft Market



Total Sales: 521a/c