



National Audit Office

MINISTRY OF DEFENCE

Hercules C-130 Tactical Fixed Wing Airlift Capability



SUMMARY

1 Transport aircraft are vital for both strategic and tactical tasks to support national security objectives, military exercises and training, and humanitarian aid. Strategic tasks are predominantly the transport of people and equipment long distances from the United Kingdom worldwide while tactical tasks are usually short flights within theatre. The Ministry of Defence's key tactical airlift assets are its 43 Hercules aircraft, although they are also used for some strategic tasks. It costs the Ministry of Defence (the Department) £245 million annually to operate and maintain the current Hercules fleet.

2 Operating at a high tempo and in harsh environmental conditions in Afghanistan and Iraq is taking a toll on many parts of the aircraft and in particular on the underbelly and propellers. Four Hercules have been lost during current operations, the most recent in August 2007. Recuperation funds from the Treasury have contributed towards the purchase of two additional C-17 aircraft to increase the Department's capacity for long range airlift rather than replacement Hercules.

3 Over the next decade the Department faces a period of transition. It is consolidating all fixed wing air transport aircraft on a single base at RAF Brize Norton. The Hercules C-130K fleet will be retired, the specialist operations role will be transferred to the newer Hercules C-130J fleet and the A400M will be introduced into service.

4 This report examines the Department's current performance in providing sufficient Hercules to support the full range of airlift tasks; assesses the future risk to Hercules availability and capability and considers ways in which the Department can become more efficient in its use of existing aircraft to increase its airlift capacity. Appendices 1 and 2 describe our methodology in full.

Overall conclusion

5 The Department is meeting the requirement for Hercules aircraft to be deployed in Afghanistan and Iraq, despite a declining fleet size resulting from the retirement of the Hercules C-130K aircraft and losses on operations. This performance has been achieved through collaborative working and innovations to fleet planning, especially in allocating tasks for the Hercules aircraft and prioritising the fitting of new equipment to increase availability. The current nature and scale of operations is reflected in the increasing cost of running and maintaining the Hercules fleet. There are also difficulties with the provision of spares in the Hercules C-130J fleet. With the continued focus on operations, there has been a reduction in aircrew training and non-operational airlift tasks in support of wider Defence activities.

6 Going forward, there are significant risks for the Department because demand for tactical fixed wing airlift is likely to remain high in the near future. The specialist operations role must be transferred to the Hercules C-130J whose service life is being reduced by the intensity of current operational flying. These factors will restrict the Department's ability to provide sufficient airlift to the Armed Forces. The problem is exacerbated by the late delivery of the A400M aircraft which is intended to replace the older Hercules C-130Ks when they retire in 2012. If availability of Hercules aircraft is reduced as a result of these changes to the fleet, opportunities for training will be limited, potentially eroding aircrew skills and restricting their ability to operate the Hercules in the wide variety of operational situations that may occur in the future. Extra aircraft could be purchased, leased or chartered but cost and restrictions around their use may prevent this from being a realistic and affordable option. There are some low cost or cost neutral solutions which the Department could undertake to improve availability of the newer aircraft and increase training; but these may not be sufficient to cover the likely shortfall.

Findings

Our main findings are as follows:

On meeting current operational requirements

7 Most nations do not have sufficient airlift assets to meet all their requirements and the United Kingdom is no exception. The Department has put in place a number of processes to assign Hercules aircraft to best match the needs of Defence as a whole. It has brought together all the parties with a role in providing or using Hercules aircraft into pan-Departmental working groups to prioritise tasks. Two groups, the Air Allocation Committee and the Commitments Area Requirements and Availability of Air Transport Team have successfully contributed to ensuring that the highest priority, for aircraft to be deployed on operations, was met despite a declining fleet size.

8 This requirement for aircraft in Afghanistan and Iraq has been achieved even with an increasing need for maintenance and upgrade of equipment on the fleet. The Department has to balance operational imperatives with risk and, with the creation of the Capability Delivery Steering Group, has formalised the process for prioritising upgrades to minimise the impact on availability and maintenance time. It has continually updated the fleet with equipment such as defensive aids. Once the decision to upgrade the Hercules has been approved, the Department and industry have responded well to fit the equipment to the first aircraft in a timely manner. The Department has continued to fit these equipments on to other Hercules and forecasts that the modifications will be completed with the minimum of delay and impact on availability.

9 Aircraft on operations in Afghanistan and Iraq are available to fly planned missions at least 85 per cent of the time, which is in excess of both the expected level and that achieved in the United Kingdom, although the flying is more severe and the environmental conditions are harsh. The Hercules was originally acquired for a tactical role but historically it has been used to transport people and equipment long distances from the United Kingdom. Before 2003, flights averaged three hours in duration. Now they are predominantly used for short flights in theatre, of just over one and a half hours long, and are performing more than double the number of take-offs and landings. Airstrips are often unpaved, making the aircraft more susceptible to damage from rocks and other debris, and the fleet is being used extensively to airdrop heavy supplies, increasing the stresses on the airframe.

10 The Department has obtained over 3,000 flying hours from other nations' spare airlift assets in exchange for air-to-air refuelling services or strategic airlift. Where feasible it has also purchased airlift from the commercial market. These additional sources of airlift did not however prevent a decline in non-operational tasks and training and exercises.

11 The Department's focus on operations in Afghanistan and Iraq has led to a decrease in availability of Hercules for training and other air transport flights. On operations in Afghanistan and Iraq aircrews are flying 60 hours per month on average, whereas pilots in the United Kingdom are typically flying fewer than 13 hours a month. The Department is concentrating on training that is considered essential to prepare crews for flying on operations, so the amount of training for other conditions and manoeuvres is restricted. When the number of aircraft available is fewer than expected it is the non-operational tasks and training and exercises that are cancelled. There has been a tenfold increase in the number of training flights cancelled in 2007 compared to 2005. Simulators for both aircraft variants have limitations, particularly because their software has not kept pace with aircraft modifications, especially defensive aids, and they are therefore not able to replicate flying the Hercules accurately. All these factors are contributing to the erosion of the skills base and currency of the Hercules aircrews.

12 Under the current system, RAF Lyneham determines how many Hercules it can make available (offer) for air transport tasks on a given day. This 'offer' is not always driven by the number of aircraft required for planned Defence activities. A high degree of certainty on the minimum number of available aircraft is important as it is not always possible to arrange the required cargo, crew, passengers and flight clearances for tasking at short notice. Inevitably, there will always be some unexpected variations but only on ten per cent of occasions does the number of aircraft actually available to perform the agreed tasks for the day match exactly the number that was originally predicted to be available. The Department often has more aircraft available than predicted, and is not always able to make best use of these extra aircraft.

13 The total cost to the Department to operate and maintain the Hercules fleet has risen from £212 million in 2002-03 to £245 million in 2007-08. The increasing costs of maintenance and upgrade reflect the age of the aircraft; the change from longer to shorter flying tasks and greater numbers of sorties. Funds from Treasury reserves for fuel; cost of flying; upgraded equipment and maintenance directly resulting from operating in Afghanistan and Iraq have increased significantly from £9.5 million in 2002-03 to £92.7 million in 2007-08.

On managing future risks to the availability and capability of the fleet

14 While the Department is meeting current operational requirements there are significant risks to the availability of the tactical fixed wing airlift capability in the future. Delivering this capability involves more than managing the existing Hercules aircraft and acquiring new ones. For example, training, personnel, infrastructure and logistics also need to be put in place and associated risks managed coherently.

15 Fatigue, which decreases the life span of the wings, is accumulating more rapidly on the aircraft than in the past. The cost of recovering the wings has caused the Department to retire nine of the older Hercules C-130K aircraft early, with a further five being retired as intended at their extended out of service date of 2010. These retirements have resulted in a planned gap in capability. Nine will continue to fly, and of these, five will have their wings replaced at a cost of £15.3 million to ensure that they have sufficient life to last until 2012.

16 The Department has enhanced its systems for monitoring the fatigue on the newer Hercules C-130J. The full results will be available in 2013. Given the significant stresses to which the aircraft are being subjected on operations, initial indications suggest that the worst affected Hercules C-130Js may need their centre wings replaced or refurbished from 2012 in order to reach their planned out of service date of 2030. This requirement combined with other activities to upgrade the fleet will further reduce availability around 2012. The Department will also need to identify an appropriate source of funding for a re-winging programme.

17 The United Kingdom was the first customer for the Hercules C-130J. At the time of purchase of the aircraft and their initial spares, there was no previous history of spares usage and predictions assumed a single operating base and fewer flying hours. With real experience of spares use, in different operational circumstances than originally assumed, spares estimates have proved inaccurate. The resultant shortages have not been allowed to affect the aircraft deployed in Afghanistan and Iraq. Under the Department's plans it will cost less than £8 million to rectify these problems.

18 The first batch of the new A400M aircraft is unlikely to be delivered to the United Kingdom before the end of 2011. To mitigate this risk in part, the Department has extended the service life of the Hercules C-130K until the end of 2012 at the cost of £41 million. A400M is a collaborative European procurement managed by the Organisation for Joint Cooperation in Armaments. The Department does not have a direct contractual relationship with Airbus Military and this limited influence makes it difficult for the Department to plan further mitigation strategies effectively to help them sustain airlift at current levels.

19 Originally the Department's strategy for consolidating all fixed wing tactical aircraft at RAF Brize Norton involved relocating part of the Hercules fleet only, keeping the remainder at RAF Lyneham. This would have created two main operating bases and caused significant logistical difficulties. The entire Hercules fleet and all related support and RAF maintenance activity will now be moved to RAF Brize Norton. The Department has not yet quantified the impact on the Hercules Integrated Operational Support contract. For example, there may be a lack of repair bays, insufficient parking space for aircraft and aircraft may have to be towed some distance to the repair hangars.

20 The Department is developing a comprehensive and combined overview of the key issues which affect the delivery of military capability (training, equipment, personnel, information, concepts and doctrine, organisation, infrastructure and logistics) for the Hercules fleet. It has created the Strategic Mobility – Capability Planning Group which aims to provide an overview along the lines described above, but this Group is still in its infancy. The Department must therefore ensure that its decisions in the short term are coherent if it is to make best use of its limited resources.

Recommendations

On maximising opportunities to increase tactical airlift capacity and capability

- a** Operational flying is high intensity, but crews are training on average fewer than 13 hours a month on aircraft when posted back to the United Kingdom. The Hercules simulators have not kept pace with aircraft modifications, especially defensive aids and so they are not able to replicate flying conditions accurately.
- **The Department should prioritise resources to install the necessary software on the Hercules C-130J simulator at the cost of £4.25 million to increase the hours crews spend training, reducing the erosion of the skill base, and increase its flexibility to divert aircraft to undertake additional tasks.** For example, by using the simulator intensively the Department could provide an additional 300 days of aircraft availability – the equivalent of one aircraft per year for other purposes.
- b** On average a Hercules C-130J can be unavailable to fly due to a lack of spare parts for 24 days a year.
- **The Department has identified pinch points in spares provision and it should take forward the actions it has identified to resolve these problems. It should now develop meaningful performance data to provide assurance that there are no other fundamental problems with the supply chain.** If the Department can improve the provision of spares for the Hercules C-130J to the same levels as the Hercules C-130K, then the fleet would be available for an extra 168 aircraft days in a year.
- c** The Department spent £130 million on chartering additional airlift in 2007-08.
- **It should ascertain how much of this charter work could have been undertaken by Hercules aircraft and analyse whether it would be better placed in using some of that money to increase the availability of its own Hercules aircraft.** For example, if the Department were to build an all-weather natural runway at RAF Keevil, Wiltshire, instead of landing on a beach it could reduce the time aircraft need washing to remove salt water. This runway would cost approximately £2 million, but would save around £230,000 per annum and provide 41 extra days of Hercules availability to undertake Defence tasks.

- d Repair and maintenance is taking up to 25 per cent longer on some parts of the Hercules fleet. A Departmental review has identified a shortfall in engineering staff. In response, an additional 54 personnel are being provided to RAF Lyneham with individuals drawn from less operationally-loaded units.
 - **This re-deployment has been effective to date but is only a temporary solution and the Department needs to provide the levels of personnel recommended in the review if it is to support current levels of flying.** Aircraft will always need some additional maintenance beyond that routinely scheduled, but the RAF estimates that additional engineering personnel could release an additional 300 days of aircraft availability for other purposes.
- e The Department is not able to make good use of aircraft that become available 'last minute' because there is insufficient time for crews, flight paths and cargos to be arranged.
 - **The Department should refine its system for tasking Hercules to allow users to take advantage of additional aircraft as they become fit to fly.** As a result the Department could achieve efficiencies in its allocation process, by reducing the number of tasks which have to be re-assigned or cancelled, and satisfy more bids for Hercules flights.
- f Analysis of the rate of accumulation of fatigue on the Hercules C-130J fleet shows that some aircraft's wings may reach the end of their life as early as 2012.
 - **The Department should complete its investigation into the most cost-effective method for extending the life of the Hercules C-130J wings.** By assessing the practicalities of changing the method of fleet management to mitigate accumulation of fatigue and the feasibility, cost, funding and source for procuring new centre wings or refurbishing existing "J" wings, the Department will be able to mitigate the risk to availability of Hercules C-130Js.

On managing future risks to the availability and capability of the fleet

- g Previously, there has not been a means of providing comprehensive insight into the key issues, which affect both the Hercules aircraft and the personnel who fly and support it, and the level and nature of the risk the Department is managing.
 - **This shortfall is now being addressed by the Strategic Mobility – Capability Planning Group, which is still in its infancy but tasked with developing the requisite means for managing the key issues.** By having a single group actively considering training, equipment, personnel, information, concepts and doctrine, organisation, infrastructure and logistics, the Department should improve the visibility of the risks, manage them more coherently and identify opportunities to increase availability.
- h Delays to the introduction of A400M aircraft could prevent the Department sustaining current levels of tactical airlift. One potential solution is to halt the retirement of the remaining Hercules C-130Ks in 2010 but there is a point at which measures to extend the life of these aircraft, including major depth repair and re-winging, are not practical or economic. Other options include sourcing additional airlift by lease, purchase or charter or re-balancing the way the fleet is used for example, maintaining permanent bases overseas.
 - **The Department should determine the costs and benefits of extending the life of the Hercules C-130Ks compared to alternative solutions to cover this capability gap. Progress on the A400M procurement should determine the trigger dates for the sourcing of funds and submission of a business case to the Investment Approvals Board so that the solution can be introduced within the necessary timescales.** If the Department's decision making and funding processes are sufficiently agile then these measures can be implemented without a significant reduction in the availability of Hercules aircraft.