

CHAPTER I: Operation and Maintenance of Mi series Helicopters in IAF





HIGHLIGHTS

- 1. There was a deficit of 26 per cent in the total availability of helicopters compared to the numbers required for achieving current operational projections. Category-wise short-falls were most apparent in the case of attack helicopters where the holdings were 46 per cent below the actual requirement.*

(Paragraph 1.2.1.1)

- 2. Despite availability of funds and a specific acquisition programme for the 10th Plan period, IAF was unable to induct even a single helicopter which has adversely affected maintenance of force levels and operational preparedness.*

(Paragraph 1.2.1.1)

- 3. The existing fleet is ageing and nearly 78 per cent of the helicopters have already completed their prescribed life and Total Technical Life extension has been carried out on them elongating their life.*

(Paragraph 1.2.1.2)



4. *Serviceability levels were low and fell consistently short of the prescribed 75 per cent. Combined with high Aircraft-on-Ground levels, this was indicative of inefficiency in operations, low utilization of Mi series fleet and poor repair and maintenance activities.*

(Paragraph 1.2.1.4)

5. *Seven helicopters were modified for 'VIP' role without approval of the Government. Such modification also lacked justification as a separate specialized communication squadron with adequate helicopter for use by VIPs already existed. Modification of helicopters for VIP/OEP use affected availability of helicopters for operation purpose.*

(Paragraph 1.2.1.6)

6. *Manpower deployment was not rational with respect to norms fixed per helicopter as there was an overall shortage of pilots ranging from 12 to 27 per cent during 2003-07 while, at the same time, there was an excess of aircrew.*

(Paragraph 1.2.1.7)



- 7. Achievement with regard to engine overhauls and repair in respect of Mi-8 and Mi-17 helicopters was considerably lower than the tasks fixed. This was due to shortage of spares which resulted from both delayed and inadequate provisioning for these spares. As a consequence, 210 engines were sent abroad for overhaul at a cost of Rs 68.49 crore.*

(Paragraph 1.2.2.1)

- 8. Satisfaction of AOG demands for spares was delayed in most cases, indicating deficiencies in provisioning and procurement.*

(Paragraph 1.2.2.3)

- 9. BRDs were not efficiently managed. Not only was the manpower provided considerably below sanctioned strength but there was excess utilisation of man hours and man days in performing tasks. This also added to the cost of overhauls and repairs carried out at the depot.*

(Paragraph 1.2.2.4, 1.2.2.5 and 1.2.2.6)



KEY RECOMMENDATIONS

- 1. A large proportion of the helicopter fleet will reach the end of their operational lives in the near future. Ministry should address IAF's current shortfall in the Helicopter fleet by ensuring that there are no further slippages in the acquisition programmes and expediting on-going procurement processes.*
- 2. Air HQ needs to urgently address the main reasons for shortfalls in serviceability and increased AOG levels and ensure timely repair and maintenance services and availability of essential spares.*
- 3. Air HQ should take effective steps to measure output and performance of repair depots. This would imply setting standard norms for AOG levels and permissible cannibalisation and Category 'D' status.*



4. *Project management and monitoring should be accorded priority so that repair and overhaul facilities needed to support aircraft serviceability are created in-time and are designed to deliver full functionality.*
5. *Shortage of spares should be addressed through careful and prompt provisioning and procurement since shortages create bottlenecks in utilising the capacity of repair and maintenance facilities.*
6. *The quality of services and the level of efficiency in repair and maintenance facilities should be stepped up to eliminate delays, instances of premature withdrawals and use of man hours/ mandays beyond norms.*

Part I

Introduction

1.1 Mi series Helicopter Fleet

The Indian Air Force (IAF) operates military helicopters in support of a wide range of operations and since their induction in the 1950s, the helicopter



Mi-17 Helicopter dropping supplies in Siachin.

stream of the IAF has become a key component of India's defence capability. In fact, today, helicopters are deployed for a variety of tasks spanning from life-saving missions in peace time to attack operations in a war. As a result, helicopter flying for military roles and tasks has increased considerably over the last two decades. The IAF helicopter fleet is a balanced mix of various types of helicopters. The current helicopter fleet consists of Cheetah, Chetak, Advanced Light Helicopter (ALH) and Mi series helicopters.

Mi series helicopters are Russian origin aircrafts with a number of variants depending upon technical specifications and role performed by the helicopter. They constitute 60 *per cent* of the IAF inventory of helicopters and are distributed across seven different types which are used for medium and heavy airlift and attack operations. These helicopters were inducted into the IAF between 1971 and 2003 and are operated from different locations. The primary role of Mi series helicopters in the IAF, type-wise, is given overleaf.

1 Primary role of different Mi helicopters

Type of Helicopter	Pay load capacity	Primary Role
Medium Lift helicopters (Mi-8, Mi-17 and Mi-17IV)	These helicopters can carry four tons of pay load.	Transportation of troops and supplies, Communication support, Logistic support including air maintenance, Casualty evacuation, Aid to civil power and Special heliborne operations.
Heavy Lift helicopter(Mi-26)	This helicopter has a pay load capacity of 20 tons.	Heavy lift logistic support and air maintenance.
Attack helicopter (Mi-25/25U and Mi-35)		Anti tank, Offensive air operation, Escort for helicopter operation and assault operation

1.1.1 Total service life

A helicopter consists of aero-engines and an airframe, which require maintenance and overhaul at prescribed periods. Each helicopter has a fixed Total Technical Life (TTL) and Time Between Overhaul (TBO). The TTL of airframe and its aero-engines, both in terms of calendar life of years and flying hours, varies with their type and role. The Original Equipment Manufacturer (OEM) of the helicopters specifies the TBO also in terms of both operating hours and year of operations. The initial calendar life of 15 years for medium lift helicopters, 20 years for heavy lift and 20 years for attack helicopters have been extended to 35 years, 25 years and 30 years respectively.

1.1.2 Maintenance philosophy

The operating units are responsible for carrying out first and second line servicing of all types of Mi-series helicopters. Third and fourth line repair and maintenance of airframe and aero-engines of Mi-8 and Mi-17 helicopters are undertaken at a Base Repair Depot (BRD). Repair/overhaul facilities for heavy lift and attack helicopters airframes and their aero engines do not exist in

India. Setting up facilities for these fleets would be economically unviable because of the small fleet size and hence, the helicopters are being sent abroad for repair/overhaul.

1.1.3 Scope of Audit

The Performance Audit, conducted between May and August 2008, covered the five years period from April 2003 to March 2008 and was later updated till March 2009. The audit exercise focused on aspects such as fleet serviceability and Aircraft on Ground (AOG)¹, actual performance of helicopter units, manning position of the squadron, projected requirement of helicopters and adequacy of facilities for repair and maintenance and their use.

Audit acknowledges with gratitude the support provided by the Ministry of Defence, Air Headquarters and all subordinate offices during the course of the Performance Audit and subsequent interactions for the collection of information for updation of the Report.

1.1.4 Audit Objectives

The operation of the helicopter fleet and utilization of repair, overhaul and maintenance facilities were examined to seek an assurance that:

- *Helicopters held by the fleet in terms of numbers and quality were adequate to maintain the envisaged force level;*
- *The operational helicopter units functioned efficiently and achieved their assigned tasks;*
- *Serviceability of helicopters was maintained as per laid down standards to minimise helicopters on ground;*
- *Facilities for repair and overhaul of helicopters were timely set up and were adequate to meet the needs of the fleet; and*
- *Servicing and maintenance of helicopters were carried out efficiently, without delay, in a cost effective manner.*

1.1.5 Audit Criteria

Important audit criteria used to evaluate actual performance with regard to operation and maintenance of Mi series helicopters are given below:

¹ Aircraft on Ground (AOG) refers to those aircraft which are not airworthy because of technical snags and demands have been placed on the OEM/repair agencies/equipment depots for spares/repair-work.

- *Authorised unit establishment of helicopters and projected requirement of helicopters.*
- *Sanctioned establishment of operational staff.*
- *Authorised flying task and flying duties assigned.*
- *Desired serviceability level of helicopters.*
- *Adequacy and efficiency of repair and maintenance facilities.*
- *Annual allotment of tasks to repair agencies.*
- *Provision of manuals and directives with regards to 1st and 2nd line servicing.*
- *Timely extension of TTL and Achievement of TBO life.*
- *Procedure prescribed for provisioning and procurement of spares.*
- *Targets for indigenisation.*

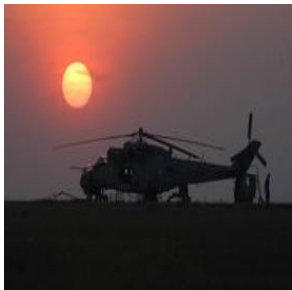
1.1.6 Audit Methodology

An 'Entry Conference' was held at Air HQ on 14 May 2008 wherein the scope of audit, objectives of audit and the broad compass of fieldwork planned were discussed with the representatives of the auditee. Subsequent audit scrutiny consisted of examination of documents and records at Air Headquarters(HQ), concerned helicopter units and at the BRD, collection of information through issue of audit memos and questionnaires, interaction with key personnel at Air HQ, Operation and Maintenance units and examination of material collected in past local audits. Field work was based on test check undertaken at Air HQ, ten Helicopter units and one BRD during May-August 2008. However, data was collected and analysed from all helicopter units.

An 'Exit Conference' was held on 28th November 2008 wherein the main findings of audit and related recommendations were discussed.



MI SERIES HELICOPTERS OF INDIAN AIR FORCE



Part II

Audit Findings

1.2 Audit Findings

The audit findings are classified under two broad categories – (a) Availability, Operation and Utilisation of Helicopters, and (b) Repair and Maintenance.

1.2.1 Availability, Operation and Utilisation of Helicopters

This section focuses on the discrepancy between the IAF's planned assumptions and capacities actually available. Audit observed that there was a deficit in the total availability of helicopters as well as short-falls in each category compared to the numbers required to fulfill their military tasks. This has been exacerbated, in the recent past, by the substantial aid being given to civil authorities for counter-insurgency and natural disasters, United Nations (UN) missions, requests from friendly nations and unauthorised modification of helicopters for VVIP use. Planned acquisitions and inductions have not materialised. Although audit noticed some improvement in the serviceability of the fleet after operationalisation of a computerised inventory management system¹, to be fully combat effective, the fleet needs to strengthen itself, not just in terms of numbers but also in quality as much of the fleet has outlived its prescribed life.

1.2.1.1 Force levels and planned inductions

The IAF procured 'M' number of Mi series helicopters of various types between 1971 and 2003. At present, the different variants constituting the existing fleet are as follows: Medium Lift Helicopters (MLH) – 86 *per cent*, Heavy Lift Helicopters (HLH) – 2 *per cent* and Attack Helicopters – 12 *per cent* (as on September 2008). However, as a result of phasing-out, accidents and unserviceability, the total Mi-helicopter fleet strength has come down to 77² *per cent* of the total helicopters procured (as on September 2008).

Though there is no deficiency in the over-all holding of the helicopter fleet against sanctioned strength during the audit period (2003-08), category-wise there are significant gaps especially in the holding of attack helicopters, where

¹ IMMOLS – Integrated Material Management On-Line System

² Out of these, 12 *per cent* helicopters were deputed to UN mission during the period under review.

the deficiency is 20 *per cent*. Further, the number of helicopters under overhaul / repair is higher than the reserve prescribed, i.e. 20 *per cent*, as a result of which operational availability is curtailed. In fact, in the case of Heavy Lift helicopters, IAF is actually running without a designated reserve.

Moreover, a different picture emerges when we allow for enhanced requirements and planned inductions to meet increased demand on account of a wide-range of tasks. For this purpose, IAF's Long Term Induction Plan during the Xth Plan (i.e. 2002-07) had projected that three units of Medium Lift helicopters and one squadron of Attack helicopters would be acquired and inducted during the period 2002 to 2007. However, these additions did not materialise and IAF is presently operating with only 74 *per cent* of the helicopters against the numbers actually required as per its current operational projection. Besides such deficiencies, phase-outs without replacement have adversely impacted the number and strength of Mi helicopter units.

Air HQ stated in August 2008 that the procurement schemes of helicopters were being progressed as per laid down procedure and these helicopters were likely to be inducted in the near future. Air HQ also confirmed in August 2008 that due to non-induction of helicopters as envisaged in the Xth Plan, IAF was facing a shortage in the number of helicopters and this had affected maintaining force level/operational preparedness of IAF.

1.2.1.2 Ageing fleet

The quality of the helicopter fleet is also affected by their current age as also the operational life left. Excepting the Mi-17 IV helicopters procured in 2000-03, the remaining fleet was purchased at least 20 years ago. Almost 78 *per cent* of the helicopters have already completed their prescribed life and Total Technical Life (TTL) extension has been carried out on them elongating their life. Even after this, nearly one-fourth of the helicopters have completed 75 *per cent* of their extended operational life by September 2009 as can be seen from the table (next page).

Mi-8 helicopters constitute a major portion of the Medium Lift fleet. The initial life of 15 years of these aircraft expired during the 1990s and, by 2012 -13, about 20 *per cent* of the existing fleet would have completed their

extended life. Although new inductions³ may materialise by this date, they will not be able to address total requirements⁴.

2 Age of fleet

TYPE OF HELICOPTER	NUMBER OF HELICOPTERS (in percentage)	PERIOD OF INDUCTION	REMARKS
Medium Lift Helicopter			
Mi-8	83	1971-80	TTL is 15 years. However, the life is extended up to 35 years.
	17	1981-90	
Mi-17	100	1984-89	
Mi-17IV	100	2000-03	
Heavy Lift Helicopter	100	1985-90	TTL is 20 years. However, the life is extended up to 25/30 years.
Attack Helicopter	100	1981-90	

Additionally, in the case of Attack and Heavy Lift helicopters, all helicopters held in the inventory were planned to be phased out by 2009-10. Although the Defence Acquisition Council has accepted the necessity and given its approval for acquisition to meet the short-fall requirement of 46 *per cent* in Attack helicopters in May 2007 and Requests for Proposal (RFPs) were issued in May 2008, the case for re-issue of RFP was initiated in February 2009 as the proposals received did not meet the Air Staff Qualitative Requirements. These

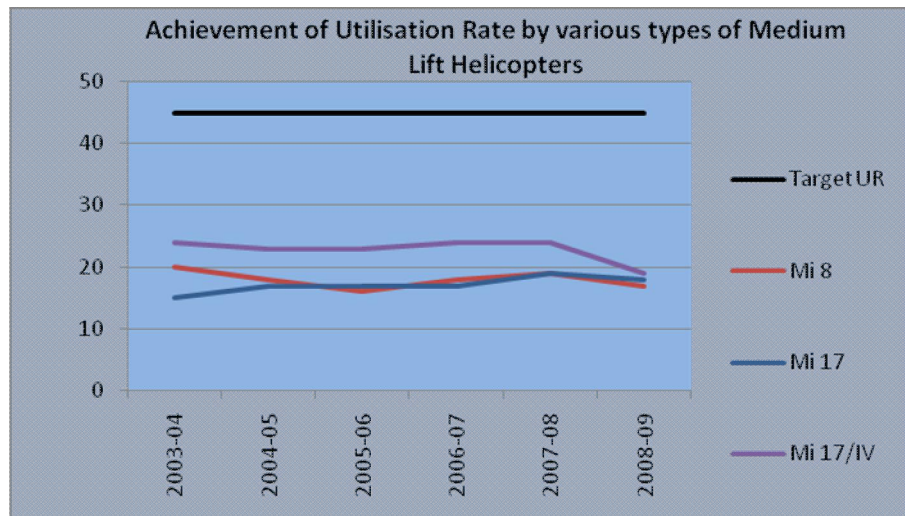
³ A contract for this type of helicopter has been concluded in December 2008 with delivery schedule to commence in 2011, to be completed by 2013.

⁴ New helicopters are required for replacing those phased-out as well as for increasing force levels.

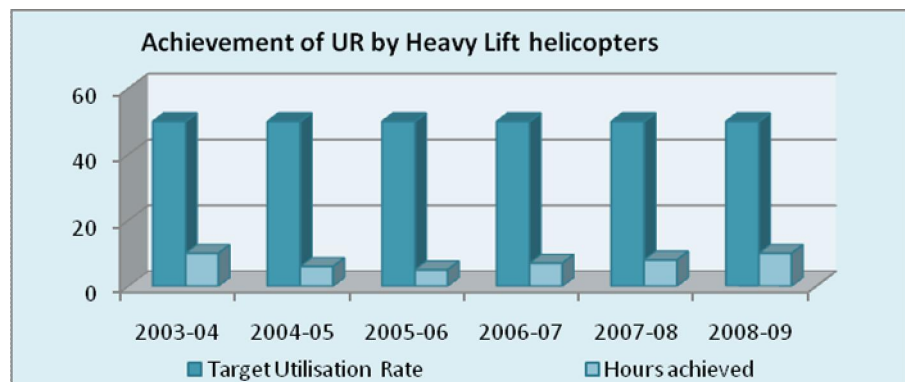
additional helicopters are likely to be inducted during the years 2011-14 if the contract is concluded by end of the year 2010. By this time, all available helicopters would have been phased out and the short fall would continue.

1.2.1.3 Operation norms not met

The Government has prescribed a Utilization Rate (UR) of 45 and 50 hours per month in respect of Medium Lift and Heavy Lift helicopters respectively. However, the actual utilisation rate of Medium Lift helicopters and Heavy Lift helicopters varied between 33 to 53 *per cent* and 10 to 20 *per cent* respectively of the prescribed norm fixed by the Government. The year-wise position with regard to flying efforts achieved by the units as compared to the approved UR for the last six years i.e. 2003-09 is given in the graphs.



Out of the total hours flown by the heavy lift unit during 2003-08, only 58 *per cent* of the hours were utilized for the assigned role while the remaining hours were used to train pilots. In addition, one of the helicopters was continuously on ground for over 33 months from July 2004 to April 2007 and another for a period of 20 months from March 2004 to October 2005 during 2003-08.



Under utilisation is also evident from the maintenance schedule as the four Heavy Lift helicopters had completed only 66 *per cent* of their prescribed TBO of 900 flying hours when the airframes had to be sent abroad for overhaul at a cost of USD 15.64 million (Rs 70 crore) since they had completed a calendar life of eight years from the last overhaul.



The Mi-26 (NATO reporting name Halo) is twin engine turboshaft, military heavy lift helicopter.

Given the low achievement, from 2005-06 onwards, Air HQ decreased the flying task on account of lower availability of serviceable helicopters and pilots. The flying tasks as of March 2009 are indicated below:

3 Flying Tasks of different helicopters

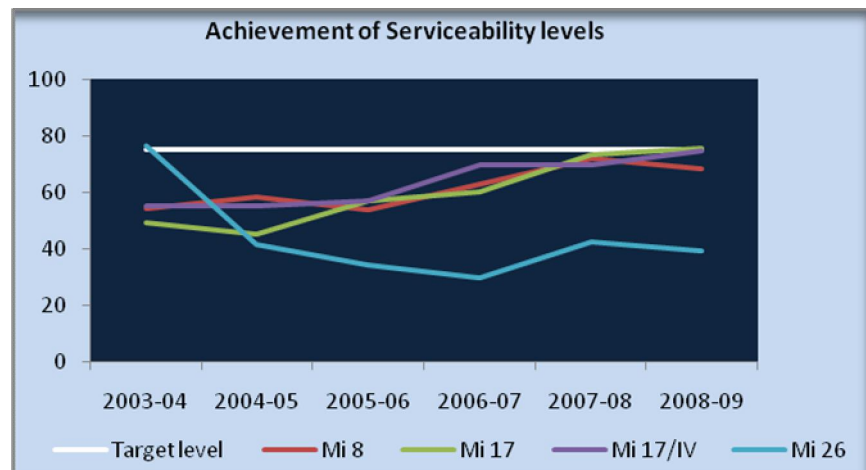
	(In hours)			
Helicopter	Mi-8	Mi-17	Mi-17IV	Mi-26
Approved flying tasks	45	45	45	50
Lowered flying tasks	18	18	25	08

This reduction in authorised flying task was done without the approval of the Government. Reduction in flying efforts also adversely affected the training of pilots at unit level.

1.2.1.4 Low serviceability and high rate of AOG

A helicopter is said to be ‘serviceable’ if it is technically available, not subject to 1st or 2nd line maintenance and has been equipped with necessary role equipment. The Ministry, at the time of procurement, assumed that 75 *per cent* of the fleet would be serviceable and ready to fly at any given point of time. Audit found that the actual serviceability rates for all types of helicopters during the entire period were below the stipulated serviceability level.

The year wise serviceability position for the last six years (2003-09) in respect of Medium and Heavy Lift fleet is given in the graph. Rates for the Medium Lift helicopters ranged between 45.08 to 57.06 *per cent* during 2003-06 and 60.38 to 75.45 *per cent* during 2006-09. In respect of Heavy Lift helicopters, serviceability state showed an initial decreasing trend from 76.59 *per cent* in 2003-04 to 30.03 *per cent* in 2006-07 which improved to 39.51 *per cent* in 2007-09.



Audit noted that the serviceability level of Mi 8, Mi 17 and Mi 17/IV helicopters has improved from 2006-07 onwards after high-level negotiations in which 59 contracts for procurement of 902 lines of spares were finalised and deliveries against these contracts had begun. Operationalisation of “Integrated Material Management On-Line System” (IMMOLS) has also improved maintenance efficiency with reference to provisioning and procurement.

Even though a helicopter may be serviceable, it needs to be ‘**ready-to-fly**’. Audit found that Aircraft on Ground (AOG) levels, i.e the helicopter was unable to fly for technical reasons, were fairly high as shown below:

4 AOG levels for different helicopters

(in percentage)

Helicopter	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Mi-8	29.24	29.70	33.06	26.34	16.47	17.83
Mi-17	33.00	43.94	33.12	25.80	12.15	8.46
Mi-17IV	25.57	36.53	33.12	19.77	13.73	11.03
Mi-26	26.51	40.25	60.55	61.19	36.55	27.49

It was noticed that each unit generally kept one helicopter as AOG for more than six months in order to cannibalize⁵ its parts. This indicated that the required number of helicopters were not in ready-to-fly condition affecting their availability to the units for performing their assigned role.

The utilisation rate for Attack helicopters was reduced by *57 per cent* against the norm prescribed by the Government from 2005-06 onwards. While this statistically ensured satisfactory serviceability levels during the last four years, this was only a temporary measure which did not reflect true efficiency.

1.2.1.5 Diversion of helicopters despite serious shortages

Despite the fact that its own needs were not being met, IAF sent 25 helicopters abroad for participation in UN Missions, allocated another seven for VVIP use



The Mi-25 is a twin engine turboshaft, assault and anti armour helicopter.

and diverted six Mi-8 helicopters to the Cabinet Secretariat (Aviation Research Centre). As a result, over all availability was only *61 per cent* during the audit. Category wise, the situation with regard to Attack helicopters was most vulnerable.

1.2.1.6 Unauthorised modification of Medium Lift helicopters

Although IAF did not possess adequate number of Medium Lift helicopters to meet its operational commitments, Air HQ modified and diverted seven such helicopters from their assigned role during 2003-07 for VIP use. Besides the fact that the modification was done without Government approval, it also

⁵ Cannibalisation refers to the removal of assemblies / components from one aircraft for the purpose of making another unserviceable / incomplete aircraft/its system serviceable / complete.

lacked justification since a dedicated Communication Squadron already exists for the use of VIPs/ Other Entitled Persons (OEPs). In fact, one of the units where the helicopters were modified was situated adjacent to the Communication Squadron. Further, audit noted that these modified helicopters were also utilized by persons other than VIPs/OEPs, for example, family members of the VIPs and political leaders, on many occasions.

The issue of unauthorised diversion of transport aircraft for VIP use was also reported in Paragraph No. 1.6.1.5 of Performance Audit Report No.5 of 2007 (Defence Service – Air Force and Navy). In their Action Taken Note, Ministry stated that all the modified aircraft have been de-modified and given assurance that no aircraft would be modified for VIP use in future. In the same vein, modification and diversion of helicopters also needs to be reviewed by the Ministry as it impacts the operational preparedness of the Services.

1.2.1.7 Deployment of operational personnel

The helicopter fleet would be ineffective without the requisite number of pilots. As per norms, two pilots are required for one helicopter. However, audit noticed that 40 *per cent* of the helicopter units had deficiencies in the number of pilots, i.e. where number of pilots was lower than the number of helicopters available. In these units, the shortages ranged from 5 *per cent* to 37 *per cent*.

Overall, as regards operational staff, there was shortage of pilots against sanctioned strength ranging between 12 and 27 *per cent* and excess of aircrew ranging from 10 to 26 *per cent* during the 2003-04 to 2007-08. In respect of technical staff, against the sanctioned strength the availability of manpower has improved considerably during the last five years (2003 – 2008) showing a surplus in the officers' cadre with a small deficiency of 6 *per cent* in the airmen cadre. However, deficiency in technical manpower would compromise the first and second line servicing activity which would ultimately affect the operational preparedness of the IAF.

Unit authorities informed Audit that deficiency in manpower was met by putting in additional effort by unit personnel in terms of extended hours/working on holidays etc. However, extended working hours may lead to fatigue and tiredness among the personnel which ultimately affect the operation and maintenance of helicopter fleet and the morale of troops.

Recommendations

- *A large segment of the helicopter fleet will reach the end of their operational lives in the near future. Ministry should address IAF's current shortfall of Mi Helicopter's fleet by ensuring that there are no further slippages in the acquisition programmes and expediting on-going procurement processes.*
 - *Air HQ needs to address urgently the main reasons for shortfalls in serviceability and increased AOG levels, i.e. timely repair and maintenance services and availability of essential spares.*
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1.2.2 Repair and Maintenance

Ensuring that an aircraft is serviceable and in a ready-to-fly state, is the result of the combined efforts of maintenance personnel at front-line units, repair depots and logistics support responsible for procuring and storing spares and other parts. Audit examination disclosed that there were serious delays in setting up of BRD, acute shortage of spares and technical manpower resulting in delays in repair and overhaul of engines, offloading of engines abroad for overhaul and increased AOG as discussed in the succeeding paragraphs:

1.2.2.1 Utilisation of installed capacity for overhaul of engines

IAF has established facilities for the repair/overhaul of aero engines of Mi-8 and Mi-17 series helicopters at No. 3 Base Repair Depot (BRD). Since the Time Between Overhaul (TBO) is fixed as per the maintenance philosophy, Air HQ authorities can work out the number of engines due for overhaul (TBO) well in advance and allot the overhaul task to the BRD. This facilitates in the planning and provision of spares, material etc. required for the repair / overhaul as the concerned authorities can take into account the lead time required for procurement. Within two months of receipt of task of repair/overhaul from Air HQ, the BRD is expected to carry out periodical reviews and submits a list of spares required.



Analysis of the performance of the BRD revealed that although, in general, tasks allotted were as per the installed capacity⁶, the BRD could only complete 39 per cent of the tasks allotted. This implied that the BRD could overhaul

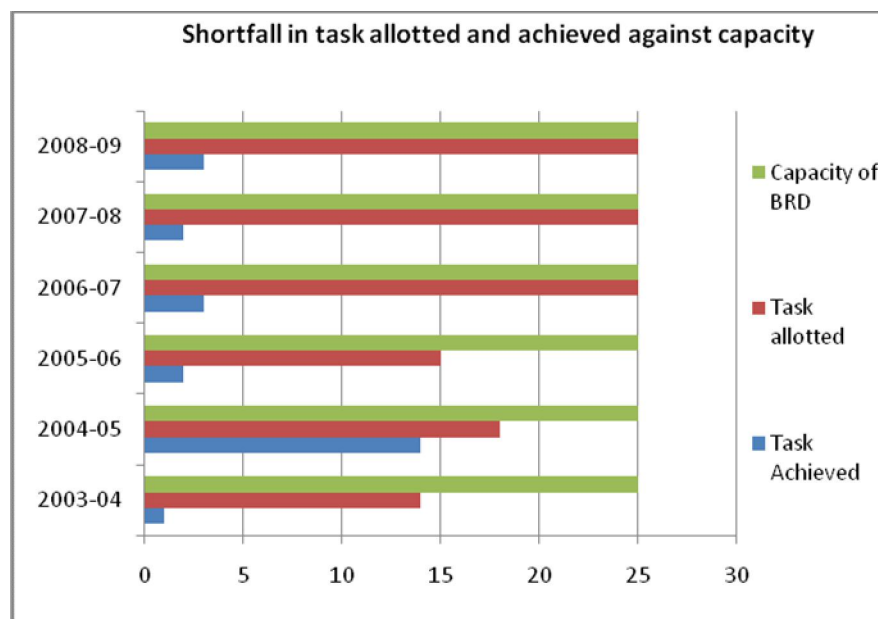
⁶ Installed capacity for overhaul is 25 and 30 aero engine for Mi-8 and Mi-17 helicopters respectively.

engines to the extent of 35 *per cent* of installed capacity. Besides the shortage of technical manpower, an important reason for the non-achievement of the tasks allotted was the non-availability of imported spares. Air Force authorities failed to plan and procure material required to meet annual overhaul task allotted due to non submission of timely requirement of spares by BRD and lack of non maintenance of reliable data base management for estimation of prices and vendor despite both the forecasted and firm overhaul tasks being identified well in advance.

Audit observed that as a result, to maintain the serviceability of the helicopter fleet, meet AOG demand and avoid accumulation of Category 'D'⁷ engines, Air HQ had to send 110 aero engines of Mi-8 helicopters abroad between 2004-07 for overhaul at an aggregate cost of Rs 28.84 crore while keeping in-house maintenance facilities idle. Similarly, 100 aero engines and 15 Main Gear Box (MGB) of Mi-17 helicopter had to be sent abroad between 2005 and 2009 at a cost of Rs 39.65 crore and Rs 45.23 lakh respectively. Helicopter wise position in three cases where facilities have been set up as shown below:

Case I: Mi-8 helicopter series

IAF was unable to utilise the installed capacity at the BRD for overhauling 25 engines annually. Tasks allotted by Air HQ ranged from 56 *per cent* to 100 *per cent* of existing capacity during 2003-09 while tasks actually achieved ranged from four *per cent* to 56 *per cent* of capacity during the period.



⁷ Aero engine requiring repair are categorised at Cat 'D' aero-engine.

For instance,

- For production year 2001-02, although Air HQ issued the forecast task in September 1996, BRD finalized the requirement of spares only in July 2001 leading to delay in initiating the procurement action. Subsequently, improper selection of vendor led to delay in concluding the contract and ultimately spares required for the production year 2001-02 were received



The Mi-8 (Russian origin, NATO reporting name “Hip”) is a medium twin-turbine transport helicopter that can also act as a gunship. The Mi-8 is the world’s most produced helicopter, and is used by over 50 countries.

after 36 months from the start of the production year.

- Even Contracts for Most Critical Material (MCM) for the production years 2002-03, 2003-04 and 2004-05 were concluded after repair task should have been completed.

5 Delayed conclusion of MCM contracts

Production Year	CONTRACT Conclusion	Remarks
2002-03	October 2003	Seven months after repair task should have been completed
2003-04	June 2005	15 months after repair task should have been completed
2004-05	July 2005	Four months after repair task should have been completed
2005-06	July / August 2006	Contract concluded for 39 lines of spares out of 90 lines required. Overhaul of aero engines for the year 2005-06 and 2006-07 delayed and only 124 engines available against the requirement of 198 aero engines in September 2005.

It was seen that as a sequel to Government decision to decentralise provision/procurement responsibility to HQ Maintenance Command, Air Force authorities felt the need to give a holiday to provisioning review for a period of two years. However, scheduled repair and maintenance for aero engines is a mandatory requirement and no administrative change ought to affect this schedule, which compromised the operational needs of the IAF.

Case II: Mi-17 Helicopter series

Facilities set up at the BRD for Mi-17 Helicopter can cater for the repair / overhaul of 60 aero-engines per year. However, annual targets for overhaul fixed for the period 2002-05 could not be achieved as shown in the table.

6 Achievement of overhaul tasks

Year	Installed capacity	Task Allotted		Task Achieved	
		Repair	Overhaul	Repair	Overhaul
2002-03	60	15		10	2
2003-04	60	6	20	7	7
2004-05	60	8	26	8	7
2005-06	60	10	27	9	27
2006-07	60	9	30	5	30
2007-08	60	10	30	4	11
2008-09	60	10	30	19	07

The BRD could not achieve its tasks mainly on account of non-availability of spares demanded in November 2002 through the Provisioning Review for 2003-08. The contract for these spares was concluded by Air HQ only in February 2005. Also, unserviceability of critical equipment required in overhaul tasks from 2004 onwards adversely affected the repair/overhaul programmes.

Non-achievement of task by BRD resulted in accumulation of aero engine at BRD and led to increased grounding of Mi-17 Helicopters.

Case III: Main Gear Box of aero engine of Mi-17 Helicopters

The overhaul facility for VR-14 Main Gear Box (MGB) of the aero engine of Mi-17 helicopter was set up at BRD during 2002-03 and the installed capacity of the BRD is 24 MGB per year. Against this, a forecast and firm task of 16 MGB was allotted to the unit in December 2002 and October 2004 for the



Mi-17(NATO reporting name “Hip”) is a medium twin turbine transport helicopter that can also act as a gunship.

production years 2005-06. However, BRD could not achieve the task due to non-availability of four types of spares for which demand was raised by the BRD in November 2002 but contract was concluded only in December 2007 with date of delivery as April 2008. These items are yet to be received (August 2008).

1.2.2.2 Delay in setting up of overhaul facilities for Mi-17IV helicopters

Mi-17IV Helicopter was inducted into squadron service during 2000-03. TTL of the newly inducted helicopter is 25 years or 7000 hours and that of aero engine is 3000 hours. The helicopter and its engine require periodic repair overhaul. Prescribed TBO of airframe and aero engine is 1500 hours/7 years. Ideally, the repair facility for helicopter/equipment should have been established in parallel so that the facilities would have been available by the time their first major repair/overhaul is due in 2010. In November 2007, approval of the Defence Acquisition Council has been taken for establishing the repair and overhaul facilities at a cost of Rs 196 crore.

As of December 2009, RFP for the project had been issued. Clearly, activities are as yet at the inception stage and facilities will not be available by 2010. The delay in setting up of facilities may force Ministry to offload aero engine and airframe abroad for repair and overhaul. Another serious impact of the delay would be that by the time the repair facilities would be fully set up, more than 30 *per cent* of the original life of the helicopter would be over.



Mi-17IV is multirole version of Mi-17 suitable for duties including flying hospital.

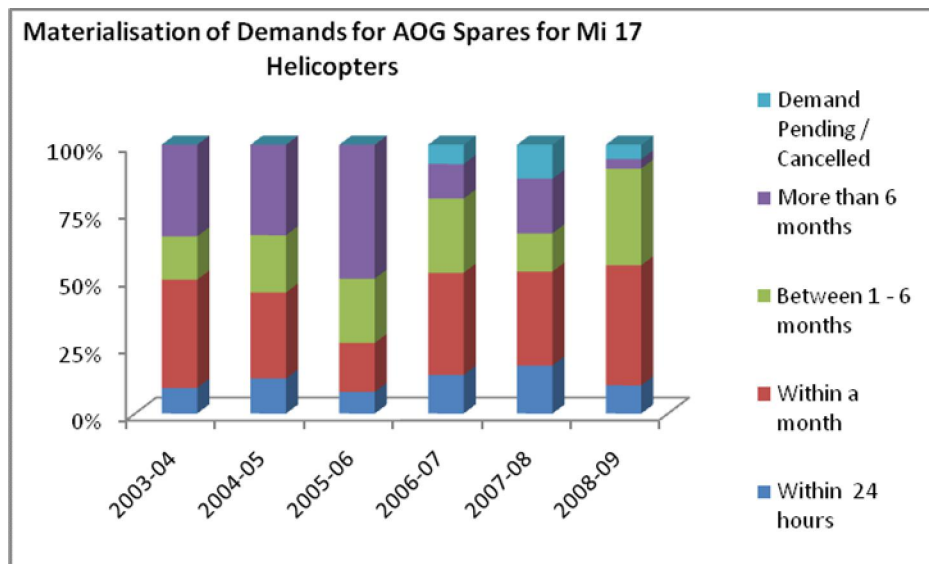
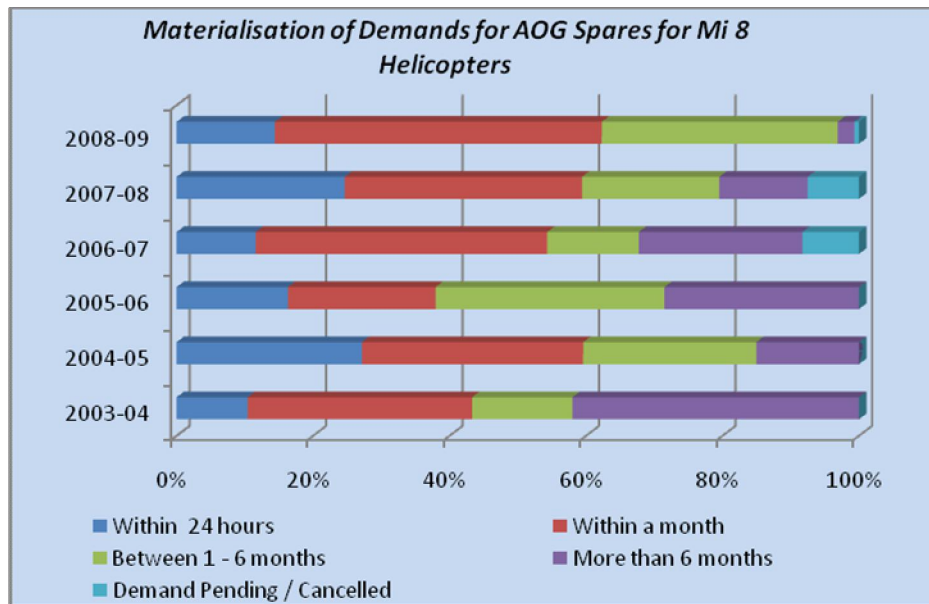
Even though several cases of delay in setting up of repair facilities after induction of aircraft have been highlighted in Defence Audit Reports⁸ in the last 15 years, Ministry has not addressed this problem.

1.2.2.3 Delay in meeting AOG demands

AOG demands for spares are required to be met within 24 hours so that incidents of AOG and their duration are minimised and the helicopters made serviceable at the earliest.

Details of AOG demand satisfaction level raised by the operating units of Mi-8 and Mi-17 helicopters to the BRD for the period 2003-09 were analysed and the results are given in graphs for each type of helicopter separately.

⁸ 1. Paragraph No. 6 of Report No. 9 of 1993
 2. Paragraph No. 4 of Report No. 9 of 1995
 3. Paragraph No. 8 of Report No. 8 of 2001



The analysis discloses that for Mi-8 and Mi-17 helicopter taken together only 14 per cent of AOG demands could be met within 24 hours and 33 per cent within 30 days whereas 22 per cent of the demands took one to six months to be met. Around 28 per cent of the demands were met after six months and 3 per cent were never met at all.

Inability of repair agencies to meet AOG demands in reasonable time indicates serious deficiencies in provisioning and procurement of spares and rotables.

1.2.2.4 Shortfall in manpower deployment at BRD

There was a shortfall in the availability of technical manpower both in officers and airmen categories at the Base Repair Depot for the repair/overhaul of medium lift helicopters as indicated in the table below:

7 Shortfalls in manpower across cadres

Year	Deficiency (in percentage)	
	Officers	Airmen
2005-06	41	39
2006-07	40	40
2007-08	46	41
2008-09	46	38

The BRD stated, in July 2008, that the requirement of manpower had been met by putting in extra hours beyond the normal working hours schedule despite the shortfall in manpower. However, as the facility consistently failed to meet targets for overhaul, adverse fall-out of manpower shortages on the capacity and capability of the depot to undertake tasks cannot be ruled out.

1.2.2.5 Delay in third and fourth line servicing of aero engine at BRD

The prescribed time for overhaul of an aero-engine of medium lift helicopters is 12 months. Analysis of records for 109 aero engines overhauled at the BRD during 2003-09 disclosed that only 46 engines were overhauled within 12 months and in the case of the other 63 engines time taken for overhauls was far in excess of the average lead time of 12 months. Details of delays in case of these engines are given in the table.

8 Delays in servicing of aeroengines

Engine of Helicopter	Extent of delay				
	Between 1 to 12 months	Between 13 to 24 months	Between 25 to 36 months	More than 36 months	Total
Mi-8	-	3	12	10	25
Mi-17	23	9	5	1	38
Total	23	12	17	11	63

BRD stated in November 2008 that the main reason for these delays was non-availability of imported spares for a prolonged time.

1.2.2.6 Excess utilisation of man hours on repair and overhaul of aero engine

There are standard prescribed man-hours to be utilised for repair and overhaul of engines. Audit noticed that there was excess utilisation of man hours indicating lack of efficiency leading to extra cost of overhauls and repairs. For instance, for the overhaul of a single aero engine of Mi-8 helicopter, the standard man hours prescribed is 4,100 hour. The BRD, however, used 7,065 man hours per engine for overhaul of 25 aero engines during the period 2003-09. BRD therefore utilised 74,131 man hours extra above the admissible man hours as per norm as shown in the table below:

9 Extra manhours utilised in repair and overhaul

Year	No. of engines	Prescribed Man hours	Man hours utilised	Extra man hours
2003-04	01	4100	8004	3904
2004-05	14	57400	101359	43959
2005-06	02	8200	15638	7438
2006-07	03	12300	19927	7627
2007-08	02	8200	15667	7467
2008-09	03	12300	16036	3736
Total	25	102500	176631	74131

Thus, BRD utilised 42 *per cent* excess man hours in overhaul of aero engines of Mi-8 helicopter. Excess utilisation of man-hours by the BRD besides indicating lack of efficiency also added to the cost of overhaul.

The BRD informed in November 2008 that extra man hours had become necessary due to ageing fleet and non-availability of imported spares which necessitated cannibalisation of spares on which considerable amount of efforts in terms of man-hours were spent. Main reason for non-availability of imported spares was non-submission of timely requirement.

1.2.2.7 Withdrawal of aero engines before completion of TBO

TBO of the aero engine of Mi-8 helicopter is 1500 hours. During the period 2003-09, 68 aero engines overhauled at BRD were sent for next overhaul before the prescribed interval. Out of 68 total engines, 17 and 24 aero engines were withdrawn before completion of 25 and 50 *per cent* of their TBO life respectively. This indicated inadequacies in overhauls being conducted in the BRD.

Recommendations

- *Air HQ should take effective steps to measure output and performance of repair depots. This would imply setting standard norms for AOG levels and permissible cannibalisation and Category 'D' status.*
 - *Project management and monitoring should be accorded priority so that repair and overhaul facilities needed to support aircraft serviceability are created timely and are designed to deliver full functionality.*
 - *Bottlenecks in utilising the capacity of repair and maintenance facilities arising out of shortage of spares should be addressed through careful and prompt provisioning and procurement.*
 - *The quality of services and the level of efficiency in repair and maintenance facilities should be stepped up to eliminate delays, instances of premature withdrawals and use of man hours / mandays beyond norms.*
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1.3 Conclusion

Helicopters are a versatile component of air power. The Mi- series helicopters are thus, a significant element in achieving the IAF's military objectives. However, there are gaps in the requirements and existing force level. Shortfalls in the availability of helicopters and the advanced age of available assets raise serious concerns about the capability of the fleet. It is, therefore, critical that these shortages be met by using the existing fleet more productively through higher serviceability rates and lower AOGs. A critical role in this task will be that of helicopter logistics support, repair and maintenance facilities. This report reveals that this is a major challenge for the IAF as its performance on this account has not been encouraging. Provisioning and procurement activities need to be made more effective and the internal controls in this regard strengthened. Manpower engaged in these tasks needs to be more efficient. Lastly, Ministry of Defence and Air HQ

must achieve their acquisition plans in order that the IAF's helicopter fleet retains its operational advantages.

The matter was referred to Ministry in October 2008; their reply was awaited as of February 2010.