

Chapter 5: Aircraft deployment and utilisation

Fleet deployment and fleet utilisation are key performance indicators for airline operations. Fleet deployment is the number of aircraft put into operations while aircraft utilisation is the average number of hours (during each 24 hour period) that an aircraft is actually in flight. The TAP (2012) had laid down targets for utilisation of aircraft by AIL. Audit scrutinised the capacity deployment and utilisation of wide and narrow body aircraft and noticed significant deficiencies. The findings are discussed below:

Wide Body Aircraft

5.1 Fleet Deployment

The over-provisioning of wide body aircraft by AIL already discussed in Chapter 4, impacted their deployment pattern. While the deployment of the older B-747-400 and A-330 has been very poor, the deployment of newly acquired aircraft (B-777-200 LR, B-777-300 ER, B-787-800) was also been significantly low varying between 50 percent and 80.95 percent over the period from 2013 to 2016. The actual deployment of wide body aircraft over the period from 2010-11 to 2015-16 is indicated in the table below:

Table 5.1: Percentage of deployment of wide body aircraft

Type of aircraft	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
B-777-200 LR	93.75	87.50	93.75	62.50	50.00	50.00
B-777-300 ER	66.67	83.33	83.33	79.17	75.00	79.17
B-787-800	0*	0*	83.33	56.82	76.32	80.95
B-747-400	50	50	40	30	20	25.00
A-330	50	50	50	75	#	#

Source: Information furnished by AIL

*B787-800 delivery commenced from September 2012.

#A330 returned back on completion of lease

Deployment of all aircraft shows a declining trend. In fact, in 2015-16 only 73 percent of available aircraft capacity was deployed (29 deployed out of 40 aircraft). Deployment of aircraft remained low as they were grounded for considerable periods, due to cannibalisation of parts, non-availability of serviceable engines, non-maintenance of sufficient float of components/parts/spares, etc. as discussed in the paragraphs below.

Management stated (02 February 2016) that the deployment of wide body aircraft was low only in the case of B-747-400 aircraft and B-777-200 LR aircraft as their cost of operation was high. Three B-747-400 were being used for VIP operations. Plans were underway to reconfigure the B-777-200 LR aircraft to around 300 seats to bring down the per seat cost and with fall in fuel prices, the Company had started operations to San Fransisco (SFO).

While concurring with the management reply on high operating cost of B-747-400 and B-777-200 LR, MoCA stated that now B-777-200 LR were being put into operations with fall in fuel prices.

The fact remained that B-777-200 LR had been put into full-fledged operations only almost after nine years after their procurement. The plan of AIL to reconfigure the aircraft to 300 seats needed to be reviewed in the light of the fact that the cost of operation of B-777-200 LR aircraft was high mainly due to the high price of fuel. Since, B-777-200 LR were being put into operations now with fall in fuel prices, as stated by MoCA, the cost benefit analysis of reconfiguration of the seats needs to be reworked. Further, reply of MoCA is not acceptable as the deployment of the newer aircraft; B-777-300 ER and B-787-800 was also not optimal as seen from the table although it improved marginally in 2015-16 as compared to 2014-15. MoCA also stated that B-747-400 should not be considered for fleet deployment, but B-747-400 was a part of the fleet and had been shown in the TAP projection too. Further, MoCA in their reply (30 August 2016) stated that the decision to reconfigure the B-777-200 LR may not be approved due to cost factors.

5.2 Grounding of Aircraft

One of the reasons for low deployment was that aircraft were grounded for extended periods. Aircraft are grounded for normal maintenance and checks, on specific instructions of DGCA for safety purpose, repairs including accident repairs, modifications, etc. While some reasons for grounding of aircraft were beyond the control of the airline, others were controllable and avoidable.

Audit noticed that the main cause of grounding of AIL aircraft was non-availability of spares leading to cannibalisation of spares from one aircraft to another, escalating the grounding period and loss of flying hours. In case of some aircraft, the initial provision of spares was lower compared to the recommended list and orders for spares were placed only as and when the need arose. Credit-hold²⁴ by major manufacturers/suppliers and long lead time of vendors for supply of spares, aggravated the situation. Besides, the requirement of spares for servicing the aircraft kept changing as parts of the aircraft were cannibalised and used for other line aircraft. The percentage of aircraft grounded during the period from FY 2010-11 to FY 2015-16 is given in the table below.



²⁴ If an account is put on credit-hold due to outstanding payments, all supplies/sales on credit to the account are also put on hold.

Table 5.2 Aircraft grounded (in percentage)

Type of aircraft	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
B-777-200 LR	6.25	12.50	6.25	37.50	50.00	50.00
B-777-300 ER	33.33	16.67	16.67	20.83	25.00	20.83
B-787-800	0.00*	0.00*	16.67	43.18	23.68	19.05
B-747-400	50.00	50.00	60.00	70.00	80.00	75.00
A-330	50.00	50.00	50.00	25.00	0.00#	0.00#

Source: Information received from AIL, Please refer table 4. 1 in chapter 4 for the number of each type of aircraft.

*B787-800 delivery commenced from September 2012.

#A330 returned on expiry of lease

MoCA confirmed the facts and concurred with the reply of the management that the reason for grounding was shortage of spares which led to cannibalisation of parts.

The reasons for grounding were scrutinised by Audit. The results of scrutiny are given below:

5.2.1 Grounding for regular scheduled checks/ tasks

As per the aircraft maintenance programme, regular checks were carried out to keep the aircraft airworthy and safe for operations. Each check category involved tasks that were pre-packaged and in line with a fixed schedule. Keeping in view the technical guidelines, the Company planned these regular scheduled checks for each type of aircraft in advance.

5.2.1.1 Delay in scheduled checks/ tasks leading to excess grounding of aircraft

Audit observed that the time taken for completion of regular scheduled checks (during 2010-2016) exceeded the norm/planned period. Besides, different grounding periods were noticed for the same check and same aircraft type. The fleet-wise delays for regular checks were as indicated in the table below:

Table 5.3: Fleet wise delay for regular checks

Type of aircraft/fleet	Period	Total Checks carried out during the period	Remarks
B-747-400	2010-16	39	Out of a total of 39 checks, delays ranging from 1 to 227 days were noticed in 25 cases. (16 cases were observed in the range of 1 to 50 days, 5 cases between 51 to 100 days, and 4 cases more than 100 days.)
B-777-200 LR	2010-16	78	Out of a total of 78 checks, delays ranging from 1 to 147 days were noticed in 42 cases. (34 cases were observed between 1 to 50 days, 2 cases between 51 to 100 days, 6 cases more than 100 days)
B-777-300 ER	2010-16	171	Out of a total 171 checks, delays ranging from 1 to 263 days were noticed in 70 cases

Type of aircraft/fleet	Period	Total Checks carried out during the period	Remarks
			(66 cases were observed between 1 to 50 days, 1 between 51 to 100 days and 3 more than 100 days).
B-787-800	2010-16	35	Out of total 35 checks, delays ranging from 1 to 131 days were noticed in 15 cases. (14 cases were observed between 1 to 50 days and one more than 100 days).

These delays needed to be viewed in the context of the recurring finance cost incurred by AIL for the purchase of the new aircraft (B-777-200LR and B-777-300ER) and the lease rentals borne by the Company for the other aircraft procured on sale and lease back mode (B-747-400 and B-787). While the airline paid lease rentals/finance costs, the aircraft remained grounded defeating the purpose of their procurement. The unfruitful expenditure incurred by the AIL on this account was ₹92.96 crore (2010- 2016).

Management accepted the fact that aircraft remained grounded for prolonged periods and stated that excess grounding was mainly due to non-availability of spares and occasionally due to deployment of manpower for VVIP aircraft.

MoCA (30 August 2016), while concurring the views of the management, further stated that the delay in carrying out checks are more in respect of B-747-400 and B-777-200 LR aircraft which were not being used mainly for scheduled operations and there were lower delays in checks in respect of B-777-300 ER and B-787-800. Further, no aircraft were on ground on account of cannibalisation and all aircraft were flying.

Reply of MoCA was not tenable as even during 2015-16 the delay in checks of B-787-800 aircraft ranged from 1 to 131 days and delay in respect of B-777-300 ER aircraft from 1 to 57 days. Delays in respect of B-747-400 aircraft ranged from 1 to 227 days. Moreover, during 2015-16 VT-AND, VT-ANJ, VT-ANH and VT-ALS aircraft were grounded for more than 2 months.

5.2.1.2 Grounding of aircraft for more than six months

Audit noticed instances of prolonged grounding, i.e. for periods exceeding over six months. During these prolonged periods when the aircraft were on the ground, they were cannibalised, thereby extending the grounding period further. For the period the aircraft remained grounded, the airline continued to pay finance charges (for owned aircraft) and lease rent (for leased aircraft). Instances of grounding for more than six months during the period 2010-11 to 2015-16 are tabulated below:

Table 5.4: Aircraft grounded more than six months

Type of aircraft /fleet	Aircraft	Reason for grounding	Duration of grounding and percent	Finance cost (₹ in Crore)	Lease rent (₹ in Crore)
B-747-400	VT-ESN	Check C and further cannibalisation	8 July 2013 to March 2016 (46%)	--	208.74
	VT-ESO	Check C and further cannibalisation	February 2012 to June 2012, June 2013 to August 2013 and April 2014 to July 2014 (18%)	--	44.73
B-777-200 LR	VT-ALH	P and C check*	17 January 2012 to 9 April 2012 and 10 August 2012 to 9 February 2015 (49%)	90.59	--
	VT-ALG	To facilitate redelivery of sale aircraft	14 April 2014 to 24 November 2015 (24%)	72.72	--
B-777-300ER	VT-ALR	C Check	17 September 2012 to 19 June 2013 (14%)	10.19	--
B-787-800	VT-ANI	Boeing Reliability Modification plan and further cannibalisation	23 April 2014 to 14 February 2015 (34%)	--	58.63
	VT-AND	Boeing Reliability Modification plan and further cannibalisation	01 January 2015 to 26 November 2015 (26%)	--	66.84
Total				173.50	378.94

Source: Data from AIL/ Engineering

*C check: 10000 flying hours or 24 months whichever comes earlier.

P"Check" More than 2000 flying hours or 240 days whichever comes earlier

(Percentage calculation of Grounding of aircraft in respect of VT-ALH, VT-ALG, VT-ALR, VT-ANI, and VT-AND is for the period from their induction in service. Percentage of Grounding of aircraft in respect of VT-ESN and VT-ESO is for the period from 2010 to 2016).

MoCA concurred with the views of the management and stated (30 August 2016) that the delay was mainly due to non-availability of spares arising from various reasons.

5.2.2 Sub-optimal deployment of B-787-800 aircraft due to aircraft related problems

Audit observed sub-optimal deployment of B-787-800 aircraft. The reasons for such sub-optimal deployment are discussed below.

5.2.2.1 Unplanned grounding of B-787-800 aircraft due to battery problems

AIL had ordered (December 2005) a fleet of 27 B-787-800 aircraft from M/s Boeing, the first of these aircraft was to be delivered in September 2008. Due to various technical reasons, the first six aircraft were delivered four years later (from September 2012 to December 2012). All these six aircraft had to be grounded soon after their induction for over four months (17 January 2013 to 4 June 2013) on account of reported malfunctioning of Lithium-ion Battery. The airline lost an estimated amount of ₹527 crore (USD 95.95 million as worked out by AIL) for the 19 weeks that these aircraft remained grounded.

Audit noticed that the purchase agreement did not contain any provision for levying penalty on the manufacturer in case of 'inherent technical fault'. In fact, the purchase contract specified that M/s Boeing would not be liable for any consequential or other damages due to loss of use, revenue or profit due to any fault in the aircraft. As such, M/s Boeing did not have any contractual obligation to pay compensation to AIL.

AIL claimed a compensation of USD 50 million. Following protracted negotiations, M/s Boeing agreed to pay USD 24 million in cash and USD 3.4 million towards waiver of late fee on AIL's spares account. In the absence of a specific provision in the agreement, AIL failed to recover its claim from M/s Boeing.

Management replied (02 February 2016) that M/s Boeing refused to enhance the compensation as it was not covered by the agreement and they had accommodated AIL by accepting delay in payment of balance amounts towards the aircraft delivered till date by waiver of interest charges on the delayed payment etc.

MoCA too (30 August 2016) stated that the purchase agreement did not contain any provision for levying penalty on the manufacturer and AIL was able to negotiate and obtain USD 24 million.

The reply confirmed the finding that in the absence of specific provision in the purchase agreement, a meagre concession could be obtained as a special business consideration. AIL, meanwhile, incurred substantial expenditure due to unplanned grounding on account of mechanical defect in the aircraft, which was a design deficiency attributable to M/s Boeing.

5.2.2.2 Frequent grounding due to technical snags faced during operation of B-787-800 aircraft

Dreamliner (B-787-800) aircraft had been identified as the workhorse of AIL (September 2011). However, the aircraft suffered continuous technical snags since its inception in AIL's fleet.

Due to technical snags, B-787-800 aircraft remained grounded for 274 hours in 2013 (January to December 2013). This increased to 1464 hours by March 2016 (January 2015 to March 2016). Audit also noticed that some of these problems were of a recurring nature. As the aircraft were under the warranty period of 48 months at that time, the repairs were carried out by M/s Boeing free of cost. However, the Company continued to suffer due to un-scheduled grounding of the aircraft. Considering the increasing incidence of technical snags, Audit is of the opinion that, there was a strong case for extending the warranty period for these aircraft to ensure adequate coverage in the future.

Management stated (02 February 2016) that in order to overcome the shortcomings noticed in the reliability of components of B-787-800, Air India had entered into the Rotable Exchange Program with M/s Boeing.

MoCA (30 August 2016) in its reply stated that AIL has entered into a Rotable Exchange Programme from July 2016 and M/s Boeing had extended warranty for parts which were failing frequently.

Audit observed that the extended warranty agreement in respect of B-787-800 aircraft were still under discussion and not yet finalised by AIL. The Rotable exchange²⁵ programme had been signed by AIL only in July 2016. The benefits of this program would be reviewed in future audits.

5.3 Utilisation of aircraft

The utilisation of aircraft, post deployment, was also found to be sub-optimal as detailed below.

A. Utilisation of aircraft in terms of hours

The TAP (2012) had set targets for utilisation of aircraft by AIL in terms of hours to be flown within a period of 24 hours. Audit compared the actual utilisation vis-a-vis the targeted utilisation during the period from 2011-12 to 2015-16. The results of the analysis are shown in the table below:

Table 5.5: Planned Vs. Actual hours of utilisation

Year	2011-12		2012-13		2013-14		2014-15		2015-16	
	Planned	Actual								
B-747-400	7.33	8.90	7.33	8.90	0	5.41	0	2.49	0	2.97
B-777-200 LR	15.00	14.50	15.00	14.50	15.00	8.75	15.00	2.04	15	6.89
B-777-300 ER	14.00	14.20	14.00	14.20	14.00	12.31	14.00	12.52	14	11.78
B-787-800	9.00	0.00	12.00	7.30	13.00	12.45	13.00	12.94	13	12.07

Source: TAP and information furnished by AIL

Audit analysis of low utilisation further indicated the following

- **B-747-400:** These aircraft being old incurred an operational loss of ₹1566.64 crore due to lower efficiency during the period from 2010 to 2016. Further, these aircraft were grounded for approximately 32 months and incurred an expenditure of ₹253.47 crore (April 2010 to March 2016) on lease rental for the period the aircraft remained grounded.
- **B-777-200 LR:** The Company had started utilising these aircraft on Delhi-San Francisco route from December 2015 in addition to operating these aircraft on Delhi-Riyadh sector. Being unviable, their utilisation had decreased during 2011-12 to 2014-15 and five aircraft had been sold during 2013-14. The utilisation of these aircraft improved only in 2015-16, but yet was lower than the target set in the TAP. The Company took a long time from the date of procurement to December 2015 to improve the utilisation.
- **B-777-300 ER:** As AIL had higher number of aircraft than its requirement, the utilisation of these aircraft was lower than TAP target. Hence those were operated on short haul

²⁵ Rotable exchange means AI had signed an agreement for support of removed U/S LRUs of 787 aircraft wherein Boeing will provide access to their Rotable Exchange Inventory for smooth operation of B-787 aircraft.

routes resulting in higher operating costs. One of these aircraft, VT-ALR remained grounded for nine months as indicated in Para 5.2.2.2 of this report.

- **B-787-800:** 21 B-787-800 aircraft out of 27 aircraft ordered, had been received till March 2016. As a result the TAP utilisation target during the period from 2011-12 to 2012-13 could not be achieved. Of the 21 aircraft, AIL utilised only 19 aircraft on rotation basis (summer schedule 2016). As per the Project Report for acquisition of aircraft (May 2005), the target utilisation of B-787-800 aircraft was 14.2 hours. While the company could achieve utilisation of 12.94 hours against TAP target of 13.00 hours, it could not achieve the projected target of 14.2 hours prescribed in the Project Report. Two aircraft, VT-ANI and VT-AND remained grounded for a considerable period as referred to in Para no 5.2.1.2. Besides, the Company utilised some of these aircraft for short duration of two to four hours on domestic and regional routes even though they were designed and optimised for medium to long range flights.

The utilisation of B-777-300 ER and B-787-800 further reduced during 2015-16. Utilisation of B-787-800 reduced from 12.94 hours to 12.07 hours and that of B-777-300 from 12.52 hours to 11.78 hours in 2015-16 as seen in Table 5.5. The utilisation of these aircraft had not improved as per target of TAP.

MoCA stated (30 August 2016) that operation of B-747-400 aircraft was unviable due to high operating cost and is mainly used for VIP operations and has government support. B-777-200 LR aircraft had been put into operations in San Francisco route which increased the utilisation of the aircraft. B-777-300 ER aircraft had met with a number of incidents and B-787-800 aircraft was grounded mainly due to want of spares.

B. Utilisation of aircraft in terms of seat kilometres.

Available seat kilometre (ASKM) is a measure of the passenger carrying capacity of an airline. It is defined as the number of seats available on an aircraft multiplied by the number of kilometres flown by it. The TAP (2012) had fixed target ASKM for the Company. The actual achievement vis-à-vis the targets set in TAP are as given below:-

Table 5.6: Achievement of ASKM* vis-a-vis targets

(ASKM in million km)

Particular	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
TAP Target	25138	27919	35475	38374	41146	47175
ASKM Achieved	25065	25173	19960	25642	30625	32607
Shortfall	73	2746	15515	12732	10521	14568
Shortfall percent	0.29	9.84	43.74	33.18	25.57	30.88

Source: Data from AIL/ Finance

*ASKM figures include ASKM of B-747-400, B-777-200 LR, B-777-300 ER and B-787-800.

Analysis of the achievement vis-à-vis the target indicated as follows:

- The Company could not achieve the targeted ASKM. The shortfall in ASKM increased from 0.29 to 30.88 *percent* during the period 2010-11 to 2015-16. During 2015-16 the ASKM of B-777-300 ER aircraft and B-787-800 aircraft reduced further.
- Despite inducting 21 B-787-800 aircraft instead of 16 B-787-800 as envisaged, the ASKM target of TAP could not be achieved.

Management in its reply (02 February 2016) stated that AIL had been facing constraints like non-availability of spares, increased instances of snags in B-787-800 aircraft, cockpit and cabin crew shortages and high cost of operations on certain routes for certain types of aircraft like B-747-400. The management further stated that the ASKM would improve in future with various measures taken.

MoCA stated (30 August 2016) that it was not proper to compare increase in aircraft with ASKM even while they admitted that there has been increase in ASKM with the introduction of more aircraft in the fleet. MoCA further stated that the reduction in ASKM was mainly on account of lower utilisation of B-747-400 and B-777-200 LR aircraft on account of high operating cost.

It was however, observed that the ASKM of B-777-300 ER aircraft also reduced during the FY 2015-16. Further, MoCA accepted the fact that B-747-400 and B-777-200 LR aircraft had high operating costs and that B-787-800 aircraft did not have adequate number of trained pilots. The company was aware of the scheduled delivery of the aircraft and its operational requirements and was hence required to plan for the same. Management reply explains the reasons for low ASKM.

5.3.1 Higher weight of B-787-800 aircraft adversely impacting their profitability

Twenty One B-787-800 aircraft were inducted into the fleet of AIL till June 2015. On receipt of the aircraft, it was observed that the empty weight of the aircraft was higher by ten tons resulting in additional fuel consumption. AIL calculated the likely loss on additional fuel consumption (for 27 aircraft over an operating life of 20 years of each aircraft) at USD 400 million. However, compensation recoverable, as per the procurement contract, for additional fuel consumption as a result of slippage of performance guarantee levels, was capped at USD 80,000 per aircraft per year for five years. Thus, the maximum compensation for the 27 aircraft arising out of breach of the performance guarantee clause would be USD 10.8 million which would not cover the loss of the airline on this account.

Audit noticed that a clause regarding specific compensation to be paid to AIL for increase in the weight of the aircraft (MTOW²⁶) had been included in the purchase agreement for B-777-200 LR aircraft with the same company, M/s Boeing. This clause, however, was not included in the contract for B-787-800 aircraft and hence the claim for additional compensation could not be enforced by the Company.

²⁶ MTOW: Manufacturers design take-off weight -227.930 ton

Audit noticed that M/s Boeing had refused to negotiate the ceiling on compensation but had only offered negotiation in good faith. The matter had been submitted to the CCEA which had directed that the issue be referred to Ministry of Law and Justice and an Empowered Group of Officers be constituted to further negotiate on the subject. Audit noticed that the time limit of six months for the negotiation had already been extended twice to 18 months and subsequently to 30 months.

Management replied (02 February 2016) that while delinking the performance guarantee issue from delay settlement agreement, AIL extended the deadline of resolving the slippage in performance guarantee from initial six months to 18 months, considering the availability of adequate performance data of 14 B-787 aircraft to assess the extent of compliance and deviation from the purchase agreement and also from 14 to 30 months, to coincide with the delivery of 20th B-787 aircraft. It was also stated that Boeing admitted in a meeting (19 October 2015) that performance of B-787-800 aircraft had been below that had been promised and AIL would be compensated by providing suitable discount in future delivery of three B-777-300ER aircraft. It was also stated that a marked reduction in weight had been noticed in the later aircraft. However, no final figure of compensation had yet been arrived at with M/s. Boeing.

MoCA stated (30 August 2016) all the agreements were vetted by reputed international legal firms and aircraft manufacturers did not deviate from standard sale agreement. Meetings were held with Boeing and the company could extract compensation. On account of extensive negotiation with M/s Boeing, GoI was able to extract additional compensation and the total compensation worked out to USD 71 million inclusive of the fuel-burn guarantee under Purchase Agreement.

It is pertinent to note that the procurement contract did not have adequate safeguards for enforcing compensation and as such the Company had to resort to negotiation. The Board in its 46th meeting held on 28 May 2012 concluded that the performance guarantee with Boeing required to be taken up along with the need to incorporate a clause for settlement of compensation or suitable arbitration clause for resolution of disputes. Hence, the company too felt the need of arbitration clause only at a later stage and not at the time of signing the agreement.

Narrow Body Aircraft

Audit findings relating to deployment of narrow body aircraft are given below:

5.4 Deployment of existing capacity

5.4.1 Deployment and Grounding of Aircraft:

Though there was acute under-provisioning of narrow body (NB) aircraft, the deployment of available narrow body fleet during the period from 2010 to 2016 was less than satisfactory. The deployment of available A-320 family aircraft during the period from 2010-11 to 2015-16 was as under:

Table 5.7 Percentage of aircraft deployed and grounded

Type of Aircraft	2010-11		2011-12		2012-13		2013-14		2014-15		2015-16	
	Utilisation	Grounding										
A-319	88.33	11.67	89.67	10.33	87.13	12.87	84.21	15.79	88.64	11.36	89.36	10.64
A-320	78.57	21.43	85.71	14.29	80.55	19.45	80.55	19.45	72.50	27.50	78.33	21.67
A-321	93.15	6.85	89.40	10.60	92.10	7.90	91.85	8.15	88.55	11.45	88.35	11.65
Total A-320 family	85.88	14.12	88.31	11.69	86.82	13.18	85.61	14.39	83.40	16.60	85.37	14.63

Source: Data received from ALL/ Engineering

The Oversight Committee, in its meeting held in November 2012, directed that at no point of time more than 5 percent of the NB fleet should be grounded. However, 11.69 percent to 14.63 percent of aircraft remained grounded during the period 2010-11 to 2015-16 due to cannibalisation of parts, non-availability of serviceable engines, non-maintenance of sufficient float of components/parts/spares etc. In fact, the deployment of narrow body fleet during the period from 2012-13 to 2015-16 declined year on year.

Management replied (February 2016) that out of 62 aircraft, three aircraft had completed their Design Service Goal (DSG) of 60000 flying hours and had to be grounded for Airbus certification. Further, there were nearly 13 aircraft which were older than 20 years. Thus, the percentage of grounding was not adverse considering maintenance and period checks for which purpose nearly five percent of active fleet would always be grounded. Moreover, in view of the non-availability of aircraft through tender, it was decided to revive these vintage aircraft. This took considerable time due to non-availability of spares, limited production of V-2500 engines, financial crunch and credit hold by suppliers. This adversely affected the requirement of aircraft as per schedule. Further, in spite of allocating around USD 41 million for upgradation of CFM engine overhaul facility was delayed due to financial crunch.

The reply is not acceptable as the fact of ageing fleet was known to the Management. Even, though the Management was aware of the tedious process involved in tendering and also the fact that the classic A-320 aircraft were uneconomical as also the need to replace the aircraft in September 2010, it floated the tender belatedly only in August 2013. Even though, the purchase agreement for acquisition of 43 A-320 family aircraft was signed in February 2006, the management failed to prioritise its requirement for upgradation of in-house overhaul facility of CFM engines and took considerable time exceeding six years. Deployment of A-319 and A-321 fleet, which was newly inducted, was also below the targeted levels.

5.4.2 Grounding for regular scheduled checks/ tasks

The details of scheduled checks/tasks conducted during the period from 2010-11 to 2015-16 are as given below:

Table 5.8: Regular Scheduled checks/ tasks (2010-16)

Aircraft/ Fleet	Period	Total checks carried out during the period	Status of checks
A-319	January 2011 ²⁷ to March 2016	554	Out of total 554 checks, for delay of 1 to 50 days there were 140 cases, from 51 to 100 days there were 5 cases, for delay of more than 100 days there were 5 cases
A-320	April 2010 to March 2016	549	Out of total 549 checks, for delay of 1 to 50 days there were 186 cases, from 51 to 100 days there were 7 cases, for delay of more than 100 days there were 7 cases
A-321	April 2010 to March 2016	608	Out of total 608 checks, for delay of 1 to 50 days there were 64 cases, from 51 to 100 days there were 5 cases, for delay of more than 100 days there were 7 cases

Source: Data furnished by AIL/ Engineering

The main reasons for delays in carrying out the check were non-availability of critical spares, components and engines, cannibalisation of parts, etc. Thus, delay in completion of scheduled checks not only adversely affected the operations of the Company but also affected its revenue generation.

Management replied (February 2016) that a number of engines were dropped much before time due to harsh environment almost simultaneously resulting in delays and prolonged grounding and the company had to send these engines abroad. Moreover, shortage of spares on certain occasions was also a cause for the prolonged grounding.

MoCA stated that the target of TAP were based on assumption of inducting new A-320 fleet and phasing out of old A-320 classic fleet. However, the actual induction of aircraft started in 2015 and Air India was forced to continue operating with the old classic fleet.

The reply is factual. However, the Company was well aware of these facts even before implementation of TAP. Delay in checks had resulted in non-achievement of target fixed for deployment as envisaged.

5.4.3 Grounding of aircraft for more than six months

Audit observed that in 19 cases the period of grounding A-320 aircraft fleet exceeded six months due to cannibalisation/non-availability of engines/parts, delay in checks, etc. The aircraft remained grounded and could not be deployed on operations for excessive periods ranging from 156 days to 1400 days as given at Annexure 3.

²⁷ The data from April 2010 to December 2010 was not provided by Eastern Region.

Management replied (02 February 2016) that classic A-320 aircraft were approaching their major checks and DSG and were initially decided to be declared vintage. However, due to non-availability of replacement for A-320 aircraft, it was decided to revive these aircraft. In respect of enhanced A-320 family fleet, the aircraft remained grounded due to shortage of float components on account of shortage of funds during the period from 2010 to 2014.

MoCA stated that the target of TAP were based on assumption of inducting new A-320 fleet and phasing out of old A-320 classic fleet. However, the actual induction of aircraft started in 2015 and Air India was forced to continue operating with the old classic fleet.

The reply given by Management is general in nature. However, the fact remains that the Management was well aware of the available resources before implementation of TAP inspite of setting aggressive targets for deployment of aircraft, which the Company could not achieve in any of the years.

5.4.4 Non-procurement of component/parts recommended for initial provisioning

AIL received 43 new Airbus aircraft between October 2006 and May 2010. It had been recommended that the Company would procure total 5070 components/parts through six rounds of initial provisioning which would be synchronised with the delivery of aircraft to ensure smooth operation of the aircraft. However, it could procure only 1669 components/parts (August 2015) and failed to procure recommended components/spares necessary for operations, thereby leading to a shortage of 3401 recommended components/parts. Further, time lines for procurement of balance quantity and relevance of initial provisioning was not made available to Audit.

MoCA replied that due to financial constraints AIL could not procure a level of components/spares/inventory which were required for a regular and smooth production of engines from the engine workshop. The company was finally able to negotiate an External Commercial Borrowing (ECB) loan of USD 300 million in August 2015 and upgraded its Commercial Fan Motor (CFM) workshop. Funds were also utilised for procurement of essential spares and was able to produce nearly 2 to 3 engines per month instead of sending the engines to outside agencies for repair. In order to avoid prolonged grounding of aircraft, the company also leased engines from CFM and enhanced the levels of spare engines in order to support the fleet.

MoCA admitted the delay in procurement of components/spares provisioned initially. The fact remains that failure in procuring the parts resulted in prolonged grounding of aircraft during the period reviewed in audit.

5.4.5 Grounding of aircraft due to shortage of engines

Review of records relating to grounding of aircraft revealed that aircraft grounded for regular checks remained grounded for long time due to failure of Jet Engine Overhaul Complex (JEOC) to provide serviceable engines on time. During the period from 2010-11 to 2014-15, A-320 narrow body aircraft remained grounded for 2691 days; A-319 aircraft for 1710 days and A-321 aircraft for 872 days for want of serviceable engines. However in the year

2015-16, A-320 aircraft remained grounded for 224 days, A-319 aircraft for 59 days and A-321 aircraft for 377 days due to shortage of engines.

Management stated in reply (02 February 2016) that during the period from 2010 to 2015, a total of 101 engines were overhauled in Jet Shop, Delhi despite various constraints including financial crunch, credit hold, etc.

The reply highlights the constraints responsible for delays in engine production. The resultant prolonged grounding of aircraft meant that the Company could not achieve its targeted fleet deployment.

Audit studied the reasons for delay in servicing engines in the Jet Shop, Delhi and noticed the following:

5.4.5.1 Delay in operationalising CFM engine facility leading to engines being sent abroad for repairs

AIL had an in-house engine service facility, the Jet Engine Overhaul Complex (JEOC), with facilities to conduct mandatory and preventive maintenance of only V-2500 engines of narrow body aircraft. The 43 narrow body aircraft, purchased through agreement signed in February 2006, were fitted with CFM 56-5B engines. The Company took six years (from the date of agreement) to develop and commission (April 2013) facilities for servicing CFM engines. The Company procured only five spare engines against 43 Airbus aircraft by March 2015. There was also insufficient float of CFM engines. Thus, in the absence of in-house facility and adequate engine float, the engines were sent abroad for maintenance incurring additional expenditure.

Management in reply (02 February, 2016) stated that the delay in operationalising the in-house engine facility was not within its control as it resulted from financial crunch faced by the airline and delayed training on account of vigilance enquiry. Management further stated that the engines had to be rapidly removed due to harsh environment, sea and dust in Gulf and in view of the delayed shop upgradation to CFM, leading to the engines being sent to other MROs for refurbishment/overhauling. Management also informed that the primary reason for insufficient float of engines was non-availability of funds and credit hold situation faced within the Company and that three more engines had been received in 2015.

The financial crunch referred to in the Management reply needed to be viewed against the additional expenditure incurred by the Company in servicing the engines abroad due to delay in operationalisation of the in-house facility and the fact that aircraft often remained grounded due to non-availability of serviceable engines. Due to insufficient float of engines, engines from the newly acquired aircraft were cannibalised when they were grounded for checks and as a result, these aircraft remained grounded for prolonged periods affecting deployment of aircraft. Besides, the environmental factors of operation were known to the airline and its effect on engines and consequent service requirements ought to have been anticipated by the airline. It was also significant to note that though the engine facility became functional by April 2013, it could service only 17 of the 65 engines removed from

April 2013 to March 2015, with the balance being sent abroad for repairs which raised doubts about the actual capacity of the engine overhauling facility.

MoCA admitted the fact of under-utilisation of engine repair facility and also stated that this was mainly due to the limited procurement of spares and other infrastructure equipment which was required for continuous production at the Jet Engine Workshop.

5.4.5.2 Inefficiency of the engine facility at Jet Shop, Delhi

The engine facility has to remove the engine from the aircraft, induct it into the shop and rectify/refurbish/overhaul the engine as per requirement. Audit noticed that no standard time-frame had been fixed for removal of engines for induction into the shop and neither were there any norms for time to be taken for completion of engine jobs. It was seen that CFM engines took 2 days to 110 days to be removed. During the interim period, the aircraft remained grounded.

It was also noticed that there was a wide variation in the time taken ranging 4 to 755 days to complete similar engine jobs of V-2500²⁸ and in case of CFM-56-5B engines²⁹, variation ranged from 9 to 369 days.

Management in its reply stated (02 February 2016) that Board decided to phase out all A-320 aircraft equipped with V-2500 engines reaching 60,000 flying hours or grounded for 'C' check. Therefore induction of such engines was not required and hence not done. Financial crunch was also a reason for non-induction of engines. Despite this during the period from 2010 to 2015, 79 V-2500 engines were produced. CFM engine production has also now been enhanced from 1 to 2 engines per month to 3 to 4 engines per month. Management further stated that fixation of standard turnaround time for jobs did not come under the best practices followed by the shop. Norms existed for an engine inducted for overhauling or minimum performance level or module wise overhauling. Engine wise summary of man-hours spent on each engine was being maintained as per traditional practices. Variance report as per work scope was not maintained for either types of engines due to swapping and cannibalisation, non-availability of finances/LRUs³⁰/items, compliance of AD/SB³¹ etc.

The reply of the Management is not acceptable as even after the Board meeting of December 2012, there were 12 A-320 aircraft which had flown less than 55,000 hours (April 2013) and were therefore available for regular operations. Management stated that variance report as per work scope was not being prepared. In its absence, the large differences noticed for completing similar jobs could not be explained or controlled. The inordinate time taken for induction and servicing of engines contributed to increasing the grounding time of the aircraft leading to poor deployment, operation and inability to meet the turnaround targets in this regard.

²⁸ Total 50 cases of V-2500 engines reviewed –BSI failure took 6-755 days, High Exhaust Gas Temperature 72-331 days, Life Limited Parts 30-632 days & Oil Leak 4-549 days

²⁹ Total 15 cases of CFM engine reviewed –BSI failure C3 took 9-369 days and BSI Failure rectification took 13-237 days

³⁰ LRU-Line replacement unit

³¹ AD/SB –Advisory/Service bulletin

5.4.5.3 Financial impact of poor engine maintenance

AIL was to re-deliver leased aircraft (two A-319 aircraft and seven A-320 aircraft) to the lessor as per agreed maintenance condition. In case of poor maintenance status, AIL had to pay compensation. Besides, AIL would have to pay the lessor rent till the aircraft is returned and delivery accepted by the lessor.

The Company could not comply with the re-delivery conditions while returning two A-319 aircraft and agreed to pay USD 11.35 million (₹ 68.98 crore) for 'buy out package' (compensation paid to the lessor in exchange of waiving all liabilities associated with the aircraft re-delivery conditions). Subsequently, the lessor raised an objection on condition of engines (VT-SCE) and the Company incurred expenditure of USD 10.25 million (₹ 62.68 crore³²) on repair of the same. The Company also paid USD 0.25 million towards lease rent for the period the aircraft was grounded for engine repair. In a similar case, AIL had to pay a compensation of ₹177.99 crore to the lessor as a 'buy out package' while returning seven leased A-320 aircraft.

Management in reply stated (02 February, 2016) that stringent requirements were imposed on re-delivery of leased aircraft by the lessor. Re-delivery entailed high expenditure to ensure that the aircraft was made available to lessor in compliance with the redelivery conditions. It was also stated that in the airline's experience, the lessor kept delaying acceptance, pointing out fault in the maintenance of engine/airframe and accordingly it was felt that a buy-out package for the re-delivery condition was best so that the amount of re-delivery expenditure was certain.

MoCA stated that in a "Buyout package", the aircraft could be used till the date of delivery as otherwise it would not be necessary to ground the aircraft for the purposes of redelivery checks. Usually an aircraft is grounded two to three months before the re-delivery for the checks, thus, entailing an additional lease cost. A "buyout package" was, therefore, resorted to under such circumstances within an established maintenance provider or MRO after following a tender procedure. Before a buyout package was agreed to, AIL does a study of the advantages of buyout and the cost implications and only if it was found to be more economical to buyout AI entered into a buyout arrangement. Generally there was a risk involved in doing a complete redelivery check as redelivery conditions generally required overhaul at European Aviation Safety Agency (EASA) approved facilities and all the parts needed to have back to birth traceability.

The reply was not tenable because as stated in Para 5.5.3 the aircraft remained grounded for more than four to six months for redelivery check. Further, the Company could not maintain the aircraft in agreed condition and also cannibalised components from leased aircraft during grounding for checks from leased aircraft. Moreover, opting for buy-out package in all lease cases, as seen in past, would lead to substantial payment of compensation at the time of return of leased aircraft.

³² Based on average Dollar-rupee exchange rate of the year

5.5 Audit findings on utilisation of aircraft

Audit findings on utilisation of aircraft are given below:

5.5.1 Non-achievement of targeted ASKM

The available seat kilometer (ASKM) is an indicator of the capacity of an airline. The capacity utilisation in terms of ASKM targeted in TAP and its achievement during the period 2010-11 to 2015-16 is as under:

Table 5.9: Target vs actual ASKM

(In million kms)

Particular	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
TAP Target	18603	19697	21546	23526	27290	28991
ASKM Achieved	13385	14317	19843	19262	19339	18794
Shortfall	5218	5380	1703	4264	7951	10197
Shortfall <i>percent</i>	28	27	8	18	29	35

Source: Data furnished by AIL/ Finance

As can be seen from above, the Company could not achieve the targeted ASKM in any of the years and shortfall ranged from 8 *percent* to 35 *percent* during the period from 2010-11 to 2015-16 due to failure on the part of Management in deployment of available fleet effectively and also on account of non-induction of aircraft as envisaged in the TAP. Moreover in 2015-16, the Company achieved ASKMs of 18794 million KM, against target of 28991 million KM. The shortfall was 35 *percent*.

Management stated (02 February 2016) that due to delay in delivery of B-787-800 aircraft and non-availability of narrow body aircraft on lease, induction of aircraft as given in TAP did not take place and targeted ASKM could not be achieved. Moreover, AIL had also ordered 14 new A-320 aircraft and also floated tender for another 15 aircraft.

MoCA stated that AIL had extended the lease of A-319 aircraft and also converted some of the A-320 aircraft into all economy class aircraft and reduced the J Class configuration from 20 to 12 in the A-321 fleet to increase the capacity offered in the domestic market.

The reply was not tenable as the induction was to be done from FY 2011-12 for 'Indian Shuttle Service' (ISS) and replacement of old classic fleet but the first tender was issued only in August 2013. Moreover, the deployment of existing fleet was also not effective as explained in para below, which adversely affected the achievement of targeted ASKM.

5.5.2 Utilisation of narrow body fleet

The daily utilisation of A-320 family aircraft for the period from 2010-11 to 2015-16, on the basis of available total fleet against the target fixed in TAP is shown below:

Table 5.10: Utilisation of aircraft*(in hours per day)*

Particulars	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
<u>A-319 Aircraft</u>						
TAP Target	9.90	10.50	10.50	11.00	12.25	12.25
Actual utilisation of hours	6.94	7.65	8.53	7.74	8.19	7.63
Shortfall percent	29.89	27.14	18.76	29.64	33.14	37.71
<u>A-320 Aircraft</u>						
TAP Target	9.10	9.50	10.50	11.00	12.25	12.25
Actual utilisation of hours	6.65	7.70	7.78	7.93	7.49	6.41
Shortfall percent	26.92	18.95	25.90	27.91	38.86	47.67
<u>A-321 Aircraft</u>						
TAP Target	11.50	12.00	12.00	12.00	12.25	12.25
Actual utilisation of hours	8.90	9.03	9.37	9.43	8.90	9.03
Shortfall percent	22.61	24.72	21.89	21.39	27.36	26.29
<u>A-320 (IS) Aircraft</u>						
TAP Target	--	9.50	10.50	11.00	12.00	12.00
Actual utilisation of hours	--	--	--	--	--	--

Source: SBI CAP Information Memorandum and data furnished by AIL/Engineering

It can be seen from the table above, that the Company failed to achieve the daily utilisation targets for any of these aircraft fleet. Further, review of aircraft-wise utilisation during the period from 2010-11 to 2015-16 revealed that daily utilisation of A-319 aircraft was between 1.84 hours and 10.17 hours, that of A-320 aircraft was in the range of 1.04 hours to 11.70 hours, and of A-321 in the range of 2.44 hours to 11.20 hours. Moreover, out of the total narrow body fleet of A-320 family, one to four aircraft could only achieve the targeted utilisation during the period 2010-11 and 2012-13 and no other aircraft of the same family could achieve the targeted utilisation in any of the years reviewed in Audit.

The reason for under-utilisation of the A-320 family of aircraft was due to grounding of aircraft. The Company reported in meeting of Oversight Committee (OC)³³ that on a stand-alone basis, the Airbus Narrow Body (NB) aircraft have been flying for nearly 9.9 hours - 12 hours and also that utilisation of NB fleet was above the TAP target if operating fleet was considered.³⁴ This was factually incorrect.

³³ In 3rd Oversight Committee meeting held on 5 November 2012, 5th meeting held on 25 April 2013,

³⁴ In 4th Oversight Committee meeting held on 15 January 2013, 6th meeting held on 26 August 2013 & 10th meeting held on 12 March 2015.

Management stated (January 2016) that in OC meeting aircraft utilisation was reported on total fleet basis as well as on operating fleet basis. It was further stated that 14 classic A-320 aircraft were more than 20 years old and were not available for flying on number of days on account of grounding due to maintenance. Therefore, the utilisation for NB aircraft appears low.

MoCA replied that out of the fleet of around 65 narrow body aircraft, 14 belonged to the old classic bogie type of landing gear. These aircraft are around 20 years old and were reaching their Design Service Goal (DSG) level. At present, 4 of these aircraft have already been grounded. It was also stated that only 43 aircraft were new. Aircraft utilisation was considerably affected due to the poor schedule reliability of the old fleet. However, the classic A-320 aircraft could not be counted for the purpose of utilisation and only operating fleet was taken into consideration. The TAP had assumed that the requisite aircraft type would be available for replacement of the old fleet which assumption could not be fulfilled due to reasons stated in earlier replies.

The reply of AIL was not tenable as the fact of ageing fleet of old classic A-320 aircraft was known to AIL while fixing TAP target for deployment. Moreover, the Management failed to achieve targeted utilisation on effective fleet as brought out above.

5.5.3 Utilisation of leased A-319 aircraft

Erstwhile Indian Airlines Limited entered into an aircraft operating lease agreement with M/s ALS Irish Aircraft Leasing for leasing of two A-319 aircraft (VT-SCD and VT-SCE) for five years with effect from April 2006 to April 2011. These aircraft were grounded for redelivery checks as per lease agreements and remained grounded till 27 June 2011 and 27 March 2011 respectively. The delay was 196 days and 144 days for lease return and other major checks and the aircraft were subsequently cannibalised to service other aircraft. Resultantly, due to prolonged grounding the lease rent of ₹13.13³⁵ crore paid during the aforesaid period was unfruitful.

The operational efficiency of these leased aircraft was reviewed for the period 2010-11 to 2015-16 and daily utilisation of leased aircraft was as under:

Table No. 5.11: Utilisation of leased A-319 aircraft

Particular	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
A 319 Aircraft						
TAP Target	9.90	10.50	10.50	11.00	12.25	12.25
Actual utilisation of leased aircraft						
VT-SCA, SCB, SCC, SCD & SCE	3.48 to 6.58	5.25 to 7.85	8.06 to 9.35	6.27 to 9.45	7.92 to 8.55 ³⁶	6.68 to 6.93

Source: Data received from AIL/ Engineering and SBICAP information memorandum

Despite underutilisation, the lease period was extended by the Company on expiry of the original lease term.

³⁵ VT-SCD-₹7.09 crore and VT-SCE ₹6.04 crore

³⁶ Two aircraft VT-SCD and SCE were returned during 2014-15.

Management stated in its reply (February 2016) that aircraft were grounded due to preparation for redelivery and engines were sent to MRO for restoration. Further, pending decision on extension of lease, the aircraft remained grounded for a longer duration. Management further stated that lease term of three A-319 aircraft were extended so that fleet size did not fall which would have resulted in a fall in market share and AI becoming a marginal player.

MoCA replied that out of the fleet of around 65 narrow body aircraft, 14 belonged to the old classic bogie type of landing gear. These aircraft are around 20 years old and were reaching their Design Service Goal (DSG) level. At present, 4 of these aircraft have already been grounded. It was also stated that only 43 aircraft were new. Aircraft utilisation was considerably affected due to the poor schedule reliability of the old fleet. However, the classic A-320 aircraft could not be counted for the purpose of utilisation and only operating fleet was taken into consideration. The TAP had assumed that the requisite aircraft type would be available for replacement of the old fleet which assumption could not be fulfilled due to reasons stated in earlier replies.

The reply was not acceptable because the aircraft were to be grounded for 90 days prior to date of expiry of lease as per action plan. Contrary to this, the aircraft were grounded before 196 and 144 days. Moreover, inspite of prolonged grounding and under-utilisation of leased aircraft, the lease term was extended by the Company. However, the reply did not address the issue of utilisation of leased A-319 aircraft.

The Company could not achieve the TAP targets for daily utilisation of available fleet. Aircraft grounded for routine checks remained grounded for prolonged periods owing to non-availability of components, serviceable engines and other parts which led to cannibalisation of parts. Meanwhile, the company paid substantial amount as lease rent/finance cost of these grounded aircraft.

The grounding was more significant in respect of narrow body fleet which was already facing shortage of aircraft. Audit noticed that there were considerable delays in operationalising the CFM engine facility which led to these engines being sent abroad for repair and maintenance. Besides, inordinately long time was taken for removal and induction of engines in the shop in some cases due to malfunction in engine shop. Inefficiency in maintenance of aircraft also resulted in compensation that the airline had to pay to lessors for non-fulfilment of re-delivery conditions of the aircraft.

The Company also suffered significant losses on account of unplanned grounding of B-787-800 aircraft due to battery problems, technical snags as well as higher weight of these aircraft. The procurement contract of these aircraft with Boeing did not have the necessary safeguards to address such shortcomings.