CHAPTER III

Audit Paragraphs relating to Contract Management

3.1 Acquisition and operation of C-17 Globemaster III aircraft

IAF procured (June 2011) ten C-17 Globemaster III aircraft and associated equipment at a total cost of USD 4,116 million (₹18645.85 crore) from Government of United State of America (USG) under Foreign Military Sales (FMS) route. There was delay in completion of specialist infrastructure and setting up of simulators required for training to pilots and loadmasters was also delayed. Operational capabilities of C-17 aircraft were under-utilized partially due to non-availability of runway with appropriate pavement classification number (PCN) and lack of ground equipment at various bases.

3.1.1 Introduction

In order to meet the growing strategic airlift on dual front and to have additional capacity during conflict, Indian Air Force (IAF) projected (April 2009) for a suitable aircraft under 'very heavy transport aircraft' (VHETAC) category.

Ministry of Defence (MoD) signed (June 2011) a Letter of Offer and Acceptance (LOA) with the Government of United States (USG) for procurement of ten C-17 Globemaster III aircraft and associated equipment at a total cost of USD 4,116,080,586 (₹18645.85 crore). These aircraft were inducted in IAF between June 2013 and December 2014.

MoD established (June 2012) 81 Squadron as operating unit at AF Station, Hindan for operation and maintenance of C-17 aircraft.

The aircraft produced by M/s Boeing of USA is a long range heavy transport aircraft with in-flight refueling capabilities and range of 4200 kms with maximum payload of 70 tonnes and 9000 kms with reduced payload of 40 tonnes.

The audit of procurement and utilization of the aircraft is discussed as under:

3.1.2 Delay in establishment of training Simulator

As training offered by simulators contributes largely to enhancing the quality of training and also provides cost benefit, IAF projected the requirement of training simulators for C-17 fleet. The requirement for simulators training for initial qualification, quarterly currency, instructional and role clearance and special operations was estimated to be 1700 hours per year for aircrew of the C-17 Squadron. IAF wanted one simulator installed, functional and operational at least three months before the delivery of the first aircraft on build, operate and maintain (BOM) basis by the original equipment manufacturer (OEM *i.e.* M/s Boeing).

In pursuance of the offset contract signed (June 2011), M/s Boeing was to set up the following simulator facilities-

Table 3.1: Details of offset for setting up simulator facilities for C-17 aircraft

Facility	Value of equipment offered as offset	Indian Offset Partner (IOP)
C-17 platform unique training facility (Maintenance training simulator)	USD 38.21 million (₹173.10 crore)	M/s Mahindra Defence Systems, Tata Consultancy Services
C-17 simulator center (Flying training simulator)	USD 96.87 million (₹438.82 crore)	M/s Mahindra Defence Systems, Tata Consultancy Services

Source: Offset Contract

Audit observed that though as per the offset contract (June 2011), the simulator services were to be made available within two years *i.e.* by July 2013, however M/s Boeing was yet to setup simulator services in India through its IOPs. Audit further noticed from the Quarterly Flying Training Returns (QFTRs) of the operating Squadron for the quarter ending September 2015 that the squadron has been routing pilots for simulator training with United States Air Force (USAF) as per the slots given by the US Government.

Thus, simulator services which were to be set up by July 2013 were yet to become functional (March 2016).

Air HQ stated in reply (April 2016) that as per offset contract signed in June 2011, M/s Boeing will get offset credit from fourth year onwards therefore simulator should have been operational by June 2015. Air HQ also stated that the simulator was being set up at Gurgaon and was likely to be operational by June 2016.

Reply of Air HQ may be seen in perspective that all the aircraft had arrived by December 2014 and the simulator services which were required by IAF by at least three months before arrival of the first aircraft in June 2013, were yet to become functional (April 2016).

3.1.3 Non-availability of ground equipment

IAF acquired C-17 aircraft for high load carrying capacity with less loading/ offloading time as well as to provide direct delivery of load/ troops to the operating sector with least number of trips.

In order to reduce ground time of a strategic asset whose main aim was rapid deployment, all units conveying load on regular basis on C-17 aircraft should have a required material handling equipment (MHE), trained fork lifter driver and trained manpower for palletization[1] of their load.

Audit examined the process of loading and unloading by 81 Squadron in operation of C-17 aircraft and observed that -

a) For the purpose of loading and unloading, a fork lifter weighing 13 tonnes was always being carried in the aircraft, as other units did not have ground handling equipment. This fork lifter occupies 35 *per cent* of the cargo space leaving limited space for payload. Due to this space restriction, C-17 aircraft had to undertake more than one sortie on the same day to airlift cargo from same destination, on many occasions. With cost of ₹43.19 Lakh per flying hour for C-17 aircraft, this was imprudent.

b) Units conveying load on regular basis through C-17 aircraft did not have plywood/ load spreader and wooden batons for preparation of loads on pallets at respective squadrons. Conveying this concern, 81 Squadron had requested (June

[1] Method of storing and transporting material for airlift, stacked on a pallet.

2015) Air HQ for provisioning and distribution of pallet to all wings so that carriage of material handling equipment with the aircraft could be minimised.

Thus, lack of ground equipment at various IAF bases adversely affected performance of C-17.

In reply (April 2016), Air HQ accepted the fact.

3.1.4 Delay in creation of specialist infrastructure

Specialist technical and operational infrastructure such as hangars, ramp, taxiway, storage, maintenance, parachute packing and rigging, hydrant fuel piping, various building, etc., was required for effective operation of C-17 aircraft. IAF had provided specialist infrastructure in the LOA at an estimated cost of USD 152.75 million (₹723.27 crore). As per LOA the infrastructure was to be created by M/s Boeing and was to be ready by June 2013 *i.e.* before arrival of the first aircraft at the base. Further, although schedule of quarterly payment to USG was defined in the LOA but there was no condition stipulated for imposition of penalty for delay in supplies/delivery of infrastructure services.

USG was to build infrastructure for the aircraft at Air Force Station, Hindan through M/s Boeing and Larsen & Toubro was the sub-vendor of Boeing. USG has nominated US Army Corps of Engineers for execution of the project and quality control.

Audit evaluated progress of completion of infrastructure necessary for C-17 fleet and observed that-

a) Against the target date of June 2013, infrastructure was not created so far (March 2016).

b) As per the minutes of Program Monitoring Committee (September 2015) the overall progress of completion of specialist infrastructure was 54 *per cent* and the probable date of completion of infrastructure was scheduled by December 2015.

Audit enquired (December 2015) from operating unit the status of infrastructure, their reply was awaited (March 2016).

Thus, there was delay in completion of specialist infrastructure.

In reply (April 2016), Air HQ accepted the fact.

3.1.5 Underutilization of pay load capability

Audit examined payload carried by the aircraft from the relevant records of operating Squadron *i.e.* 81 Squadron as tabulated below-

Table 3.2: Payload carried by C-17 aircraft

Year	Total number of Sorties	Total hours flown	Number of Sorties on Air Maintenance Task	Total hours flown for Air Maintenance Task	Total Air Maintenance Task/ load carried (in tons)	Air Maintenance Task per Sortie (in tons) (column 6/ column 4)
1	**2**	**3**	**4**	**5**	**6**	**7**
2013-14	666	897:30	72	65:45	929.484	12.910
2014-15	1617	2109:05	260	236:50	4503.470	17.321
2015-16 (Up to Dec 2015)	1992	2676:30	731	633:05	9888.080	13.527

Source: Data from Quarterly Flying Training Reports (QFTR) during June 2013 to December 2015

As seen from the above Table, annual average load airlifted by C-17 ranged between 13 tonnes and 18 tonnes per sortie, against the aircraft's payload capacity of 70 tonnes.

The operating squadron stated (September 2015) that C-17 aircraft could carry only 35 tonnes of load (40 tonnes in winters) and on a few occasions, C-17 was tasked for only 26 tonnes.

Thus a costly national asset, procured for carrying heavy loads was not being used as per its capacity.

In reply (April 2016), Air HQ accepted the fact of underutilization of aircraft and intimated that the point had been brought up to the notice of appropriate authorities.

3.1.6 Non exploitation of capabilities of C-17 due to inadequate runways

C-17 aircraft is capable of conveying payload of 70 tonnes with short field landing capability on 3500 feet runways including its capability to operate from high altitude

austere airfield. However, for its effective operations at higher loads, it requires runway pavement to be of certain minimum quality. The quality of pavement is indicated through its pavement classification number (PCN). For operation of C-17 aircraft, runway was upgraded with PCN value to 75 at AFS, Hindan.

In order to operate C-17 aircraft with full pay load, Head Quarter Western Air Command (HQ WAC) decided (December 2014) for PCN evaluation during 2015-16 in respect of five Air Force bases (Sirsa, Sarsawa, Jammu, Pathankot, Udhampur) where runway resurfacing was planned for 2016-17. HQ WAC also decided (December 2014) for PCN evaluation in respect of four other airfields (Hindan, Awantipur, Chandigarh and Thoise) which were upgraded/resurfaced during 2015.

Since runways did not possess the required PCN and were not strong enough to withstand full impact, the aircraft was operating with lesser payload being carried. Although, the Maximum All Up Weight (AUW) of C-17 aircraft was 265 tonnes however aircraft was operating with average AUW of 216 tonnes.

Thus, IAF had not assessed suitability of its runways before induction of C-17 fleet and as a result of runways with lower PCN, C-17 aircraft was operating with lesser payload.

Air HQ stated (April 2016) that the C-17 aircraft is capable of operating from runways with lesser PCN value in case situation demands such operation. Air HQ further added that the Audit statement holds good partially in respect of 14 airfields which were found unsuitable for operation of C-17 because of low PCN values and ground manoeuvring requirements.

Reply of Air HQ may be seen in perspective that the C-17 fleet had been operating with the reduced payload.

Thus, there were delays in completion of specialist infrastructure and simulators required for training to pilots and loadmasters. Further, there was under-utilisation of operational capabilities of C-17 aircraft due to non-availability of runway with appropriate PCN and lack of ground equipment at various bases.

3.2 Procurement of 14 additional Dornier aircraft

Indian Air Force (IAF) worked out the requirement of Dornier aircraft at below the envisaged utilization rate resulting in procurement of 14 additional aircraft costing ₹891 crore.

The Dornier aircraft are used by Indian Air Force (IAF) for providing initial flying training to trainee pilots (transport fleet) of IAF, Indian Navy and Coast Guard after completion of their basic training. Original manufacturer of the aircraft was Dornier GMBH, Germany and it was being manufactured by Hindustan Aeronautics Limited (HAL) under license agreement since 1987. Air Force Station, Yelahanka (AFS) was authorized in January 1990 to hold five Dornier aircraft for training of 22 trainees and the utilization rate (UR) of the aircraft was 65 hours (hrs) per month. Ministry of Defence (Ministry) in October 2014 revised the authorization of Dornier aircraft for the AFS from 5 to 22 Dornier aircraft for training 69 trainees and the UR of 65 hrs per month was revised to flying hours as authorized by Air HQ.

The Ministry concluded a contract (December 2007) with HAL at ₹552 crore for procurement of 12 Dornier aircraft (five for operational role and seven for training role) with delivery by March 2011. Ministry under repeat order concluded another contract in February 2015 with HAL at ₹1090 crore for 14 Dornier aircraft and one simulator for training purpose with the delivery scheduled by March 2019. As per the contract the aircraft are expected to be in service for next 20 years.

While working out the requirement for 14 Dornier aircraft it was envisaged (2012) by IAF that from the year 2014 onwards 65 trainees will be trained annually. Air HQ projected (May 2012) a total requirement of 11,800 hrs considering the total training period of 165 hrs per trainee per year and 10 *per cent* extra for incidental flying. IAF considered the utilization rate of 30 hrs per aircraft per month and average serviceability of the Dornier fleet at 75 *per cent* for calculating the total

requirement of 42 aircraft[2]. As 28 Dornier aircraft were already available for training purpose, IAF thus projected for procurement of 14 Dornier aircraft for imparting training.

Audit noticed (October 2015) that IAF had projected their requirement in excess as discussed below:

a) While procuring 12 Dornier aircraft in December 2007, IAF had taken monthly utilisation at 45 hrs per month which was well below the utilisation rate of 65 hrs per month authorised in the Government sanction (January 1990). However, under the present contract the monthly utilisation was taken at 30 hrs per month. Had IAF taken monthly utilisation rate at 45 hrs, it could have sufficed to impart training to 65 trainees with the existing fleet of 28 aircraft[3].

b) The contract (February 2015) also caters for a Full Motion Training Simulator (FMTS) at a cost of ₹75.07 crore to be delivered by HAL by September 2018. A FMTS artificially re-creates aircraft flight and the environment in which it flies and considerably reduces need of actual aircraft for training. However, this aspect was not taken into consideration, resulting in over-projection of requirement.

Thus, there was over projection of requirement of 14 aircraft worth ₹891 crore.

The Ministry in response stated (April 2016) that:

- The utilization rate for each year is nearly equal to the planned Rate of Efforts (ROE)[4] figure. ROE of 30 hrs was authorized by the Government for Dornier fleet. The ROE at time may be adjusted for short duration to meet

[2] 30 hrs X 12 months = 360 hrs. Total aircraft required 11800 hrs /360 hrs = 32 aircraft with serviceability at 75 *per cent*. For 100 *per cent* serviceability, the requirement of aircraft worked out to 42.

[3] 45 hrs X 12 months = 540 hrs. Total aircraft required 11800 hrs/540 hrs = 21.8 aircraft with serviceability at 75 *per cent*. For 100 *per cent* serviceability the requirement would be 29 aircraft.

[4] The Rate of Effort (ROE) is a function of the total number of aircraft and the total quantum of flying effort envisaged. This is a parameter used for planning of flying, maintenance, provisioning of spares and servicing activities.

the operational requirements of IAF when required number of aircraft was not available for various reasons.

- Due to lack of simulator and absence of previous experience the IAF will have to formulate training syllabus with induction of simulator and check the efficacy of the same for the initial set of trainee batches. Meanwhile training has to be carried out therefore the requirement of aircraft was worked out without considering the simulator.

The reply furnished by Ministry lacks rationale as training and operational task were merged for calculating the flying efforts whereas additional 14 Dornier aircraft were procured for imparting training and not for operational role. Further, procurement of these aircraft is contrary to the Ministry's revised approval (October 2014) which authorizes 22 Dornier aircraft and a simulator for 69 trainees as compared to 28 aircraft held by the AFS for the purpose. Also, there was a consistent reduction of the UR by Air HQ from 45 hrs to 30 hrs against the authorized UR of 65 hrs/month, thereby inflating the number of aircraft to be procured.

3.3 Refurbishment of 'X' system

IAF failed to timely conclude contract which led to extra expenditure of ₹19.31 crore due to rate revision by OEM. The Total Technical Life (TTL) of 104 'X' systems expired in April 2009, but even after lapse of over six years and incurring expenditure of ₹101.52 crore, efficacy of 'X' system was doubtful.

'X' system is an 'abc' weapon system which is deployed to destroy hostile air defence radars. 108 'X' systems were acquired (March 1995) from M/s 'A' (OEM) and inducted in IAF in 1999-2000 with a Total Technical Life (TTL) of 10 years.

As the TTL of these systems was expiring in March 2009, IAF in June 2007 carried out a joint survey with M/s 'A' for making an assessment regarding enhancement of TTL for further 10 years. Thereafter, IAF approached (October 2008) M/s Bharat

Dynamics Limited (BDL) after finalizing Schedule of Requirement (SOR) for undertaking the refurbishment task as per the Government Policy.[5]

A Request for Proposal (RFP) was issued to M/s BDL in May 2011. The proposal of M/s BDL was accepted by Technical Evaluation Committee (TEC) in November 2011. A contract for refurbishment of 104[6] 'X' systems was concluded by Ministry of Defence (Ministry) with M/s BDL in September 2012 at a total cost of ₹109.16 crore. As per the contract, the refurbishment activities including validation trials were to be completed by December 2014.

Audit scrutiny of contract relating to the enhancement of TTL for 104 'X' systems revealed the following:

(i) **Capital expenditure following revenue procedure**: Rule 90 of General Financial Rules stipulates that significant expenditure incurred with the object of enhancing the utility of existing assets shall broadly be defined as capital expenditure. Although the nature of work *i.e.* TTL extension of 'X' system for further 10 years was capital in nature, however, Air HQ adopted revenue procedure prescribed in the Defence Procurement Manual (DPM-2009) as per special dispensation authorized by the Ministry in 2007 in order to accelerate the process. IAF however, took 204 weeks in the process, commencing from issue of Schedule of Requirement (SOR) in October 2008 to signing of contract in September 2012, as against specified time of 20-23 weeks for entire activities involved in processing of the case, as per DPM-2009.

(ii) **Unauthorised change of oil**: 'X' system is propelled by engine which uses a specific type of lubrication oil. The contract (March 1995) stipulated usage of 'I' lubrication oil for engines of 'X' system. The life of 'I' oil filled in the 'X' system had expired in 2006 and the same was not available in stock with IAF. IAF started using equivalent oil ('J' oil) from January 2007 onwards without consultation with OEM.

[5] BDL is Nodal agency for life extension/refurbishment of 'S' held by three Defence Services as nominated by Ministry of Defence

[6] Two were utilized in training and two in live firing.

(iii) **Delay in conclusion of contract leading to extra expenditure:** After joint survey (June 2007) IAF along with M/s 'A' conducted (June 2009) live firing of 'X' systems in order to validate their efficacy. In this process two 'X' systems were utilized. During the live firing, Air HQ noticed degradation in their performance as these 'X' systems failed to climb the planned altitude. IAF in June 2009 asked M/s 'A' to investigate the reasons for engine power degradation. IAF approached (October 2008) M/s BDL after finalizing SOR for refurbishment of 104 'X' systems. However, the matter could not be finalised by IAF as the investigation report by OEM in respect of engine power degradation was awaited. The OEM concluded (October 2009) that the prime cause of degradation in performance of 'X' system was due to use of unfit oil.

Thereafter, IAF in January 2010 held meeting with M/s 'A' and M/s BDL to discuss the technical issues involved in the refurbishment activities of 'X' system. M/s BDL after consultation with M/s 'A' submitted its budgetary quote (April 2010) for refurbishment of 104 'X' systems at a cost of ₹89.85 crore which was valid up to December 2010. IAF, however, could not float RFP timely and took time in carrying out remedial measures for rectification of snags noticed during the live firing *i.e.* flushing of unfit oil, repair of engines and repair of 'Item-D'. IAF in May 2011 again approached M/s BDL for refurbishment of 104 'X' systems against which M/s BDL revised its quote to ₹109.16 crore due to revision of rates by OEM.

(iv) **Cost escalation from ₹37.15 crore (2008) to ₹109.16 crore in 2012**: Air HQ in June 2007 had invited proposal for refurbishment directly from OEM, which was submitted by M/s 'A' in July 2008 at a cost of USD 7905685 (₹ 37.15 crore). M/s BDL in April 2010 had submitted the proposal to IAF on the basis of negotiations with M/s 'A' for refurbishment of 104 'X' systems at a cost of ₹89.85 crore. However, Air HQ kept the offer open for 204 weeks which resulted in revision of rates by OEM. Ministry concluded the contract with M/s BDL at ₹109.16 crore in September 2012. Under this contract M/s BDL was to carry out refurbishment after getting technical

support, Item-E, Item-F and other items from OEM for which M/s BDL had concluded a contract with M/s 'A' in October 2012 at a cost of USD 14324153 (₹80 crore).

(v) **Changing conditions regarding validation tests:** DPM-2009 states [Para 4.12.6(e)] that no conditional offer should be accepted which is not in conformity with the specifications mentioned in the RFP. As per RFP validation trials were to be carried in six out of the initial 20 'X' systems refurbished by OEM and only on successful validation of the same, the refurbishment of remaining 84 'X' systems were to be taken up.

However, during the TEC stage Air HQ decided to conduct validation trials after 24 months of signing of the contract due to delay in receipt of supplies[7] required for refurbishment. Based on the recommendations of the TEC, the Ministry included validation trials clause after refurbishment activities for all 104 'X' systems.

Resultantly, as per the contract (September 2012) all the activities relating to refurbishment of 104 systems were to be completed first by September 2014, thereafter validation trials on six 'X' systems were to be conducted during November–December 2014, which besides violating relevant condition of DPM-2009 also created un-favourable situation for IAF including operational un-certainty of 'X' systems.

(vi) **Unsuccessful validation trials**: It was also noticed during audit that so far three 'X' systems have been tested by IAF for validation trials, out of which two did not follow the programmed profile. The 'X' systems were under detailed investigation by OEM in order to establish the cause of failure. The validation trials of the remaining three 'X' systems will be conducted after completion of investigation by OEM.

Thus, Audit observed that: a) even after deviating from the prescribed procedure by using revenue procedure, IAF could not adhere to prescribed time schedule of DPM-2009 and failed to derive the desired benefit of expediting the process;

[7] 'Item-F', 'Item-E' and 'Item-G' and 'Item-H'

b) used inappropriate oil without consulting OEM, enquiry into which led to delays in conclusion of contract; c) the delays subsequently resulted in expiry of quotes submitted by M/s BDL in April 2010, resulting into extra expenditure of ₹19.31 crore (₹109.16 crore – ₹89.85 crore); d) delays also led to cost escalation from ₹37.15 crore as initially offered by M/s 'A' in 2008 to ₹109.16 crore in the contract finally made in 2012; e) IAF changed the important control mechanism of validating six out of 20 initially refurbished 'X' systems, before proceeding for refurbishment of remaining 84 systems. Inclusion of validation trials clause after refurbishment activities resulted in release of payment of ₹101.52 crore to M/s BDL for various milestone activities in February 2015, which was 93 *per cent* of total payment. IAF has got 101 'X' systems in stock without their validated reliability. Till the completion of validation trials, the reliability of the 'X' system will remain doubtful.

Ministry in response stated (March 2016) that:

- Time lines as stipulated in the DPM-2009 could not be adhered to due to complexity of the case and involved organisational procedures.
- Indigenous substitution is a continuous process to facilitate self-reliance. 'J' oil was used instead of 'I', as supplier of oil company intimated that 'J' oil has been approved by ADE (DRDO)[8] after experimentation for use in different engine by same OEM. It was inferred that same substitute will work in 'X' system. However, 'J' oil was subsequently flushed out and refilled with 'I' in January 2010 as per the recommendations of OEM.
- The rates were enhanced due to increase in scope of work and not due to delay in conclusion of contract.
- The deviation from RFP specification was deliberated at various levels and being inescapable requirement the same was accepted and approved by CFA.

[8] Aeronautical Development Establishment (Defence Research and Development Organisation)

- After establishing the cause of failure by OEM, necessary measures will be incorporated and the validation trials are scheduled in March 2016.

The reply may be viewed in light of the fact that i) 'X' systems are high performance weapon system and IAF should have consulted OEM before changing the Oil; ii) there were no changes in SOR decided in October 2008 and September 2012; iii) changing of validating trials after refurbishment resulted in uncertainty about performance of the system despite payment of ₹101.52 crore (93 *per cent* of total payment) to M/s BDL.