

17

STANDING COMMITTEE ON DEFENCE
(2006-2007)

(FOURTEENTH LOK SABHA)

MINISTRY OF DEFENCE

**IN-DEPTH STUDY AND CRITICAL REVIEW OF
HINDUSTAN AERONAUTICS LIMITED (HAL)**

SEVENTEENTH REPORT



LOK SABHA SECRETARIAT

NEW DELHI

April, 2007/Vaisakha, 1929 (Saka)

SEVENTEENTH REPORT

STANDING COMMITTEE ON DEFENCE
(2006-2007)

(FOURTEENTH LOK SABHA)

MINISTRY OF DEFENCE

**IN-DEPTH STUDY AND CRITICAL REVIEW OF
HINDUSTAN AERONAUTICS LIMITED (HAL)**

Presented to Lok Sabha on 04.05.2007

Laid in Rajya Sabha on 04.05.2007



LOK SABHA SECRETARIAT

NEW DELHI

May, 2007/Vaisakha, 1929 (Saka)

C.O.D. NO. 81

Price : Rs.

© 2007 BY LOK SABHA SECRETARIAT

CONTENTS

PAGES

COMPOSITION OF THE COMMITTEE.....	
PREFACE.....	

REPORT

CHAPTER – I	INTRODUCTION.....	
CHAPTER – II	ORGANISATIONAL STRUCTURE.....	
CHAPTER –III	ENGINE DESIGN CAPABILITIES OF HAL.....	
CHAPTER –IV	ATTRITION OF MANPOWER.....	
CHAPTER –V	CURRENT PROJECTS	
CHAPTER –VI	PERSPECTIVE PLAN OF HAL.....	
CHAPTER –VII	RESEARCH AND DEVELOPMENT.....	
CHAPTER –VIII	ROLE OF PRIVATE SECTOR.....	
CHAPTER –IX	NAVRATNA STATUS TO HAL.....	
CHAPTER –X	EXPORT MARKET OF HAL.....	

APPENDICES

Minutes of the sitting of the Committee held on 7 November 2006,
13 December 2006 and 12 February 2007

COMPOSITION OF THE STANDING COMMITTEE ON DEFENCE (2006-07)

Shri Balasaheb Vikhe Patil

- *Chairman*

MEMBERS

LOK SABHA

2. Shri Churchill Alemao
3. Shri S. Bangarappa
4. Shri Milind Murli Deora
5. Shri Santosh Kumar Gangwar
6. Shri Ramesh C. Jigajinagi
7. Shri Suresh Kalmadi
8. Shri C. Kuppusami
9. Dr. K.S. Manoj
10. Ms. Ingrid Mcleod
11. Shri Asaduddin Owaisi
12. Shri Adhalrao Shivaji Patil
13. Shri Shriniwas Patil
14. Shri Rajendrasinh Ghanshyamsinh Rana (Raju Rana)
15. Dr. H.T. Sangliana
16. Shri Arjun Charan Sethi
17. Prof. Mahadeorao Shiwankar
18. Shri Manvendra Singh
19. Shri Balashowry Vallabhaneni
20. Shri Rajesh Verma

RAJYA SABHA

21. Dr. Farooq Abdullah
22. Shri Jai Parkash Aggarwal
23. Shri Abu Asim Azmi
24. Smt. Shobhana Bhartia
25. Shri R.K. Dhawan
26. Smt. N.P. Durga
27. Shri S.P.M. Syed Khan
28. Shri K.B. Shanappa
29. Shri Arun Shourie
30. Smt. Viplove Thakur

SECRETARIAT

- | | | | |
|----|------------------------|---|-------------------------|
| 1. | Shri S. K. Sharma | - | Additional Secretary |
| 2. | Shri P.K. Bhandari | - | Joint Secretary |
| 3. | Shri Gopal Singh | - | Director |
| 4. | Shri D.R. Shekhar | - | Deputy Secretary-II |
| 5. | Smt. Jyochnamayi Sinha | - | Under Secretary |
| 6. | Shri Nilendu Kumar | - | Sr. Executive Assistant |

PREFACE

I, the Chairman, Standing Committee on Defence (2006-07) having been authorised by the Committee to submit the Report on their behalf, present this Seventeenth Report on the subject 'In-depth Study and Critical Review of Hindustan Aeronautics Limited(HAL)'. The subject was selected for examination by the Standing Committee on Defence during 2006-07.

2. The Committee, during their examination of the subject, took evidence of the representatives of the Ministry of Defence on 7 November and 13 December 2006. The Committee also undertook an on-the-spot study visit to Hindustan Aeronautics Limited, Bangaluru on 19 November 2006 for an in-depth analysis of the subject matter.

3. Based on the background note, written replies to the list of points furnished by the Ministry of Defence on the subject, briefing / oral evidence tendered by the representatives of the Ministry, including the Chairman, HAL, and the observations made by the members of the Committee during the Study visit, the Committee considered and adopted the draft Report at their sitting held on 12 February 2007.

4. The Committee have inter-alia recommended for decentralization of the powers presently vested with the Board of Directors, functional and financial autonomy to the four units of HAL, need for a robust industrial base for engine design and development, attractive job package to the engineers in discipline viz. design, production, computers, finance, human resource etc. so as to check attrition of manpower, involvement of private sector in research and design activities right from conceptualization (design & development) of the project to final integration of the sub-systems and Navratna Status to HAL.

5. The Committee wish to express their thanks to the representatives of the Ministry of Defence for appearing before the Committee for evidence and for furnishing the material and information in a very short span of time which the Committee desired in connection with the examination of this subject.

6. For facility of reference and convenience, the observations/ recommendations of the Committee have been printed in thick type in the body of the Report.

NEW DELHI;
March 15, 2007
Phalgun 24, 1928(Saka)

(BALASAHEB VIKHE PATIL)
CHAIRMAN,
STANDING COMMITTEE ON DEFENCE

REPORT

CHAPTER – I

INTRODUCTION

1.1 Since its inception in 1940, Hindustan Aeronautics Limited (HAL) has evolved into a large Aeronautics Complex. It has built up comprehensive skills in Design, Manufacture and Overhaul of Fighters, Trainers, Helicopters, Transport Aircraft, Engines, Avionics and System Equipment. Its products track record consists of 11 types of Aircraft from in-house R&D and 14 types of licence production inclusive of 8 types of Aero Engines and over 900 items of Aircraft System Equipment (Avionics, Mechanical, Electrical). HAL has produced around 3400 aircraft, 3600 aero engines and overhauled around 8320 aircraft & 27800 engines by 2005-06 besides manufacture/overhaul of related accessories and avionics. The Company has the requisite core competence base with demonstrated potential to become a global player.

1.2 HAL's major supplies / services are to IAF, Navy, Army, Coast Guard and BSF. Transport aircraft and Helicopters have been supplied to Airlines as well as State Governments. The Company has also achieved a foothold in export in more than 20 countries, having demonstrated its quality and price competitiveness. HAL is a major partner for the Space Vehicle programmes of ISRO. It has also diversified into the fields of Industrial & Marine Gas Turbine business and Real-time software business.

1.3 In order to meet with the challenges in the 21st Century, the Company has redefined its mission as follows:

“To become a globally competitive Aerospace Industry while working as an instrument for achieving self-reliance in design, manufacture and maintenance of Aerospace equipment, Civil Transport Aircraft, Helicopter & Missiles and diversifying to related areas, managing the business on commercial lines in a climate of growing professional competence”.

The basic objectives towards specific goals in furtherance of the missions are:

- i) To enlarge the product range through R&D, and in parallel through co-development and co-production to maximize its share of supplies and meet emerging requirements of Defence Services.
- ii) To enlarge its Civil/Transport aircraft business through co-development and co-production.
- iii) To expand Engine/System Equipment business.
- iv) To increase the level of participation in Space Programmes.
- v) To progress R&D / production / diversification projects.
- vi) To enhance customer Support.
- vii) To increase exports.
- viii) To increase outsourcing and co-operation with Private Sector.

HAL - OVER THE YEARS

1.4 The history and growth of the Hindustan Aeronautics Limited is synonymous with the growth of Aeronautical industry in India over the past 60 years.

The Company which had its origin as the Hindustan Aircraft Private Limited was incorporated on 23 Dec 1940 at Bangalore by Shri Walchand Hirachand a farsighted visionary in association with the Government of Mysore with an Authorised Capital of Rs.4 Crores and with the aim of manufacturing aircraft in India. In March 1941, the Government of India became one of the shareholders in the Company holding 1/3 of its paid-up capital and subsequently took over its management in 1942.

In collaboration with the Inter Continental Aircraft Company of USA, Hindustan Aircraft Private Limited commenced its business of manufacturing of Harlow Trainer, Curtiss Hawk Fighter and Vultee Bomber Aircraft. However, the aircraft manufacture programmes were abandoned a year later in favour of Overhaul & repair of aircraft to support the Second World War effort. After the close of Second World War, Hindustan Aircraft Private Limited in Dec 1945 was placed under the administrative control of Ministry of Industry & Supply. In January 1951,

Hindustan Aircraft Private Limited was placed under the Administrative control of Ministry of Defence.

In August 1963, Aeronautics India Limited (AIL) was incorporated as a Company wholly owned by the Government of India with facilities at Nasik, Koraput and Hyderabad to undertake the manufacture of the MIG-21 aircraft under licence from Russia. In June 1964, the Aircraft Manufacturing Depot which was set up in 1960 as an Air Force unit to produce the Airframe for the HS-748 transport aircraft was transferred to AIL. The two companies i.e. Hindustan Aircraft Private Limited and Aeronautics India Limited were merged on 1st Oct 1964 to form “Hindustan Aeronautics Limited (HAL)” with its principal business being design, development, manufacture, repair and overhaul of aircraft, helicopter, engines and related systems like avionics, instruments and accessories.

GROWTH & CONSOLIDATION

Early Years : 1940s

The initial orders booked by Hindustan Aircraft Company were for manufacture of Harlow PC-5A trainers, Curtiss 75A-5P Hawk fighters and Vultee V-12-D attack bombers. However, during the 1940s, the services of the Company were mainly utilized for the Second World War efforts of the Allies. By, mid-1943, the assemble programme was abandoned with only 5 Hawks and three Vultee aircraft having been delivered to take up the overhaul and repair of military aircraft of the Allies. USAAF was given complete control of the factory during the war and was managed by it till the end of the War. After the War, the Company took up the task of overhaul and refurbishing of Douglas DC-3 aircraft (Dakota) and Liberators. Subsequently, HAL was recognized as Authorised Douglas Service centre in India.

During this period, the first licence build aircraft programme commenced at HAL with manufacture of Percival P.40 **Prentice** trainer aircraft. The first HAL assembled Prentice flew on 30 Apr 1948 and a total of 65 Prentice aircraft were delivered to IAF during 1948 and 1949.

1950s and 1960s

Indigenous design of aircraft was identified as a key factor to the growth of the Company from its early years. HAL launched the design of the **HT-2** trainer aircraft in 1948. The first flight of indigenously designed and developed HT-2 prototype took place on 5 Aug 1951. The aircraft entered IAF's service as an elementary trainer in 1955. Thousands of student pilots of IAF, Navy and Army have been trained on this aircraft.

In pursuance of the national objective of attaining self reliance in the design and production of combat aircraft, HAL was entrusted the task of developing a fighter aircraft. Design work on the first indigenous fighter aircraft commenced in June 1957. Dr. Kurt Tank, a renowned German aircraft designer was involved as the head of the design team at HAL. The first flight of the prototype of the **HF-24 (Merut)** took place on 24 June 1961. During the period 1965 to 1977, 147 aircraft were produced by HAL for IAF.

HF-24 aircraft was powered by two Orpheus 703 engines (without reheat) produced under licence at HAL. This under-powered engine was integrated into the aircraft as efforts to acquire a more powerful engine for the programme did not succeed due to political and commercial reasons. A reheat system for the Orpheus 703 engine was developed by the GTRE, but the development flying of HF-24 with re-heat engine suffered a severe setback when the prototype crashed just after take off. Several attempts were made by HAL to integrate more powerful engine into the aircraft. But these project proposals did not progress due to events and decisions beyond HAL's control and the HF-24 project subsequently came to a close.

In Dec 1959, HAL was given a Go-Ahead for the design and development of a basic jet trainer to meet the needs of the Indian Air Force. The **HJT-16 (Kiran)**, the trainer aircraft with twin side-by-side seats and a single turbojet engine was designed and productionised by HAL. The aircraft was subsequently named Kiran and three variants (Kiran Mk.I, Kiran Mk.IA and Kiran Mk.II) were produced for IAF and Indian Navy. These aircraft produced between late 1960s and 1980s are still in service providing the basic aircraft training to the pilots of the Armed Forces.

Pushpak (Club trainer), **Krishak** (Air Observation post aircraft) and **Basant** (Agricultural aircraft) were also indigenously developed and produced for different customers during this period.

Many Major Licence production programmes were launched during late 1950s and 1960s. Govt of India entered into a licence agreement with de Havilland Company of England for manufacture of **Vampire** F.B.52 jet fighter. The aircraft became the first jet fighter aircraft to be manufactured by HAL.

Gnat aircraft was taken up for production at HAL with the signing of licence agreement with M/s Folland, UK in Sep 1956. The first aircraft assembled from kits was delivered in 1959 and production from raw material extended from 1962 to 1973 achieving a peak production rate of 4 aircraft per month during 1965-66.

Engine Division was established in the year 1957 in Bangalore to manufacture Orpheus Turbo Jet engines for HF-24 aircraft under licence from Rolls Royce, UK. In 1959 another, licence agreement was signed with Rolls Royce to manufacture Dart engines to power HS-748 transport aircraft and overhaul Avon engines fitted on Canberra and Hunter aircraft.

In Aug 1962, an Agreement between India & USSR was signed for manufacture of **MiG-21 aircraft**, including its engines and avionics under licence in India. New divisions at **Nasik** for Airframe, at **Koraput** for engines and at **Hyderabad** for Avionics were formed in 1964 for taking up production of MiG-21 series aircraft. Avionics Division, Hyderabad was set up to manufacture radars, communication systems and other airborne avionic and ground based systems.

Transport Aircraft Division, Kanpur commenced its operations in 1960 in the name of Aircraft Manufacturing Depot (AMD) under the functional control of Maintenance Command of Indian Air Force, for the licence manufacture of HS-748 Transport Aircraft. The Aircraft Manufacturing Depot was merged with Aeronautics India Ltd in June 1964. The division has produced HS-748 aircraft in a variety of roles and models for Indian Air Force, Indian Airlines and other civil customers.

A Licence Agreement between HAL and M/s. Sud Aviation, France (now Eurocopter) was signed in June 1962 for manufacture of **Chetak** (Alouette III) helicopters. Facilities were established in Bangalore for helicopter manufacture and this was bifurcated as a separate Helicopter Division in 1970. The Artouste-IIIB engines for the helicopter also were manufactured under licence at the Engine Division, Bangalore.

1970s and 1980s

In the 1970s, development of **Ajeet** was completed based on the Gnat aircraft platform. Ajeets were produced for IAF during 1977- 1988. The development of trainer version was taken up in 1976 and the first prototype flew in 1982. The certification of the trainer version could not be completed due to the imminent phasing out of Ajeet aircraft fleet.

HPT-32 is a piston engine trainer designed and produced by HAL for the basic flying training of pilots. Development and production of this aircraft was completed successfully for IAF during 1975 – 1994. This aircraft is powered by single piston engine imported from Lycoming, USA. HAL undertook the development of a modified version of HPT-32 with a turbo-prop engine with improved performance. This aircraft, **HTT-34** although had a better performance characteristics than HPT-32 was not productionised due to lack of orders.

The concept of an independent facility for the Design and Manufacture of aircraft accessories took shape as result of the recommendations of Aeronautical Committee and an **Accessories Division at Lucknow** was established in the year 1970. The division commenced its operations with manufacture of Hydro-Mechanical accessories under licence from M/s Dowty, Dunlop etc., required for HF-24, Ajeet and Kiran aircraft.

In September 1970, a licence agreement for manufacture of **Cheetah** helicopter (Lama SA-315) was signed with M/s. SNIAS, France (now Eurocopter). Cheetah helicopters produced at HAL were delivered to IAF and Army are still in operation and are best suited for high altitude operations.

Manufacture of **Jaguar**, deep penetration strike aircraft, was launched under licence from British Aerospace with signing of the Licence agreement in 1979. A separate **Avionics Division was formed at Korwa**, UP in 1982 for manufacture of Display, Attack, Ranging and Inertial Navigation (DARIN) system of Jaguar aircraft. The first licence built aircraft was delivered to IAF in 1982.

Manufacture of **MiG-27M** ground attack fighter was taken up at HAL under a licence agreement signed in 1982 with Russia. MiG-27M aircraft were produced during 1984 to 1997. This production schedule was affected due to disintegration of USSR in early 1990s.

A Licence Agreement with M/s Dornier GMBH, Germany was signed in Nov 1983 for manufacture of **DO-228 aircraft** at Transport Aircraft Division, Kanpur. The production line is still active at the Division.

Through Licence productions, the Company has absorbed several critical production technologies required for the aircraft industry during the 1960s through 1980s. Taking up licence production has increased the self-reliance in providing life cycle support for maintenance and operation of these aircraft and helicopters. Engines, Accessories and Avionics have also been manufactured for these aircraft/helicopters at HAL with dedicated Engine and Accessories Divisions set up for the purpose.

In 1974, **Foundry and Forge Division** was established at Bangalore by merging the departments of forges and foundry under the Aircraft Division. The activities of the division include development and manufacture of Aluminum and Magnesium base alloys and indigenous development of castings and forgings in ferrous and non ferrous alloys, Rolled rings, Brake pads and Rubber products for critical applications for the Aeronautics, Space and other industries.

A separate **Aerospace Division** was established in 1988 at Bangalore. This Division is dedicated to manufacture large light alloy structures for the space of Indian Space Research Organisation.

1990s and 2000s

HAL's mission is to become a global player and to achieve self reliance in aerospace design and manufacture. Three of the current major projects – the **Advanced Light Helicopter (ALH)**, the **Intermediate Jet Trainer (IJT)** and the **Light Combat Helicopter (LCH)** will help in promoting HAL as a design house producing world class products.

To meet the multi-role helicopter requirement of the Indian armed forces, the design of ALH was launched in mid 1980s. ALH has been developed incorporating many advanced and innovative design and production technologies like Integrated dynamic system rotor concept, hingeless main rotor and bearingless tail rotors. The certification of the helicopter was delayed by 4 years due to technical issues encountered during development.

ALH is in production since 2001 and both the military version and the civil version have been certified. The operation and production of ALH was affected during 2005-2006 due to an incident of tail rotor failure on one of the helicopters in Nov 2005. This incident was thoroughly investigated and remedial actions were put in place in 2006. Production of ALH with new glass cockpit, higher powered engine (Shakti) and weaponised versions will continue in the coming years.

Intermediate Jet Trainer is a basic jet trainer being designed by HAL to replace the ageing Kiran aircraft with IAF and Navy. The programme was launched in 1999 and two prototypes are undergoing flight evaluation and the certification is expected to be achieved by end 2008.

Development of Light Combat Helicopter for IAF was launched in 2005 and is expected to enter service in 2011.

HAL is also involved in the development of Light Combat Aircraft (LCA) along with Aeronautical Development Agency (ADA). HAL is providing complete support in Production of Prototype vehicles and limited series production aircraft, Ground and Flight testing to achieve certification of the aircraft.

A Licence Agreement for production of **SU-30MKI aircraft** was signed with Russians in Dec 2000. Licence production of SU-30MKI aircraft is progressing at HAL under licence and the first aircraft was delivered in 2005.

Production of **Hawk Advanced Jet Trainer** also has been launched and these will be produced during 2008-2011. Hawk aircraft is being produced under licence from British Aerospace, UK for which a licence Agreement was signed in Mar 2004.

In order to capture the growing market in the industrial gas turbine engines, a new Division called the **Industrial & Marine Gas Turbine Division**, was formed in 1998. Currently this Division is undertaking manufacture of **LM-2500** engine, Repair and Overhaul work related with Industrial Avon Engines and Allison 501K and 571K series. Production of industrial gas turbines for power generation purpose is being explored.

Airport Service Centre, an independent profit centre, for providing Airport related services was created in May 2000 with a view to synergize the operation of HAL Bangalore Airport. The main aim of creation of this Airport Service Centre is to restructure the existing resources to provide focused attention to meet the market needs of service segment related to airlines operations and commercially exploit the available infrastructure of the Company at Bangalore.

1.5 Capital Structure: The Authorised Capital is Rs. 160 Crore consisting of shares having face value of Rs. 10 each. The issued, Subscribed and Paid-up share capital remained at Rs. 120.50 crore, comprising 12,05,00,000 shares of Rs. 10 each. During the year 2004-05, the Company achieved turnover of Rs. 4534 crore and exports of Rs. 150.05 crore. Exports during the current year up to December 2005 were of the order of Rs. 105 crore (approx). The dividend paid during the last 3 years has been 73.02 per cent for 2002-03, 76.73 per cent for 2003-04 and 94.54 per cent in 2004-05 on the Paid Up Capital of Rs. 120.50 crore.

1.6 Over the last few years, HAL has developed strategic alliance between its Divisions, DRDO and CSIR laboratories, reputed academic institutes like IISc & IITs. HAL has also entered

into working arrangements with many of the renowned companies abroad in pursuance of its programmes. As a part of new business initiatives, Joint Ventures have been formed and are also in the pipeline with companies of Indian and foreign origin. Joint ventures / collaborations would be required to ensure that the resources, financial and human, are deployed suitably and to ensure that technology developed globally could be deployed in our products in a cost and time effective manner. This also facilitates acquisition of advanced technology, rationalization of investments, ensuring product support throughout lifecycle of the product and encourage public – private partnerships.

1.7 HAL, despite all its efforts, is faced with several problems relating to its R&D activities and subsequent delayed projects. The experienced and talented engineers of HAL are leaving the company in search for better and lucrative job packages and joining private companies, MNCs and Navratna PSUs which is causing excessive delays in project completion schedules. Realising the importance of private sector in defence research and production, HAL has made alliance with several private companies so as to strengthen R&D base in the country. However, providing a level playing to the private sector is an important issue which concerns the Committee. According Navratna status to HAL is also an issue which has attracted attention of the Committee. The Committee have taken note of these issues and have recommended for improvement in succeeding paras of the Report. Since HAL is performing a task that is vital for the security of the country, the recommendations are meant only to strengthen its functioning and to expedite its delivery schedules.

CHAPTER – II

ORGANISATIONAL STRUCTURE

2.1 The present organisational structure of HAL comprises 4 Complexes – Bangalore Complex, MiG Complex, Accessories Complex and Design Complex responsible for the production and R&D. Bangalore Complex, MiG Complex and Accessories Complex are each headed by three Managing Directors and the Design Complex by a Director. The area of operations of each of the Complexes is indicated below:

Bangalore Complex : Comprises 7 Production Divisions and 1 R&D centre situated in Bangalore for manufacture & overhaul of Western & Indigenous aircraft.

MiG Complex: Comprises 4 Production Units and 2 R&D Centres at Nasik and Koraput for manufacture & overhaul of Russian designed aircraft including the new SU-30MKI project.

Accessories Complex : Comprises 4 Production Units and 2 R&D Centres at Lucknow, Hyderabad, Korwa and Kanpur, supplying accessories & avionics systems to other Complexes. The division at Kanpur is engaged in production and overhaul of transport aircraft.

Design Complex : Comprises 3 R&D Centres in Bangalore for indigenous development of aircraft, helicopters, small engines and engine test beds. Helicopter production Division at Bangalore also forms part of Design Complex.

2.2 The Board of Directors of HAL comprises of a Chairman, 7 whole-time Directors, 2 Part-time official Directors and 6 Part-time non-official Directors. The Corporate Organisation is headed by the Chairman. Apart from the Managing Directors/Director heading the Complexes, 3 functional Directors are responsible for Corporate Planning & Marketing, Finance, Personnel & Administration respectively at the Corporate level.

2.3 The present structure was decided on the concept of accountability of each complex for its end product. The basis for this structure was the recommendation of a Committee of Board of

Directors of HAL, constituted in 1971 and approved by the Aeronautics Production Board in Dec, 1972. Subsequently, minor changes were effected in the organisation structure based on the recommendations of the Rajyadhyaksha Committee in 1976.

2.4 It can be seen that HAL Divisions are organized into functional groups of Aircraft, Engines, Helicopters, Avionics and Accessories (Mechanical & Instrument systems). Each Complex is responsible for already identified products. All the Divisional heads and Complex heads are delegated with necessary administrative and financial powers for their overall operations.

2.5 The Standing Committee on Defence, in their Eleventh Report on Demands for Grants (2006-07), had recommended about re-structuring of HAL. The Ministry in reply to the same furnished the following:

“The operations between various units are closely inter-related and business transactions are carried out under one roof avoiding a lot of time consuming commercial procedures. The present organisation structure is effective in meeting the present business requirements.

In the present set up, HAL has the flexibility to earmark the projects to its different Production Divisions. For instance, productionisation of IJT is proposed at Kanpur Division to utilize the infrastructure available there. This would release the capacity at Bangalore Division to produce AJT(Hawk) and LCA. Similarly, to enhance the ALH production capacity in Bangalore, overhaul of Cheetah/Chetak helicopters is being shifted to Barrackpore. Such flexibility will be lost if the Company is converted into different groups.

Considering the world-wide trend of mergers and collaborative arrangements in aerospace industry, it is proposed that the present organizational set up is maintained.”

2.6 The Committee in their Ninth Report (14th Lok Sabha) on ‘Defence Public Sector Undertakings’ had *inter-alia* recommended that DPSUs should appoint a Committee of experts including some outside experts also which may, from time to time, give well-considered advice to improve their products and bring efficiency in the work. The Ministry in reply to this recommendation has furnished as under:

“There are 6 independent directors with expertise in Finance and Entrepreneurship on the Board of HAL offering their advice to the Company. Sub-committees of the Board, like the Audit Committee, Procurement Sub-Committee, help the Board in taking decisions.

The process of appointing consultants at HAL is an on-going process on need basis. Presently, a consultant of international repute is engaged for improving the Company-wide productivity based on Lean principles. Consultants have been engaged to maximize the output from HR assets by imparting training to the top management team on global competitiveness, competency modeling and assessment of officers for recommendations on individual developmental inputs. Consultants are also appointed to assess new business opportunities.”

2.7 In regard to the management of HAL, Secretary (Defence production) further informed the Committee as under:

“HAL is now managed by a professional Board of Directors. It has six independent directors who have been selected from diverse areas of specialisation such as industry, Finance, technocrats etc. and among them is Mr. Ratan Tata also on the Board of HAL. These professionals have brought a wider perspective to the management of this company. HAL has been consistently trying to shift the focus from licensed manufacturer to indigenous development and co-development of the aircraft”.

Recommendation No. 1

Need for restructuring of HAL

2.8 The Committee note that the Board of Directors of HAL comprises a Chairman, 7 whole-time Directors, 2 Part-time official Directors and 6 Part-time non-official Directors. The Corporate Organisation is headed by the Chairman. Apart from the Managing Directors/Director heading the four Complexes *i.e.* Bangalore Complex, MiG Complex, Accessories Complex and Design Complex responsible for the production and R&D, 3 functional Directors are responsible for Corporate Planning & Marketing, Finance, Personnel & Administration respectively at the Corporate level. The Committee feel that there is a need to decentralize the powers presently vested with the Board of Directors so as to provide sufficient functional and financial autonomy to the four complexes of HAL in order to enhance their decision making powers. Each unit be headed by an independent official who would be answerable to the Board in regard to the projects being undertaken. The four complexes of HAL thus should be recognized as separate and independent entities with freedom to have joint venture / collaboration with private companies and research organisations of the Country and take immediate decisions. The Committee also feel that an expert / independent Committee should be appointed at the earliest to go into the whole issue of this re-structuring so that the company emerges as an independent corporate body on Brahmos Model, separate from DRDO with DRDO's role just as a facilitator in HAL's projects. This re-structuring will give complete leadership to HAL in aeronautic research, design and development.

2.9 The Committee further note that HAL is managed by a professional Board of Directors, selected from diverse areas of specialisation such as industry, finance, technocrats etc. The Committee desire that the Board of Directors must have permanent representation from the Armed Forces also with one member each from Army, Navy and Air Force so as to provide a platform to the users to stress their requirements and ensure timely completion of the projects.

CHAPTER –III

ENGINE DESIGN CAPABILITIES OF HAL

3.1 Hindustan Aeronautics Limited (HAL) is engaged with Design, Manufacture and Overhaul of Fighters, Trainers, Helicopters, Transport Aircraft, Engines, Avionics and System Equipment. HAL has a long history of engine design and development. However, no concrete achievement has been registered by the Company in its endeavour. The Ministry has furnished the following note about the development history of engine design capabilities of HAL:

“Engine Design Bureau - EDB of Hindustan Aeronautics Limited, Bangalore subsequently renamed as Engine Test Bed Research and Design Centre (ETBRDC), started functioning in the year 1960. ETBRDC was re-structured under Design Complex in 1980 with only some of the young designers.

Before 1980:

Initially, in the 60s the task was to design engines and engine accessories for the indigenous aircraft designed by the Aircraft Design Bureau (ADB). The piston engine PE-90 was designed and certified for use on HPT –32. However, the engines did not enter into series production. A hydraulic pump (HHP) was also designed and certified. This unit was certified and HAL, Lucknow Division took up the manufacture. An Air Turbine Starter was designed, tested and certified for starting Orpheus engines and this was series produced. Another task assigned to EB in the late sixties was the design and development of a 11KN class (2500 lb thrust) turbojet engine for powering Kiran MKII aircraft. The project HJE – 2500 was taken up and with the limited resources available. One prototype was built and successfully tested on the test bed. However the project was closed before the engine was fully developed and certified.

After 1980:

Pilotless Target Aircraft Engine (PTAE-7)

In 1979, ADE proposed to design a pilot less target aircraft for airborne target training purpose. The design of the engine of 350 Kg thrust was entrusted to HAL. The project initially was to be completed by 1985. The usual route of an engine design involves elaborate component testing and component performance mapping. Since the funds allotted were meager even for those times and the Centre started the activities with virtually no infrastructure, no component testing was possible. Thus all components had to be used directly on the engine. Apart from this, the design team was young and inexperienced. A number of problems, which cropped up had to be addressed to by analysis, trial and error.

Some of the major problems faced were-withdrawal of M/s Dowty Fuel Systems (UK) from the programme and consequent redesign of engine control system, fuel pump, alternator and power control unit with the country; rotor dynamics problems leading to re design of shifting; sea water corrosion problems leading to change of materials for some major components; ADE increasing their thrust requirement to 380 kg leading to higher Turbine Entry Temperature operation; starting problem leading to redesign of starting circuit and introduction of enrichment circuit; compressor blade cracking leading to redesign of blade number and thickness; burning of turbine nozzle guide vanes leading to improvement of flame tube design; turbine blade cracking leading to redesign of turbine disc twice; withdrawal of M/s.Microfusion (supplier of turbine casting) from the programme; mist lubrication system problems leading to prolonged experimentation and redesign of the system; EMI/EMC problems of power output interfering with spend signal leading to additional electronic components.

The engine was test flown for the first time in May 1995. Since then 8 test flights have been carried out with the mist lubrication system. All the major problems have been overcome and now the engine is under production. 14 engines have been delivered to power the Lakshya PTA.

Gas Turbine Starter Unit (GTSU-110):

When LCA programme was conceived in mid 80s, EDB proposed to design and develop the gas turbine starter for starting the engine. GTSU is a small gas turbine engine of 110 KW capacity. The experience of PTAE-7 was useful in cutting short the development time considerably. The successful starting of GE 404 engine in the test bed was done in 1998 and the first flight of LCA with GTSU-110 took place on 4th Jan 2001. All the flights of LCA so far have taken place with GTSU –110 as the engine starter. The unit has been successfully productionised to meet all the future requirements of LCA.

Shakti Engine Co-development:

Indian Army and Air force wanted engines with power higher than TM333-2B2 for Dhruv helicopters. An agreement was signed with M/s Turbomeca, France in 2002 for the Co –development of Shakti engine ETBRDC was entrusted with the design and supply of the oil pumps, oil cooling system, the filter unit and the external dressing. Engineers of ETBRDC also took part in casing modelling, rotor dynamics and stress analysis at Turbomeca, France.

Test Beds:

An aero engine needs extensive testing on a test bed before installation on aircraft. ETBRDC has built various test beds and rigs for over-speed testing of discs, 'g' load testing, blade vibration testing for high cycle fatigue, fuel pump and oil pump testing and PTAE-7 and GTSU-110 test rigs. A small high altitude rig was also built to test GTSU-110 to check the starting capability up to 6 km altitude conditions.

The Centre also has acquired competence in the design and commissioning of test bed on “Turn Key” basis and in online Data Acquisition Systems (DSA) for test beds including software development.

The centre has designed and built test beds for several jet engines-R29B, RD33, Pegasus and Adour. It has also built test beds for several shaft power engines-Garrett, Allison, LM2500, industrial Avon, TM333 2B2, Aircraft Gearbox tool rigs have also been built for CASA (MiG 29 aircraft gearbox) and Aircraft mounted Gear Box for LCA.

Future Scenario:

ETBRDC propose to develop into and Aero-engine house of international level in the years to come. Several projects are being envisaged to be taken up.

A twin spool Turbofan Engine is being proposed to power a Cruise Missile under design. ETBRDC will jointly develop this engine with NAL and GTRE. The engine is small; the technology involved is as complex as any bigger engine. Since the usage is for missile application, no external help can be sought and the engine has to be wholly indigenous. This is a challenging task and ETBRDC is confident that it can meet the challenge.

A fully indigenous Auxiliary Power Unit (APU) (which is a turbo shaft engine) has been proposed to power the MCA of ADA. It can alternatively be installed in Fifth Generation Fighter Aircraft being proposed to be developed jointly by India and Russia.

To gain a better foot hold in the technology, it is also proposed to participate in co development activities of some engines with leading players in the world. Co development proposals for F-125 with Honeywell or Adour Mk821 with Rolls Royce, 250-C40B with Rolls Royce, USA is also under study. Participation as a co-development partner in the FT4000, aero derivative industrial version, with P&W also is envisaged.

The Road Ahead:

Two approaches are possible to bridge the extensive gap between Indian and advanced countries in the field of engine development.

A - Continue the indigenous development activities with national funding. Build design capability, test rigs, test facilities and expertise (man power, software etc.,) for engine development. Though expensive and time consuming this is the preferred way to create self-reliance.

B - Join with international design houses as co-development partners. In view of the limited expertise and resources available at present, till expertise is built up as explained above, the Indian side can only be junior partner. While 100% knowledge transfer from

leading engine houses is not feasible since it is proprietary knowledge developed over a long period, this would however, give a initial impetus to engine development in India.

Following the above philosophy, HAL will be in a position to take up design and development of large size and complex aero engines over a period of time.

3.2 About the capacity utilisation of HAL in terms engine manufacturing, the Ministry has furnished information for the last few years as 99 per cent for 2002-03, 98 per cent for 2003-04, 95 per cent for 2004-05, 97 per cent for 2005-06 and 100 per cent for 2006-07 (upto September 2006).

3.3 Regarding engine design capabilities, Secretary, DRDO further informed the Committee as under:

“Worldwide, an aircraft building centers on two or three important issues – design and building. One is that ability to do what I call basic airframe, landing gear and integrating systems, and buying out parts. It may be avionics; it may be engine; and it could be radar. These are technology intensive products. Generally, you will find that the aircraft builder does not build engine. Boeing builds aircraft but it does not build engine. General Electric builds engine, and Pratt & Whitney builds engine.

We do not have an industrial base in this country for engine design. We manufactured a few Russian engines under license in Koraput. That does not automatically make you a designer. If you are producing an ambassador car, we could not produce another car. It is not that we were not producing the car but the design engineering capability is something very unique and distinct.

What I want to tell is that understanding a capability to productionize a part does not automatically gives you a design capability. That has to be nurtured and built. If I remember, in the DRDO presentation I did say that in building a capability, the design engineer takes up to 15 years. Building a capability as a chief designer takes up to 20 years. So these technology intensive works, up to some level, have been accomplished partly in the HAL in certain areas and partly in the DRDO laboratories in certain areas. For example, we have relatively done better in avionics; we have done better in landing gear system. On engines, there were two divisions working. One was on smaller engines, in the HAL Engine Design Bureau and the other was on the gas turbine. There was only one gas turbine research establishment of DRDO in Bangalore, which had been working, which had steadily taken up the power levels. At a point when the LCA programme started, there was thinking that their experimental engine would be converted into a potential engine for Kaveri. Kaveri as of today, has developed certain capability close to 80 to 85 per cent of what we need ultimately for fitment in an LCA aircraft.

They took 15 years to reach 85 per cent from the design stretch to a level where four to five engines are simultaneously under test. If you come to Bangalore, we can show you that.

Now, going from the 85 per cent to 97 per cent in all aircraft engines, the final thrust or the push is the most difficult area. It needs certain advance technology relating to blade, cooling and also vibration-free. It needs different materials and processed engineering.”

Recommendation No. 2

Industrial base for engine design and development

3.4 The Committee note that the Ministry have admitted during oral evidence that the country does not have an industrial base for engine design and also that it takes 15 to 20 years for a Chief designer to take up the development of an engine, which is reflective of very slow state of affair of R&D activities in the Country. The Committee also note the roadmap for engine development in the country i.e. continuing the indigenous development activities with national funding as also joining hands with international design houses as co-development partners. The Committee strongly feel that the aircraft industry in the country till date has not made much progress in engine design and development so far. The Committee further find it contradictory to note that the capacity utilisation of the company in engines development is near to 100 percent over the past few years which shows that the utilisation of the capacity is related to only those engines which are being built under Transfer of Technology(ToT) from abroad. The Committee feel that even after spending about 20 years and a lot of money much needs to be done for designing an engine. The Committee desire that the matter should be examined and immediate correcting steps be taken.

3.5 The Committee feel that achieving self-sufficiency in engine development is an imperative need and for that a robust industrial base for engine design needs to be created so as to overcome the dependence on foreign suppliers and address the requirements of the Armed Forces. The Committee also desire that HAL should explore the possibility of entering into join venture / collaboration with indigenous private companies / foreign companies which have proven competence and capability in design and development of Aircraft engines so that indigenous engines are available to power the aircraft built by HAL. The Committee would like to be apprised of the progress made by the HAL in this regard.

CHAPTER –IV

ATTRITION OF MANPOWER

4.1 In search for a better job package, the employees of HAL in various ranks and disciplines have been leaving the Company over the past several years which has caused a great deal of concern to the Board of Management and also to the Ministry of Defence. When asked to furnish detailed status of the attrition of talent in the executive cadre in the company, the Ministry has stated as under:

“In order to meet the manpower requirements of the Company for successful completion of the tasks which are increasing from year to year as well as to meet the requirements of future programmes, the Company has been inducting fresh Engineering Graduates/Professionals as Management/ Design Trainees, Asst. Engineers etc. Inductions at higher levels are done on a selective basis, depending upon requirements.

It was noticed that a good number of the youngsters inducted and experienced Executives are resigning from the services of the Company and the same is showing an increasing trend. The number of Executives who have resigned since 2003 are as follows:

Year	Asst. Engineers/ Engineers/ Deputy Managers	Manager & above	Total
2003	41	15	56
2004	122	13	135
2005	279	38	317
2006 (upto Sept.)	314	52	366
Total	756	118	874

The Executives who are resigning are taking up employment in the Aviation Industry, IT Sector, MNCs, Navratna PSUs etc. There is great demand for the experienced Engineers and other Professionals in the Company, especially in Disciplines like Design, Production, Computers, Finance, HR etc, in the job market. The Compensation Structure in such Companies is far superior to that in HAL, which is attracting the talent from HAL.

Successful completion of the Projects on hand and future Programmes require experienced & competent personnel in the Company. Projects have got tight cost and time schedules. Attrition of trained & experienced Executives is affecting the Project schedules. Further, it causes knowledge erosion and loss of expertise. New inductees take time for technology absorption, which are of very high standards in the Aviation Industry. Replacements for experienced Executives who are resigning are not readily available from outside also. As such, there is a very strong need to retain in-house built expertise & knowledge.

The Company has taken steps like extending benefits of leased accommodation, subsidy on Car Loans & re-imburement of expenditure incurred for maintenance of Car, to executives at the junior levels, besides introduction of a Professional Development Allowance, w.e.f. 1.1.06. Further, an accelerated promotion scheme has been introduced for the Executives. Certain other measures related to job allocation, performance management, career advancement, learning and work environment culture & leadership have also been taken. However, these steps are seen as too little and cosmetic. The actual need is to improve the Compensation Structure in the Company.

Accordingly, a proposal for the revision of the Pay Scales of the Executives, by adopting the Pay Scales of NTPC, besides introduction of a Performance Linked Allowance and rationalization of Allowances & Benefits, was put up to the Board of Directors at its 287th meeting held on 25.5.06.

The Board was unanimous in its view that the Pay Scales of the Executives need to be revised to retain talent. After deliberations, the Board had decided to adopt the Pay Scales applicable in respect of the Executives of NTPC, as a benchmark, for the revision of Pay Scales of HAL. The Board had authorized the Company to take up the matter suitably with the Ministry of Defence to finalise the revision of the Pay Scales. The Board had also decided that the scheme of Performance Linked Allowance be reviewed and put up in a subsequent meeting.

As approved by the Board, the matter regarding upgradation of the Pay Scales of Executives of the Company, w.e.f. 1.4.06, based on the Pay Structure of NTPC, has been taken up with the Ministry of Defence. A Statement indicating the existing Pay Scales in HAL, Pay Scales in NTPC and the Pay Scales proposed to the Ministry for adoption in HAL, is enclosed as Annexure.

Annexure - I

Existing Scales of Pay in HAL		Scales of Pay in NTPC		Scales of Pay proposed to the Ministry for adoption in HAL	
Grade	Scale of Pay (Rs.)	Grade	Scale of Pay (Rs.)	Grade	Scale of Pay (Rs.)
(1)	(2)	(3)	(4)	(5)	(6)
I	6550-200-11350 (Assistant	E-1	10750-4%-16750	I	10750-300-16750
		E-2	11225-4%-17250 (Engineer Trainees)	II	11225-300-17225 (Management / Design Trainees)
II	8600-250-14600 (Management / Design Trainees)	E-2A	12000-4%-17500 (Engineer Trainees on Absorption)	IIA	12000-325-17525 (Management / Design Trainees on absorbtion)
III	10750-300-16750	E-3	13750-4%-18700	III	13750-350-18300
IV	13000-350-18250	E-4	16000-4%-20800	IV	15500-400-20300
V	14500-350-18700	E-5	17500-4%-22300	V	17000-400-21800
VI	16000-400-20800	E-6	18500-4%-23900	VI	18000-450-23400
VII	17500-400-22300	E-7	19000-4%-24750	VII	19000-450-25300
VIII	18500-450-23900	E-7 (A)	19500-4%-25600	VIII	19500-450-25350
IX (GM)	20500-500-26500	E-8 (GM)	20500-4%-26500	IX (GM)	20500-500-26500
X (ED)	23750-600-28550	E-9 (ED)	23750-4%-28550	X (ED)	23750-600-28550

4.2 Giving analysis of attrition of employees in HAL, the Ministry has stated in post study visit written reply as under:

“A) The Number of Officers and Workmen who have left HAL during the last 10 years is as indicated below:

Reason	Officers	Workmen	Total
Superannuation	2884	8323	11207
Resignation	1414	313	1727
Voluntary Retirement	406	1225	1631
Medical Termination	219	970	1189
Death	199	1336	1535
Disciplinary Grounds	2	6	8
Others	76	117	193
Total	5200	12290	17490

B) Flexibility required to HAL for fixing Salary Structure of employees

The Executives who are resigning are taking up employment in the Aviation Industry, IT Sector, MNCs, Navratna PSUs etc. There is great demand for the experienced Engineers and other Professionals in the Company, especially in Disciplines like Design, Production, Computers, Finance, HR etc, in the job market. The Compensation Structure in such Companies are far superior to that in HAL, which is attracting the talent from HAL.

Considering the Projects on hand, new developments taking place and the growth profile, there is a pressing need to evolve attractive Compensation Packages so that HAL can attract & retain talent to meet the challenges. This is all the more necessary now as more and more Global Players in the aviation filed are setting up subsidiaries, joint ventures etc in the country (like Rolls Royce, EADS, Pratt & Whitney, Snecma, Infotech etc). Such Companies would be looking for experienced Officers and would also be offering attractive Compensation Packages. At some point of time, HAL may need to match the Salary & Perks offered by MNCs, the IT Sector and reputed Private Sector Companies.

However, being a Central Public Sector Undertaking, HAL may have to follow the Guidelines issued by the Government of India for fixing the Salary Structure of its employees. HAL alone deviating from the Government Guidelines and fixing a higher Salary Structure for its employees could result in problems for the other PSEs.

In this connection, it is to be noted that the Salary Structure prevailing in PSUs like NTPC, Oil Sector, BHEL etc. are superior to that in HAL. The Company can easily match its Salary Structure with that of these PSEs.

As such, flexibility can be given to HAL to have Salary Structure on par with leading PSEs like NTPC, Oil Sector etc. This would enable to check the rate of resignations from the Company. Having Salary Structure on par with the Aviation Sector, MNCs etc. can be considered at an appropriate time in the future.”

4.3 On being asked by the Committee, the Ministry has further furnished tabular information about the officers who have resigned in various disciplines in recent years as under:

DISCIPLINE WISE NUMBER OF OFFICERS WHO HAVE RESIGNED					
Discipline	2003	2004	2005	2006 (upto 31.10.06)	Total
Design	22	42	96	106	266
Production Shops	6	17	73	91	187
Production Engineering	7	10	31	66	114
Quality Control	6	13	19	34	72
Finance	3	12	28	20	63
Computers	1	15	7	9	32
Integrated Materials Management	1	4	14	13	32
Personnel & Administration	2	4	7	9	22
Plant Maintenance	1	3	7	11	22
Others *	7	15	35	50	107
Total	56	135	317	409	917

* include the Disciplines of Management Services, Customer Services, Laboratory & Process, Aerodrome Operations, Works Engineering, Marketing, Flight Operations, Library, Security, Vigilance, Medical and Secretarial

4.4 An analysis of the grade-wise officers, who resigned in recent years as furnished by the Ministry of Defence is contained in the following table:

GRADE WISE NUMBER OF OFFICERS WHO HAVE RESIGNED

Grade	Designation	2003	2004	2005	2006 (upto 31.10.06)	Total
I	Assistant Engineer / Officer	28	66	155	190	439
II	Engineer / Officer	5	33	84	116	238
III	Dy. Manager	8	23	40	42	113
IV	Manager	4	1	16	19	40
V	Senior Manager	6	8	10	24	48
VI	Chief Manager	5	0	2	7	14
VII	Dy. General Manager	0	4	8	8	20
VIII	Addl. General Manager	0	0	2	1	3
IX	General Manager	0	0	0	2	2
X	Executive Director	0	0	0	0	0
Total		56	135	317	409	917

4.5 It is general perception that the officers tend to resign after having job experience in the relevant field. The Ministry has furnished information about length of service in HAL vis-à-vis number of resignations as under:

LENGTH OF SERVICE-WISE NUMBER OF OFFICERS WHO HAVE RESIGNED	
Resigned with service in HAL (yrs.)	Number (01.01.2003 to 31.10.2006)
1 & below	134
2 – 4	397
5 – 8	213
9 – 12	91
13 – 16	48
17 – 20	23
21 & above	11
Total	917

Recommendation No. 3

Improvement in Salary structure of HAL

4.6 The Committee note with serious concern the attrition of manpower in HAL. The Committee note the number of Assistant Engineers / Engineers / Deputy Managers resigning in HAL since 2003 is 756 and the number of officers in the rank of Managers and above is 118; in a single year (2006-upto September) alone the numbers being 314 and 52 respectively. The Committee also note that the engineers resigning from HAL are mostly from the four disciplines viz. design, production shops, production engineering and quality control. The Committee further note that most of the engineers resigning are in the Rank of Assistant Engineer, Engineer and Deputy Manager, thus forming the young age group of the engineers. The Engineers leaving HAL are taking up employment in the Aviation industry, IT Sector, MNCs, Navratna PSUs etc. The experienced engineers of HAL are in great demand in disciplines like design, production, computers, finance, human resource etc. in the job market as the compensation package in these companies is far superior to that in HAL. The Committee take a very serious note of the excessive delays in project schedules of the company. The Committee understand that HAL had submitted proposal for the revision of pay scales of the Executives on the lines of Pay scales of NTPC to the Board of Directors. The proposal, after approval from the Board, is pending with the Ministry of Defence for final clearance. The Committee feel that the engineers resigning from HAL are from a few particular disciplines and form part of a particular age group of the employees. The Committee desire that the Ministry should take immediate steps to offer attractive job package to these sections of engineers which is comparable to the best package available to them in the job market. They should also be provided on-job trainings to brush up their knowledge. The Committee at the same time also desire that the Ministry should frame a recruitment policy clearly stipulating service conditions that the engineers joining the company must sign a bond of compulsory service in the company for at least 8 to 10 years and in case of breach of the bond, the expenditure incurred on their job specific training would be recovered from

them. The Committee further note that attrition of manpower in HAL is inter-alia attributed to Voluntary Retirement, Medical termination and death, the number being 406, 219 and 199 in case of officers and 1225, 970 and 1336 in case of workmen respectively during the last 10 years, which is reflective of the fact that the employees may have been denied basic facilities, necessary for retaining the work force and affecting adversely their health. The Committee are very unhappy to take note of this fact and strongly feel that the Ministry should appoint a Committee to look into this grave situation of attrition and find remedial measures to check it at the earliest.

4.7 The Committee further note that several global players in the aviation field are setting up subsidiaries, joint ventures, etc. in the country which would be offering attractive packages. The Committee feel that this situation will further add to the attrition of talent in HAL. The Committee, therefore, strongly recommend that since HAL is an intensive defence research organisation whose delayed project schedules cause a lot of concern to the nation and huge costs to the Armed Forces, the pay structure of all its employees must be adequately modified so as to compete the packages of the companies which have been attracting its employees over the years. In addition to this, the Company should also offer incentives to its employees comparable to that being offered in private sector companies. While offering incentives/promotional avenues and other facilities to the employees, the Government must take into account their individual performance and contribution to the overall growth of the company. The Committee further recommend that the Government should extend royalty to the engineers for their original R&D works and any product developed thereon.

CHAPTER –V

CURRENT PROJECTS

5.1 HAL is undertaking several projects relating to design and development and manufacturing. The major projects currently handled by HAL can be broadly divided into Design and Development project and Manufacturing Projects as indicated below.

Design projects

- Intermediate Jet Trainer
- Light combat Aircraft
- ALH Weapon System Integration
- Light combat Helicopter
- Aircraft Upgrades (Jaguar , Sea Harrier)

Manufacturing Projects

- SU-30 MKI aircraft
- Jaguar single seater
- Advanced Light Helicopter
- Dornier 228

5.2 The details regarding the Design projects, as furnished by the Ministry in written reply to a related question, is as under:

“Intermediate Jet Trainer (HJT-36)

HAL has undertaken development of IJT to replace the ageing Kiran trainer aircraft in service with Defence Services. This aircraft will be used for Stage II training of pilots. IJT has tandem seat configuration with good visibility for the pilots. It is equipped with mission computer and Integrated Avionics system.

Sanction for the development of the aircraft was accorded in Jul 1999. The sanction was revised in Mar 2005 with revised scope of work including the development/integration of a higher powered engine (AL-55i) and glass cockpit. The sanctioned (revised) project cost is Rs.466.86 Cr with project completion by Mar 2008.

Presently, two prototypes are undergoing developmental flight tests. A Cumulative total of 319 test flights have been completed on these aircraft by end Oct 06. Initial Operation Clearance is expected to be completed by Mar 2008.

Contract for supply of 12 IJT's (Limited Series Production) to IAF was concluded in Mar 2006 at Rs.486.82 Cr. Production of 12 aircraft is scheduled to be completed during 2008 – 2010. Activities for placement of orders for materials, fabrication of jigs and tools, drawing release/methodising work have been launched and are progressing satisfactorily.

IJT is an Intermediate Jet Trainer indigenously designed and developed by HAL. The aircraft is powered by a single engine with FADEC. Cockpit is ergonomically designed for comfort and is equipped with light weight ejection seats with zero-zero speed & altitude ejection capability. The aircraft is equipped with Integrated Avionics Suite with a Mission Computer and liquid crystal displays in the cockpit.

The aircraft can be used for training on General flying, Navigational & formation flying, Instrument flying, Basic air to ground & air to air weapon training, Tactical flying and Night flying.

Development Status:

The Govt sanction for the development project was received in Jul 1999 at a cost of Rs. 180 Cr (1997 level). The first prototype flew on 7th Mar 2003 followed by the second prototype on 26th Mar 2004. Development flights were carried out on these two prototypes. Preliminary assessment of performance, stability, flying controls and initial system assessments have been completed.

Subsequently in Apr 2005, a revised CCS sanction was accorded for the revised scope of the project incorporating development of higher powered AL55 I engine and the development of IJT fitted with this higher powered engine at a cost of Rs.467 Cr.

Two prototypes (PT-1 and PT-2) are undergoing flight tests for evaluating systems and flight envelope towards certification. A cumulative of 320 flights has been completed on these prototypes as of 14 Nov 2006. Hot weather trials were successfully completed at Nagpur in May 2006. Both the prototypes did also participate in the Farnborough Air Show at U.K. in July 2006 and further flight trials at Bangalore are in progress. Evaluation of systems and flight parameters is progressing satisfactorily with changes for improvements carried out as required.

AL-55 I engine:

The prototypes are equipped with Larzac 04H20 engines from Snecma. The production series aircraft will be fitted with a higher powered AL55I engine which will be produced by HAL under Licence from Russia. A contract has been signed with M/s Rosoboronexport in Jun 2005 for development of AL55-I engine. Development of the engine is progressing at Russia. First prototype of

the engine has done undergone initial tests. A Mock-up of the engine was received at HAL in Dec 05 and trial installation on IJT has been successfully completed.

Project Schedule

Development: The Initial Operation Clearance (IOC) of IJT is planned for completion in Mar 08 and Final Operation Clearance (FOC) in Mar 09 with receipt of flight-worthy engine scheduled in Jan 07 from Russia. However, it has just been informed by the Russian side that there is a delay of 8 months due to technical issues in the supply of developmental engines for flight testing on IJT. Consequently, there could be a delay in the delivery of initial batch of production engines. This delay could be get retrieved towards the end of LSP programme.

Production: An order for 12 Limited Series Production (LSP) aircraft has been placed by IAF in Mar 2006. The delivery schedule is as follows:

<u>Year</u>	<u>Quantity</u>
2007-08	1
2008-09	3
2009-10	8

The delivery of the first aircraft is likely to be rescheduled in line with the IOC. The production rate will be further ramped up for series production depending on the requirements of IAF & other customers.

Light Combat Aircraft (LCA) (Tejas)

LCA is a light weight, highly agile, multi-role supersonic fighter. It has quadruplex digital fly-by-wire Flight Control System (FCS) with associated advanced flight control laws. The aircraft with delta wing is designed for 'air combat' and 'offensive air support' with 'reconnaissance' and 'anti-ship' as its secondary roles. Extensive use of advanced composites in the airframe gives a high strength to weight ratio, long fatigue life and low radar signatures. Aeronautical Development Agency is the designated project manager for the development of LCA.

The project definition phase of the programme was launched in 1987. In 1991, Full Scale Engineering Development (FSED – Phase 1) was launched at a project cost of Rs. 2188 Cr involving design, production of 2 technology demonstrators, 2 prototype vehicles, one static test specimen and associated ground and limited flight tests. This work was completed in 2005.

In 1999, FSED-Phase 2 was launched at a project cost of Rs. 3302 Cr involving 3 additional prototype vehicles (including a trainer variant) and production of 8 aircraft under limited series production.

Currently, two TDs and two prototype vehicles (PVs) are undergoing flight evaluation and a cumulative of 567 flights have been completed as of end Oct 06 covering a flight envelope of 1.4 Mach and 15 Km altitude. The trainer variant : is under build and is expected to be ready for engine ground run by Dec 2006. Further a programme for design and development of naval variant of LCA has been launched subsequently in 2003 at a project cost of Rs.949 Cr involving development of two prototypes.

It is expected that Initial Operation Clearance (IOC) for the LCA is achievable in 2008. To expedite achieving IOC, monthly review of the programme by a joint committee comprising of Chairman, HAL, Deputy Chief of Air Staff and Chief Controller(R&D) is being carried out.

The number of aircraft requirement projected by Services is 220 aircraft . LSP of 8 aircraft has been taken up against MOU signed with ADA and the 1st aircraft is expected to be delivered in 2006-07. Further a contract for supply of 20 aircraft at a value of Rs. 2701.70 Cr has been concluded with IAF in Mar 2006 . These 20 aircraft are scheduled for delivery during 2010 – 2012.

5.3 During examination of Demands for Grants (2004-05), the Committee were informed that initial operational clearance of Light Combat Aircraft (LCA) is planned by 2006 and final operational clearance by 2008. In Action Taken Reply to the same Report, the Ministry furnished revised schedule stating that initial operational clearance of LCA would be over by March 2007 and final operational clearance by 2009. During examination of Demands for Grants (2005-06), the Committee were informed that initial operational clearance would be over by the year 2010. In Action Taken Reply to this Report, the Ministry informed that initial operational clearance is planned by 2008 and final operational configuration by 2010.

5.4 The Ministry has furnished reasons for delay in induction of Light Combat Aircraft (LCA) as under:

Reasons for delay in Full Scale Engineering Development (FSED) of LCA are

- Technology difficulties
- Non availability of systems design & high safety standards

- Foreign Exchange crunch of 1991
- Revision of development strategy by increasing indigenous content in aircraft & ground facilities
- Sanctions imposed by USA in 1998
- Redesign of Composite Wings to cater for Weapon definition changes specified by Indian Air Force (IAF) during Jan 04.
- Indigenous development & integration of Obsolescence-free Open Architecture Avionics Systems
- Integration of interim Electronic Warfare (EW) equipment specified by IAF during 2005
- Extensive on ground evaluation, simulation & testing of indigenous equipment, systems, software & aircraft.
- Extensive Independent Verification & Validation (IV & V) of complex airborne software to ensure flight safety
- Co-ordination & integration effort by many work centres to type certify indigenous equipment systems.

The present status of this project is as given below:

- Flight Test Phase (FTP) of FSED Phase 2 is in progress. As on 30 Nov 06, 572 Flight Test (313 Hrs 24 Min) have been completed utilising 2 Technology Demonstrators and 2 Prototype Vehicles. Handling Quality (HQ) of LCA has been adjudged as “Very Good” by 11 Test Pilots of IAF & Indian Navy.
- Third Tejas (Prototype Vehicle) has completed High Speed Taxi Trials (HSTT) and is ready for its maiden flight. Development of 2 Trainer Variants is in progress and the first Trainer is expected to fly in 2007. Integration of IAF specified Sensors & Weapons is progressing satisfactorily
- During FSED Phase 2, manufacture of 8 limited Series Production (LSP) standard Tejas aircraft and establishment of 8 aircraft per annum production facility has been initiated concurrently to gain time advantage during Production Phase. Four Tejas (LSP) aircraft are expected to join Flight test phase during 2007.
- Confidence in LCA as a flying machine is high and IAF has placed procurement order for 20 LCA with the manufacturing agency (M/s Hindustan Aeronautics Ltd.) for inducting one LCA Squadron into operational service. Production Phase of LCA has also been initiated concurrently with FSED Phase to gain time advantage.
- There was no cost over-run in LCA FSED Phase 1 programme. As on date, there is no cost over-run in LCA FSED Phase 2 Programme also.
- Production Standard LCA comprises 65% of indigenous equipment (Line Replaceable Units).

Kaveri Engine:

HAL is providing manufacturing support for fabricating certain modules of the prototypes of Kaveri being designed by GTRE. Following Seven Modules of Engine have been supplied for the prototypes

Oil Tank (Titanium)
Jet Pipe
Turbine
Exhaust
Rotational System Internal Flow
(RSIF)
Convergent Divergent Nozzle
Fan

Apart from manufacturing of modules, HAL, Engine Division is also supporting GTRE in Assembly of LP Turbine Disc, Integration of Jet Pipe and Convergent-Divergent Nozzle and Shroud Segments on Turbine Casing.”

5.5 About the status on Kaveri Engine, the Ministry has stated as under:

- Currently, 4 Engines are running on test bed at the Gas Turbine Research Establishment (GTRE), Bangalore, while 2 engines are being manufactured. These engines fall short of design intent by a small margin. However, their performance may be adequate to fly the Light Combat Aircraft over a limited flight envelope. Therefore reliability and safety tests are being carried out to demonstrate compliance to the strictest standards in this direction. Simultaneously efforts are being made to improve thrust and reduce weight.
- Request for Proposal (RFP) to international engine house to partner GTRE and HAL to meet full performance requirement in accelerated timeframe for development, test and evaluation and production is under process.

5.6 Regarding capabilities of HAL in development and manufacturing engines for Aircraft, Secretary (Defence Production) further apprised the Committee during Oral evidence as given below:

“As regards engine manufacturing or indigenous engine development, we have been at it for quite some time but we have not reached 100 per cent success so far in Kaveri engine. Once we master the technology of engine, whether it is Kaveri engine or any variant of that, then it will be possible to be able to make other variants of those engines. DRDO, of course, is more competent to answer the questions as to why we have not been able to do it; what are the difficulties that we are facing; and how we are resolving those difficulties. Once we achieve it, we can see how its capacity can be created to be able to do its variants also.”

5.7 While replying to a query of a Member in regard to delay in prototype designs of LCA and flight testing, Chairman (HAL) informed the Committee during Oral evidence:

“We first do the design. Then, we have to construct the aircraft like constructing a house. Then, you put all the equipment. In fact, in this specific project, we benchmarked ourselves this prototype design, and prototype flying was done in the fastest possible time we could imagine. From the time we finished our design, we cut the metal into the first prototype in just 18 months’ time. In think, it was the world record as far as design and development are concerned in the Intermediate Jet Trainer. The process is, you design the aircraft; construct one prototype; start flying that; and in the second prototype, you use the same tooling what was used for the first prototype, and then you start flying. In fact, we were very pleased that this project has been done so fast.

The second question was on the selection of the engine. When the design was conceptualized we took stock of what engines are available in the market. They were all in the 1500 kg class. We started our prototype development with what was existing but ultimately it emerged because of the requirements of the specification that we needed an engine with much higher power. That was how we went ahead.”

5.8 About the present status of LCA and its induction plan in Air Force, Secretary (DRDO) further informed the Committee during Oral evidence:

“In the earlier presentation, I had said very clearly that we have taken up the policy decision that the first two squadrons of LCA will go with General Electric engine, with which it is already flying.

It would be covered by the end of 11th plan. By the time we have built two squadrons, we would know the capability of Kavery for a repacelment. The first squadrons means 40 aircraft with GE engine. We can think of a Kaveri type of engine only beyond 40 aircraft.”

ALH (Dhruv) Weapon System Integration

The development project for Weapon System Integration on ALH for Army/IAF and Navy was sanctioned in Dec 1998. Weapons and systems are to be integrated on ALH for Anti-tank, Anti-submarine Warfare, Combat Air Support roles and other unarmed roles. The scope of the project was revised in Jul 2005 to include integration of additional systems and the development and integration of higher powered Shakti engine. The revised project cost is Rs 710.29 Cr and the scheduled completion is by Jul 2008.

Current status of Integration:

- Unarmed role: All unarmed role integration completed except for Infra Red Suppressor which is expected to be completed by end 2006. IR Suppressor is being developed indigenously in collaboration with IIT, Mumbai.
- Armed role : For the Anti-Submarine Warfare Role, Torpedo / Depth charges release, Radar and Electronic Support Measure (ESM) trials have been completed successfully. 1st phase of deep sea trials with Ships and submarines are completed successfully. Further trials will be taken up after integration of Tactical Mission System on the helicopter.
- Integration of systems for armed role is planned to be completed by Jul 2008.

Shakti Engine

- Contracts for co-development and co-production of higher powered Shakti Engine and direct purchase of TM-333-2B2 engines inclusive of overhaul with M/s Turbomeca (TM) was signed in Jan 2003 with TM, France. The Shakti engine will be co-developed between Turbomeca and HAL with phased manufacturing planned at HAL.
- The development activities are being progressed satisfactorily and HAL has completed its share of all the design work packages. The first test bed run of the Shakti Engine was completed in Oct 05. Prototype engines have been received and testing of engine on helicopter will commence in Jan 07. Certification is expected to be completed by Jul 2007.

Jaguar Navwass Upgrade:

Upgrade of the Direct Supply Jaguar aircraft (Navwass standard) to improve its Navigation and Weapon Aiming capabilities by fitment of state-of-the-art avionic equipment was taken up by HAL. A contract was concluded with IAF in Sep 2003 at a cost of Rs. 268.61 Cr for the upgrade on 2 developmental aircraft and for fleet modification. The development was to be completed by Dec 2004.

Development and supply of Mission Computer was contracted with Smith's Aerospace, UK. Smith's Aerospace demanded an upward revision to the contract value during the course of development which was not acceptable to HAL. Consequently, indigenous development was resorted to through Defence Avionics Research Establishment (DARE). Indigenous Mission Computer for the upgrade program has been developed jointly by HAL and DARE. This delayed the certification of the upgrade program on aircraft.

Initial Operation Clearance(IOC) for the Upgrade was obtained on 15 Dec 2005. The IOC standard aircraft is cleared for operation with all the navigation & display sub-systems and 12 weapons operational. Final Operation Clearance (FOC) with 11 additional weapons and Electronic Warfare systems for the Twin Seater aircraft was accorded in Sep 2006. FOC for the Strike variant is expected by end Nov 2006.

Sea Harrier Upgrade

HAL has contracted with Indian Navy to upgrade 14 Sea Harrier aircraft with new Fire Control Radar, Combat maneuver Monitoring and flight recorder, Multi function display unit, Ring laser gyro, Inertial Navigation and Ground Positioning System, Modified Radar hand controller & stick top and Beyond visual range missile with launcher.

The contract was signed on 30 March 2005 for Rs. 476.69 Crores. As per contract the flight test completion of two prototype aircraft is scheduled in Feb 2007. Two prototype aircraft are currently being upgraded and flight trials are planned in Feb 2007. The series upgrade of 12 aircraft are scheduled from April 2007 to March 2008.

Light Combat Helicopter (LCH)

LCH is proposed to be developed to meet the need of combat helicopter for IAF. LCH will have maximum possible commonality with ALH and will incorporate number of stealth features and crash-worthy landing gear for better survivability.

Sanction for the development project was accorded in Oct 06 at cost of Rs.376.67 Cr and a timeframe of 50 months (Oct 2010) for achieving Initial Operation Clearance.

Following development activities have been completed;

- Overall configuration studies and Optimization of overall geometry
- Definition of common parts
- Landing gear – preliminary design
- Preliminary layouts of Armour panel, Pilot & co-pilot layout, Armament boom, pylons and various weapon integration configurations
- Wind tunnel test for fuselage configuration definition

Further design work is progressing as per schedule and the project is expected to be completed within the specified timeframe.

Recommendation No. 4

Checking time and cost overruns of HAL projects

5.9 The Committee are concerned to note time and cost overruns in a large number of projects undertaken by HAL so far. In some of the cases like LCA, very small achievement appears to have been made even after 15 years of efforts like LCA. The Committee also note that, in some cases, delays have occurred due to changes in scope of work. The Committee feel that due to time overrun, the user is tempted to ask for latest changes in the product as the project had not been completed in time. The Committee have examined various important projects in the following paras:

IJT

5.10 The Committee note that the sanction for the development of Intermediate Jet Trainer (IJT) was accorded in July 1999 at a cost of Rs. 180 Crore, which was revised in April 2005 to a cost of Rs. 467 Crore. The Committee are unhappy to note that the development flight tests of IJT are still being undertaken on Larzac engines from Snecma, France and the production series is planned to be fitted with higher powered AL-55 I engine from Russia. The Committee feel that despite the passage of a long period since the project was sanctioned, HAL has not successfully developed the engine of the Aircraft and unfortunately it has taken HAL more than 7 years to complete the outer airframe of IJT. The Committee feel that much remains to be done so far as the development of IJT project is concerned. The Committee, therefore, recommend that HAL should concentrate on the development of the indigenous engines for IJT instead of depending on French and Russian Companies. The time frame fixed in 2005 be strictly adhered to.

LCA

5.11 The Committee further note that the Light Combat Aircraft (LCA) project was conceived way back in 1987 and Full Scale Engineering Development (FSED) - Phase I started in 1991. The Committee are constrained to note that even after 15 years of its initiation, the project has not been able to see the light of the day. The Committee also note that the project of Kaveri engine which is being developed indigenously and expected to power LCA has also no indication of its completion. The Committee are dismayed to note that only structure of the LCA has so far been completed. The Committee take a very serious note of it and strongly recommend that the Ministry should strictly fix deadline for the completion of the two projects. If the deadlines are not met, HAL should enter into joint venture / collaboration with private firms and R&D organisations which have attained capability to design and develop such engine. The Ministry should also ensure closer participation of Air Force in these projects.

Other projects

5.12 The Committee further note the slow pace of progress of the projects viz. Advance Light Helicopter (Dhruv) Weapon System Integration to be powered with Shakti Engine being developed in joint venture with M/s Turbomeca, France, Jaguar upgrade, Sea Harrier upgrade and Light Combat Helicopter. The Committee feel concerned about these projects as HAL has not been able to meet deadlines in any project and therefore desire that HAL should not solely depend on DRDO but also intensify its R&D efforts in order to achieve comprehensive skills in design and development of engine. For the purpose, it can use its young and talented engineers by providing them optimal scientific environment and encouragement so that in near future we may not have to depend on foreign companies for any strategic crucial technology. The Ministry

should also make all out efforts for the timely completion of pending / delayed projects.

5.13 The Committee further desire that the Ministry should chalk out a well considered plan in order to monitor the development of various projects being undertaken by HAL and accountability for the delay in completion schedule must be fixed on the concerned engineers / officials, in-charge of the project. The HAL should make clear cut assignment of project related jobs to officials at the start of the project. All out efforts must be taken so that the projects are not allowed to languish in an indefinite timeframe as in the case of LCA, IJT and Kaveri. The Committee further desire that the option of involving private sector in the various projects must be explored at the beginning itself and private sector be encouraged to make active participation in these projects.

CHAPTER –VI

PERSPECTIVE PLAN OF HAL

Modernisation of Indian Air Force and self-reliance

6.1 In written reply to a question on the contribution of HAL in achieving self-reliance in the modernisation of Indian Air Force, the Ministry has furnished the following note:

“HAL over the years has built up comprehensive skills in design, development, manufacture and overhaul of fighters, trainers, helicopters, transport aircraft, engines, avionics and system equipment. The products and services of HAL has been mainly catering to the requirements of Indian Defence Services.

HAL has taken up a number of measures and initiated programmes for enhancing the level of self-reliance in the field of military aviation as given below :

Programmes	Details
Design and development of aircraft, airborne systems and equipment	<ul style="list-style-type: none">• Advanced Light Helicopter• Light Combat Helicopter• Light Combat Aircraft• Intermediate Jet Trainer• Avionics & Simulators• Development of rotables• Development of Materials, Castings, Forgings & New Processes
Upgradation of existing fleet of aircraft with modern avionics and equipment	<ul style="list-style-type: none">• Jaguar NAVWASS upgrade• MiG-21 BIS upgrade• MiG-27M upgrade• Avro upgrade• Sea Harrier upgrade• Cheetah/Chetak upgrade

Technology development programmes	<ul style="list-style-type: none"> • Finite element modeling of helicopter rotor blades • Fly-by-light tail rotor control • Application of Smart materials to helicopter dynamic systems • Development of elastomeric bearings • Development of DS blades for engines • Development of Application Specific Integrated Circuits • Phased Array Antenna • Vacuum diffusion welding of dis-similar materials • Composite materials technology
Co-development and co-production with leading aerospace companies	<ul style="list-style-type: none"> • Multi role transport aircraft • High powered Shakti engine for ALH • Multi Mode Radar
Indigenization and import substitution	<ul style="list-style-type: none"> • Mission computer • Multi Function Displays • INGPS • Aircraft & Helicopter Accessories • Canopy
Maintenance support for non-HAL manufactured aircraft	<ul style="list-style-type: none"> • Mirage 2000 Overhaul • Sea harrier upgrade • Product support for MiG aircraft variants not produced by HAL

Indigenisation and self-reliance

6.2 The Ministry has further provided an account of the indigenisation content in the various projects of HAL during the last five years vis-à-vis the targets set out as under:

Indigenisation Content in the Major Projects during last 5 years

Project	Total No. of items involved	Cumulative No. of items indigenised And Indigenous Content in %				
		2002-03	2003-04	2004-05	2005-06	2006-07*
Advanced Light Helicopter Airframe	9096	7210 79.3%	7310 80.4%	7657 84.2%	7874 86.6%	7932 87.2%
Cheetah / Chetak Helicopter Airframe	7822	6873 87.9%	6903 88.2%	7023 89.9%	7049 90.1%	7053 90.2%
Jaguar Airframe	27098	23000 84.9%	23268 85.9%	23573 87%	23926 88.3%	23968 88.4%
Dornier Airframe	12242	7445 60.8%	7445 60.8%	7445 60.8%	7445 60.8%	7448 60.8%
Garrett Engine	2273	1570 69.1%	1589 69.9%	1615 71%	1620 71.3%	1625 71.5%
Artouste Engine	2274	1490 65.5%	1552 68.2%	1620 71.2%	1636 71.9%	1648 72.4%
Adour Engine	3986	3111 78.0%	3185 79.9%	3260 81.8%	3276 82.2%	3356 84.2%
R-25 Engine	3398	3270 96.2%	3277 96.4%	3285 96.7%	3288 96.8%	3288 96.8%

* Actual upto Oct 06.

6.3 For the upgradation and modernisation of Air Force, the Ministry has prepared a long-term perspective plan. The Ministry has provided the following details of the perspective plan:

“The major production programs envisaged in the Perspective Plan for the 11th Plan period (2007 – 2012) are furnished below:

	2007-08	2008-09	2009-10	2010-11	2011-12
Jaguar	8	4	-	-	-
SU-30MKI	13	15	15	16	16
HAWK	1	14	24	3	-

LCA	3	4	8	8	4
IJT	1	3	8	12	16
DO-228	4	4	6	6	6
ALH	24	28	28	28	28

Multirole Combat Aircraft (MRCA) and Multi-role Transport Aircraft (MTA) included in the Perspective Plan are not shown above for the following reasons:

- MRCA: Request for Proposal is yet to be issued by Air HQs for selection of the aircraft
- MTA : Co-development of this aircraft was delayed due to delay in confirmation of the quantity required by Russian Air Force.
- HAL is pursuing additional programmes like manufacture of Light Observation helicopters as replacement to Cheetah/Chetak, weaponised version of ALH, Upgrades on Sea Harrier, MiG-29 and Mirage 2000 aircraft during the 11th plan.

Based on the Perspective .Plan, annual production plans are finalized considering the contractual timeframes for each project and new business initiatives. HAL is making all efforts to fulfill the above Perspective Plan.”

Recommendation No. 5

Need for a comprehensive perspective plan

6.4 The Committee have noted the efforts made by HAL towards modernisation and self-reliance of Indian Air Force. The Committee have also examined the indigenisation content in the major projects during the last 5 years. In some cases, this content has remained static and in some case it has increased only by 2 to 3 per cent in 5 years time. The previous track record of HAL in terms of various delayed projects also strengthens the fact that there is no concrete planning of HAL for design and development of aircraft, engine etc. The continuous unfulfilled requirements of the Armed Forces for the aircraft, helicopters etc. also corroborates that the same has not been duly addressed by the company over the last several years. The Committee take a very serious view of it. The Committee also feel that only those projects need to be carried forward which meet requirements of the Armed Forces. The projects which have been showing inordinate delays and cost overruns should be reviewed to see whether further investments in such projects are worthwhile. The Ministry should chalk out a well considered R&D plan and focus only on result-oriented R&D activities. The Committee feel that since upgradation and modernisation is a continuous process, HAL should prepare a time-bound programme for completion of upgradation and modernisation of infrastructure in the various units of HAL and that programme should have the approval by the Board of Directors.

6.5 The Committee are of the view that HAL, in its Perspective plan, should focus on comprehensive skill in design, development, manufacture and overhaul of fighter, trainer helicopters and system equipment so as to build a strong industrial base in aeronautics production lines to enable the country to meet the serious deficiencies in the present combat Air Force squadrons. The Committee strongly feel that while preparing the long-term Perspective Plan, the Ministry should earnestly address the needs of the Armed Forces and thus actively involve them through out the process since inception of the project. The Perspective plan should also address the threat perception, NBC War, rapid technological changes / innovations in Defence technologies taking place all over the world and exploitation of available resources to augment our financial resources and export of its products like Advanced Light

Helicopter (ALH) and other aircraft. The Committee also desire that the plan should also be mandated to cater to the requirements of civil sector aviation and the Ministry should strive to make financial allocations to the HAL to meet all its plan objectives.

CHAPTER –VII

RESEARCH AND DEVELOPMENT

7.1 HAL has 9 R&D centres co-located with the production Divisions which strive to bring out new products, continuous upgradation of existing products besides providing services in the areas of modernisation, technological upgradation, modifications replacement schemes and cost-effective solutions to meet the emerging requirements of its customers. The, Ministry of Defence has furnished a detailed note on the major Research, Design and Development projects undertaken by the company in last 10 years period in the areas of Aircraft / Helicopter / Aero-Engines, and Accessories and Avionics as follows.

Aircraft

- a) Intermediate jet trainer HJT-36
- b) LCA development tasks as decided with ADA
- c) Jaguar Navwass Upgrade
- d) MiG-27M Upgrade
- e) Sea Harrier upgrade
- f) Avro Upgrade
- g) Role modifications on Dornier DO-228 aircraft

Helicopter

- h) ALH / Completion of utility variant development
- i) Weapon systems integration on ALH
- j) Civil certification of ALH
- k) Launch of Light combat Helicopter
- l) Upgrades on Cheetah (Cheetal) and Chetak (Chetan).

Aero-Engines

- m) Pilot-less Target Aircraft Engine (PTAE-7)
- n) Gas Turbine Starter Unit for GEF404
- o) Engine Test beds

Accessories and Avionics for Aircraft and Helicopter (LCA, IJT, ALH & Upgrade programmes)

- p) Hydraulic System Units like Pumps and Actuators.
- q) Undercarriages and actuators

- r) Electrical System items like Generator Control and Protection Unit, Static inverters, etc
- s) Environmental Control Systems Units
- t) Multi Mode Radar
- u) Mission Computer
- v) Communication System Units
- w) Identification of Friend or Foe (IFF) Units
- x) Radio Altimeters.
- y) Solid State Flight Data Recorders

Achievements during last 10 years:

- Certification of ALH (both military & civil variants), Jaguar Navwass Upgrade, Cheetal (re-engined & upgraded Cheetah helicopter) has been completed.
- LCA and IJT prototypes were produced and are under flight evaluation.
- Line Replaceable Units and Systems components developed for LCA, IJT and ALH have been productionised. These units are flight operational on these aircraft.
- Patents have been obtained for the Gas Turbine starter (for LCA) and the PTAE-7 (for Lakshya) engine developed. These have been productionised.
- Jaguar and MiG-27M aircraft have been upgraded without any support from the OEMs.”

7.2 Regarding technological upgradation for enhancing R&D base of HAL, the Ministry has stated as under:

“HAL has acquired, adapted and developed several technologies over the years. New technologies are inducted through technology transfer and through indigenous development. Continuous augmentation/upgradation of facilities is carried out through annual capital budget.

HAL has taken up a number of technology upgradation projects funded from the R&D reserves of the Company covering design, manufacturing and process technologies. Some of these projects are:

- Open system architecture mission computer
- Digital Map generation system
- Virtual cockpit system
- Smart multifunction displays
- Solid State Flight Data Recorder
- Application of Smart materials to helicopter dynamic systems
- Development of elastomeric bearings
- Development of Application Specific Integrated Circuits
- Spread spectrum technology

- Direct digital synthesis
- Surface mounted devices technology
- Thick film and thin film micro electronic modules
- Phased Array Antenna
- Vacuum diffusion welding of dis-similar materials
- Composite materials technology

The quality management system of HAL has been upgraded to ISO – 9001 – 2000 standard . HAL has also implemented ISO 14001 – 1996 EMS standard and obtained environmental system certification.

HAL’s facilities and quality systems have been audited and approved by Boeing, Airbus, Eurocopter and Bell for whom HAL is producing airframe work packages. Presently, Boeing Production Systems , NADCAP, AS9100 standards etc are being put in place in the core manufacturing areas of HAL. Further, HAL has identified centers of excellence within the company for composites and engine components.”

7.3 The Committee on defence, in their 9th Report on ‘Defence PSUs’ had stressed on self-reliance or indigenisation of products and technology through emphasis on R&D and exploitation of global market through export. The Ministry, in reply to this recommendation of the Committee, has furnished the following information:

“HAL has identified indigenization as one of the thrust areas to achieve self reliance. In addition to the indigenous development projects like IJT, ALH, Aircraft & Helicopter Upgrades, development of high value airborne components and spares required for both new projects and overhaul projects have been taken up. A Design Perspective Plan for the period 2006-2012 has been drawn up identifying the new development and technology projects to be taken up. Several Company funded projects are also identified and the estimated outlay for these Company funded projects is Rs. 1096 Cr during this period. The number of items indigenized during the last 3 years for both HAL products and non-HAL products is furnished below:

Year	2003-04	2004-05	2005-06
No. of items indigenized	5857	5136	4050

The major technology initiatives launched include :

- a) Stealth technologies to be adapted on Light Combat Helicopter
- b) Open system architecture Mission Computer for deployment on future de-novo and upgrade programmes of combat aircraft
- c) Proposed joint technology group in the area of aircraft accessories and systems with IIT, Kanpur.
- d) Development of inertial navigation and Global Positioning System in collaboration with RCI, DRDO

7.4 About the efforts being made by the Ministry of Defence for achievement of self-reliance in research and design capabilities of HAL, Defence Secretary informed the Committee during Oral evidence as under:

“What they say is this. Is particular equipment required for one service, required by more than one service? If that is so, then, the numbers or bulking is done. Secondly, should it be buy and make, that is, make with transfer or whether should it be of make, that means, make with indigenous development? The main reasons is: Why has this been set up in the procedure itself is the first issues? Can this be made in India? Even if we do not have the technology, if the numbers are large, then can we acquire the technology and make it in India? Then, the whole approach has been such that we have larger reliance on Indian made products. Only then, we have the capability. We may not have the technology. Then, we go for the make procedure in which again the development will be done in India in both public sector and this whole process also has R&D fund in which development fund will be given to increase both private and public sector so that this can be made. Now, all this has been deliberately kept so that we have a great self-reliance within the country. HAL and BEL are strategic industries. WE are very sure that we have the mechanism to see that these organisation get the concern which they deserve. At the same time because we do not have any organisation to have monopolistic prices because the Services do not have unlimited budget, therefore, we have to compete or they have to have prices which are genuine for that product. Therefore that kind of discipline will have to be enforced on them.”

Recommendation No.: 6

Need for strengthening R&D infrastructure in HAL

7.5 The Committee note that for strengthening R&D infrastructure in HAL, the Ministry has also taken up technological upgradation programme by which new technologies are being inducted under ToT and indigenous development of the projects being emphasized. There are efforts for continuous augmentation / upgradation facilities on the part of the Ministry through Annual Capital Budget. The Committee, however, feel that despite all these efforts several projects of HAL are running behind schedule and thus causing cost overrun. The Committee therefore, desire that well concerted efforts need to be taken by the Ministry for the development of strong base of in-house design & development by intensifying R&D activities of the company with full-fledged involvement of DPSUs, DRDO and private companies so that their scientific and technological expertise/capacity could be gainfully utilised to achieve the goal of self-reliance in Defence Production.

7.6 The Committee further desire that the Ministry should fix R&D targets and strive to achieve the same. Efforts must be taken to make the coordination of the Company with DRDO and other agencies stronger in all its R&D activities. The Committee take note of the delayed projects of IJT and LCA whose flight evaluation trials are still going on and final operational clearance is still awaited and therefore strongly feel that the company should take steps to limit the number of such trials and achieve final operational clearance for induction in the combat strength of the Armed Forces. The Committee also feel that proper care should also be taken to ensure ample staff strength for the R&D activities so that the projects are not delayed. For the purpose, the Ministry should also make strategy to attract the best talent available in the Market and thus the best job package should be offered to them so as to check the ongoing attrition of manpower. The Ministry should also frame guidelines under which the engineers cannot leave the company until completion of the projects they are assigned to. They should not be allowed to leave the project midway. The Committee further desire that the Ministry should make a well documented record of the ongoing research in the project step-by-step simultaneously so that the research could be carried further in case the engineer or workmen associated with the project leave the

company due to reasons whatsoever. The Ministry must make out a time-bound programme for completion of the projects. The Ministry should also take efforts to ensure proper coordination with private sector in various projects of HAL.

CHAPTER –VIII

ROLE OF PRIVATE SECTOR

8.1 The Ministry of Defence has furnished an account of the collaborations / Joint ventures, the HAL has made over the past few years in research, design and development of various Defence equipment for development of aircraft or upgradation of existing one as under:

“HAL has developed strategic alliance between its Divisions, DRDO and CSIR laboratories, reputed academic institutes like IISc & IITs. HAL has also entered into working arrangements with many of the renowned companies abroad in pursuance of its programmes. As a part of new business initiatives, Joint Ventures have been formed and are also in the pipeline with companies of Indian and foreign origin. Major cooperation areas in the last few years are listed below.

- Mission Computer Development along with DARE, DRDO for Jaguar Strike and MiG 27 aircraft.
- Design, Testing and Quality Assurance packages with National Aeronautical Laboratories, CSIR for Wind Tunnel testing, Composites, Flight Control Laws, Saras systems.
- Multi Mode Radar development along with LRDE, DRDO.
- Tactical Mission System development by ADA and its integration on ALH.
- Digital Electronic Engine Control Systems for GTRE.
- Radar Processing Computers from DARE, DRDO for SU-30 programme
- MiG 27 upgrade programme with DARE.
- Project on ‘Smart Materials’ along with Indian Institute of Science, Bangalore.
- Development of Infra Red Suppressor technology with Indian Institute of Technology, Mumbai.
- Integration of Radar Warning Receiver designed by BEL and Chaff and Flare Dispensers of BDL.
- Cooperation with ELTA in upgrade programmes of Sea Harrier and Dornier role conversion for Navy.
- Cooperation with ELBIT in Stimulator Technology for Air Combat Stimulator and IJT Stimulator programmes.
- Cooperation with M/s Goodrich in the area of Hydro Mechanical Engine Control System.
- Wind Tunnel testing and Aerodynamic Studies with centres at Russia and France.
- Co development of Shakti Engine with Turbomeca, France.
- Joint venture with British Aerospace (BAe –HAL) in the area of Software solutions of Aeronautical applications
- Proposed Joint Venture with SAMTEL for development and manufacture of Multi-function Displays (MFDs) and with ELBIT in the areas of Avionics and Stimulators.

Joint ventures / collaborations would be required to ensure that the resources, financial and human, are deployed suitably and to ensure that technology developed globally could be deployed in our products in a cost and time effective manner. This also facilitates acquisition of advanced technology, rationalization of investments, ensuring product support throughout lifecycle of the product and encourage public – private partnerships.

8.2 The Ministry has further furnished the specific measures / steps taken by the HAL for increasing the role of private industries in the defence production as under:

“Private Participation in Company’s programs is encouraged to

- Concentrate efforts on Core Strength (Design & Integration)
- Optimise manpower strength
- Increase productivity

In order to increase outsourcing and participation of private sector on a long term basis, steps were taken to first familiarize the private industry with types of jobs/ processes available for outsourcing. Based on qualification of vendors for particular jobs, panels of vendors have been prepared. Orders are placed based on competitive bidding from the empanelled vendors.

Internal guidelines have been issued for outsourcing, laying emphasis on Long Term Contracts to evoke and retain vendors’ interest. The guidelines cover the methodology of assessing the vendors, competitive tendering for tooling and components/assemblies indicating HAL’s long term requirement, supply of materials specially in case of components/assemblies, methodology of inspection and other important terms & conditions. Approximately 800 private sector units have been registered with all Divisions of HAL put together.

Work packages offered on Outsourcing

- Sub-assemblies – Mechanical / Welded / riveted assemblies - Control surfaces like Canard, Stabiliser, Slat, Rudder, Flaperon etc
- Machining and Sheet Metal fabrication
- Electronic assemblies
- Other components – Rubber / Fiber glass
- Tooling – Jigs and Fixtures
- Design Packages

Based on experience on outsourcing, the company is encouraging successful private entrepreneurs to enter into Joint Venture/Transfer of Technology agreements with foreign vendors with the assistance of HAL. Export of such developed/-manufactured items will also be encouraged.

The aim is to assume role of designer and integrator thereby enabling private industry to build capabilities for product development and production.”

8.3 The Standing Committee on Defence, in their Ninth Report on 'Defence Public Sector Undertakings' had emphasized outsourcing to be promoted by the Public Sector Undertakings. The Ministry has furnished the following reply to the recommendations:

"HAL has identified Outsourcing as one of the key thrust areas to achieve cost reduction and to develop self reliance. Major thrust for outsourcing was given from 2002-03 by formulating the procedures and systems for outsourcing. The main objectives of outsourcing by the Company are :

- i) To meet the increased work load with minimum increase of manpower;
- ii) To outsource a large number of medium and low-tech components/activities after ensuring full utilisation of available infrastructure, thus limiting the investment in infrastructure; Outsourcing of design packages and sub-systems to be done subsequently after the industry matures in India.
- iii) Cost Reduction

The value of outsourcing during the last three years is Rs. 98 Cr in 2003-04, Rs.182 Cr in 2004-05 and Rs. 282 Cr in 2005-06. During 2005-06 a number of work packages for the production of Su-30MKI aircraft structures like control surfaces, stabilizer, fin and other components have been outsourced. Design packages like Oil cooling system for the Shakti engine have been outsourced. Discussions are also progressing for outsourcing of design packages for the Light Combat Helicopter project."

8.4 The Ministry has further informed the Committee about the strategies of HAL to exploit the benefits of offset clause incorporated in the Defence Procurement Policy, 2006 as under:

- (i) Creation of dedicated facilities for Aero structures and Engine Shops at Bangalore & Koraput
- (ii) Augmentation of existing facilities in Machining, Composites, Forging & Casting
- (iii) Obtaining International Certification in Quality Systems AS9100 & National Aerospace Defence Contractors Accreditation (NADCAP).
- (iv) Establishing JVs for MRO facilities of Airframe & Engines
- (v) Strategic alliances with IT industry for Design & Engineering Support
- (vi) Private Sector Participation
Collaborative arrangements are being proposed with companies such as TVS Group, Tata Advanced Materials, L&T, Godrej, Crompton Greaves, Dynamatic Technologies Ltd, etc.

Recommendation No.: 7

Involvement of private sector from the stage of design to final integration

8.5 The Committee note the efforts being made by HAL for involving private companies in design & development of systems & sub-systems. The Committee, however, feel that the efforts are not at the required pace which can make some meaningful contribution. The Committee feel that the role of private sector in research and design activities should be recognized and they should be involved right from conceptualization (design & development) of the project to final integration of the sub-systems. It would will boost up the level of domestic R&D base and thus gradually minimize the country's dependence on foreign suppliers. Besides, HAL should share the available technology with private companies to strengthen the defence R&D base in the country, so as to contribute in the development of the company as a strategic business unit of the country.

8.6 The Committee note the benefits of implementation of offset clause under Defence Procurement Policy, 2006 and the strategy prepared by the HAL to utilise the opportunities out of it. The Committee, therefore, desire that to take benefit of offset clause, HAL should take immediate steps to develop alliances with the private companies so as to facilitate the ongoing research and design projects of the company. The Ministry should also make efforts to make available the technology brought to the company under ToT to the private sector companies which have proven track record of high technological capability and as well as financial capacity and which can set up production lines of aircraft, helicopter and other avionics and accessories in their joint venture-ship. At the same time, accountability for timely completion or delays in the project should also be fixed on the firms involved in the joint-venture, etc. The Committee further desire that while undertaking projects in alliance with other Government agencies / organisations under offset clause, the existing system of nomination should be abolished and decision in this matter should be merit-based.

CHAPTER –IX

NAVRATNA STATUS TO HAL

9.1 The Authorised Capital of HAL is Rs. 160 Crore consisting of shares having face value of Rs. 10 each. The issued, Subscribed and Paid-up share capital remained at Rs. 120.50 crore, comprising 12,05,00,000 shares of Rs. 10 each. During the year 2004-05, the Company achieved turnover of Rs. 4534 crore and exports of Rs. 150.05 crore. Exports during the current year up to December 2005 were of the order of Rs. 105 crore (approx). The dividend paid during the last 3 years has been 73.02 per cent for 2002-03, 76.73 per cent for 2003-04 and 94.54 per cent in 2004-05 on the Paid Up Capital of Rs. 120.50 crore.

9.2 HAL is an MoU Company and due to consistent performance wherein excellent rating has been achieved over the past few years, the Company has been recognized as MINI RATNA category-I Company from the year 2001-02 onwards. The Company has met all the eligibility criteria for obtaining the “*Navaratna*” status and Government has been requested to consider upgrading HAL as a “*Navaratna*” company.

9.3 HAL at present has been accorded Mini-Ratna category-I status. There are several benefits in regard to removal of monetary ceiling, freedom to establish joint ventures with private companies and also raise debt from domestic as well as international market. Secretary (Defence Production) of the Ministry of Defence also stressed on the need for according this status to HAL during oral evidence as under:

“HAL, since the year 2001, has been categorized as a mini-Ratna Category-I Company. I am glad to inform you that its performance vis-à-vis the MoU targets fixed by the Industry in the last five years is excellent and it has achieved excellent ratings.

It has all the criteria that could enable it to become a *Navratna* Company also as the department is pursuing it with the concerned authorities to see that this company becomes a *Navratna* company.”

9.4 The Ministry further elaborated the advantages of *Navratna* status in post-evidence written reply as under:

“By gaining the Navratna status, the Board of Directors of HAL would be empowered to exercise the following enhanced / additional powers: -

- i) As against Rs.500 Crores for the Miniratna, there will be no monetary ceiling for the Board to approve capital expenditure on new projects, modernisation and purchase of equipment.
- ii) The equity investment to establish financial joint ventures and wholly owned subsidiaries in India or abroad shall be 15% of the net worth in one project limited of Rs.500 Crores.
- iii) HAL will be authorised to raise debt from domestic capital market and borrow from the international market subject to RBI / Finance Ministry’s approval as Navratna PSU.
- iv) The powers for merger and acquisition as per the conditions laid down.
- v) The power to further delegate the powers relating to HRD i.e., appointments, transfer, postings etc., of below Board level executives to Sub-Committee of the Board or to executives of PSU as may be decided by the Board.

HAL as Mini Ratna Category-I Company has the autonomy for all its normal operations. Support from MoD is available for obtaining sanctions for the Projects costing more than Rs 500 Crores.

HAL has requested for re-categorisation as Navaratna hence it meets the specified criteria. This would enhance its image which would attract and retain human talent necessary for the Aviations industry. “

Recommendation No.: 8

Navratna Status to HAL

9.5 The Committee note that HAL's performance has been consistent over the past few years and has thus achieved excellent rating for the same. The Committee also note that if HAL is accorded Navratna status, the Board of Directors of HAL would be empowered to exercise enhanced powers viz. as against Rs. 500 crore for the Miniratna, there will be no Monetary ceiling for the Board to approve capital expenditure on new projects, modernisation, etc.; equity investment to establish financial joint ventures and wholly-owned subsidiaries in India and abroad; authorization to raise debt from domestic capital market and borrow from the international market; powers for merger and acquisition; and delegation of powers relating to HRD. The Committee note the immense benefits of Navratna Status and therefore feel that the matter of according Navratna status of HAL must be taken up at the highest level so as to provide flexibility in working of HAL enabling it to take immediate decisions and build up its image in the domestic as well as international market in the aviation industry.

CHAPTER -X

EXPORT MARKET OF HAL

10.1 The Ministry has furnished details about the exports of HAL during the last three financial years as under:

Year	MoU Target	Actual Export
2003-04	Rs.78.00 Cr	Rs.215.35 Cr *
2004-05	Rs.149.00 Cr.	Rs.150.05 Cr
2005-06	Rs.175.00 Cr	Rs.186.19 Cr

* Includes 2 ALH exported to Nepal and 1 Dornier DO-228 to Mauritius.

10.2 About the initiatives / steps taken for enhancing exports of the products and services of the HAL and also the countries where the company is exporting its product and providing services, the Ministry has furnished as under:

“The measures initiated to improve exports from HAL :

- **Focus areas:** The “Focus Areas” identified as having high export potential and where specific export oriented marketing initiatives are called for are
 - (i) Dhruv advanced light helicopter
 - (ii) Dornier-228 aircraft
 - (iii) Metallic composite aero-structures and engine components and
 - (iv) IT based services in the field of design and development.
- **Pricing:** Competitiveness of pricing is being achieved through higher productivity and waste reduction adopting “lean management” practices. Appropriate measures have been initiated in all the Divisions of HAL in this direction.
- **Skills Upgradation:** Being achieved through multi skills development and training programmes for managerial personnel as well as technicians.
- **Diversification:** By augmenting its facilities and capabilities, HAL is establishing itself as a reliable supplier of major work packages for international civil aircraft programmes, at competitive prices.
- **Outsourcing:** Delivery schedule and cost are two most important factors affecting performance of the industries. To achieve the above objectives, HAL has been outsourcing large number of components and major assemblies to industries having necessary infrastructure and capability in private/public sector. Outsourcing is one of the major thrust areas of HAL.
- **Dedicated customer service organization:** HAL is establishing separate manufacture and overhaul facilities for export customers and has created float of spares, rotables, GHE/GSE, etc. to meet export market needs.
- **Civil Certification:** Obtaining international certification for products like ALH is essential for augmenting its export potential, especially to civil customers. The first step in this direction is to secure a Government to Government Agreement between Govt. of India and the Govt. of the prospective customer’s country. HAL has taken up with the Ministry of Civil Aviation for such an agreement with Israel. Proposals are under consideration for a few other countries like Chile, UK and USA.
- **Government Grants:** Grants/Subsidy Packages/Friendship Prices, etc. are being offered by Government to promote the sale of defence equipment to friendly/neighbouring countries.

Export is made to following countries:

Name of Product	Country to which exported
Work packages/Forgings/Blades	France
Work packages & Digitisation of drawings	USA
Work packages / Castings (RR)	U.K.
Aircraft Avionics items/Helicopter spares/Overhaul services/Rescue hoist repair	Malaysia
Jaguar / Aircraft spares	Oman
Avionics	Russia
Helicopter spares/Dornier spares/overhaul services/NDT Inspection / HS 748 spares/Supply of 2 Advanced Light Helicopters	Nepal
Design services / Elta Radar Integration & Mirage standard parts	Israel
Aircraft / Engine spares / Services	Thailand
Helicopter spares / overhaul services, Artouste engine spares	Namibia
Aircraft / Helicopter spares / supply of DO-228 aircraft	Mauritius
Spares and services	Zimbabwe, Romania, South Africa, Italy, Germany, UAE, Vietnam, Peru, Portugal

Strategy for utilizing offsets:

For successful completion of various offset opportunities which are expected in the near future, HAL has formulated a comprehensive strategy on the following lines :-

- (i) Creation of dedicated facilities for Aero structures and Engine Shops at Bangalore & Koraput
- (ii) Augmentation of existing facilities in Machining, Composites, Forging & Casting
- (iii) Obtaining International Certification in Quality Systems AS9100 & National Aerospace Defence Contractors Accreditation (NADCAP).
- (iv) Establishing JVs for MRO facilities of Airframe & Engines

- (v) Strategic alliances with IT industry for Design & Engineering Support
- (vi) Private Sector Participation
Collaborative arrangements are being proposed with companies such as TVS Group, Tata Advanced Materials, L&T, Godrej, Crompton Greaves, Dynamatic Technologies Ltd, etc.

Following packages are targeted for export through offsets:

Structural Work Packages	through	Build to Print Packages <ul style="list-style-type: none"> • Manufacture of Parts / components as per drawings supplied <p style="text-align: center;">&</p> Design to Build Packages <ul style="list-style-type: none"> • Design, development & Manufacture of parts / components
<ul style="list-style-type: none"> • Fuselages • Wing Boxes • Control Surfaces 		
Aircraft Components		
Tooling		
Design Work Packages		
Software		

10.3 The Ministry has further provided information about the initiatives taken for development of new market as under:

- Focussed efforts have been initiated to develop new market segments for Dhruv. HAL has responded to major tender bid to Turkey for supply of 12 Dhruv helicopters.
 - Dhruv has been offered to Govt of Malaysia and steps have been initiated for revalidation of Dhruv type certification by Director General Aviation (DGA) Malaysia.
 - MOU has been concluded with ENEAR, Chile to provide 'in-country' maintenance support to Dhruv in Chile and also in Latin American region.
- Centres of Excellence in Composites and Aero-engine components are being put in place to take up production of aero-structures and components.
 - A contract has been signed with Rolls Royce as a Tier-I supplier, for supply of semi-finished Steel Rolled Rings starting from Jan 06.
 - A contract was signed for supply of indigenously developed avionics items to Irkut, Russia for fitment on SU-30 aircraft.

- An MoU was signed with Boeing for additional 398 shipsets of B777 Uplock Box Assembly
- Letter of Intent (LoI) has been received from Bolivia for supply of two Dhruv helicopters.
- ATP (Authorisation to Proceed) has been received from Israel Aircraft Industries, Israel for supply of 200 s/s of Aft Fuselage of G-150 project. Contract is under finalisation.

Recommendation No.: 9

Market Exploration for HAL products

10.4 The Committee note that the export market of HAL products is confined to only small developing countries viz. Nepal, Thailand, Malaysia etc. and the monetary value of actual export over the past few years has been insignificant and has shown declining trend after the year 2003-04. The Committee also note that a few work packages related to forgings, drawings etc. are being exported to some developed countries also which reflects that there is no serious export business of HAL outside the country. The Committee therefore strongly feel that there is no substantive efforts on the part of the company to explore the export Market of its products. The Committee note that even though certain measures have been taken by the Ministry for the improvement of export business on the fronts of pricing, skill upgradation, diversification, outsourcing, etc., the outcome has been insignificant. The Committee therefore, desire that the Ministry should take necessary steps to implement these measures so as to produce good export results. HAL should pursue with Ministry of Civil Aviation to sign agreements with other countries to obtain international certification for its products. The Government should also provide grants / subsidy packages to HAL to help them increase the exports. The most important requirement on the part of HAL is to maintain its delivery schedule and cost to face the stiff competition in international market. The Committee would also like to suggest that HAL should encourage development of private sector industries by offering them technologies etc. to reduce their costs as also to enable them to take advantage of off-set clause under various international arms deals.

Concluding Observations

The Committee have made an in-depth study of the functioning of HAL from various standpoints and have thus made recommendations under various chapters for effecting improvement in overall working of HAL. The Committee conclude that HAL plays a vital role for the national security of the country and therefore its functioning should be so organised and re-structured as to make it an autonomous R&D body on the lines of ISRO and Brahmos and it should be totally independent from DRDO. DRDO, however, can facilitate the working of HAL in various projects but at the same time it should refrain from being a controlling authority of HAL projects. The Committee also feel that despite the passing of a very long period from its inception, HAL has not been able to develop leadership in aeronautic defence research projects which may be perhaps due to bureaucratic control of the Ministry of Defence. The Committee, therefore, strongly desire that HAL should be allowed to work in a more flexible, independent and open atmosphere so that there is a need for least governance and regulation. The Committee further wish that HAL should be allowed to function on corporate lines in order to enable it to raise finances from internal and external markets so as to give fillip to R&D activities and produce high-end technologies for the Armed Forces. In addition, the Ministry should also ensure that Members from the corporate world/professional organisations may invariably be appointed on the Board of Directors of HAL.

New Delhi
12 February, 2007
23 Magha, 1928 (Saka

BALASAHEB VIKHE PATIL
Chairman
Standing Committee on Defence

**MINUTES OF THE SEVENTH SITTING OF THE STANDING COMMITTEE ON DEFENCE
(2006-07)**

The Committee sat on Tuesday the 07th November, 2006 from 1500 hrs. to 1630 hrs. in Committee Room 'C', Parliament House Annexe, New Delhi.

PRESENT

Shri Balasaheb Vikhe Patil - Chairman

MEMBERS

LOK SABHA

2. Shri Santosh Kumar Gangwar
3. Shri Ramesh C. Jigajinagi
4. Shri K.S. Manoj
5. Ms. Ingrid Mcleod
6. Shri Adhalrao Shivaji Patil
7. Dr. H.T. Sangliana
8. Shri Mahadeorao Shiwankar
9. Shri Rajesh Verma

RAJYA SABHA

10. Shri R.K. Dhawan
11. Smt. N.P. Durga
12. Shri K.B. Shanappa
13. Shri Arun Shourie

SECRETARIAT

1. Shri S. Bal Shekhar - Joint Secretary
2. Shri D.R. Shekhar - Under Secretary

LIST OF REPRESENTATIVES FROM MINISTRY OF DEFENCE

1. Shri K.P. Singh - Secretary (DP)

2.	Shri S. Banerjee	-	DG (ACQ)
3.	Dr. M. Natarajan	-	SA to RM
4.	Shri V.K. Misra	-	Secretary (Def. Fin.)
5.	Shri Ashok K. Baweja	-	Chairman, HAL
6.	Shri P. K. Rastogi	-	Addl. Secy (DP)
7.	Shri K.P. Lakshmana Rao	-	FA (ACQ)
8.	Dr. D. Banerjee	-	CCR&D (AMS) & DS
9.	Dr. Prahlada	-	CCR&D (SI) & DS
10.	Shri Ranjan Chatterjee	-	JS (HAL)
11.	Shri S.K. Sharma	-	JS&AM (Air)
12.	Shri Bimal Julka	-	JS (G/Air)
13.	Mrs. Anuradha Mitra	-	Addl. FA (AM) & JS
14.	Shri Pulak Sengupta	-	DGAQA

Armed Forces Headquarters

1.	Lt. Gen SS Dhillon	-	MGO
2.	V Adm Raman P Suthan	-	DCNS
3.	Air Mshl. A.K. Nagalia	-	DCAS
4.	AVM R.S. Sandhu	-	ACAS (Eng A)

2. At the outset, Hon'ble Chairman welcomed the Members and representatives of Ministry of Defence to the sitting of the Committee. The Chairman then requested the Representatives of the Ministry to brief the Committee on the subject 'In-depth Study and Critical Review of Hindustan Aeronautics Limited (HAL)' and drew their attention to the Direction 58 of the Directions by the Speaker, Lok Sabha regarding maintaining confidentiality of the deliberations of the sitting.

3. In the absence of Defence Secretary, Shri K.P. Singh, Secretary (Defence Production) briefed the Committee about the major aspects of the functioning of Hindustan Aeronautics Limited (HAL), its Research & Design activities, major projects undertaken so far and the achievements registered since its inception in 1940.

4. The Committee then raised several issues viz. delay in Light Combat Aircraft (LCA) Project, Kaveri Engine, Intermediate Jet Trainer (IJT) etc. The issues of Nav Ratna status to HAL, the on-going project of the indigenous manufacturing of Advanced Jet Trainer (AJT), Advanced Light Helicopter (ALH) Dhruv, Su-30 MKI aircraft and the collaboration of HAL with DRDO in Research and Design activities and the projects undertaken were also raised by the Committee. The representatives of the Ministry then replied to the issues raised by the Members.

5. A copy of verbatim record of the proceedings was kept.

The Committee then adjourned.

MINUTES OF THE TWELFTH SITTING OF THE STANDING COMMITTEE ON DEFENCE (2006-07)

The Committee sat on Wednesday the 13 December, 2006 from 1500 hrs. to 1630 in Committee Room 'B', Parliament House Annexe, New Delhi.

PRESENT

Shri Balasaheb Vikhe Patil - Chairman

MEMBERS

LOK SABHA

2. Shri Milind Deora
3. Shri K.S. Manoj
4. Dr. H.T.Sangliana

RAJYA SABHA

5. Shri Abu Asim Azmi
6. Shri K.B. Shanappa
7. Smt. Viplove Thakur

SECRETARIAT

1. Shri S. Bal Shekar - Joint Secretary'
2. Shri R.C. Kakkar - Deputy Secretary
3. Shri. D.R. Shekhar - Under Secretary

LIST OF REPRESENTATIVES FROM MINISTRY OF DEFENCE

1. Shri Shekar Dutt - Defence Secretary
2. Shri K.P. Singh - Secretary (DP)
3. Shri V.K. Misra - Secretary (Def. Fin.)
4. Dr. D. Banerjee - CCR&D(AMS) & DS

5.	Dr. Prahlada	-	CCR&D (SI) & DS
6.	Shri Pulak Sengupta	-	DG, AQA
7.	Shri. A.K. Baweja	-	Chairman, HAL
8.	Shri Ranjan Chatterjee	-	JS (HAL)
9.	Shri. S.K. Sharma	-	JS&AM(AIR)
10.	Smt. Anuradha Mitra	-	Addl. FA (AM) &JS
11.	Shri Peeyush Sonkar	-	DS(Aero)
12.	Shri M. Fakruddin	-	Director (CP&M), HAL
13.	Shri D. Shivmurthi	-	Director (Fin.) HAL

ARMED FORCES HEADQUARTERS

1.	V. Adml Nirmal Verma	-	VCNS
2.	Lt. Gen. Z.U. Shah	-	DCOAS (P&S)
3.	Air Mshl AK Nagalia	-	DCAS
4.	Maj. Gen. B.S. Ghotra	-	Addl. DG (Proc)
5.	R. Adml. Shekhar Sinha	-	ACAS (Air)
6.	AVM N Vijaya Kumar	-	ACAS (FP)

2. At the outset, Hon'ble Chairman welcomed the representatives of the Ministry of Defence to the sitting of the Committee. The Committee then took oral evidence of the representatives of Ministry of Defence on the subject 'In-depth Study and Critical Review of Hindustan Aeronautics Limited (HAL)'. During the discussion, the Members put forth the following points :-

- (i) Attrition of Engineers and scientists from HAL and the effect on the delay in the completion of the project and the possibility of appointment of engineers on contract basis.
- (ii) How HAL can be given the status of Public Limited Company and how it can be strengthened more by restructuring its Board.
- (iii) Appointment of consultants or experts to decide the key companies under the Ministry of Defence which can work commercially.
- (iv) Single vendor system, offset clause technology transfer;
- (v) Clear cut division of business at the highest level in the BEL to look after production for Armed Forces and civilians.
- (vi) Regarding sharing of expenditure on R&D among Ministry of Defence, HAL and private industries.
- (vii) Delay in finalization of the projects by HAL.
- (viii) Efforts made by Ministry of Defence and HAL for indigenization and road map prepared to achieve self-reliance.

3. The representatives of the Ministry of Defence answered the points put forth by the Members one-by-one.

Witnesses then withdrew.

4. The Verbatim Record of the proceeding was kept.

The Committee then adjourned.

MINUTES OF TWENTIETH SITTING OF THE STANDING COMMITTEE ON DEFENCE (2006-2007)

The Committee sat on Monday, the 12th February 2007 from 1100 to 1430 hrs. in 'Main' Committee Room, Parliament House Annexe, New Delhi.

PRESENT

Shri Balasaheb Vikhe Patil – Chairman

MEMBERS

LOK SABHA

2. Shri S. Bangarappa
3. Shri Santosh Kumar Gangwar
4. Dr. K.S. Manoj
5. Shri Asaduddin Owaisi
6. Shri Adhalrao Shivaji Patil
7. Shri Mahadeorao Shiwankar
8. Shri Rajesh Verma

RAJYA SABHA

9. Dr. Farooq Abdullah
10. Shri Abu Asim Azmi
11. Shri R.K. Dhawan
12. Smt. N.P. Durga
13. Shri K.B. Shanappa

SECRETARIAT

1. Shri P.K. Bhandari, Joint Secretary
2. Shri Gopal Singh, Director

WITNESSES

REPRESENTATIVES OF MINISTRY OF DEFENCE

- | | | | |
|----|---------------------------|---|-----------------------|
| 1. | Shri Shekhar Dutt | - | Defence Secretary |
| 2. | Shri K.P. Singh | - | Secretary (DP) |
| 3. | Dr. M. Natarajan | - | SA to RM |
| 4. | Shri S. Banerjee | - | DG (ACQ) |
| 5. | Shri V.K. Mishra | - | Secretary (Def. Fin.) |
| 6. | Dr. (Mrs.) Rekha Bhargava | - | Special Secretary (B) |
| 7. | Shri P.K. Rastogi | - | Addl Secy. (B) |

8.	Dr. W. Selvamurthy	-	CCR&D (LS&HR)
9.	Shri Gautam Chatterjee	-	JS (O/N)
10.	Shri Binoy Kumar	-	JS (E)
11.	Shri Harcharanjit Singh	-	Secy (BRDB) / JS (ESW)
12.	Shri S.N. Mishra	-	Addl FA(M)
13.	Shri Alok Perti	-	JS (SY)
14.	Dr. (Mrs.) Kiran Chadha	-	JS (X)
15.	Shri T. Ramachandru	-	JS (S)
16.	Shri Ranjan Chatterjee	-	JS (HAL)
17.	Shri Mohd. Haleem Khan	-	Addl FA (H)
18.	Smt. Anuradha Mitra	-	Addl FA (AM)
19.	Shri Amit Cowshish	-	Addl FA (A)
20.	Shri S. Ghosh	-	Chairman/OFB
21.	Shri V. Somasudaram	-	JS (OF)
22.	Shri B. Saha	-	Secy, OFB
23.	Shri Sharad Ghodke	-	OSD (P)
24.	Shri Ashok K. Baweja	-	Chairman, HAL
25.	Shri V.R.S. Natarajan	-	CMD, BEML
26.	Shri M. Narayana Rao	-	CMD, MIDHANI
27.	Shri VVR Sastry	-	CMD (BEL)
28.	Rear Adm (Retd.) A.K. Handa	-	CMD, GSL
29.	Rear Adm T.S. Ganeshan	-	CMD, GRSE
30.	Vice Admn S.K.K. Krishnan	-	CMD, MDL
31.	Maj. Gen (Retd.) R. Gossain	-	CMD, BDL
32.	Shri PRK Hara Gopal	-	Dir (Fin.), BEL
33.	Shri SK Mehta	-	Dir (R&D), BEL
34.	Shri Devjit Ghosh	-	LO. MIDHANI
35.	Commdt. Sunil Mane Sinde	-	CM, GSL
36.	Shri Yogesh Sharma	-	Regional CM, MDL
37.	Commander Hardev Inder	-	IN (Retd.), Addl GM
38.	Lt. Gen. HS Lidder	-	CISC
39.	Lt. Gen. Deepak Kapoor	-	VCOAS
40.	V. Adml. Nirmal Verma	-	VCNS
41.	Air Mshl AK Nagalia	-	DCAS
42.	Lt. Gen. SS Dhillon	-	MGO
43.	Lt. Gen. Thomas Mathew	-	AG
44.	Air Mshl VR Iyer	-	AOP
45.	Vice Adml Sunil K. Damle	-	COP
46.	Surg Vice Adml VK Singh	-	DGAFMS
47.	Lt. Gen. LP Sadhotra	-	DGMS (Army)
48.	Air Marshal HK Maini	-	DGMS (Air)
49.	Surg Vice Adml Yogendra Singh	-	DGMS (Navy)
50.	Maj. Gen. Suresh Chandra	-	Addl DGAFMS
51.	Maj. Gen. J. Jayram	-	Addl DGAFMS (MR)
52.	Maj. Gen. R.K. Kalra	-	MD-ECHS
53.	Maj. Gen. A.K. Mehra	-	ADG WE
54.	AVM N. Vijaya Kumar	-	ACAS (FP)
55.	R. Adml. R.K. Dhowan	-	ACNS(P&P)
56.	Brig. Kunwar Karni Singh	-	Dy. DGAFMS (P&T)

57.	Brig. Satish Malik	-	Dy. MD-ECHS
58.	Col. A.K. Verma	-	Dir MS (H)
59.	Col. Pawan Kapoor	-	Dir AFMS (P)
60.	Col. G. Ghosh	-	Dir. ECHS
61.	Lt. Col. SI Subhani	-	CRD Cell
62.	Capt. Abhishek Saxena	-	SO to VCOAS
63.	Shri S. Ahuja	-	INAS, DGONA

2. At the outset, Hon'ble Chairman welcomed the representatives of the Ministry of Defence to the sitting of the Committee and drew their attention to Direction 58 of Directions by the Speaker, Lok Sabha.

3. The Committee then took evidence of the representatives of Ministry of Defence on Action Taken Replies furnished by the Ministry of Defence on Seventh Report on 'Defence Ordnance Factories', Ninth Report on 'Defence Public Sector Undertakings' and Twelfth Report on 'Review of Medical Services and Education in the Defence Sector'.

4. The Committee expressed their displeasure almost on all the Action Taken Replies furnished by the Ministry to the recommendations contained in the above Reports especially on Twelfth Report on 'Review of Medical Services and Education in the Defence Sector'.

5. The representatives of the Ministry of Defence submitted that they would go through the recommendations again in respect of Twelfth Report and requested the Committee to give two months' time for submission of Action Taken Replies thereon. The Committee agreed to the request of the Ministry.

6. The Committee thereafter sought clarifications on the Action Taken Replies to the observations/recommendations contained in the Seventh and Ninth Reports on Defence Public Sector Undertakings and Defence Ordnance Factories respectively to which the representatives of the Ministry of Defence answered one by one.

The witnesses then withdrew

7. The verbatim record of the proceedings was kept.

8. The Committee, thereafter, considered the two draft reports on the subjects 'In-depth Study and Critical Review of Bharat Electronics Limited (BEL)' and 'In-depth Study and Critical Review of Hindustan Aeronautics Limited (HAL)' and adopted the same with some additions/modifications as suggested by the members.

9. The Committee then authorised the Hon'ble Chairman to finalise the reports and present the same to the Parliament.

The Committee then adjourned.

**MINUTES OF TWENTIETH SITTING OF THE STANDING COMMITTEE ON DEFENCE
(2006-2007)**

The Committee sat on Monday, the 12th February 2007 from 1400 hrs. to 1430 hrs. in 'Main' Committee Room, Parliament House Annexe, New Delhi.

PRESENT

Shri. Balasaheb Vikhe Patil – Chairman

Members

Lok Sabha

2. Shri. S. Bangarappa
3. Shri. Santosh Kumar Gangwar
4. Dr. K.S. Manoj
5. Shri. Asaduddin Owaisi
6. Shri. Adhalrao Shivaji Patil
7. Shri. Mahadeorao Shiwankar
8. Shri. Rajesh Verma

Rajya Sabha

9. Dr. Farooq Abdullah
10. Shri. Abu Asim Azmi
11. Shri. R.K. Dhawan
12. Smt. N.P. Durga
13. Shri. K.B. Shanappa

2. At the outset, Hon'ble Chairman welcomed the members to the sitting of the committee. The Committee, therefore, considered the two draft reports on the subjects 'Bharat Electronics Limited (BEL)' and 'Hindustan Aeronautics Limited (HAL)' and adopted the same with some additions/modifications as suggested by the members.

3. The Committee then authorised the Hon'ble Chairman to finalise the reports and present the same to the Parliament.

The Committee then adjourned.