CHAPTER- 5

MODERN DEFENCE PRODUCTION ORGANISATION

INTRODUCTION

Defence stores in India is being produced by OFs, DPSUs and some selected private sector enterprises.

There were 16 OFs in India in 1947: today, there are 39. These are divided into different groups, such as: weapons, explosives, clothing and vehicles. The range of productive activities is wide, incorporating small arms and ammunition, explosives, armoured vehicles, rocket propellants, parachutes and military apparel. Co-existing alongside the ordnance factories are what are termed the Defence Public Sector Units (DPSUs). As with the ordnance sector, the DPSUs are organized under the Department of Defence Production & Supplies within the Ministry of Defence. With the increased focus on local production of armaments during the 1960s and 1970s the number of DPSUs had grown to nine by the 1980s. This was reduced to eight in 1986 by the transfer of Praga Machine Tools Ltd to the Ministry of Industry.¹

The distinction between the OFs and the DPSUs is two-fold. Firstly, the traditional military needs for basic equipment and stores are satisfied by the OFs. They mostly supply basic equipment, small arms, ammunition and uniforms—the bread and butter
of military affairs. The DPSUs, on the other hand, involve themselves in the manufacture of modern, sophisticated weapons systems: in advanced electronics: and in the production of exotic metal alloys for aerospace projects. They are organised, as far as possible, to gain the benefits of operating on a private-enterprise basis. In supporting the DPSUs bigger and more complex manufacturing programmes, in-house design and development capabilities have been established. By comparison, the lower-order activities of the OFs require only limited design and development facilities, with much greater reliance on the institutional research base, the Defence Research and Development Organisation (DRDO), which is external to the ordnance sector. The second difference between the ordnance factories and DPSUs has to do with the destination of output. The OFs are primarily oriented to produce for the Army: supplies to the air force and navy are small, and only about three per cent of production is to meet the requirements of the police and paramilitary forces, sports (rifles) and civil undertakings (explosives). The DPSUs also, obviously, cater for the defence sector, but not exclusively as they service the needs of the civil market as well. The proportion of sales to the civilian sector has been variously estimated to lie between 15 and 50 per cent. In value terms this is not negligible, because by Indian standards, defence-industrial activity is a big business: for 1996-97, DPSU production was nearly Rs. Six thousands crores out of which stores worth Rs. Two thousands crores was sold to civil sector.

Modern defence organisation will be discussed as follows :-

1. **Department of Defence Production & Supplies.** The organisation of DDP&S and its activities will be discussed in detail so as to give some insight into the functioning of this important department of MOD.

2. **Ordnance Factories (OFs).** The activities of OFs will be examined critically in this part of the thesis.
3. **Defence Public Sector Undertakings (DPSUs).** The origin of various DPSUs have been discussed at relevant places in the previous Chapters. However, in this part, their activities have been highlighted as to give the correct picture of the range of their production.

4. **Other Organisations of DDP&S.** A brief outline of other organisations which help in production, quality control, standardisation of stores and their advertising etc. will be given in this part.

5. **Defence Research & Development Organisation (DRDO).** It functions under the Department of Defence Research & Development headed by SA to the Defence Minister. Various development projects undertaken by DRDO have been highlighted in this part of the thesis.

6. **Private Sector Enterprises.** The role of PSEs have been given out in this part.

7. **Indigenisation : A Soldier's View Point.** The present indigenisation process have been critically evaluated in this part

**DEPARTMENT OF DEFENCE PRODUCTION AND SUPPLIES**

A substantial part of defence stores needed by the services is now being developed and produced within the country. The responsibility for this has been entrusted to the Department of Defence Production and Supplies in the Ministry of Defence. The Department directs and coordinates production of material equipment required by the armed forces.
The need for consolidating the indigenous defence production units became imperative in the aftermath of the 1962 war. It was in this context that a separate department, the Department of Defence Production was created in 1962 in the Ministry of Defence with the primary objective of developing an integrated base for production of defence hardware with a view to achieving self sufficiency. The creation and sustenance of such a base requires harnessing of the infrastructure available in the defence sector as well as promoting participation of the non-defence sector. A new Department of Defence Supplies was set up in 1965 for mobilizing the capabilities available in the civil sector to supplement the efforts of the defence production units. These departments were merged in December 1984 to constitute the present Department of Defence Production and Supplies.

**Industrial Capacity**

India's defence industrial capacity essentially consists of the production of Ordnance Factories (OFs), the Defence Public Sector Undertakings (DPSUs) and, to a much lesser extent, select civilian and private sector manufacturing establishments. The OFs and the DPSUs are administered by the Ministry of Defence (Department of Defence Production & Supplies). At present, there are eight DPSUs, namely

1. Hindustan Aeronautics Ltd (HAL).
2. Bharat Electronics Ltd (BEL).
5. Garden Reach Shipbuilders and Engineers Ltd (GRSE).
7. Bharat Dynamics Ltd (BDL) and

In addition, the capacities available in the civil sector industry, both in the public and private sectors are utilized. The Department maintains close interaction with the Services and the Department of Defence Research & Development to facilitate review and upgrading of lines of production to meet the emerging requirements of the armed forces.

Besides the OFs and the DPSUs, the following five organisations assist the Department in formulating plans for undertaking production and for providing common support services production related areas on an integrated basis :

3. Directorate of Standardisation.
4. Directorate of Planning and Coordination.
5. Defence Exhibition Organisation.

**Modernisation**

In their quest for modernization and self reliance in the manufacture of sophisticated arms and ammunition, the OFs and DPSUs have built a strong industrial base in a variety of high technology fields and have shown impressive growth in terms of production volume and range. They are now engaged in the task of positioning themselves to meet the new emerging requirements of the Services through selective
modernization of existing facilities as well as through the setting up of new facilities, where ever necessary, to manufacture new systems being introduced in the Services. They have already established serial production of several major systems developed by Indian efforts. A few examples of this process are the 5.56 mm weapons and ammunition system, 155 mm ammunition, guided missiles and other electronic warfare systems which have been put into the production stream. They are positioned to undertake production of such sophisticated systems as the Main Battle Tank Arjun and the Advanced Light Helicopter. The production units also continue to increase their output both for the defence services and the civil sector apart from exploring avenues for exports.6

Diversification

Diversification has been a thrust area for the last few years. This is primarily intended to achieve increase in turnover by utilising spare capabilities for production for the non-defence sector without any erosion in their commitment to the defence forces and to pass on the benefits accruing to the defence services in the form of reduced unit costs of production. The process has also helped in enhancing their exposure to the commercial industrial sector leading to greater sensitivity to costs and prices. The trend in production from 1994-95 in OFs and defence PSUs is shown in the following table:7
### Table 5.1

**Trend in Production of OFs & PSUs**

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>Total Value of Production for Issues</strong> (Rs. In Crores)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFs</td>
<td>1916</td>
<td>1986</td>
<td>2293</td>
<td>2600</td>
</tr>
<tr>
<td>DPSUs</td>
<td>4163</td>
<td>4357</td>
<td>4673</td>
<td>5445</td>
</tr>
</tbody>
</table>

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</thead>
<tbody>
<tr>
<td><strong>Value of Production for Issues to Defence Forces</strong> (Rs. In Crores)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFs</td>
<td>1523</td>
<td>1614</td>
<td>1899</td>
<td>2200</td>
</tr>
<tr>
<td>DPSUs</td>
<td>2286</td>
<td>2662</td>
<td>2717</td>
<td>3482</td>
</tr>
</tbody>
</table>
Exports

Exports by DPSUs and their subsidiaries and OFs in 1998-99 were Rs. 76 crores as against the target of Rs. 189 crores for the same year.⁸

ISO 9002 Certification

Twenty nine ordnance factories, all the manufacturing units of BEML, and HAL and some units of BEL and MIDHANI have been accredited with ISO-9002 certification after extensive audit of their quality systems and procedures. These accreditation would enhance customer confidence.⁹

Supplies Wing

Functioning as an integral part of the Department of Defence Production and Supplies since December 1984, the Supplies Wing has been assigned the challenging task of locating and developing broad based indigenous sources of supply of defence equipment and stores both in the public and private sectors. This involves:-¹⁰

1. Identification of imported equipment/sub-systems/systems and indigenisation thereof, with the assistance of the civil sector industry.

2. Production of imported items developed by DRDO through civil sector industries.
3. Functioning as the nodal wing for purchase in the Ministry of Defence.

In order that the tasks specified above are carried out unbridled, specialized technical advice is made available by eight Technical Committees (TCs), each headed by a Senior Technical Officer of the rank of Major General/Brigadier or equivalent. These committees identify items for indigenisation and thereafter undertake a survey-cum-capacity assessment exercise to establish potential sources for successful and economically viable development of the identified items.

The Central Technical Committee (CTC) under the Chairmanship of Secretary (Defence Production and Supplies) exercises overall supervision and gives requisite direction to the TCs in their role as technical advisers to the Supplies Wing. Purchase Decisions are taken on the basis of competitive quotations obtained from capacity verified firms.

Interaction with Industry. For establishing close and continuous interaction between defence and industry for optimum exploitation of the available potential, a two-tier institutional mechanism consisting of an apex body headed by Secretary (Defence Production and Supplies) and three discipline-wise functional groups with representatives from major associations of trade and industry have been in existence since 1985. The meetings of these bodies provide an effective forum for exchange of views between the users, the suppliers and the inspection authorities.11
With a view to encouraging greater participation of civil sector units by recognizing the endeavour put in by them in meeting defence requirements for equipment and stores which are currently being imported, a scheme of National Award for excellence in indigenisation was introduced from 1993-94.

**Achievements.** The Supplies Wing normally deals with items requiring *ab-initio* development. In 1996-97 the value of the items ordered (Rs. 250 crores) continued to be at a level above Rs. 200 crores. The following table gives details of the number of items ordered and their value during 1993-94, 1994-95,1995-96 and 1996-97:

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of items/ Sub-systems offered</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993-94</td>
<td>3332</td>
<td>225.88</td>
</tr>
<tr>
<td>1994-95</td>
<td>3097</td>
<td>265.36</td>
</tr>
<tr>
<td>1995-96</td>
<td>3166</td>
<td>224.11</td>
</tr>
<tr>
<td>1996-97</td>
<td>2818</td>
<td>250.00</td>
</tr>
</tbody>
</table>

Table 5.2

**Orders for Indigenous Items by Supplies Wing**
### Table 5.3

**Major Achievements in the Area of Indigenisation (1995-96)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Foreign exchange saved (Rs. In Lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tent extendable, frame supported</td>
<td>1044.00</td>
</tr>
<tr>
<td>Ejector and air cleaner</td>
<td>393.75</td>
</tr>
<tr>
<td>Hydraulic control system</td>
<td>336.25</td>
</tr>
<tr>
<td>Distribution mechanism</td>
<td>227.50</td>
</tr>
<tr>
<td>Cooling System</td>
<td>123.56</td>
</tr>
<tr>
<td>Filtration and ventilation system</td>
<td>148.94</td>
</tr>
<tr>
<td>Bridge super structure for BLT Kartik</td>
<td>654.20</td>
</tr>
<tr>
<td>Control unit protection box</td>
<td>192.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3120.00</strong></td>
</tr>
</tbody>
</table>
ORDNANCE FACTORIES (OFs)

The Ordnance Factories organisation in its present form is a departmental undertaking engaged in the production of defence hardware. The first unit named 'Gun Carriage Factory' (now called Gun and Shell Factory) began functioning in 1801. The industrial network of OFs which now has 39 ordnance factories with a historical continuity and tradition has entered in its third century of active life in 2001. The units of the organisation employing a manpower of 1.64 lakhs and spanning a wide range of disciplines, technologies, and products are located all over the country. There are 10 factories each in Maharashtra and Uttar Pradesh, 6 factories each in Madhya Pradesh and Tamil Nadu, 4 factories in West Bengal and one factory each in Andhra Pradesh, Orissa and the Union Territory of Chandigarh.

Of the 39 OFs, 16 were set up before Independence which had capacities created not only for production of finished stores required by the armed forces but also backwardly integrated facilities for supply of basic and intermediate materials for which the indigenous civil infrastructure available at that time was inadequate. In respect of the factories set up after Independence, with the gradual emergence and development of the civil industrial infrastructure, the concept of backward integration has been progressively given up, because, now, the orientation was more towards production of finished stores, drawing upon supplies from the civil sector for raw materials, components and semi-finished goods, etc.

OFs are dedicated units for production of defence hardware for the armed forces and para-military/police forces. These factories have, however, during the last few years been diversifying their products for
the civil market with a view to optimizing utilization of their capacities. This was in keeping with the new economic policy enunciated by the Government run industries. This threw up the urgent need for an alternative strategy framework for optimizing capacity utilization and enhancing turnover, thereby lowering the cost of products for the armed forces. In the context of the strategic role that OFs are required to play, it was decided that OFs should increase their turnover utilizing their spare capacities for the non-defence sector, without any erosion in fully meeting the requirements of the defence forces.

Organisation

Though OFs are departmentally run units of the Government, a board form of management was introduced at the apex level in 1979. This is headed by the Director General Ordnance Factories (DGOF) as its Chairman and has nine members each of the rank of Additional DGOF. At present, OFs are divided into 5 groups as under, based on the type of main products/technologies employed:

1. Ammunition and Explosives (A&E)
2. Weapons, Vehicles and Equipment (WV&E)
3. Materials and Components (M&C)
4. Armoured Vehicles (AV) and
5. Ordnance Equipment (OE)
Objectives

The paramount objective of the OFs is to meet the requirements of the Armed Forces, particularly for the army, for conventional lethal and non-lethal defence hardware with a view to achieving self-reliance and self-sufficiency in defence preparedness.\textsuperscript{16}

Product Technology

OFs produce a wide range of arms and ammunition for the Services. The factories also produce military transport vehicles, infantry combat vehicles, armoured vehicles, optical and opto-electronic instruments, field cables, summer and winter uniforms, tentages, parachutes, miscellaneous leather goods, floats, bridges, general stores and civil blasting explosives. There is also a factory for manufacture of special purpose machine tools for production of arms and ammunition components.

OFs also manufacture arms, ammunition, vehicles and clothing items for police forces and paramilitary organisations. They also supply hardware to the Railways and Public Sector Undertakings and explosives and accessories, the products of OFs are reputed for their quality, reliability and performance.

Growth

In line with the Government’s policy of attaining self-reliance in defence production, OFs have responded to new challenges with
dynamism. Since the late 80s, the OFs have concentrated on the manufacture of tanks and infantry combat vehicles, and their variants, as also weapons, ammunition and instruments under licence from the erstwhile USSR. The factories have progressively enhanced the indigenous content in the manufacture of these items. The stagnation in the performance which had set in during 1989-91 has been overcome and their turnover and productivity have since been increasing on an average at rates higher than the national average. The value of production for issues in ordnance factories, of Rs. 1,577 crores in 1991-92 touched Rs. 2,600 Crores in 1996-97 representing an average increase of about 12 percent in these five years. The value of issues to defence indentors touched Rs. 2200 crores during 1996-97 registering a growth of 16 percent over the previous year, (1995-96 Rs. 1899 crores).17

Highlights

Some of the significant achievements of the OFs in last few years have been as follows:-

1. Thirty Eight factories secured certification under ISO 9002.

2. Overhaul of T-72 Ajeya Tanks has commenced at HVF, Avadi.

3. Amino Guanidine Sulphate and Hexa Nytro Stibene have been produced indigenously, substituting imports.

4. Production of new transport vehicles of 2.5 Ton and
5/7.5 Ton capacity has been established and these vehicles are being supplied to the Army.

5. A 5.56 mm rifle with its sight has been developed and production has been achieved; variants viz 5.56 mm LMG as 5.56 mm carbine are under user trials.

**Research and Development Activities**

The OFs meet the growing and changing needs of the defence sector in consultation with the defence services and the DRDO. These factories take advantage of indigenous technologies developed by the DRDO or go in for licensed production in collaboration with foreign manufacturers. In-house R&D projects are also taken up with the specific objective of effecting product and process improvement. Some of the major achievements in these fields are as follows:-

1. Indigenous development of anti-sinking device for 81 mm mortar in desert and icy terrain.

2. Indigenisation of a number of ammunition items for 155 mm weapon system.

2. Ammunition items for tanks and ICVs.

5. 5.56 mm INSAS rifle with day light telescope and ammunition.

6. Development of rare aluminium alloy for tank ammunition.

7. Passivisation gunner sight of T 72 tank.

8. Casting of RDX:TNT pellet and fitting it in bar mine.


**Diversification**

The technology-wise thrust areas for diversification in OFs with the available infrastructure has both linear and lateral dimensions. In the context of linear diversification the OFs have increased their sales of products akin to their lines of manufacture to paramilitary forces and have also made a beginning in exporting ammunition and other items. In lateral diversification in civil trade; the OFs have sought to develop products for the public and private sectors. In the civil sector the major customers of OFs include Railways, PSUs and other government departments.
The OFs produce more than 1,500 items of arms, ammunition, equipment and components. Collectively, they constitute the 45th largest arms-producing company in the world (in terms of 1991 sales), according to SIPRI estimates.19

The bulk of OF production nonetheless, still constitutes large quantities of relatively low to medium technology items required by the armed forces. These include the family of small arms, anti-tank and anti-aircraft guns, mortars, associated ammunition, rocket projectiles, bombs, grenades, mines.

The diversification programme includes the production of sporting weapons and ammunition, automobiles, chemicals, power generation equipment and top quality clothing (including shirts).

The tentative forays which characterized the initial entry phase of OFs into the civilian market have now been replaced by firm measures to increase their visibility in the market, e.g. setting up of regional marketing centers. Approximately 20 percent of production of OFs now goes to non-defence customers.

**DEFENCE PUBLIC SECTOR UNDERTAKINGS**

The realization, that defence technological base could be utilized to cater to a wide and diversified range of applications, in addition to the basic task of catering to the needs of the armed forces, prompted the Government to adopt the corporate structure in defence production. This led to formation of Defence Public Sector Undertakings (DPSUs)
with flexible form of organisation. There are eight DPSUs functioning under the administrative control of the Department.

The production capacities in the DPSUs have been built over the years with high degree of vertical integration. This was because of inadequate infrastructure and capacities in the private sector to supply primary and intermediate products, the large order of investment required, and the low and fluctuating volumes of off take which made this area unattractive for the private sector. Over the years certain capacities have been created in the private sector and these are utilized for defence production wherever possible.

**Production for the Civil Sector:**

With increasing emphasis on profitability under the new economic policy, the DPSUs have striven to achieve optimum capacity utilization through diversification of their products and services for the civil sector and the export market. Care has been taken, however, to ensure that there is no dilution in the commitment to defence requirements.

**Hindustan Aeronautics Limited:**

Hindustan Aeronautics Ltd. (HAL), set up in 1964 with its corporate office at Bangalore is the largest public sector undertaking under the administrative control of the Department of Defence Production and Supplies. The principal functions of the company are to design, manufacture, repair and overhaul various types of aircraft helicopters and related aero-engines, avionics, instruments and accessories.
Highlights. Some significant achievements of HAL during 1996-97 were as follows:\textsuperscript{20}

1. Development of the backup structure of primary antenna and bonding of wave guides for the programme of the Center for Airborne Systems programme.

2. Development of an indigenous power amplifier for An-32 aircraft.

3. Conclusion of an MoU with M/s Malaysian Aerospace Technologies, for a teaming arrangement as a prelude to prospective joint business through joint ventures.

5. Successful conduct of ground resonance test on Light Combat Aircraft’s technology demonstrator Aircraft-I.

6. Design of a jet fuel starter for the light combat aircraft.

7. Design of a high altitude simulator for testing of jet fuel starter of the Kaveri engine.

8. Supply of the second lot of gear of civil aviation standards to M/s Mitsubishi Heavy Industries, Japan.

137

With HAL's well established quality systems which are at par with those of international counterparts, all 12 divisions of HAL have already been accredited with ISO 9001-9002 certification.

**Bharat Electronics Limited (BEL):**

Bharat Electronics Limited (BEL) was established in 1954 and assigned the role of meeting the electronic equipment/components requirements of the defence services and civilian departments for general use through indigenous production.

It has grown to be the major electronics manufacturing organisation in the country today. The Company presently has nine operational units located in various states with its corporate office at Bangalore. Since its inception, BEL has achieved progressive self reliance in the design development and production of state-of-the-art electronic equipment like radio communications, radar, broadcasting (sound and television) and electronic components. It also meets the bulk of the electronic equipment needs of the Indian defence services, para-military forces and other government users like, All India Radio, Door Darshan, Department of Telecommunications, Police Wireless, Meteorological Department etc. The BEL is also the primary source in India for professional electronic components.
Highlights. Some of the significant events of BEL during 1996-97 are mentioned below:

1. New products developed include emergency communication systems, unmanned level crossing alarm for Railways, Secured FAX (SECFAX), MILEX (Military Exchange), semi ruggedised auto exchange RCPO Satcom for Air Force, S-Band TVRO, long distance satellite telephone, radar altimeter, digital static tropo communication system for Fly-away, OB-System for Door Darshan, Indra-II radar, TOPAE, under water vessels, Ballistic Computer for MBT and hand laser range finder etc.

2. Components production has been expanded, particularly of integrated circuits, hybrid micro circuits, silicon semiconductors and power devices, vacuum interrupters and crystals.

3. A memorandum of understanding has been signed with General Electric Company, USA for a joint venture for the manufacture and supply of CT MAX and other X-ray tubes at Bangalore.

Bharat Earth Movers Limited (BEML)

Bharat Earth Movers Limited (BEML), incorporated in May 1964 as a defence PSU, commenced its operations from January 1, 1965. It has production divisions at Bangalore, Kolar Gold Fields (KGF) and
Mysore. The product range of the company includes mining and construction equipment, earth moving equipment, off-highway rear dump trucks, towing tractors and broad gauge railway equipment, viz, rail coaches, rail-bus, spoil disposal wagons and DC EMUs. The company’s other customers in the country are Coal India Limited, Neyveli Lignite Corporation, Tata Iron and Steel Company, Associated Cement Company, Steel Authority of India Limited, National Hydro Electric Power Corporation and National Thermal Power Corporation.

**Highlights.** Some of the salient activities of BEML during 1996-97 have been as follows: 22

1. All the production units of BEML have received ISO 9000 series certification.

2. With the assistance of M/s TWI, UK a renowned institution in welding technology, BEML has upgraded its welding technology in heavy structural fabrications. Service adequacy audits are being conducted at major customer project sites.

**Mazagon Dock Limited (MDL):**

Mazagon Dock Limited was taken over by the Government in 1960 with the primary aim of construction of warships for the Indian Navy. The company has since come a long way from being a ship repair yard to its current status as the premier builder of warships, submarines and offshore platforms. As a result of phased programme of expansion and
development, MDL’s ship-building capacity has been increased so as to enable it to build warships of up to 27000 DWT. Its major activities include construction of submarines, missile boats, destroyers, frigates and corvettes for the Indian Navy, patrol vessels for Coast well-head Guard and well-head platforms and diving services for coating/laying sub sea pipelines.

**Highlights.** Some of the significant achievements of MDL during 1996-97 were as follows:

1. Twenty 225 KW windmill towers were delivered to NEPC/MICON, Madras.

2. An order worth Rs 34.34 crore for construction of one grab-cum-suction hopper dredger was received from the Mumbai Port Trust.

3. A order worth Rs 202 crore for construction of HX & HY class of wellhead platforms has been received from ONGC.

4. A letter of Intent for construction of B-55 class wellhead platform costing US $ 23 million has been received.

5. An order for modification to HAS/HSB and Neelam 2 & 3 HRA platform and 14 OCI vessels has been received.
Garden Reach Shipbuilders and Engineers Ltd. (GRSE)

GRSE is multi-unit shipyard which has three well-structured divisions viz., Shipbuilding Division, Engineering Division and Engine Division.

The main objective of the company is to construct warships and auxiliary vessels of various types for the Navy and the Coast Guard and to undertake repair of vessels of these organisations. Other products of the company include a variety of high technology ship-borne equipment, portable Bailey type steel bridges, turbine pumps for the agricultural sector, marine sewage treatment plants, diesel engines, etc.

**Highlights.** Significant achievements of the Company during 1996-97 have been as follows:

1. Keel of the third Fast Patrol vessel was laid on September 18, 1996

2. A letter of Intent for three diesel engines valued at Rs 22.13 crores was received from the Gas Authority of India Ltd. against a global tender for an ADB funded project.
Goa Shipyard Limited (GSL)

The activities at Goa Shipyard Limited primarily comprise construction and repairs/refit of ships/vessels. It has undertaken construction of a variety of vessels for the Navy and Coast Guard as well as for the non-defence sector. Refits of Naval/Coast Guard vessels and repairs to ships calling at the local port are also undertaken. The shipyard has so far taken up 162 vessels of which 154 have been delivered. Of these, 46 were for the Indian Navy, six for the Coast Guard and 102 for other authorities. The shipyard has entered into collaboration arrangements with firms in France, Russia, Portugal, Vietnam, Israel, Poland USA, Norway, Korea, UK, Canada, etc. to take on diverse items of manufacture.

**Highlights.** Significant achievements of the Company during 1996-97 were as follows :-

1. An advanced offshore, patrol vessel ‘SAMAR’ was delivered to the Coast Guard.

2. An export order from the Government of Maldives for one 5.5 ton tug (Veeru) has been secured against a global tender. The boat has already been launched.

3. The company has paid a dividend of 51.5 percent for 1995-96, the highest ever.
Bharat Dynamics Limited (BDL)

Bharat Dynamics Limited (BDL) was set up in 1970 as a pioneer in manufacture of guided missiles. It is now one amongst a few strategic industries of the world with the capability to produce the most advanced guided missiles systems for the armed forces. The corporate office and two of its units are situated at Kanchanbagh, Hyderabad, while one unit is at Bhanoor village in Medak District, Andhra Pradesh. BDL has been nominated as the prime production agency for the manufacture of four missile systems being developed under the Integrated Guided Missiles Development Programme (IGMDP) of the Defence Research and Development Organisation (DRDO), namely the battle field support tactical surface to surface missile, Prithvi, the quick reaction surface to air missile with multiple target handling capability, Akash and the anti tank missile, Nag. The Company has also taken up production of small arms for central police/paramilitary forces of the country.

Highlights. Some of the significant achievements of the Company during 1996-97 have been as under :-

1. Production of Milan missiles has been stepped up through heightened productivity.

2. Indiginisation of Konkurs weapon system has been completed.

3. Limited series production of Prithvi missile has commenced.
Mishra Dhatu Nigam Limited (MIDHANI)

Mishra Dhatu Nigam Limited (MIDHANI) has emerged as one of the foremost centers for production of advanced materials in the country meeting the critical requirements of super-alloys, titanium alloys, special steels, etc. for aeronautical, space, defence, atomic energy communications and general engineering industries.

Highlights. Some of the significant achievements of MIDHANI during 1996-97 have been:

1. Obtained ISO 9002 quality certificate.

2. Supplied aeronautical material worth Rs 14.30 crores for Kaveri engine programme.

3. Delivered armour plates valued at Rs 5.49 crores to NFTDC

4. Sold special grade high performance steels valued at Rs 1.89 crores to Bharat Heavy Electrical Limited (BHEL) for gas and hydro turbine components.

5. Exported titanium mill forms including tubes and super-alloy products valued at Rs 1.37 crore to UK, Japan and Vietnam.
OTHER ORGANISATION OF DDP&S

Directorate General Quality Assurance (DGQA)

The onus of ensuring high precision and quality of all stores for the Army, the Navy (excluding naval armaments) and common user items for the Air Force vests with DGQA. The organisation comprises various Controllerate of Quality Assurance and proof establishments. The DGQA’s role includes:

1. Preparation of drawings and specifications.
2. Establishment of sources for procurement
3. Testing and evaluation of samples
4. Compilation of literature and documentation
5. Product improvement based on feedback
6. The DGQA assists the civil sector firms to indigenise and productionise components and products

The value of stores inspected and accepted during 1996-97 was Rs.5067.02 crore and 4408.83 crore respectively.
Directorate General Aeronautical Quality Assurance (DGAQA):

The Directorate General Aeronautical Quality Assurance (DGAQA), earlier known as the Directorate of Technical Development and Production (Air), has its headquarters at New Delhi with inspection establishments at various production centers. It performs the following functions:

1. Quality assurance to aeronautical specifications during design and development, and inspection of equipment; quality assurance of aircraft and engines overhauled by HAL; technical and quality inspection on request of imported aeronautical items procured by the Air Force, screening indents for import with reference to indigenous availability.

2. Development and establishment of indigenous sources of supply for special airborne and ground equipment furthering import substitution. It was proposed to indigenise 130 items worth Rs 19 crores during 1996-97.

3. Associating itself with indigenous aeronautics development projects from prototype to proof. Participating in defect and accident investigations and suggesting remedial measures.

4. Functioning as nodal agency for Missile System Quality Assurance Agency (MSQAA) in association with DGQA and DNAI during development and limited series production phases.
The MSQAA, is a common inspection agency, comprising of representatives from DGAQA, DGQA and DNAI, under the functional and administrative control of the Director, DGAQA. It was set up in 1991-92 to attend to the development and quality assurance of certain missile system.

The value of aeronautical equipment inspected in 1996-97 was Rs 1185 crore.

**Directorate of Standardisation:**

Constituted in 1962, the Directorate of Standardisation is responsible for establishing commonality in equipment and components among the three Services with the distinct objective of curbing proliferation of items within the Services. Ably assisted by nine standardisation cells located at nodal stations in the country, the tasks assigned to this Directorate entail:

1. Preparation of standardisation documents, such as Joint Services Specifications, Joint Rationalised Lists, Joint Services Guide, Joint Services Policy Statements and Joint Services Qualitative Requirements.

2. Codification and cataloguing of defence inventory

3. Entry control
**Directorate of Planning and Coordination:**

The Directorate of Planning and Coordination is functioning as deemed attached office of the Department of Defence Production and Supplies since 1964. The Directorate acts as a catalyst in the planning and coordination of defence production organisations, the users and the R&D agencies. As such the directorate represents the Department of Defence Production and Supplies in the General Staff Equipment Policy Committees, the R&D panels, Standardisation Committee Task Force and various monitoring committees. The Directorate also represents the Department of Defence Production and Supplies in the Licensing Committee meetings of the Ministry of Industry to ensure that there is no overlap in the capacities created with those already available under the Ministry of Defence. The setting up of ordnance factories at green field sites is processed and progressed by the Directorate. One of the important tasks entrusted to the Directorate recently is to assist in providing thrust to defence exports. The Directorate is the nodal agency in the DDP&S for international co-operation in defence production and defence exports.

Besides indigenous manufacture of armoured vehicles, the setting up of facilities for filling of high calibre ammunition as well as overhaul of tanks and their engines, manufacturing of sights and laser range finders, limited series production of MBT Arjun are some of the major programmes presently being progressed by the directorate.

**Defence Exhibition Organisation:**
The Defence Exhibition Organisation, created in 1981, is primarily responsible for organising and coordinating defence exhibitions in India and abroad. All DPSUs, the DRDO, the Ordnance Factory Board and the Quality Assurance Organisation are its co-opted members apart from the three Services and the other organisations of the Ministry of Defence such as the Directorate General Resettlement, Directorate Armed Forces Medical Services, Coast Guard, NCC, OFB etc.

The permanent Defence Exhibition at Pragati Maidan is maintained by this organisation. The Defence Pavilions provide an over-view of the wide range of our defence production infra-structure to visiting foreign dignitaries/delegations/purchase missions and general public. The exhibition displays products manufactured by the ordnance factories and the eight DPSUs. It also depicts the 'Recruitment to Retirement' profile of the defence forces, the efforts made to rehabilitate ex-Serviceman and the role of the DRDO, the Quality Assurance agencies and the civil sector in meeting defence requirements.

DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION

Origin

Defence Research & Development Organisation (DRDO) was established in 1958 by amalgamating the Defence Science Organisation and some of the technical development establishments. A separate Department of Defence Research and Development was formed in 1980 which operates through a network of 51 laboratories/establishments. Aeronautical Development Agency (ADA), a society funded by the Department, is engaged in the development of LCA. The Department is engaged in the pursuit of self-reliance in critical technologies of relevance to national security. It formulates and executes programmes of scientific research, design and
Research and development activities of the Department cover important demarcated disciplines like aeronautics, rockets, and missiles, electronics and instrumentation, combat vehicles, engineering systems, naval systems, armament technology including explosives research, system sciences including advances computing, high altitude agriculture, physiology, food technology, nuclear medicine and allied sciences. In addition, the Department also assists the Services by rendering technical advice regarding formulation of requirements, evaluation of systems to be acquired, fire and explosive safety and mathematical/statistical analysis of operational problems.

In April 1994, a vision for the Department was evolved. It envisages the transformation of the Department into a leader of international class with the mission to capture and retain commanding heights in critical technologies.³²

The Government have approved a national mission to achieve self-reliance in defence systems through a “mission mode” organisational structure and approach. This effort is expected to increase the element of self-reliance from the current figure of about 30% to 70% in 2005 in terms of the proportion of the annual expenditure on acquisitions. A Self-reliance Implementation Council had been constituted with the SA to RM as Chairman and senior officers of the Ministry and Services as members for mission execution.³³

**Manpower**

The manpower strength of the Department is about 30,000, which included about 6,800 scientists and engineers. Efforts have been mounted to manage DRDO
programmes with marginal increase in budget allocations through internal resource
generation and by reduction in administrative expenses, including civil construction.34

**Project Management**

The Department has adopted the development strategy of consortia partnership with
academic institutions, R&D laboratories of other departments and industry in the
public and private sector for making optimum use of science and technology (S&T)
expertise, technical know-how and industrial infrastructure available in the country.

Complex technological programmes are managed by multi-tier management boards
which insure multi-layered reviews and monitoring facilitating quick co-ordination,
problem solving and smooth execution of the programmes/projects. Depending upon
the cost and technical complexity of programmes, review processes have been
instituted which include both in-house and external panels, steering committees, peer
group etc. The programmes are also reviewed at the apex level by DRDO Council,
chaired by SA to RM and at the level of Service Chiefs and RM. These reviews are
carried out with active participation of representatives of the user Services, production
agencies and quality assurance organisations.

In order to shorten the time cycle between completion of development and
productionisation of Defence Systems, techniques of 'Concurrent Engineering', and
'Real Time Technology Absorption' are being used in some cases of the complex
programmes/projects.

To achieve qualitative integrity of the R&D programmes, DRDO has an
institutionalised mechanism of internal project reviews, right from the pre-sanction
stage. These include feasibility stage review, design review, system review, trial
readiness review, post-trial analysis, failure analysis review, production readiness
review and technology transfer reviews. A special feature of these reviews is that they draw expertise from national S&T agencies, academic institutions, sister DRDO laboratories, user services, production agencies and quality control agencies. Thus participative decision making is regularly and effectively ensured.

The R&D project activities of the Department so far have led to the successful development and production of more than 1100 items of weapon system/equipment. The production value of these items so far has been about Rs 6,000 crore. This figure is expected to rise very sharply when major weapons/equipment like tanks and missiles, now under evaluation and trials, enter into production.35

Progress Made in 1990s

Armament

1. **Pilotless Target Aircraft.** Limited series production of the Pilotless Target Aircraft (PTA) Lakshya is in progress.36 The Air Force requirement of PTAs is being met now. Naval version of PTAs is also planned and its development is under progress.

2. **Remotely Piloted Vehicle.** Twelve flight trials of remotely piloted aircraft (RPV) Nishant have been carried out. During these flights, hydro-pneumatic launcher, repeatability of air vehicle recovery system auto-navigation and endurance of more than 3 hours have been proved. Payloads such as daylight TV, mini-pan camera and, indigenously developed gymballed payload assembly were tested during these trials, with satisfactory results.37
3. **FSAPDS Ammunition.** Bulk production of DRDO developed 125 mm FSAPDS soft core ammunition, with better penetration capability than the ammunition currently in use with T-72 tank has commenced in ordnance factories.

4. **5.56mm INSAS.** Bulk production of 5.56mm calibre INSAS rifle is in progress, and that of 5.56mm calibre LMG will also commence shortly. Troop trials of 5.56mm calibre carbine are in progress.

5. **Pinaka.** The Multi Barrel Rocket System, Pinaka, has accomplished a major milestone through conduct of Phase I user trials in 1997-98. Based on the users’ observations made during trials, the Pinaka has been further refined and its accuracy, consistency, safety and reliability aspects have been successfully demonstrated to the users. Extended user trials of the system were planned for early 1999.

6. **Artillery Ammunition.** User trials of an improved 105mm illuminating ammunition capable of a range of 16.5 km and illumination capacity of 7 million candles have been successfully completed. The ammunition has been accepted for introduction in to Service by the Army and its production has already commenced.

### Combat Vehicles

1. **T-72 Tanks Upgrade.** One T-72 engine has been successfully updated from 780 HP to 1000 HP. Limited automative trials of the T-72 M1 tank integrated with uprated 1000 HP T-72 engine were conducted during 1998. Two T-72 M1 tanks, integrated with uprated engines, will be offered to users for trials during summer 1999.
Electronic Warfare

1. **Samyukta.** All entities required for the core system demonstration (CSD) of the communication segment of integrated electronic warfare system SAMYUKTA have been realised, integrated and tested along with their embedded software. System software is now being tested after which the communication segment will be offered for demonstration.41

2. **EW System.** An airborne electronic warfare system for the MiG series aircraft, which includes a radar warning receiver and a jammer, has been cleared for limited production and will be inducted into Air Force after flight trials during second half of 1997.42

**Communications, Command & Control**

1. **Electronics & Instrumentation.** Trials of the laser warning system mounted on combat improved Ajeya tank and armoured personnel carrier have been completed. Bulk encryption equipment has successfully undergone user trials. A fibre optic control and communication system (FCCS) has been developed and approved for use in futuristic radios in armoured fighting vehicles. A laser output level of 11 kW has been achieved from a combustion driven carbon dioxide gas dynamic laser. A laboratory model of ring laser gyro has been developed and its basic operation has been achieved. The first batch of Indira PC low level radar for Air Force is getting ready for delivery. Fax/data/test encryption system has been delivered and installed in users' establishments A compact integrated receiver (Ka Band) using hybrid MIC technology in planer transmission line configuration has been realised. Five types of application specific integrated circuits (ASICs) have been developed and delivered for various programmes. A light weight thermal imager has also been developed.

155
2. **GAETEC.** All facilities and equipment for fabrication of gallium arsenide (GaAs) wafers have been installed and commissioned at the Gallium Arsenide Enabling Technology Centre (GAETEC). The DRDO developed technology for fabrication of monolithic microwave integrated circuits (MMICs) is being transferred to the Centre. The first Metal Epitaxi Semiconductor Field Effect Transistor (MESFET), came out of GAETEC by May 1997.

3. **ACCCS.** User trials of Artillery Combat Command Control System (ACCCS) were conducted successfully and limited series production phase of the system will commence shortly.

4. **RTS.** Consequent to successful users trials, Radio Trunk System (RTS) has entered the production phase.

5. **Advanced Computing.** Another stride towards higher super computing capability has been made through development of a PACE plus computer capable of delivering about 1.7 Giga Flops in computational fluid dynamics codes.

### Combat Engineering Systems

1. **Engineering Systems.** All automotive trials of Armoured Engineer Reconnaissance Vehicle (AERV) with a capability to acquire, record and transmit data on width, bed profile, water depth, bearing capacity, etc. has been successfully completed. 44

2. **Bridge Layer Tank.** Track mounted mechanically launched bridge layer tank (BLT) on T-72 chassis, capable of carrying and launching 20m/22m assault bridge
has undergone successful user trials. The equipment has been recommended for introduction into service.45

3. Assault Trackway. Mat Fording Cl 70, a track way expedient for enhancing negotiating shallow rivers, mounted on high mobility Tatra vehicle has completed user trials successfully and equipment recommended for introduction into Services.46

4. Carrier Mortar Tracked. The Army has placed an indent for bulk manufacture of CMT on the production agency – Ordnance Factory, Medhak. All the production drawing and technology for manufacture of CMT have been handed over by DRDO to the production agency.47

Fire Suppression Systems48

1. Naval. A state-of-the-art fire detection and suppression system has been developed for use in missile launcher/ magazine areas on board naval ships for all possible type of fires in these areas, including propellant fires. The efficacy of the system has been demonstrated to a team of naval officers by simulating fire conditions in a mock-up barbette.

2. T-72 Tanks. Fire/explosion detection and suppression system for T-72 M1 tank has been developed, successfully subjected to user trials and recommended for introduction into service. The system is capable of detecting and effectively suppressing hydrocarbon fuel explosion initiated by various anti-tank ammunitions. A fire fighting truck (dry chemical powder type), capable of fighting large petroleum fires in storage depots and bulk petroleum installations has been developed and successfully subjected to user trials.
Naval Projects

1. Submarine Weapon Control System (Panchendriya).

Composite Sonar and Tactical Weapon Control System, Panchendriya, has been installed on board a submarine for users’ trials. It had been subjected to harbour acceptance tests (HATS) and sea acceptance tests (SATs) by the users and has been accepted by them.49

2. HUMSA Ship Sonar. Upgraded version of hull mounted sonar HUMSA has completed its factory acceptance tests. The system will be fitted on board ship under construction at GRSE, Kolkata.50

3. Naval Systems. A lightweight anti-submarine torpedo has been successfully launched from ship for dynamic trials and the propulsion, control, launch and recovery system have met the objectives. Homing trials will be undertaken shortly.

4. Radar Absorbing Material. Radar absorbing material been successfully tested on naval ships and it has led to substantial reduction in range detectability after its application. This material has also been successfully tried out on aircraft. Anti corrosive and anti fouling paints have been successfully developed and inducted into the Navy.

Materials Development51

1. Aluminium lithium alloys have been produced for structural applications in LCA. Oxygen-free high purity copper sheet have been developed in aluminium alloy through metal forming route have been successfully tested and are in various stages of production.
2. A vehicle mounted spraying system for construction of operational helipads in desert area has been successfully user evaluated and recommended for introduction.

3. Technology for production of butyl rubber in high compression moulding with breakthrough time more than six hours has been developed.

4. A light weight composite based on ultra high molecular, weight polyethylene has been produced for electromagnetic interference shielding application.

5. Polyether ketone, a high performance engineering thermoplastic which will find use in aerospace and chemical industry, has been developed.

6. A third generation single crystal super alloy and advanced directional solidified super alloy, both containing Rhenium, have been developed for use in high performance aero-engines.

7. A process comprising air induction melting and electro slag remelting has been developed to produce iron aluminide based inter metallic alloys, which have demonstrated excellent room temperature tensile and creep properties.
**Aeronautics**

1. Pilot parachutes of Jaguar aircraft and MiG aircraft have been developed and type approved for service use.

2. Aircraft arrester barrier system used to halt combat aircraft landing on short runways has been cleared after user trials.

3. A high technology software for fabrication of components made of composite materials has been incorporated in aided design software of Computer Vision, USA and is ready for world-wide sales. Other software have also been demonstrated and sold to aircraft houses abroad. The revenue earned will be ploughed back to further R&D in these areas.

4. A virtual reality laboratory is under establishment in partnership with industry. As a first step a digital mock up of aircraft will be created in virtual reality environment.

**Life Sciences**

1. Life support system for hot air balloon has been successfully completed.

2. Technetium-99m-Citrate diagnostic kit has been developed for diagnosis of soft tissues and bone tumours and their metastasis. In case of bones, it can make a distinction between malignant and degenerative diseases.
3. Technetium-99m-Dextran, another kit, has been found of high investigation value in the diagnosis of inflammation, G.I. bleed, ulcerative colitis and kidney cortical disorders. Clinical, trials are being planned.

4. Titanium endosteal ossointegrated bone implants and titanium bone plates have been developed and fabricated for fractures, of the facial skeleton. Multi centric trials for the titanium endosteal bone implants ' arid plates are being carried out.

5. A deferrization unit has been designed, developed and tested, which is capable of providing 16 ltr/min potable water acceptable as per ICMR/WHO norms.

6. Emergency flying ration for air crew has been accepted by the Air Force.

7. One step detection kit for salmonella and E coli and strip test for spoilage detection in atta, oils and milk powder has been found acceptable after user trials.

8. A process based on hurdle effect has been developed by which fruits like pineapple, apple, guavas, muskmelon, oranges, mango and papaya can be preserved for more than nine months in flexible plastic films. The preserved fruits are light in weight and retain the original sensory and nutritive quality.

9. Freeze-thaw method of dehydration has been developed for providing instant cooking character to pulses wholelegumes and cereals. Supplementary compo pack rations and survival rations have been supplied to the Army.

10. A process for preparation of 2-Deoxy Glucose, (2DG), an anti-cancer drug, has been standardised. Phase I Clinic trials of 2DG have been conducted at KMIO,
Bangalore and AIIMS, New Delhi after obtaining clearance from the Ethics Committee, Drug Controller and Ministry of Health & Family Welfare.

12. Aloe-Vera, a homeopathic medicine, has been cleared by the Director General Armed Forces Medical Service for clinical trials on patients of frost bite.

12. Studies have been conducted to establish usefulness of glutamic acid to enhance hypoxia tolerance of soldiers at high, altitudes.

Conclusion

The magnitude of the failure of India’s political leadership to institute an appropriate higher defence management structure which would integrate technology development with defence production and procurement needs to be highlighted at this stage. The Defence Technology Industrial Base (DTIB), consists of three components, namely the R & D, the Manufacture and the Maintenance. Unless the management structures for administering all of these three components and, especially, of Development and Manufacture are integrated with the defence procurement organization in a manner which enables defence procurement to drive the DTIB, a nation’s defence industrialization cannot make adequate progress. It may be mentioned here that in all industrially developed countries; in democracies and communist countries alike, national security considerations have mandated the growth and promotion of largely self-reliant defence industries through the establishment of such integrated management structures.
PRIVATE SECTOR ENTERPRISES (PSEs)

The role of PSEs will be crucial to the success of self-reliance in defence. Contrary to conventional wisdom, the PSEs have always played a key role in the defence industry sector. During the early decades, the bulk of national industry was in the small sector, and it was this sector that played an important role as subcontractors and ancillary industry. The national industrial base has been expanded into major areas of manufacture. It is logical that the private sector should also step into the defence industry field in a larger way.  

The defence forces now spend nearly Rs. 7,000 crores on equipment acquisition as part of the capital expenditure, besides another Rs. 8,000-odd crores per year on stores, including spare parts. A significant proportion of this is already procured from the private sector. This is obviously an important market although the size of individual item required may be small. There is clearly a role for PSEs which is essential to the success of the Government's Self-Reliance Initiative.

There are new opportunities emerging for the PSEs in terms of collaborations with industry abroad. The global trend and our own needs for the future point towards the need for some fresh thinking on the question of managing self-reliance in defence weapons and equipment through expanding interdependence.

Problem Faced by Civil Industries

Bulk of the indigenisation being done by DGQA is through civil industry. Even OFs and DPSUs are entrusting the manufacture of large number of spares to civil industry. However, the response from civil industry is also lukewarm. The industry attributes this to unreasonably strict quality control, rigid delivery schedules, secrecy over technical drawings and specifications, change of specifications without consultation,
lack of assured orders and payment delays. The other reasons put forth by them are as follows :-

1. Cost of development being high.

2. The product to be indigenised does not fit in the normal production line of the firm.

3. Frequent changes in the projection of quantities.

4. The quantities projected for indigenisation not attractive/economical.

5. Repetition of orders not assured.

6. Raw materials as per specification not being available indigenously.

7. Specification/guide lines not being provided to trade to help the development.

8. Facilities for fitment trails not made available.

9. Rigidity of specification and inspection criteria.
INDIGENISATION: A SOLDIER'S VIEW POINT

The modernization of Indian Armed Forces has brought in equipment intensive weapon system. In the changing techno-economic scenario, the Services will continue to have a mix of imported and Indian origin equipment. The equipment/systems have to be maintained and kept operationally fit at all times. With some of the equipment becoming obsolete in the country of origin and with the collapse of erstwhile Soviet Union, availability of spares especially for East European equipment have become scarce.

Non-availability of spares for maintenance of imported equipment due to financial crunch as well as socio-political changes all over the world, has affected the sustainability of these equipment. In order to overcome the problem and reduce our dependence on imports, indigenisation is being accorded high priority.

The task of indigenisation of defence stores, particularly import-substitution is basically being undertaken by Director General Quality Assurance under the Department of Defence Production and Supplies. For this purpose, DGQA has set up appropriate infrastructure consisting of laboratories, drawing offices and detachments at various locations. Indigenisation is also being undertaken by EME, and various OFs for items under their purview.

Indigenisation Sources

The existing Defence Industry contributing to indigenisation in India may be divided into the following segments:-
1. Ordnance Factories

2. DPSUs

2. DRDO

4. Civil Industry

5. Army Base Workshop. It has been already discussed in preceding Chapters as to how above mentioned sources contribute to indigenisation process. ABW is an in-house source of indigenisation in the Army. Employing approximately 14000 persons, Army Base Workshops have been actively involved in all types of indigenisation, be it manufacture of stores, updating of hardware or change in software, operating procedures and the like. The Army Base Workshop have indigenised and manufactured items worth Rs 18 crores pertaining to armament, vehicles and electronic portion of various East European equipment.

Strength and Weaknesses

The major strength are the availability of scientific manpower, the technology, the raw materials, economical labour, commitment and experience. The weaknesses stem from Government control, bureaucratic methods, unionized work force, a complacent attitude, indifferent quality control and lack of organized impetus for exports.

The response of OFs and DPSUs is sluggish because their concentration is on production of the weapon system and not the components and sub components. Also since financing is through public funds, less efforts are devoted to fast circulation of
funds. Delays or failures are not taken that seriously since they know that in case of failure of development, import permission is granted. Authorities are answerable to a certain limits only or they are transferable as compared to private sector where the authorities are answerable and liable up to the cost of services.

**Problems in Indigenisation**

1. The process of indigenisation starts at a belated stage.

2. Indigenisation takes long due to elaborate procedure adopted by various technical committees.

3. Incomplete vetting of documents of newly introduced equipment. It has been experienced that contractual documents of maintenance spares and SMTs/STEs etc are either incomplete or non-existent.

4. Non-availability of drawings and specifications especially for cases where detailed parts list of an equipment were not prepared at the time of introduction of the equipment and the scaling documents were prepared at a later stage. In such cases, DGQA also express inability to prepare drawings and the maintenance agency is told “Part No. Not Identifiable”.

5. It is seen that DGQA is largely dependent on the equipment manufacturer for the inspection of equipment standards. This leads to dilution of the inspection equipment standards. This leads to dilution of autonomy/independence of the nodal inspecting agency.
6. There is no demonstration of consistency in quality. Whereas control samples are defect free, free flow production is defect ridden leading to serious doubts about process control capabilities and intentions of the organisation.

7. AHSP does not entertain any investigation into stores purchased directly by ordnance depots without the involvement of CQA inspection and thereafter, if they found defective, user is left high and dry in such cases.

8. Lackadaisical approach of the private sector – the interested entrepreneurs shy away because of low profitability on account of the small quantities involved and the cumbersome procedures for obtaining certificates.

**Recommendations**

It is felt that indigenisation activity must commence during the pre-contract/contractual stage of any equipment. The representatives of DGQA, DGOS, DGEME and OFB must be associated during this stage. A committee convened by Army HQ should work out the requirements of indigenisation. The committee must look into the aspects of transfer of technology (TOT) for manufacture of weapon system in the country later on, adequacy of technical literature, maintenance spares for two years and spares for pilot overhaul as decided by EME.

During the initial stages of induction of an equipment, Army HQ generally decides the retention policy, methodology for sustenance and maintenance of spares support during the life span. There is a need to lay down the policy at this stage itself as to whether long time indigenisation should be entrusted to an empowered committee or short term indigenisation based on Annual Provision Review would suffice. Other recommendations which merit consideration are as follows:-
1. Govt must encourage the corporate world to step forward and take up the production of defence needs. In this direction the following may be useful:

(a) Simplify procedure of procurement.

(b) Simplify payment procedure.

(c) Allow exports of products to make the industrial effort economically viable.

(d) Permit association of industry from the stage of GSQR till field/fitment trials.

2. Nominate a corporate body like CII to be the focal point in co-ordination of the needs of defence and industry.

3. Provide loans from the defence budget to small scale industries dedicated to indigenisation of improved components for defence.

4. Concept of self certification should be encouraged.

5. In the present systems, tender is evaluated on the basis of individual item even when the tender has been floated for a number of items clubbed together in one
tender. The intention is to make the tender attractive in terms of the total value, as each item by itself, is very small in quantity. It may be considered evaluating the tender as a whole.

6. The present approach for indigenisation has been development and manufacture. This approach has certain limitation. Hundred percent indigenisation of spares will not be possible during the life cycle of an equipment keeping in view the diversity and range. Therefore, the futuristic approach of indigenisation should be “substitution first and then development and manufacture”. Substitution of items like horns, head lights, dynamos, generators, wireless sets, bulbs, harness assemblies etc by indigenous industrial commercial equivalent assemblies with slight modifications will be more economical than the indigenisation of components for above items.

8. While preparing/vetting the spares parts list of any equipment, DGQA should get the equipment stripped and ensure that each and every component, however minor or expendable in nature, is included and its specifications/drawings are available. This will avoid major problems at a later stage when the equipment undergoes repair or overhaul. The drawings should be self explanatory, giving the information of :-

(a) Raw material/alternate material.

(b) Standard to be followed i.e. GHOST, DIN, IS, or BS etc.

(c) Chemical composition /alternate chemical composition.

(d) Heat treatment
9. Since most of the ex-import equipment are of Soviet Origin, assimilation and adoption of the Soviet technology should be undertaken by DGQA. They should maintain efficient communication through constant liaison with manufacturers with a view to anticipate likely problems in manufacture, material requirement, testing, evaluation and guide manufacturers to develop the various systems/sub-systems within the given time frame.

10. Spares purchased directly by Ordnance Depots under their LP powers should also be subjected to CQA inspection.

Conclusion

The Army holds a large variety of war like and commercial equipment for providing national security against external aggression and internal security. To achieve this, maintenance and sustenance of high state of readiness is paramount. This can only be achieved by acquiring self sufficiency in provision of spares through indigenisation with active participation and co-operation of our trade and industrial infrastructure. It is required to streamline the procedures and cut down delays at all levels. Adequate use must be made of management tools like information technology (IT), re-engineering and Total Quality Management (TQM) to ensure higher productivity, improved efficiency and cordial working condition. The pursuit for perfection and excellence in indigenisation and indigeneous production should be the motto in this first decade of new Millennium.
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