CHAPTER VIII: ORDNANCE FACTORY ORGANISATION

8.1 Performance of Ordnance Factory Board

8.1.1 Introduction

8.1.1.1 Ordnance Factories are the oldest and largest organization in India's defence industry with a history that dates back to 1787.There are 41[117] factories divided under five clusters or operating groups (Table-21) and produce a range of arms, ammunitions, weapons, armoured & infantry combat vehicles and clothing items including parachutes for the defence services. They function under the Ordnance Factory Board which is under the administrative control of the Department of Defence Production of the Ministry of Defence of Government of India. The Ordnance Factory Board comprises a Chairman and eight members[118].

Table-21

Operating group	Number of factories
Ammunition & Explosives	10
Weapons, vehicles and equipment	10
Materials & Components	8
Armoured vehicles	6
Ordnance equipment group	5
Total	39

8.1.1.2 The objectives of the Ordnance Factory Board[119] are:

- To supply quality arms, ammunition, tanks and equipment to armed forces;
- To modernise production facilities to improve quality;
- To absorb latest technology through Transfer of Technology[120] and in-house Research & Development; and
- To meet customer satisfaction and expand consumer base.

[117]Two Ordnance Factories at Nalanda and Korwa are under construction. Beset with delays, the two Ordnance Factories are yet to put into operation with scheduled date of coming into operation remaining uncertain

[118] Members are in the rank of Addl. Secretaries, being of Finance, Personnel, Planning & Material Management, Projects & Engineering, Technical Services, Material & Components, Weapons, Vehicles &Equipment, Ammunition &Explosive, Armoured Vehicles (Avadi) , Ordnance Equipment (Kanpur)

[119] As enunciated in Mission and Vision Statement of Ordnance Factory Board

[120] Transfer of Technology from Defence Research & Development Organisation or from Original Equipment Manufacturers through contracts linked to purchases

8.1.1.3 In addition, the policy objectives of the Government on Defence Production and Procurement, list the following objectives which have a bearing on the Board:

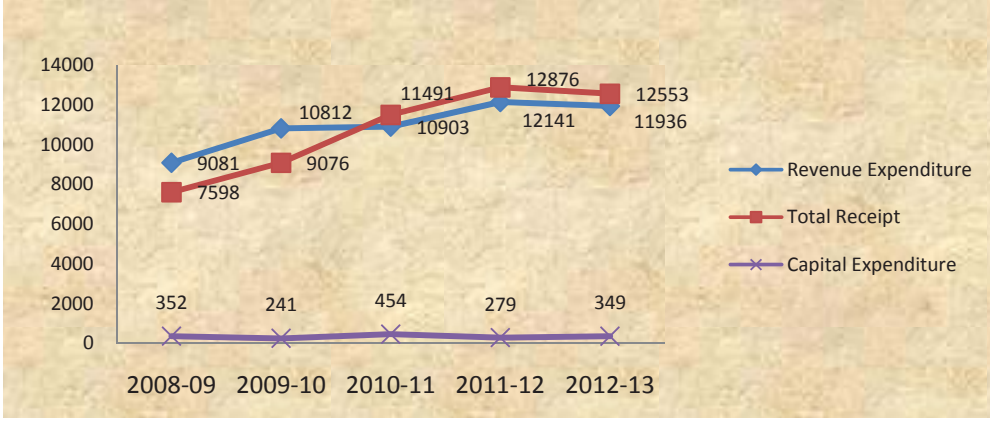
- To ensure expeditious procurement of the approved requirements of the armed forces, in terms of capabilities sought and timeframe prescribed by optimally utilizing the allocated budgetary resources;
- To achieve substantive self–reliance in design, development and production of military equipment/weapon systems/platforms required for defence in as early a time frame as possible; and
- To enhance the potential of Small and Medium Enterprises in indigenisation.

8.1.1.4 Our analysis of the performance of the Ordnance Factory Board during 2012-13 places it, where relevant, against the above objectives.

8.1.2 Financial performance

Trends in expenditure are illustrated in **Chart-7**.

Chart-7 : Trend in Receipt against Revenue and Capital Expenditure (in crore)



Revenue expenditure

8.1.2.1 The Ordnance Factory Board receives budgetary grant under the Accounts Head 2079 to meet its revenue expenditure. The grant was ₹ 11936 crore in 2012-13.

8.1.2.2 The Ordnance Factory Board operates Accounts Head: 2079 for booking its expenses and its receipts[121] against issues to the Defence

[121]The Ordnance Factory Board debits all its revenue expenditure to the Accounts Head 2079. At the time of issue to the Defence establishment, there is (-) Debit to the Account. The receipts against sales to other clients (exports, civil trade) are recorded against the Accounts Head 0079

establishment**.** Another Accounts Head 0079 records the receipts against sale of products to non-defence establishments (State Police), in the open market or exports. The issue price of products is so fixed to recover the cost of manufacture. In 2012-13, the Ordnance Factory Board earned a net surplus of ₹ 617 crore, being 5 *per cent* of the expenditure. Further comments on pricing are at Paragraph8.1.6.

8.1.2.3 Revenue expenditure showed 11 *per cent* increase[122] in 2011-12 but decreased marginally by 2 *per cent* in 2012-13. Stores expenditure constituted 48 *per cent* of the total revenue expenditure; manufacturing expenditure constituted 36 *per cent*. Together the two components accounted for 84 *per cent* of the total revenue expenditure. Both the components registered a dip in 2012-13: stores by 7 *per cent* and manufacturing by 2 *per cent*. The decrease in expenditure under stores was mainly due to delays in supplies.

8.1.2.4 It is worthwhile to note that the norm for procurement of stores was changed with effect from January 2012. Prior to January 2012, factories' procurement was restricted to the annual requirement, which was changed to two years' requirement plus 50 *per cent* optional clause with staggered delivery. Despite the relaxation, the stores procurement did not increase in 2012-13 showing a conservative approach in the Ordnance Factory Board taking into cognizance the uncertainties in demand. Para 8.1.3.5 highlights the impact of short-closure of indents (*i.e*. reduction of demand) on production in the factories.

Capital expenditure

8.1.2.5 The Ordnance Factory Board also receives budgetary support for capital expenditure (Major Head 4076), also called the New Capital grant. This grant meets the expenditure on new projects including procurement of plant and machinery, for which ₹ 349 crore was spent in 2012-13. In addition, a separate fund called the Renewal & Replacement Fund, funds the replacement of old machinery. Currently at ₹ 439 crore, the Fund has been created through yearly transfers from revenue grant[123].

8.1.2.6 Capital expenditure has more or less remained static over the years: in fact, capital expenditure under New Capital grant at ₹ 349 crore was almost at the same level as in 2008-09. It represented only 3 *per cent* of the total expenditure of the Ordnance Factory Board. The low allocation for capital expenditure was because of slow progress on the two existing projects[124]; two

[122] The spurt in revenue expenditure in 2011-12 was due to increase in production with a resultant increase of 26 *per cent* in manufacturing expenditure.
[123]The amount transferred from Revenue grants (Major Head 2027) annually for the RR fund is equal to the annual depreciation of plant & machinery and rough expenditure for annual replacement.
[124] Ongoing projects being on establishment of Ordnance Factory Nalanda Project and Ordnance Factory Korwa, sanctioned in November 2001 and October 2007 with an outlay of ₹ 2160 crore and ₹408 crore respectively. As of March 2013, ₹ 856 crore was spent on the 2 projects.

new[125] projects were sanctioned in 2012-13 against which there was no expenditure during the year.

8.1.2.7 Our analysis showed that the expenditure on plant & machinery did not meet the need for new machines. As of March 2013, 572 project proposals for purchase of 1468 machines were reflected in the Ordnance Factory Board's database as pending decision at various levels. Further analysis of the level at which the procurement decision was pending is at Table-22. The delays would impact the project schedules. For instance, the project for "augmentation of capacity for production of spares relating to overhaul of T-72 and T-90 tanks" was sanctioned in October 2010 at a capital outlay of ₹ 368 crore due for completion in December 2013. As of March 2013, only ₹ 58 crore was spent on the project; 129 items of machines were yet to be ordered.

Table-22

Status	**Number of cases**
Tender opened at the factories	116
Tender Evaluation Committee meetings held at the factories	82
Tender Purchase Committee meetings held at the Factory/Board	41
No action on procurement	333
Total	**572**

8.1.3 Meeting the demand of Defence Forces

8.1.3.1 The Ordnance Factory Board plans production in the factories on the basis of :

- ***Requirements projected by the Forces***: Since 2011, the Army prepares a 5-year perspective (roll-on) plan for its needs of weaponry. This practice is yet to be adopted by the Air Force & Navy which provide such needs annually. However, the Ordnance Factory Board plans the production on the basis of firm orders (indents) placed by the Defence forces.

- ***Capacity of the factories for production***: The capacity of the feeder factories and that of the assembling factories (that assemble the final product for issue), together provide an assessment of the Ordnance Factory Board on its capacity to meet the requirements of the Forces.

8.1.3.2 The production targets are fixed by Ordnance Factory Board in consultation with the Defence forces. These targets are intimated to the

[125]Creation of capacity at Grey Iron Foundry for 51mm mortar bomb body and Creation of facilities for manufacture of components for anti submarine rockets at Heavy Alloy Penetrator Project Trichy

factories: for final products and for feeder factories, which are then communicated by the Ordnance Factory Board to the factories. The performance of the Ordnance Factory Board in meeting the targets over the period 2008-13 is indicated in the Table-23. In 2012-13, the Ordnance Factory Board could meet the targets on only 39 *per cent* of the items required by the Armed Forces.

Table-23

Year	Number of items			Percentage of shortfall
	Targets	Production	shortfall	
2008-09	419	296	123	29
2009-10	434	300	134	31
2010-11	639	416	223	35
2011-12	547	195	352	64
2012-13	529	205	324	61

8.1.3.3 We analysed a sample of 68 items across the operating groups, randomly selected, for the reasons for shortfall in production. Results of our analysis are at Table-24**.** No reasons were recorded against 28 items in the Report. It is important that the Ordnance Factory Board insisted on reasons for shortfalls from the Factories, for an effective internal control on achievement of targets. For instance, there was a 42 *per cent* shortfall in production of mine protected vehicle-Mark III by the Vehicle Factory Jabalpur, the value of shortfall being ₹ 158 crore but no reasons were recorded for the shortfall.

Table-24

Reasons	Number of items	Value of shortfall (₹ in crore)
Modification in demand by the clients	17	312
Non-receipt of components	16	416
No reasons recorded	28	538
Awaiting clearance for production	2	Not available
Others	5	44
Total	**68**	**1310**

8.1.3.4 An important factor to the shortfall was the inability to source quality components on time. The factories meet around 55 *per cent* of their demand from local vendors. For the remaining 45 *per cent*, reliance is placed on the sister ordnance factories; this is categorized under “inter-factory demands”. There were problems in both these streams of supply affecting supply of critical items of ammunition to the Army, as illustrated in Table-25. Paragraph 8.1.6.2 further analyses the impact of inter-factory demands on losses in sister assembling factories.

Table-25

Item	Target (Number)	Achievement (Number)	Shortfall (Number)	Value of shortfall (₹ in crore)	Reasons for shortfall
Shell 155mm HE ERFB (BB)	15,000	7,552	7,448	50	• Shortage in base bleed (propellant) grains from Ordnance Factory at Itarsi • Manufacturing defects in empty shells from Ordnance Factory at Ambajhari
Rocket 84mm HE	26,000	7,750	18,250	27	Short supply of empty fuse ex trade and propellant by Ordnance Factory Bhandara
Bomb 120mm Mortar HE	47,000	21,602	25,398	38	Short supply of empty bomb body from local vendors
Bomb 120mm Mortar PWP	5,000	Nil	5,000	8	• Successive failure in proof • Short supply of empty body and on hardware supplied by trade firms
Round 125mm HE	60,000	40,569	19,431	92	Non availability of passed proof shells from Ordnance Factory at Ambajhari due to quality problems

8.1.3.5 An equally significant reason for shortfalls was the vagary of demand wherein the clients, especially the Army reduced the demand during the year. Some critical items in which production was affected by short-closure of indents by the Army are illustrated in Table-26.

Table-26

Item	Target (Number)	Achievement (Number)	Shortfall (Number)	Value of shortfall (₹ in crore)
23mm Schilka APIT (ammunition)	50,000	8,651	41,349	11
84mm Rocket Launcher Indigenous MK-III	1,000	540	460	49
Shell 105mm IFG HE(ammunition)	1,80,000	1,03,385	76,615	90
Fuse 117 MK-20(ammunition)	1,50,000	56,470	93,530	25

8.1.4 Production

Value of production

8.1.4.1 The trends in value of production across the five operating groups of the Ordnance Factory Board during 2010-13 are given in the Table-27. The Ammunition & Explosives group contributed to 34 *per cent* of production in the Ordnance Factory Board. Together with Armoured Vehicles as well as Weapons, Vehicle & Equipment group, the contribution was 79 *per cent*. Trends in production of these three groups have a significant impact on the overall performance of the Ordnance Factory Board.

Table-27

Year	Value of production (₹ in crore)					
	Ammunition & Explosives	**Weapons, Vehicles & Equipment**	**Armoured Vehicles**	**Materials & Components**	**Ordnance Equipment**	**Total**
2010-11	5,016	3,275	3,263	1,802	833	14,188
2011-12	5,286	3,902	3,895	2,138	967	16,188
2012-13	5,540	3,873	3,550	2,338	1,120	16,420

8.1.4.2 The Ordnance Factory Board calculates the cost of production on finished goods; for our analysis, we treated value of production as the sum of Cost of Production plus Closing stock of Work-in-Progress minus Opening stock of Work-in-Progress. In 2011-12, the factories reported a growth of 14 *per cent* which came down to a 1.4 *per cent* growth in 2012-13. This was mainly because of a substantial dip in production in the Armored Vehicles Group, where from a growth of 19.4 *per cent* in 2011-12, the production fell by 8.9 *per cent* in 2012-13. Among this group, the fall in production in the Heavy Vehicle Factory, Avadi was ₹ 494 crore, attributable in part, to decrease in assembling of Semi-knockdown T-90 tanks. A similar pattern was seen in the Weapons, Vehicle & Equipment group: in 2011-12, it registered 19 *per cent* growth but in 2012-13, the production fell by 0.7 *per cent*.

8.1.4.3 We found that the dip in production was accompanied by a build-up of inventory under Work-in-Progress. Work-in-Progress as a percentage of cost of production rose from 16 *per cent* in the previous two years to 19 *per cent* in 2012-13.

The trends in Work-in-Progress during the period 2010-13 is at Table-28. The Armoured Group of vehicles have a longer lead time for production which would explain the higher incidence of Work-in-Progress in the group.

Table-28

Year	Work-in-Progress as percentage of cost of production					
	Ammunition & Explosives	**Weapons, Vehicles & Equipment**	**Armoured Vehicles**	**Materials & Components**	**Ordnance Equipment**	**Total**
2010-11	12	14	28	17	6	16
2011-12	12	14	25	18	6	16
2012-13	16	20	28	15	6	19

8.1.4.4 A factory-wise analysis showed some abnormal trends of Work-in-Progress which merit a closer review by the Ordnance Factory Board. The trends in factories which reported Work-in-Progress in excess of 40 *per cent* of cost of production are indicated in Table-29.

Table-29

Factory	Main product line	Years		
		2010-11	2011-12	2012-13
Ordnance Factory Medak	Combat vehicles and its overhauling	62	62	71
Gun Shell Factory, Cossipore	AK 630 Guns, 84mm RL MK-III,84mmTPT,Empty fuse and Primer	28	53	64
Gun Carriage Factory, Jabalpur	Barrels for guns and its spares	47	35	56
Metal & Steel Factory, Ishapore	Forgings for barrel and casing, Nose adapter, Steel and Brass rod, empty cartg case for 30mm Sarath	38	40	26

8.1.4.5 We selected Ordnance Factory, Medak and Gun & Shell Factory, Cossipore for further analysis. Ordnance Factory, Medak did not provide data. At the Gun &Shell Factory, Cossipore, the Works-in-Progress consisted mainly of ammunition items waiting for proof (tests on a sample) or rejected lots awaiting repairs (Table-30).

Table-30

Item	Cost (₹ in crore)	Status
Shell 125 mm HEAT ammunition: IFD item for Ordnance Factory, Chanda	76	• 8 lots costing ₹32 crore awaiting proofs • 3 rejected lots valued at ₹12 crore pending repair • 8 lots awaiting quality clearance
AK 630 gun	36	• Awaiting proof and post-proof operations
84 mm rocket launcher Mark-III	23	• Awaiting post proof operation

8.1.4.6 Effective control on production process would stem delays at different levels and timely closure of warrants (production of each item is authorized by a warrant). Warrants are required to be closed within 6 months. Our review of inventory management in eight sampled factories showed that 16 *per cent* of warrants were over a year old (Table-31). The value of warrants that were open for more than one year was ₹ 434 crore**.** Our analysis of individual items of Work-in-Progress showed that the Factories have been reflecting rejected stocks as Work-in-Progress for long periods.

Table -31

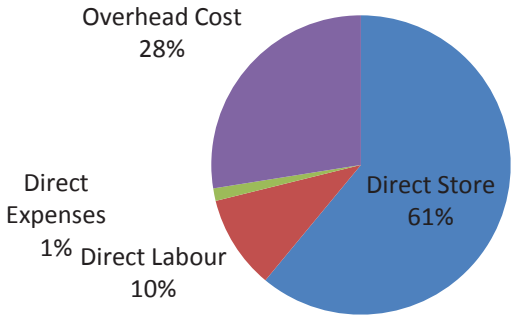
Period (in years)[126]	No. of warrants	Value (₹ in cr.)
1-2	2329	244
2-5	391	178
5-8	57	11
8-11	13	1
Total	**2790**	**434**

[126]Since the date of the warrant is not mentioned in the database of the Accounts (it mentions the year only), we could not cull out the number of warrants which were open for 6 months-1 year.

8.1.5 Cost of production

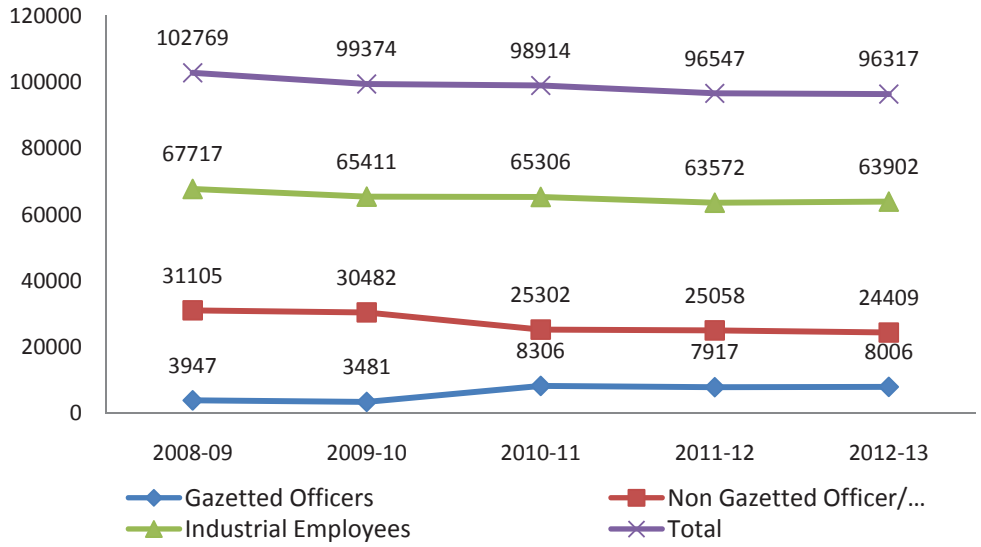
8.1.5.1 Stores account for 61 *per cent* of the cost of production. Overhead at 28 *per cent* of cost of production are particularly high in the Ordnance Factory Board.

Chart-8



8.1.5.2 The Ordnance Factory Board employed a total 96317 personnel in 2012-13 of which 63902 are categorized as Industrial Employees (Direct Labour). There had been a 5.6 *per cent* decline in Industrial employees over the period 2008-13. This reduction in direct labour was a consequence of retirements coupled with no recruitment at that level. However, re-classification of non-industrial employees as industrial employees, results in fluctuation in numbers, as in 2012-13 when there was a marginal increase in industrial employees by 330 **(**Chart-9**)**. The ratio of industrial workers to the supervisory officers was very high - 1.97 in 2012-13, *i.e.* one supervisory officer for every 1.97 direct labour. In machine intensive operating groups like Armoured Vehicle and the Ammunition & Explosives Group, the level of supervisory officers were even higher.

Chart-9: Year wise position of Staff



8.1.5.3 In the last five years, 2008-13, ₹ 3109 crore was spent by the Ordnance Factory Board on purchase of plant & machinery. The Ordnance Factory Board's instructions of 2004 require that every factory should assess the cost reduction and quality improvement with the introduction of new machinery. The basic premise is that the labour costs and cost of material should reduce with the introduction of new machinery.

8.1.5.4 Over the years 2008-13, there was no major pay revision except for periodic payments of dearness allowance which is fixed in relation to movement in Consumer Price Index. We indexed the cost of direct labour to the Consumer Price Index and discounted the rates with 2008-09 as the base year. The discounted costs show that there was an increase of 42 *per cent* in direct labour cost in the factories during 2008-13 (Table-32). The increase in labour cost, corrected for inflation, was despite the overall reduction of 5.6 *per cent* in direct labour during the same period.

Table-32

Year	Direct labour	
	Actual	Discounted[127]
2008-09	768	768
2009-10	1,102	981
2010-11	1,318	1,062
2011-12	1,490	1,108
2012-13	1,617	1,091

8.1.5.5 We further analysed the increase in labour cost with trends in utilization of man hours and machine hours to assess the efficiency effected in the factories from modernization. The results are tabulated in Table-33.

Table-33

(in lakh hours)

Year	Standard man hours			Standard machine hours			Cost of production	Increase (in *per cent*)
	Available	Utilised	Utilisation (in *percent*)	Available	Utilised	Utilisation (in *per cent*)		
2008-09	1,158	1,623	140	1,696	1,294	76	10,610	-
2009-10	1,125	1,269	113	1,839	1,261	68	11,818	11
2010-11	1,078	1,349	125	1,830	1,311	72	14,012	19
2011-12	1,080	1,375	127	1,577	1,232	78	15,933	14
2012-13	1,028	1,324	129	1,603	1,213	76	15,972	0.24

[127]

Year	Average Consumer Price Index	Calculation
2008-09	145	768
2009-10	163	(1102/163)*145= 981
2010-11	180	(1318/180)*145= 1062
2011-12	195	(1490/195)*145= 1108
2012-13	215	(1617/215)*145= 1091

8.1.5.6 The Table above shows that despite addition of new machines every year, the capacity for production in terms of available machine hours had in fact come down during 2008-13. From 1696 machine hours in 2008-09, it came down to 1603 machine hours in 2012-13. This could be the result of the following factors:

- *Loss of machine hours due to breakdowns*: We selected a sample of ten factories[128] for the review of loss of machine hours due to breakdowns. Four[129] factories did not provide the database. One[130] factory did not report any breakdown. The analysis of the remaining five[131] factories showed that out of 398 machines, 17 to 55 machines remained under breakdown for more than one month duration during 2009-13. The breakdown period exceeded six months in respect of 14-15 machines each year. The incidence of breakdowns at 9-14 *per cent* and loss of machine hours was high in the Ordnance Factories.

- The factories *de-rate the capacity* of machines over the life span of the machine. Paragraph 8.1.2.7 points to the fact that procurement of machines did not keep pace with the demand for machines.

- *Delays in commissioning new machines*: As of 31 March 2013, 265 machines worth ₹ 519 crore were awaiting installation in the Ordnance Factory Board. The Weapon, Vehicle and Equipment Division accounted for 30 *per cent* of the uninstalled machines. We also found delays in commissioning in 29 *per cent* of the machines test checked in 10 factories during the review on Capacity addition in ordnance factories.

8.1.5.7 The Ordnance Factory Board had fixed a capacity utilization of 80 *per cent* in the factories. The actual utilization averaged at 74 *per cent* during the last five years. On the other hand, the trends in utilization of man-hour was satisfactory and in correlation with trends in cost of production.

8.1.5.8 The introduction of a new machine is expected to have a tangible impact on the cost of production of items produced by the machine. For this purpose, the Ordnance Factory Board requires that the Estimates for production of items should be revised: the material/labour estimates and the percentage of unavoidable rejection should be reduced after the commissioning of the machines. Payments for labour and material are made on the basis of the estimates.

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[128]Ordnance Factory Ambajhari, Ordnance Factory Kanpur, Heavy Vehicle Factory Avadi, Ordnance Factory Khamaria, Ammunition Factory Kirkee, Rifle Factory Ishapore, Small Arms Factory Kanpur, Gun Carriage Factory Jabalpur, Gun and Shell Factory Cosipore and Field Gun Factory Kanpur

[129] Ordnance Factory Kanpur, Heavy Vehicles Factory Avadi, Field Gun Factory Kanpur and Ammunition Factory Kirkee

[130] Small Arms Factory Kanpur

[131] Ordnance Factory Ambajhari, Ordnance Factory Khamaria, Rifle Factory Ishapore, Gun Carriage Factory Jabalpur and Gun & Shell Factory Cossipore

We found that the factories did not conduct such a revision in 80 *per cent* of the machines commissioned during 2009-13 in the sampled 10 factories. Evidently, the review of the tangible benefits of modernization did not get adequate attention of the factories or the Ordnance Factory Board, leading to high material and labour costs. The Ordnance Factories have a captive client base; with little competition, there was no incentive to achieve economies in production and reduction in cost of production.

8.1.5.9 The high level of overhead charges in the cost of production, at 27.5 *per cent*, is also an indicator of inadequate control on costs. The Materials & Components group has the highest level of overheads, followed closely by the Weapons, Vehicles & Equipment group as shown in Table-34.

Table-34

	Overheads as a percentage of cost of production					
Year	**Ammunition & Explosives**	**Weapons, Vehicles & Equipment**	**Armoured vehicles**	**Materials & Components**	**Ordnance Equipment**	**Total**
2010-11	23.0	33.8	19.8	39.3	32.7	27.5
2011-12	23.3	31.7	18.0	37.3	33.3	26.5
2012-13	23.4	33.6	20.8	35.7	30.8	27.5

8.1.5.10 There was wide variation with some factories reporting consistently high level of overheads. Ordnance Factories with overheads above 50 *per cent* of the cost of production are listed at Table-35.

Table-35

Factory	**Main product line**	**Years**		
		2010-11	**2011-12**	**2012-13**
Metal & Steel Factory, Ishapore	Barrel and casing forging etc	65	61	53
Ordnance Factory Muradnagar	Castings for various ammunition	62	60	58
Rifle Factory Ishapore	5.56mm Rifle, Sporting Rifle	58	59	59
Ordnance Factory Bhandara	Propellants and charges	77	73	54
Ordnance Factory Dehradun	Sighting instruments and equipment	64	62	61
Small Arms Factory Kanpur	Carbines, Rifles and revolvers	54	56	54
Field Gun Factory Kanpur	Barrels, ordnance and revolvers	57	49	51
Ordnance Cable Factory Chandigarh	Cables and wires	63	65	52

8.1.5.11 We reviewed Metal & Steel Factory, Ishapore to examine the reasons for high fixed overheads. The fixed overheads was ₹ 137 crore in 2012-13, of which pay & allowances (₹ 79 crore) accounted for 58 *per cent*; depreciation was another 10 *per cent*. The high overheads are a consequence of high committed cost on a workforce that is not directly deployed on production. During 2010-13, the fixed overheads increased by 23 *per cent*, while the production of principal items increased only by 13 *per cent*. The increase in cost of production even as the cost of committed expenditure increased steadily reveals the high overheads at the Ishapore factory. Included in the pay and allowances are "miscellaneous allowances granted to Industrial Employees" which are essentially incentives for production and should have been booked under direct labour. In 2011-12, this miscellaneous account was ₹ 13 crore.

8.1.6 Pricing of products

8.1.6.1 The factories produce around 930 principal items. They are expected to recover the cost of production from its sales to the armed forces; from other clients in the open market, they are free to make profits. The issue price for the products is fixed in the beginning of the year based on the trends in the past three years. Hence, the issue price may be higher or lower than the actual cost of production. Moreover, the cost of production of the same item may vary across factories. Cross-subsidisation is the natural outcome of the process. In 2012-13, 31 factories earned a profit of ₹ 1044 crore while eight factories suffered a loss of ₹ 106 crore. The operating group-wise profit earned/loss incurred is illustrated in the Table-36. The Ordnance Factory Board earned a net profit of ₹ 938 crore. Included in this profit is ₹ 553 crore from issues to the Army. The Weapon group of factories registered the highest profits; in this group, the Vehicle Factory, Jabalpur with a profit of ₹ 253 crore accounted for 27 *per cent* of the total profit of the group.

Table-36

Profit/loss during 2012-13	Ammunition & Explosives	Weapons, Vehicles & Equipment	Armoured vehicles	Materials & Components	Ordnance Equipment	Total
IFD	-28	33	35	60	-3	97
Army	180	271	99	-	3	553
MHA	63	20	4	-	1	88
Others	38	128	6	37	-9	200
Total	**253**	**452**	**144**	**97**	**-8**	**938**

*IFD: *inter-factory demand, whereby sister factories feed the need for stores of other factories*

8.1.6.2 Issue price of Inter Factory Demand items are fixed centrally by Ordnance Factory Board in the beginning of the year. This introduces

elements in pricing which merit review since they have a significant bearing on cost of production and in pricing of products. In 2012-13, Inter Factory Demand factories earned a profit of ₹ 97 crore in issue of products to other factories as inputs for final products. As a result, the cost of material at final product factories was inflated by ₹ 97 crore since the cost at which these items were issued to the final product factories was taken as input cost by the final product factories and thereby jacking the input cost unnecessarily to the extent of profit element. This, ultimately, was loaded to the indentors particularly Armed Forces thereby making the product uneconomical.

8.1.6.3 Though eight factories, as referred to in Table-35, reported more than 50 per *cent* overheads in 2012-13, as discussed in Paragraph 8.1.5.10, these eight factories together made a profit of ₹ 90.5 crore in 2012-13. The absence of a strong watch on prices by the indentors allows the loss-making factories to load, to a great extent, the cost of inefficiency on the indentors. Some factories recovered their losses from issues to the Army by substantially higher prices charged from paramilitary forces (through Ministry of Home Affairs). For instance, Rifle Factory, Ishapore suffered a loss of ₹ 0.86 crore in 2012-13 in issues to Army which was compensated by ₹ 8.05 crore profit earned from sales to Ministry of Home Affairs.

Case study: Production costs & pricing at Metal & Steel Factory, Ishapore

Metal & Steel Factory, Ishapore showed a decline in number of principal items produced in the Factory: from 66 in 2010-11 to 28 in 2012-13. The cost of production of the principal items increased from ₹ 177 crore to ₹ 200 crore during the same period. The Factory is essentially a feeder factory with Inter Factory Demand issues contributing to 86-92 *per cent* of the total production. Para 8.1.5.10 highlighted the high overheads in this Factory (65-53 *per cent* of cost of production), making the production uneconomical. Yet, the factory registered profits each year: in 2012-13, it earned a profit of ₹ 19 crore.

Against a single item, the Metal & Steel Factory, Ishapore adopted different estimates for production in 2012-13. For instance, the nose adaptor for Fuze had 11 estimates with the estimated unit cost of labour ranging from ₹ 1 to ₹ 107. The fixed overhead in these estimates varied from ₹ 1.50 to ₹ 363; the variable overhead from ₹ 0.5 to ₹ 126. As a result, the actual unit cost of production against these 11 estimates varied from ₹ 141 to ₹ 793. The unit issue price of this Inter Factory Demand item was fixed at ₹ 668. This illustrates the acceptance of inefficiencies with no attempt to contain costs and the loading of these costs to the detriment of the receiving factories, with a cascading effect on the price of the final product. The Ordnance Factory Board appears to wield a relatively free hand on pricing even as the other stakeholders: the Defence Forces or the Ministry of Defence had not held the Ordnance Factory Board accountable on cost of items.

8.1.7 Inventory

8.1.7.1 Store as a percentage of cost of production was high in the Armoured Vehicles group and in the Ammunition & Explosives group at 73 *per cent* and 68 *per cent* respectively in 2012-13. The factories under these two groups are basically assembling units with input materials being procured either from sister factories or from trade.

8.1.7.2 High inventory holding is a persistent trend in the ordnance factories. Inventory of ₹ 10490 crore as of 31 March 2013 held by the Factories accounted for two-third of the cost of production. Further break-up of inventory is at Table-37.

Table-37

(₹ in crore)

Year	Stores in Hand	Work in Progress	Stores in Transit	Finished Goods and components	Total inventory
2010-11	5,178	2,296	669	1,214	9,357
2011-12	5,337	2,551	537	1,212	9,637
2012-13	5,604	2,998	682	1,206	10,490

8.1.7.3 We conducted a review of inventory management in nine sampled factories[132]. The results of the review show that the stock holding in all the sampled factories exceeded the prescribed levels, leading to build-up of non-active stores. Our key findings were:

- The Stores-in-hand (or raw materials) constitute over 51 *per cent* of the inventory holding as of 31 March 2013. Despite a reduction of 15 *per cent* in this category over 2011-13, this category continues to be an area of concern in Ordnance Factories.

- The Ordnance Factory Procurement Manual lays down Factory-wise limits of stock holding to either six months' or four months' consumption, depending on the nature of factories. We found that 95 *per cent* of the Stores in Hand in the nine Factories exceeded the prescribed limits. Over four-fifth of these items held in excess of the limits were items which were not consumed and hence, fell in the category of non-active items. Items worth ₹ 96 crore were not only held in excess of the prescribed holding limits but also had not been used even once after their procurement during 2010-13.

- Non-active stores-in-hand are the category of stores which were not consumed at all during a period of three years or more from the date of

[132]Ordnance Factory Katni , Metal & Steel Factory Ishapore , Machine Tools Prototype Factory Ambernath , Ordnance Factory Ambajhari , Gun& Shell Factory Cossipore , Heavy Vehicles Factory Avadi, Ordnance Factory Medak , Opto Electronics Factory Dehradun and Ordnance Factory Dehradun

receipt. In the nine sampled Factories, non-active stores-in-hand constitute 21 *per cent* of the inventory of stores-in-hand. The value of non-active stores stood at ₹ 512 crore as on 31 March 2013; in the three years of review, the figures for non-active stores have remained almost steady.

Chart-10: Inventory holding in nine OFs

8.1.8 Diversification of client base

8.1.8.1 Army is the principal client of the Ordnance Factory Board accounting for 80 *per cent* of the production. However, supply from the factories constitutes only 48 *per cent* of the army's total requirement. The Air Force and Navy together account for 3.6 *per cent* of the factory issues. The supplies of arms and ammunition to the paramilitary forces and the State police saw nearly 10 *per cent* spurt over the period 2011-13 and constituted 6.9 *per cent* of factory issues in 2012-13.

8.1.8.2 A small portion, 7.9 *per cent* of the issues, was accounted by civil trade, mainly in revolvers, pistols, sporting rifles. In 2012-13, the factories reported civilian trade of ₹ 948 crore. Civil trade had seen a spurt in the last three years' on which the factories earned considerable profits.

8.1.8.3 Of considerably lower value, ₹ 15 crore, was the revenue earned from exports in 2012-13; a reduction from ₹ 46 crore earned in 2011-12. Machine Tool Prototype Factory, Ambarnath was the principal exporter. However, the exports are a result of the offset policy of the Government of India which requires importers to offset the imports with exports from domestic suppliers.

8.1.9 Absorption of technology

8.1.9.1 One of the objectives of defence production in India is "to achieve substantive self–reliance in design, development and production of military equipment/weapon systems/platforms required for defence in as early a time frame as possible". This also forms one of the objectives of the Ordnance Factory Board: "To absorb latest technology through Transfer of Technology and in-house Research & Development".

Transfer of Technology

8.1.9.2 Transfer of Technology with Original Equipment Manufacturers is an important tool towards self-reliance. During the period 1999-2005, Ordnance Factory Board entered into a Transfer of Technology agreement with four Original Equipment Manufacturers (Table-38). Since 2005, there have been no Transfer of Technology agreements in the Ordnance Factory Board. Even though the planned date of indigenization ranged between 2002-03 and 2009-10 for these Transfer of Technology products, the absorption of technology had not been fully realized as given in the Table 38.

Table-38

Year	Item	OEM	Cost (₹in crore)	Planned period for indigenisation	Status of indigenisation
May 2004	AK-630 Guns	Rosoboronexport Russia	96	2007-08	48 *per cent*
February 2005	84mm Rocket Launcher Mark-III	FFV Ordnance, Sweden	460	2009-10	47*per cent*
June 2000	155mm Screening Smoke Blue Emission ammunition	M/s Denel Swartklip, South Africa	-	March 2003	25 *per cent*
October 2003	130mm cargo ammunition	IMI Israel	40	2008-09	Nil progress because of ban on IMI
February 2001	T-90 tanks	Rosoboronexport	2424	2006-07	59 of 78 codes (main assemblies)
	Total		3020		

8.1.9.3 Transfer of Technology did not lead to self-reliance: non-transfer of designs on critical assemblies by the Original Equipment Manufacturers, inability to develop a strong vendor base for components was the principal causes for setbacks in Transfer of Technology. This pushed the Ordnance Factory Board to rely on perennial imports of critical components. A case in example is the Transfer of Technology on T-90 tanks. The Transfer of Technology was marred by delays in translation of design documents and the Russian firm's failure to share designs on critical assemblies like the gun assembly. The problem was compounded by delays in decisions on alternative solutions on these designs. The result: fresh imports of T-90 tanks (and kits)

worth ₹ 4,913 crore. In addition, ₹ 2,372 crore was spent on import of critical assemblies/components of T-90, which formed 62 *per cent* of the total cost of indigenous production of T-90 tanks.

In-house Research and Development

8.1.9.4 Each ordnance factory has a cell for Research & Development. In addition, 11[133] Ordnance Development Centres have been established in different locations with specific expertise in different generic areas. These Centres form the nodal agencies to plan and advise the factories in their Research and Development efforts. The Ordnance Factory Board is authorized with full powers for incurring Research and Development expenditure.

8.1.9.5 The share of Research and Development expenditure to total revenue expenditure was negligible; at ₹ 48 crore in 2012-13, it accounted for only 0.40 *per cent* of the total revenue expenditure of the Board. There have been success stories in Research and Development expenditure. For instance, the Ordnance Factory Board developed, through a collaborative effort, 155 mm artillery gun which was successful in trial evaluation in February 2013, against which Army placed an indent of 114 guns.

8.1.9.6 However, delays had affected Research and Development efforts with projects abandoned midway without fruitful results. For instance, in Ordnance Factory Dehu road**,** two projects for Shells 155mm Red Phosphorous and Screening Smoke Blue Emission had been delayed by 118 and 17 months. The delays led to imports of ammunition to fill the gap. Out of five projects at Heavy Alloy Penetrator Project**,** Trichy on Fin Stabilised Armour Piercing Discarding Sabot shot/warhead, only one project was completed successfully. Two projects were short-closed and two were under trials.

PART-II: OUR AUDIT PROCESS

8.1.10 Audit planning

8.1.10.1 Our Audit process starts with the risk assessment of the organization as a whole and of each unit, based on expenditure incurred, criticality and complexity of activities, level of delegated financial powers, assessment of overall internal controls and concerns of stake holders. Previous Audit

[133]Small Arms Ammunition Development centre at Ammunition Factory Kirkee, Filling Technology and initiatory composition Development centre at Ordnance Factory Chanda, Explosive and Propellant Development centre at Ordnance Factory Bhandara, Ammunition Hardware, Rocket, Mechanical Fuses and Non-ferrous alloys at Ordnance Factory Ambajhari, Electronic Fuses and Guidance at Machine Tool Prototype Factory Ambarnath, Large Calibre weapon and platform centre at Gun Carriage Factory Jabalpur, Small Arms Development at Rifle Factory Ishapore, Ordnance & Combat Equipment Development centre at Ordnance Factory Kanpur, Advance Material Development (Ferrous) center at Metal and Steel Factory Ishapore, Armoured Vehicle Development centre at Ordnance Factory Medak and Optronics Development and Electronics centre at Opto Electronic Factory Dehra Dun.

findings are also considered in this exercise. Based on the risk assessment, the frequency and extent of audit are decided. An annual audit plan is formulated to conduct audit on the basis of such risk assessment.

8.1.10.2 After completion of audit of each unit, Local Test Audit Reports containing audit findings are issued to the Head of the Unit. The units are requested to furnish replies to the audit findings within a month of receipt of the Local Test Audit Reports. Whenever the replies are received, audit findings are either settled or further action for compliance is advised. Important audit observations arising out of these Local Test Audit Reports are processed for inclusion in the audit reports which are submitted to the President of India under Article 151 of the Constitution of India. During 2012-13, audit of 47 units was carried out by employing 4047 party days. Our audit plan ensured that most significant units, which are vulnerable to risks, were covered within the available manpower resources.

8.1.10.3 We issued 65 Local Test Audit Reports consisting of 435 paragraphs during 2012-13. In addition, 535 Local Test Audit Reports consisting of 1816 paragraphs were outstanding as of 1 April 2012. Regular interaction with the units helped find satisfactory response on 84 Local Test Audit Reports consisting of 524 paragraphs. As of 31 March 2013 on 516 Local Test Audit Reports consisting of 1727 paragraphs, we are awaiting a response from the units.

8.1.10.4 This Report also highlights 14 cases of infractions by Ordnance Factory Board, detected in audit, which involved substantial amount of funds.

8.2 Inventory Management in Ordnance Factories

Executive Summary

The Ordnance Factories held an inventory of ₹ 10,490 crore (31 March 2013) which accounted for two-third of the cost of production. The Review of Annual Accounts prepared by the Principal Controller of Accounts, Factories (PC of A, Fys) identifies as an “Area of Concern”, the high level of inventory in the factories. The database of stores is computerised in the Ordnance Factory Board (Board) and in the Factories. Hence, we felt that a review of the inventory management would help us make suitable recommendations on inventory management in the Ordnance Factories.

Our audit covers the performance of Ordnance Factories in the years 2010-11 to 2012-13. It covered the Ordnance Factory Board (Board) at Kolkata and nine Ordnance Factories selected across all operating groups of Factories. The selected Factories together held inventory worth ₹ 4,799 crore which

represented 46 *per cent* of the total inventory held in all Ordnance Factories as of 31 March 2013.

Stores-in-hand (SIH) *i.e.* inventory of raw material with the Stores Section of the Factory is an area of concern in inventory management in the Factories. At the level of ₹ 2,425 crore, SIH constituted over 50 *per cent* of the inventory holding in the nine sampled factories as of 31 March 2013. In the nine sampled factories non-moving SIH, *i.e.* items which were not consumed for a period of three or more years after purchase, increased by 73 *per cent* during 2010-13. Our analysis showed that 95 *per cent* of the SIH in the sampled Factories exceeded the prescribed limits. Over four-fifth of these items held in excess of the limits were items which were not consumed at all during the year under our analysis, 2012-13. Items worth ₹ 96 crore were not only held in excess of the prescribed holding limits but also had not been used even once after their procurement during 2010-13. The current procedure to exhaust all options of potential usage had in effect failed and led to build-up of non-active stores. On the other hand, the definition of "active" stores (an item is categorised as active even if only one unit is consumed during the year) creates a potential risk of token consumption in order to keep the items off the "non-moving" category. All nine sample Factories together registered token consumption against 5,925 items valued at ₹ 373 crore, indicating a common trend.

Works-in-Progress (WIP) are inventory held by the Factory Production Shop, which are under production. WIP in the nine Factories increased by 21 *per cent* during the period 2010-13 and as of March 2013, the value of WIP stood at ₹ 1501 crore. The increase in WIP without a correlated increase in cost of production points to a risk of fraudulent booking of material or labour against open warrants *i.e.* warrants not closed although production against them had stopped for variety of reasons. Although warrants are required to be closed within six months, 17 *per cent* of warrants of eight sampled factories were over a year old. The value of warrants that were open for more than one year was ₹434 crore. The Factories had been reflecting rejected stocks as WIP or Stores-in-transit between Factories, in some cases for over 20 years, which remained un-detected. A protracted process for review of inventory and to fix accountability for loss due to rejections, led to a tendency in the Factories to "hide" rejections by categorising rejected stores under WIP or SIT even as delays in fixing accountability defeated the purpose.

The assurance to be provided by the physical verification was inadequate and did not reflect the correct position on physical availability of stores. The use of "loan issues" of material without a demand note from the Shop does not have the sanction of Board and constitutes a bad practice. The review of inventory holding by the Board was not comprehensive and did not yield clear and firm directions to the Factories.

Recommendations

- ***The budget estimates on stores procurement should be closely linked to the production plans of the Factories. The Board may institute an annual mechanism to review reasons for variations which will help to increase the accuracy in estimation. This process should be steered by the Deputy Director General (Budget).***
- ***The Board may review the high incidence of stores in excess of the authorised limits and revisit the norms for stores holding.***
- ***The Board may re-examine the parameters for categorisation of Stores-in-hand as "active" and peg it to a percentage of utilisation, so as to avoid cases of nominal consumption.***
- ***Non-active stores (8530 items) valuing ₹161 crore in Heavy Vehicle Factory at Avadi on account of T-72 tanks may be segregated for Technical Review (after identifying the requirements for overhaul of existing T-72 tanks) which would facilitate specific directions from the Board on these items. Such segregation would leave a more manageable inventory in the hands of the Board.***
- ***The Board may recognise the risk of fraudulent booking of expenditure against warrants kept open without any production against them. An annual exercise to segregate such warrants and their review will mitigate the risk.***
- ***Work-in-Progress (WIP) items on account of MBT Arjun at Heavy Vehicle Factory at Avadi may be segregated for technical review which would facilitate specific directions from the Board on these items.***
- ***The Board may insist on annual item-wise analysis of items reflected as WIP and Stores-in-Transit for long periods. This could be done on a risk-based sampling which factors both value and time analysis.***
- ***The Board may review the reasons against the regular practice of "loan issues" and take steps to eliminate this bad practice.***
- ***The Board may simplify the process for declaration of items as surplus and their disposal to ensure timely action on items that have become "non-active" stores.***
- ***The Board may fix viable timelines for constitution of and the submission of reports by the Board of Enquiry as well as for action on these reports.***
- ***The Board may draw a time-bound plan for seamless integration of the two databases.***

The Board accepted all the above recommendations during the Exit Conference (September 2014).

8.2.1 Introduction

Ordnance Factories, 39 in number, manufacture various items for the defence services. These items are segregated into five Operating Groups and include arms, ammunition, armoured vehicles, transport vehicles, clothing and equipment. The Factories work under the overall control of the Ordnance Factory Board (Board), Kolkata. Member, Planning and Materials Management and Engineering (P&MM) in the Board is in charge of inventory management. The organisation of the Member (P&MM) is given in **Annexure-IX**.

The Ordnance Factories plan their production on the basis of the requirements (annual indent) projected by, and in mutual consultation with the armed forces. Only in January 2010, the process was streamlined with the Army providing a five year roll-on plan for ammunition; such a plan for weapons was started in February 2011. Army being the major client for the Ordnance Factories, a roll-on plan aids the Board in multi-year planning for production and associated activities like procurement of stores and inventory management.

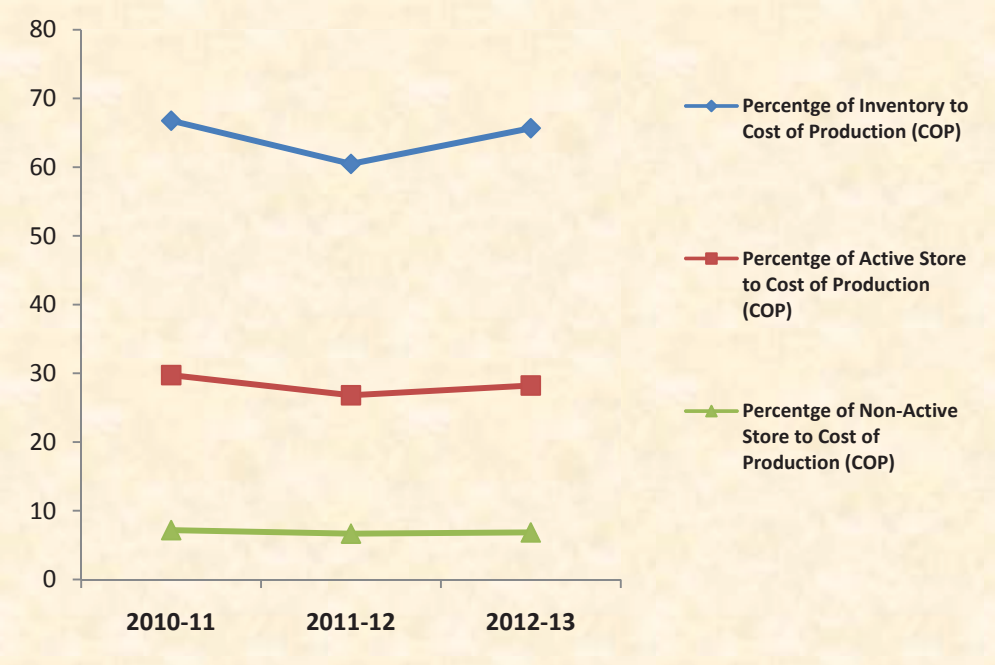
Stores constitute around 60 *per cent* of the cost of production during 2010-13 in the Ordnance Factories (Chart 11). The average annual consumption of stores in the last three years: 2010-13 was ₹ 9,500 crore and the average cost of production during the same period was ₹ 15,300 crore. The Factories purchase stores through imports, from indigenous sources and from other sister Ordnance Factories.

Chart 11: Break-up of Cost (In percentage)

8.2.2 Why did we take up this audit?

Altogether, inventory of ₹ 10,490 crore held by the Factories as on 31 March 2013 accounted for two-third of the cost of production. The holding showed an upward trend in 2012-13(Chart 12) when it stood at 66 *per cent* of cost of production. The level of non-active inventory, defined as those items of store which have not been utilised at all during the year, remained static during the last three years. The Review of Annual Accounts prepared by the Principal Controller of Accounts identifies as an "Area of Concern", the high level of inventory in factories. We felt that a review of inventory management would help us aid the Board in identifying the reasons for the inventory build-up and make suitable recommendations on inventory management.

Chart-12



8.2.3 Scope of audit and sample

Our audit covers the performance of Ordnance Factories in the years 2010-11 to 2012-13. It covered the Board at Kolkata and nine[134] Ordnance Factories selected across all operating groups of Factories. The selected Factories together hold inventory worth ₹ 4,827 crore which represented 50 *per cent* of the total inventory held in all Ordnance Factories. Table-39 below gives details on audit sample selection.

[134] Ordnance Factory Katni, Madhya Pradesh (OKAT), Metal and Steel Factory Ishapore, West Bengal (MSF), Machine Tools Prototype Factory Ambarnath, Maharashtra (MTPF), Ordnance Factory Ambajhari, Maharashtra (OFAJ), Gun & Shell Factory Cossipore, West Bengal (GSF), Heavy Vehicles Factory Avadi, Chennai (HVF), Ordnance Factory Medak, Telengana (OFMK), Opto Electronics Factory Dehradun, (OLFD) and Ordnance Factory Dehradun, Uttarakhand (OFD)

Table-39: Population and sample selected

Category of stores[135]	Population		Sample		Quantum of audit (in percentage)	Remarks
	Number of items	Value (₹ in crore)	Number of items	Value (₹ in crore)		
A	2,659	727	161	636	100	Stores items that were not included in the sample are: (a) those less than ₹ 10 lakh in value in five Factories i.e. OKAT, MSF, MTPF, GSF & OFD and; (b) less than ₹one crore in three Factories i.e. OFAJ, OFMK & OLF &(c) less than ₹ two crore in HVF.
B	2,072	592	55	79	50	
C	98,463	1,101	78	194	25	
Total	**103194**[136]	**2,419**[137]	**294**	**909**		

8.2.4 Audit objectives

The objectives of our audit were to draw an assurance that:

- An effective mechanism was in place for estimating the requirement of funds and in phasing of utilization of funds on stores procurement;
- The process was adequate to ensure that Stores-in-hand held by the factories was within the prescribed norms and are utilised on time to prevent build-up of non-active stores;
- Stores categorised as "Work-in-progress" are reviewed to ensure timely completion against the authorisation for production;
- Stores-in-transit were promptly taken on charge and disputes between factories were resolved to ensure clearance of these items; and
- The internal controls on inventory management were in place and were implemented effectively.

8.2.5 Source of audit criteria

The major sources of audit criteria adopted for assessing the audit objectives were:

- OFB's Procurement Manual 2005 and 2010;
- Factory Accounting Rules (FAR);
- Defence Accounts Department Office Manual Part-VI (DAD OM Pt-VI);
- Orders and instructions issued by the Ministry of Defence and OFB;

[135] A category items are those items whose annual consumption value represents 80 per cent of the total consumption value, B category items are those items whose annual consumption value represents 15 per cent of the total consumption value and C category items are those items whose annual consumption value represents 5 per cent of the total consumption.

[136] Out of 3.04 lakh store items, 2.01 lakh store items were having nil stock balance and actual stock items were 1.03 lakh items

[137] The value of store in hand (SIH) as on 31 March 2013 in the database of the nine Factories is reflected at ₹ 2419.24 crore whereas ₹ 2425.25 crore in the annual store account, which is yet to be reconciled.

- Delegation of financial powers;
- Minutes of the meetings of the OFB and Ordnance Factories; and
- General Financial Rules (GFR)

8.2.6 Audit methodology

The audit was conducted during October 2013 to January 2014.The database of inventory in all the nine Ordnance Factories was analysed using a computerised audit tool, IDEA (Interactive Data Extraction and Analysis). We focused on Stores-in-hand, Work-in progress and Stores-in- transit which together accounted for 89 *per cent* of the total inventory.

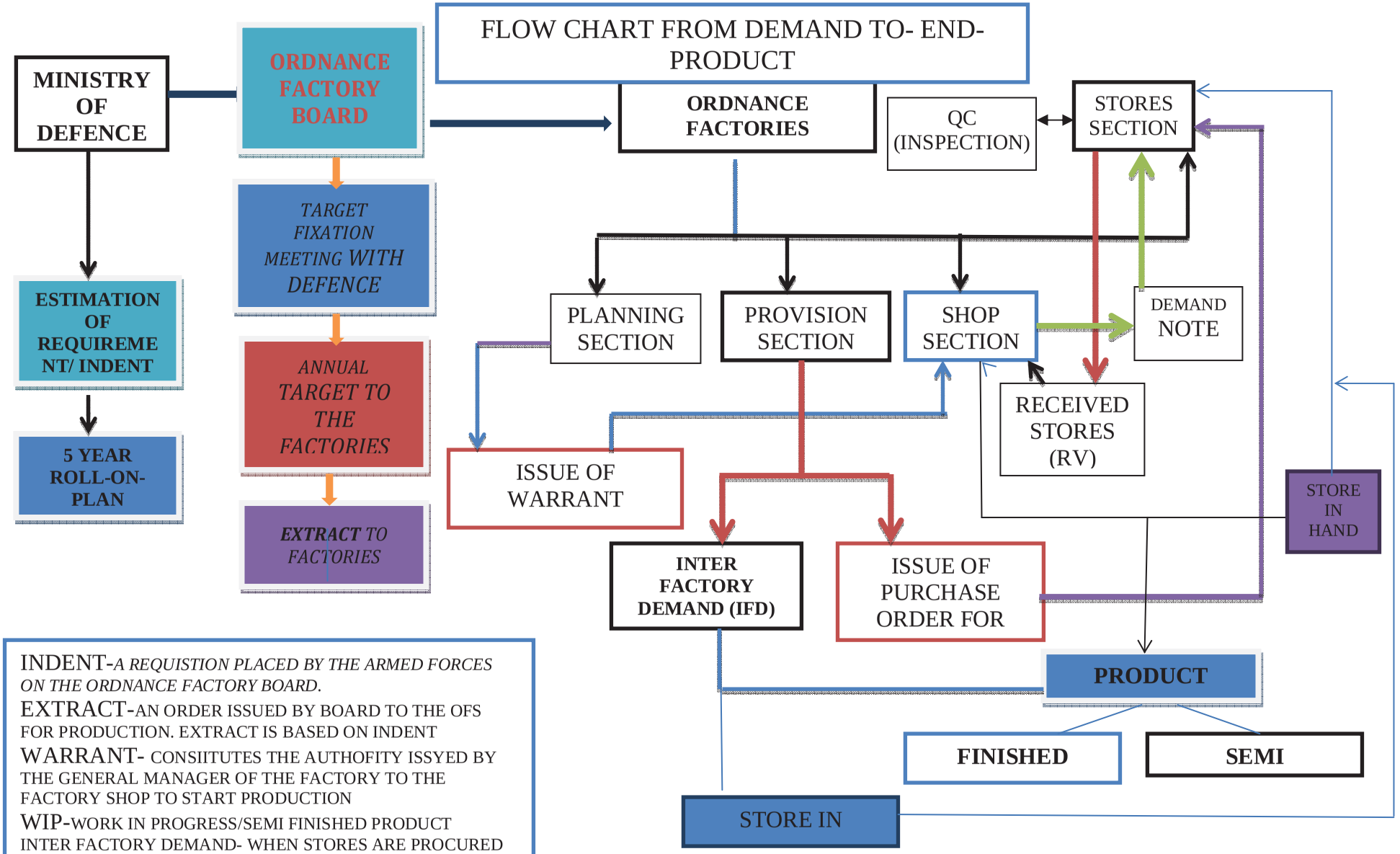
The audit objectives and criteria were discussed with the Board during an 'Entry Conference' held in November 2013. The findings were communicated to the factory management during the audit. Response of the Board, against our original draft report issued in March 2014, was received in September 2014. Views of the Board and the Ordnance Factories have been included in this Revised Report, where appropriate. The 'Exit Conference' was held on 03 September 2014, wherein the report was discussed.

8.2.7 Acknowledgement

We would like to acknowledge the support and co-operation received from the Board and the officers and staff at the nine Ordnance Factories.

8.2.8 Process flow from demand to inventory

The flow-chart overleaf illustrates the procedures in purchase and utilisation of stores in Ordnance Factories.



INDENT-*A REQUISTION PLACED BY THE ARMED FORCES ON THE ORDNANCE FACTORY BOARD.*

EXTRACT-AN ORDER ISSUED BY BOARD TO THE OFS FOR PRODUCTION. EXTRACT IS BASED ON INDENT

WARRANT- CONSIITUTES THE AUTHOFITY ISSYED BY THE GENERAL MANAGER OF THE FACTORY TO THE FACTORY SHOP TO START PRODUCTION

WIP-WORK IN PROGRESS/SEMI FINISHED PRODUCT

INTER FACTORY DEMAND- WHEN STORES ARE PROCURED FROM SISTER ORDNANCE FACTORIES

8.2.9 Audit findings

Audit Objective: An effective mechanism was in place for estimating the requirement of funds and in phasing of utilization of funds on stores procurement

8.2.9.1 Expenditure on stores management

The cost of procurement is met from Stores budget allotted by the Board at the beginning of each financial year. Details of the utilisation of funds in stores management in the sampled Ordnance Factories are given in Table-40.

Table-40: Utilisation of funds on stores

(₹ in crore)

Year	Budget estimate (BE)	Actual expenditure (AE)	Variation (AE – BE)	Percentage of variation
2010-11	3,632	2,515	-1,117	-31
2011-12	2,101	2,372	271	13
2012-13	2,222	2,056	-166	-07

The gap between budget estimates and actual utilisation had decreased substantially over the 3 years, indicating an improvement in estimation of stores requirement. However, factory-wise analysis **(Annexure X)** shows substantial variation between actual and estimated expenditure. For instance, Opto Electronics Factory at Dehradun exceeded its budget by 87*per cent* in 2012-13; in the same year, the Metal & Steel Factory at Ishapore exceeded the budget by 57*per cent*. On the other hand, Machine Tools Prototype Factory (MTPF) at Ambarnath could not spend 31*per cent* of its budget in 2012-13. The savings in five Factories netted the excess in other four Factories, keeping the overall expenditure almost within the budgeted limits in 2012-13.

Expenditure on stores decreased by 18 *per cent* during the period 2010-13. This was mainly because of bulk imports[138] of T-90 kits by the Heavy Vehicle Factory at Avadi in 2010-11 which was followed by almost nil procurement in the subsequent two years. The reduction in Avadi more than offset the increase in expenditure on stores in the remaining Factories during the period 2010-13.

The Board felt (September 2014) that budget estimates are prepared when firm indents are not available and hence, the accuracy of estimation should be judged on the revised estimates which are prepared after the receipt of indent and are more realistic.

[138] Of Semi-knocked down and Complete knock-down items

We accept that expenditure in the Board is squarely predicated on indents, which are not always predictable. Budgetary flows, dependent on the estimates, ensure that production proceeds un-hindered. However, significant divergence from estimates, at the factory-level, as illustrated in Opto Electronics Factory, Dehradun and Metal and Steel Factory Ishapore, is an issue that merits monitoring.

Month-wise analysis of expenditure **(Annexure XI)** shows a skewed expenditure pattern in the Factories with bulk of expenditure pushed to the fourth quarter of the financial year January–March, with the last month expenses being disproportionately high. The rush of expenditure was particularly noticeable in the Heavy Vehicle Factory at Avadi, Opto-Electronics Factory at Dehradun and Ordnance Factory, Dehradun. The Ordnance Factory, Dehradun spent 56 *per cent* of the stores budget in the last quarter in 2012-13; the corresponding figures for 2010-11 and 2011-12 were 61 *per cent* and 42 *per cent* respectively. The pattern of expenditure is a consequence of bunching of bills and of receipts against procurement orders in the last quarter. This could be a consequence of delays in procurement which in turn could affect the supply chain management and the Factories' ability to meet production and delivery against targets. The inventory database does not contain data on scheduled date of receipt of stores *vis-à-vis* actual date of submission of bills against supply of stores. As a result, we could not conduct an analysis of reasons for rush of expenditure in the last quarter.

The Board felt (September 2014) that these were stray cases of variations which were mainly due to foreign purchase and centralised purchases. The facts did not however, corroborate the Board's view.

Conclusion

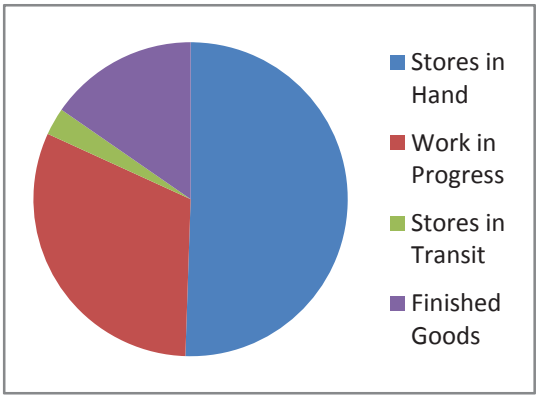
There was wide variation in utilisation of budget at a few sampled Factories and there is scope for substantial improvement in estimating the requirement of funds and in phasing of utilisation of funds on stores procurement.

Recommendation

- ***The budget estimates on stores procurement should be closely linked to the production plans of the Factories. The Board may institute an annual mechanism to review reasons for variations which will help to increase the accuracy in estimation. This process may be steered by the Deputy Director General (Budget).***

8.2.9.2 *Analysis of inventory*

Chart 13



Audit Objective: The process was adequate to ensure that Stores-in-hand held by the factories was within the prescribed norms and were utilised on time to prevent build-up of non-active stores.

Inventory held by the Factories are in the following forms:

- ***Stores-in-Hand*** (SIH): Raw material held by the Stores Section
- ***Work-in-progress*** (WIP): Items of inventory which are under production in the Factory Shop.
- ***Stores-in-Transit (***SIT): Stores held by the Store section that are issued by one factory but not accounted for by the recipient factory as of 31 March of each year.
- ***Finished goods/Finished components*** (FG/FC): Inventory of final products and intermediary products held by the Factory Shop.

The trends in inventory across these categories in the nine Factories are given in Table-41.

Table-41: Inventory position

(*₹in crore*)

Year	Stores in Hand	Work in Progress	Stores in Transit	Finished Goods	Total inventory
2010-11	2,867	1,242	202	835	5,146
2011-12	2,443	1,446	131	808	4,828
2012-13	2,425	1,501	136	736	4,798

Although total inventory holding in Ordnance Factories as a whole increased by 12 *per cent* during 2010-13, the nine sampled Factories showed a different trend. The holding across the nine Factories reduced by 6.7 *per cent* in the three years, which was mainly due to 23 *per cent* reduction in procurement of stores coupled with 10 *per cent* increase in consumption of stores.

8.2.9.3 *Stores- in- Hand*

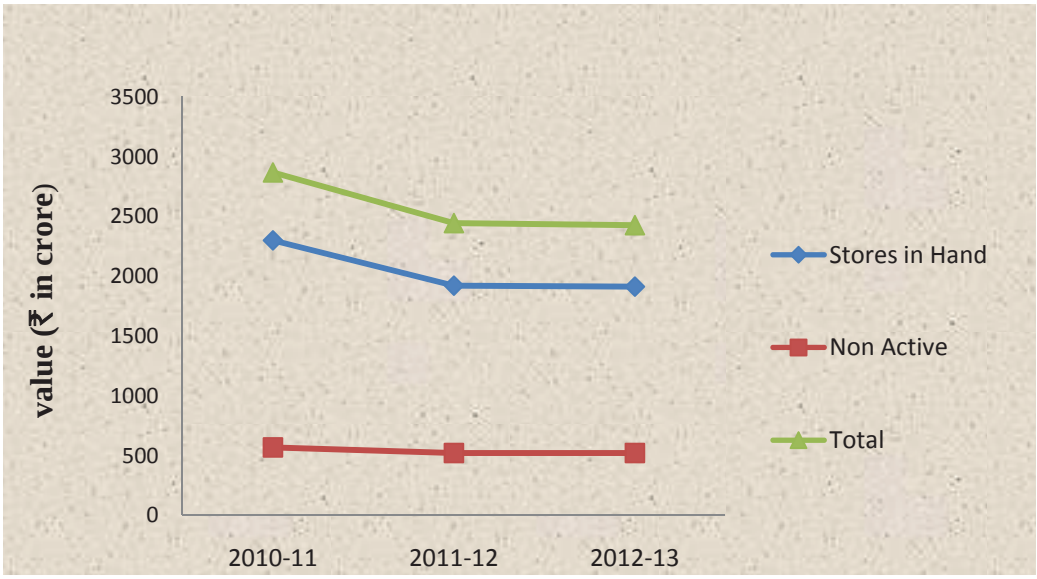
The Stores-in-hand (or raw material) constitute over 51 *per cent* of the inventory holding as of 31 March 2013. Despite a reduction of 15 *per cent* in

this category over 2011-13, this category continues to be an area of concern in Ordnance Factories.

Ordnance Factories classify inventory into following categories on the basis of their utilisation:

- **Active**: stores consumed during the year, regardless of the units or regularity of consumption.

Chart-14: Inventory Holding in Nine OFs



- **Non-active**: stores not consumed at all during the year, which is further classified as -
  - **Slow moving**: stores which were not consumed for a continuous period of one year from the date of receipt.
  - **Non-moving**: stores which were not consumed at all during a period of three years or more from the date of receipt.
  - **Surplus**: stores which cannot be utilised now or in future; are liable to deteriorate; and are declared surplus by the Factory after a review. These can be considered for use by other sister factories or Defence Public Sector Undertakings.
  - **Scrap/obsolete**: stores which are unserviceable and are declared as scrap by the Factory after a review. These are then disposed off by the Factory.

Non-active stores-in-hand in the nine sampled Factories constituted 21 *per cent* of the inventory of stores-in-hand during 2011-13. The value of non-active stores stood at ₹ 512 crore as on 31 March 2013.The analysis of non-active stores in the nine Factories during the three years 2010-13 is given in Table-42.

Table-42: Non-active stores

(₹in crore)

Year	Slow-Moving	Non-Moving	Surplus	Scrap, Obsolete	Maintenance spare	Total non-active stores
2010-11	372	158	7	10	21	568
2011-12	274	206	6	15	21	522
2012-13	195	273	4	20	20	512

During 2010-13 the holding of non-active stores in the nine Factories reduced by 10 *per cent* which is an improvement. But the non-moving stores, *i.e.* items which were not consumed in the preceding three years, increased by 73 *per cent* during the same period.

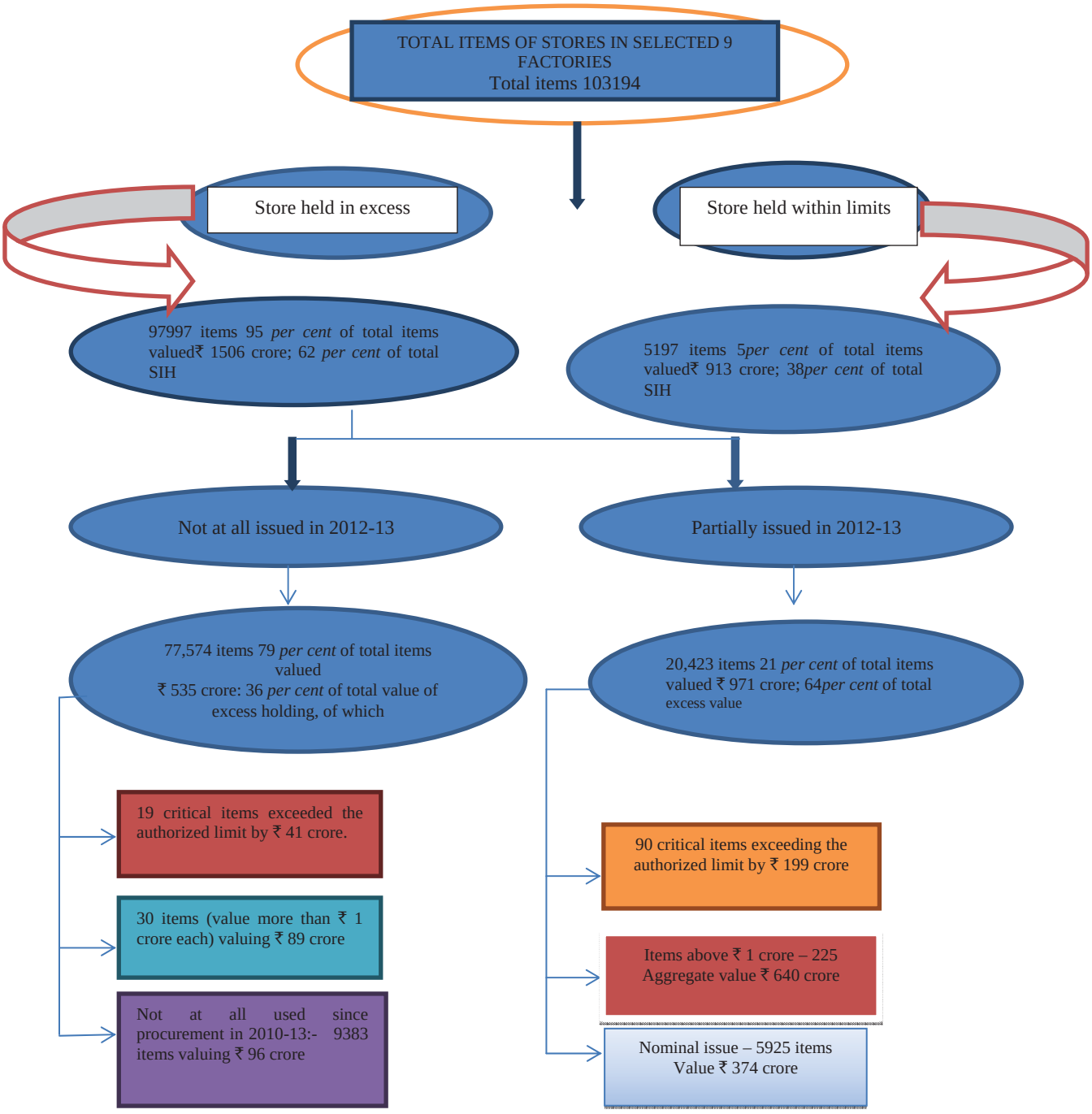
The Board stated (September 2014) that all efforts would be made to reduce the Non-active stores in the factories. Instructions were being issued to the factories to undertake a special drive to utilise or dispose non-moving stores wherever feasible.

8.2.9.4 *Holding against authorised limits*

The Ordnance Factory Procurement Manual lays down Factory-wise limits of stock holding to either six months' or four months' consumption, depending on the nature of factories. Analysis of the pattern of consumption in the nine Factories showed that the actual stock held exceeded the prescribed limits in all the Ordnance Factories except Opto Electronics Factory at Dehradun as detailed in the **Annexure XII**. Inventory held in excess of the authorised limits was 35 *per cent* of the total stock-in-hand as of 31 March 2013. Consequently, the stores could not be consumed and fell in the category of slow-moving stores initially and later, became non-moving stores.

Chart 15 provides the results of our analysis of the database on stores-in-hand (SIH). We found that 95 *per cent* of the SIH in the nine Factories exceeded the prescribed limits. Over four-fifth of these items held in excess of the limits were items which were not consumed and hence, fell in the category of non-active items. Items worth ₹ 96 crore were not only held in excess of the prescribed holding limits but also had not been used even once after their procurement during 2010-13.

Chart – 15



8.2.9.5 Reasons for Excess holding

The databases maintained by the Factories on inventory do not indicate the reasons for the excess holding. We examined individual items and found that the following reasons contributed mainly to 27 cases of stores valuing ₹ 270 crore, segregated under different causes for excess inventory, as indicated in **Annexure XIII**:

- The Factory could not meet the production schedules and the delays led the buyer to cancel (or foreclose) the order. Hence, the stores bought to

meet the original production targets, remained unutilised. Illustrative cases are indicated at serial number 1 to 7 of **Annexure XIII**.

- The indents were short-closed because the items produced did not meet the quality standards and were rejected. As a result, the remaining stores were rendered surplus. Illustrative cases are given at serial number 8 to 13 of **Annexure XIII**.
- The buyer/ the Board reduced the targets mid-way through production and the stores were rendered surplus. Illustrative cases are indicated at serial number 14 to 16 of **Annexure XIII**.
- Problems in supply chain management where inability to procure one/more input material renders the other related stores procured for the production, unutilised. Illustrative cases are indicated at serial number 17 to 19 of **Annexure XIII**.
- Over-provisioning emerges as a problem across the Factories. The reasons for over-provisioning range from genuine mistakes, problems in programming and more simply, lack of accountability. Illustrative cases are listed at serial number 20 to 27 of **Annexure XIII**.

We found that the Heavy Vehicle Factory at Avadi alone accounted for inventory of ₹ 688.92 crore of stores-in-hand which exceeded the prescribed limits, of which ₹ 304.76 crore fell under non-active items as of March 2013. A major chunk of this inventory (8530 items valued at ₹ 161 crore) was related to T-72 tanks which had been in stock since 2007, lying un-utilised because the buyer, Army fore-closed the order on grounds of five year slippage in production and poor quality of the product.

The Board, in its reply (September 2014), provided an analysis for the build-up of stores in the factories, as under:

Comments of the Board	Our remarks
Increase in inventory holding of non- ferrous scrap by ₹ 40 crore at Ordnance Factory Katni was due to upward revision of price.	The increase in value of non-ferrous scrap did not form a part of closing stock as the value of closing inventory of the said store was ₹ 2 crore out of total inventory of ₹ 103 crore as of March 2013.
Value of inventory went up at Metal Steel Factory, Ishapore after physical verification revealed surplus stores lying in the production shop, which were then taken on charge.	The surplus stores were not actually taken on charge in the stores accounts without which the value of inventory could not be increased.
Inventory limit was exceeded due to suspension of project on Gas system assembly on cluster Bomb at Machine Tools Prototype Factory.	The stores were procured as back as in March 1999. Management could not take action either for alternate use or disposal of the item for more than a decade.

Out of three items at Ordnance Factory Ambajhari, Parted steel billets for 105 IFG had been consumed fully by issue to Ordnance Factory Kanpur, Magazine blank was under active consideration for disposal and parted steel billets for 155 Extended Range Full Bore ammunition would be consumed in 2014-15 and 2015-16.	Parted steel billets 105 IFG, Magazine blank and Parted steel billets for 155 Extended Range Full Bore ammunition valuing ₹ 1.81 crore, ₹ 0.06 crore and ₹ 20.83 crore respectively were still held in stock (September 2014).
Holding of two high value stores *viz*; AK-630 and 84 mm RL MK-III at Gun & Shell Factory was due to long procurement cycle.	The management should have a system in place to carry out advance planning for procurement of stores involving long procurement cycle.
Heavy Vehicles (Armoured Vehicles group) Factory has been authorised to hold inventory up to 365 days due to specific requirement of the nature of the factory.	This is in contradiction of OFB's own procurement manual which authorises a limit of six months' holding for Armoured Vehicles group of factory which is the maximum amongst all groups of factories in OF organisation.

However, two factories- Opto-Electronic Factory at Dehradun and Ordnance Factory, Dehradun informed (September 2014) that the SIH holding had been substantially reduced as of 31 March 2013.

8.2.9.6 *Nominal consumption of stores*

Analysis of pattern of consumption in the Factories shows that the definition of categories of non-active stores carries an additional risk. We found 5925 items valued at ₹ 374 crore against which token consumption was registered in the Factories. The consumption of the above items was so low that if actual consumption was taken as the yardstick, the current holding would suffice for an irrational number of years. But token consumption of this kind would keep such items off the non-moving/slow-moving category which would make detection of these items as concern areas, difficult. This constitutes a potential risk. These findings are given in Table-43.

Table-43: Nominal issue of stores

Factory	Item code	Unit of quantity	Stock	Consumption in 2012-13	Stock in years/ consumption as a *percentage* of stock
OKAT	1035763004	Litre	17200	800	21 / 4.65
MSF	4203144066	Number	580	20	29/3.45
MTPF	7119047045	Number	4166	182	23 / 4.37
OFAJ	0282083096	Number	37929	1060	35 / 2.79
GSF	0133100032	Kg.	29289	0.013	2253014/0.00004
HVF	6206205142	Number	178	6	29 / 3.37
OFMK	6420086002	Kg	71736	225	318 / 0.31
OLF	7420111008	Number	64945	2300	28 / 3.54
OFD	0020024547	Number	577	1	577 / 0.17

The Board, in response (September 2014) furnished an analysis of reasons for accumulation of the stores during earlier years and present position of the particular stores highlighted as example. They failed to indicate any reasons against nominal issue of stores of 5925 items and steps being taken to curb the practice of shifting non-active stores to active stores through nominal issue.

Conclusion

Stores-in-hand (SIH) is an area of concern in inventory management in the Factories. In the nine sampled factories, non-moving stores, i.e. items which were not consumed in the preceding three years, increased by 73 *per cent* during 2010-13. Around 95 *per cent* of the SIH in the nine Factories exceeded the prescribed limit. Over four-fifth of these items held in excess of the limits were items which were not consumed and hence, fell in the category of "non-active" items. On the other hand, the definition of "active" category (an item is categorised as active even if one unit is consumed during the year) creates a potential risk of token consumption in order to keep the items off the "non-moving" category. All nine sample Factories together registered token consumption against 5,925 items valued at ₹ 373 crore, indicating a common trend.

Recommendation

- ***The Board may review the high incidence of stores in excess of the authorised limits and revisit the norms for stores holding.***

- ***The Board may re-examine the parameters for categorisation of SIH as "active" and peg it to a percentage of utilisation, so as to avoid cases of nominal consumption.***

- ***Non-active stores (8530 items) valuing ₹161 crore in Heavy Vehicle Factory at Avadi on account of T-72 tanks may be segregated for Technical Review (after identifying the requirements for overhaul of existing fleet of T-72) which would facilitate specific directions from the Board on these items. Such segregation would leave a more manageable inventory in the hands of the Board.***

8.2.9.7 *Work in Progress (WIP)*

Audit Objective: Stores categorised as "Work-in-Progress" are reviewed to ensure timely completion against the authorisation for production.

Work-in-Progress constitutes those items of inventory which are under production. On receipt of a target from the Board, the General Manager of the Ordnance Factory issues a warrant to the Production Shop. The warrant is essentially an authorisation for the Shop to start production. The warrant

provides the nomenclature and quantity of the final item to be produced, the input material and the labour estimates for the production of the item. So, the quantum of WIP is essentially the cost booked (labour and material) against a warrant for an item that is still under production.

8.2.9.8 *Trends in holding of Works-in-Progress*

Works-in-Progress in the nine Factories increased by 21 *per cent* during the period 2010-13. As of March 2013, the value of Works-in-Progress stood at ₹ 1,501 crore in the nine sampled Factories. Heavy Vehicle Factory at Avadi alone accounted for ₹ 382 crore of which ₹ 128 crore was on account of MBT Arjun for which the Factory has not received any fresh orders from the Army since 2010.

The increase of 21 *per cent* in Works-in-Progress did not correlate with 13 *per cent* increase in cost of production and less than one *per cent* increase in value of issue during the same period. This points to a risk of irregular or unauthorised booking of material or labour against open warrants *i.e.* warrants not closed although production against them had stopped for variety of reasons.

8.2.9.9 *Time analysis of open warrants*

The rules require that a warrant will be of a normal duration of six months only, which pre-supposes that production of items should normally be completed within six months. When considered necessary, a warrant can be extended beyond the stipulated six months, but only with the approval of the Board.

Table-44

Period (in years)[139]	**No. of warrants**	**Value (₹ in cr.)**
1-2	2,329	244
2-5	391	178
5-8	57	11
8-11	13	1
Total	**2,790**	**434**

A time-analysis of open warrants for eight sampled factories[140] showed that around 17 *per cent* of warrants were over a year old. The value of warrants that were open for more than one year was ₹ 434 crore. There was nothing on record to indicate that the Board's approval had been received for the warrants

[139] Since the date of the warrant is not mentioned in the database of the Accounts (it mentions the year only), we could not cull out the number of warrants which were open for six months to one year.
[140] Age-wise analysis of WIP in respect of Machine Tool Prototype Factory was not available in the Local Accounts Office.

outstanding for periods in excess of six months. Review of Annual Accounts prepared by the Principal Controller of Accounts (Factories) highlighted this issue of old outstanding WIP, but we did not find on record directions by the Board in this matter.

The Board stated that (September 2014) some of the vintage warrants were pending regularisation of loss; the position had improved in all factories except Gun and Shell Factory, Cossipore and Machine Tool Prototype Factory, Ambarnath, and that all the warrants prior to 2008-09 had been closed. It was also claimed that as of March 2013, only 1,165 warrants valuing ₹ 337 crore were more than one year old.

Our audit results did not corroborate the claim as per the figures shown in the Table. The Board also felt that considering the complexities/manufacturing cycles of the product, norms on life of warrants merit a review.

Analysis of individual items in WIP showed that included in this class of inventory are items that had been rejected by the buyer or were simply lying without completion of production. Cases illustrated in **Annexure XIV** (serial number-1,2,3,4,5,6,7,8,11 and 12) show that significant number of items reflected as WIP are essentially items that were rejected in quality control.

8.2.9.10 *Suspicious warrants*

Absence of managerial oversight at the level of the Board has encouraged a lax approach to an issue that has potential risk of fraud. Analysis of the outstanding warrants showed that 19 *per cent* (3,333 warrants) with a value of ₹452 crore, had only cost of stores booked against them. This essentially means that the production did not commence on these material after they were received in the Shop, since there was no labour charge or overheads booked against them. Another 1,858 warrants had no booking of material but ₹ 7 crore had been charged as labour against them. These warrants kept open though no production is currently underway against them, pose a risk of fraudulent booking of expenditure.

The Board felt (September 2014) that the above warrants may be for items in semi-finished condition. The material must have been drawn by the production section but no labour was drawn as yet. Regarding WIP in the form of labour alone, the Board stated that the warrant mentioned would be examined and remedial action be taken.

The reply of the Board is not acceptable as the warrants in the form of material only are outstanding since 2003-04 and warrants in favour of labour are outstanding since 2006-07.

Conclusion

The increase in WIP without a correlated increase in cost of production points to a risk of fraudulent booking of material or labour against open warrants i.e. warrants not closed although production against them had stopped for variety of reasons. Although warrants are required to be closed within six months, 17 per cent of warrants were over a year old. The value of warrants that were open for more than one year was ₹ 434 crore.

Recommendation

- ***The Board may recognise the risk of fraudulent booking of expenditure against warrants kept open without any production against them. An annual exercise to segregate such warrants and their review will mitigate the risk.***

- ***WIP items on account of MBT Arjun at Heavy Vehicle Factory at Avadi may be segregated for technical review which would facilitate specific directions from the Board on these items.***

8.2.9.11 *Stores in transit (SIT)*

Audit Objective: Stores-in-transit were promptly taken on charge and disputes between factories were resolved to ensure clearance of these items.

Stores that are issued by one factory but not accounted for by the recipient factory as of 31 March of each year, fall under the category of Stores in Transit (SIT). The guidelines on Inter Factory Demand (IFD) transactions require that:

- On receiving the IFD stores, the consignee factory should prepare receipt vouchers. The material should be taken in the stock on the basis of inspection notes issued by the consignor factory and the consignee's own inspection.
- In case the inspection reveals deficiency in quality or quantity of stores, the first option is to explore the option with the consignor to rectify the error. Thereafter, the consignee factory can either regularize the loss through a discrepancy voucher or raise the dispute with the Board.
- In all situations, the stores must be taken on charge in the stock register.

Period (years)	Value (₹ in lakh)
1- 5	2676
5-10	1286
10-15	517
15-20	95
> 20 years	168

SIT in the nine sampled Factories was ₹ 136 crore as on 31 March 2013. Age analysis showed that these items have been reflected as SIT and not taken into stock, some for over 20 years.

We further analysed individual cases of SIT. Three Factories alone, Metal & Steel Factory Ishapur, Ordnance Factory Ambajhari and Gun & Shell Factory Cossipore had SIT valuing ₹ 28 crore due to rejection of stores, loss of stores *etc.* Some of these cases are discussed in **Annexure XV**. The Board agreed (September 2014) that SIT arose due to inadequate documentation during issue of IFDs and due to disputes on IFDs. Specific response to cases brought out in the Annexure is awaited. The Board assured action to liquidate the long-pending SIT.

Conclusion

The Factories had been reflecting rejected stocks as Store-in-transit form between Factories, in some cases for over 20 years, which remained un-detected.

Recommendation

- ***The Board may insist on annual item-wise analysis of items reflected as WIP and SIT for long periods. This could be done on a risk-based sampling which factors both value and time analysis.***

8.2.10 Internal Controls

Audit Objective: The internal controls on inventory management were in place and were implemented effectively.

8.2.10.1 *Stock verification*

Factories are required to conduct stock verification of all inventory items as per the laid down norms: high value items[141] are verified twice in a year and the rest are verified annually. The General Manager of the Factory is responsible for this exercise.

All the nine sampled Factories had designated sections for physical verification[142]. But four Factories, Ordnance Factory Katni, Metal and Steel Factory Ishapore, Gun and Shell Factory Cossipore and Machine Tools Prototype Factory, Ambarnath did not conduct verification annually for all items; a deviation from the prescribed schedule of half-yearly verification of high value items. In one factory, Machine Tool Prototype Factory Ambarnath,

[141] The top 70 to 80 *per cent of annual consumption is regarded as high value items usually categorised as 'A' category*

[142] Physical verification team comprises Junior Works Manager, Chargeman under the control of Jt. General Manager

the store officer was also the officer-in-charge for store verification, which constituted a risk.

Deficiencies in physical verification affected the assurance provided from such an exercise. For instance: "Loan issues" are material issued by the Stores section without a "demand note" from the Shop, sometimes on verbal orders of superiors[143]. As a result, the material although not physically available with the Stores, is not deducted from the Bin Card. But in the physical verification, the material was being certified as physically available. This deficiency in physical verification was noticed in four out of the nine sampled Factories, which indicates that the physical verification did not reflect the correct position of the stores and was thus fraught with risk. Use of loan issues through which stores are used in production without documentation of quality checks and without accounting for them in stores, is in our opinion, a bad practice and introduces a serious risk. Besides, the Board's Stores Manual does not allow "loan issues".

Some of the cases are discussed in **Annexure XVI**. In Ordnance Factory Katni, we found loan issues to be a regular practice. In one case, Copper cathode valuing ₹ 1.70 crore was not taken into stock or authorised by the quality assurance wing, but was shown as issued. As a result, the physical balance was more than the amount reflected in the bin cards, but the discrepancy was not raised in the stock verification. In another factory, Ordnance Factory Medak, the physical verification showed 3246 items less than in the stores database in 2012-13, but the difference was not reconciled; such difference has been persisting since 2010-11. The Board's response to cases brought out in the Annexure was awaited as of September 2014.

The Board, while agreeing to audit observations stated that (September 2014) stock verification in the factories are being strengthened. Necessary fresh directives have since been issued for effective implementations of the instruction. The Board further stated that loan issues in the factories occurred only in exigent and emergency conditions. Our audit showed that this was not the case and loan issues were frequently resorted to by the factories.

Conclusion

The assurance to be provided by the physical verification was deficient and did not reflect the actual physical availability of stores. This was particularly with regard to "loan issues" which are material issued by the Stores section without a "demand note" from the Shop. The use of loan issues does not have the sanction of the Board and constitutes a bad practice.

[143]Factories resort to "loan issues" when there is a shortage of material against one warrant due to high rejections on quality of raw material and a "loan" helps them to continue production till another warrant permits them to draw the material against a demand note. Or when there is a delay in quality inspection of raw material, "loan issues" form an alternative route to draw material to continue production

Recommendation

- ***The Board may review the reasons against the regular practice of "loan issues" and take steps to eliminate this bad practice.***

8.2.10.2 *Review and disposal of stock*

Guidance on management of stores-in-hand requires the Ordnance Factories to follow the procedure as detailed below:

- The Accounts Office in the Factory in consultation with the Material Control Officer prepare, twice in a year, a list of all stock, segregating the stores-in-hand under different categories including non-moving as well as slow moving items.
- The items in the above list are physically verified by the stock verification group.
- The "Slow moving" and "non-moving" items are referred to the Stock Review Committee twice in a year. This Committee reviews the likely usage of these non-active items within the factory or alternatively, list the items under "surplus" stores.
- Surplus stores of value exceeding ₹ 10 lakh are circulated through Mutual Aid Scheme (MAS) to explore options of their use in other sister Factories.
- Where such items are not accepted by other Factories under MAS, the matter is referred to the Board which will constitute a Technical Committee to examine the potential use of the items including by other defence PSUs.
- At the factory level, for items below ₹10 lakh, a Technical Committee is constituted by the General Manager, who is authorized to take action to dispose the items.
- Review of disposal of identified stores is one of the items for monthly review in the Factory by the Unit Level Monitoring Committee (ULMC)

(i) Effectiveness of Stock Review Committee

The Board issued instructions in July 2008 to the Ordnance Factories to form Stock Review Committee (SRC) for review of stores-in-hand. Out of nine sampled Ordnance Factories, six had constituted a Stock Review Committee. On the other hand, we did not find a significant improvement in those Factories which had constituted the Committee. The Committee comprises Sr. General Manager/General Manager as the Chairman with Additional General Manager of the user, planning and material management

section, Controller of Accounts/Jt. Controller of accounts as Members. The Members are thus not independent of factory management.

All sampled Factories had significant stock of non-active stores. Clearly, the constitution of a Committee is a good step but there are problems elsewhere which the Committee alone cannot solve. We examined the reasons in detail in two factories, Gun & Shell Factory, Cossipore and the Metal & Steel Factory, Ishapore.

(ii) Identification and alternative use of surplus stores in sister factories

In the nine Factories, the total value of non-active stores is ₹ 492 crore[144], of which only items worth ₹ 24 crore *i.e.* 5 *per cent* had been declared surplus or scrap. The Factories tend to shy away from declaring stores as surplus. The MAS scheme was ineffective and sister Factories were not incentivised to explore the possibility of use of surplus stores of other Factories. For instance GSF circulated (February 2010)169 items valuing ₹ 16 crore through MAS but as of May 2014, there was no response from other sister factories. The scheme has a cascading effect prolonging the period of non-use of surplus stores and further lowering its residual value. A good practice would be one in which the procedure for use of surplus stores tracks the period since the item was lying un-utilised or its shelf-life; a practice that did not exist in the Board.

(iii)Other potential use

The Technical Committee is another rung in this chain which did not reveal promising results. Gun and Shell Factory, Cossipore referred (February 2010) 17 items valued at ₹ 14 crore to the Technical Committee of the Board for circulation to other defence PSUs. The records of the Gun and Shell Factory, Cossipore did not show the length of the time these items were lying as surplus stores. Gun and Shell Factory, Cossipore reported disposal of seven items (May 2012) valuing ₹ 4 crore only.

(iv) Disposal of stores

The Disposal of surplus stores is another hurdle. Gun and Shell Factory, Cossipore had surplus stores of ₹ 1.87 crore as on March 2011, out of which stores worth ₹ 0.32 crore only could be eventually disposed of. The situation in the other years remained the same, with only 17 per cent of the surplus stores being disposed of**.** In all, 1732 items valuing ₹ 1.55 crore out of the surplus stores of ₹ 1.87 crore remained static without disposal during the last three years.

[144] The total value of non-active stores was ₹ 512 crore as of March 2013, which includes "maintenance stores" of ₹20 crore, which cannot be declared as surplus because of its prolonged shelf life.

(v) Regularisation of loss and fixing of accountability

It is important to note that a large chunk of stores booked under WIP and SIT for years, are rejected stores. The General Manager of the Ordnance Factory is authorised to regularise loss due to rejection upto ₹ 2 lakh where there is negligence of the staff and officers of the Factory; and ₹ 10 lakh where there is no such negligence. All items above this list are to be referred to the Board. In case the loss is over ₹ 50 lakh, where there is no negligence or ₹ 20 lakh where there is negligence, the matter has to be referred to the Ministry of Defence (MoD). Associated with this delegation is the requirement that responsibility must be fixed through a Board of Enquiry.

We found that a significant number of cases of loss were pending for regularisation by the MoD and the Board for years together. For instance: out of 39 cases of loss regularisation in manufacture of stores in Metal and Steel Factory, Ishapore, 23 cases valuing ₹ 976 crore were pending at MoD for a period ranging from one to 21 years. The balance 16 cases valuing ₹108 crore were pending at the Board level for a period ranging between three to 28 years.

Regularisation of loss is subject to investigation of the case by a Board of Enquiry to fix responsibility, which is expected to submit its Report within two months. The Board of Enquiry is a lengthy procedure with delays at each step. For instance, Metal and Steel Factory, Ishapore constituted (July 2010) a Board of Enquiry to look into 16 number of rejection cases that had been accumulated in 16 warrants during the period 2004- 2009. The Board submitted its report in March 2011. In all the cases the Board held no individual person as responsible and instead, suggested review of quality control process as a remedial measure. In another case, the Ordnance Factory at Ambhajari constituted a Board of Enquiry in December 2005 on three rejected stores valuing ₹ 0.30 crore lying under SIT. The Report was not submitted and a fresh Board of Enquiry was constituted in July 2012.A third Board of Enquiry was approved in August 2013, the Report of which is awaited. The requirement of submission of Reports by the Board of Enquiry clearly did not hold much sanctity in the Ordnance Factories. The delays in different stages stymie the deterrent impact of this control.

This protracted process, meant as a deterrent to negligence leading to loss , also creates a disincentive for the Factories to come clean on the stock holding of rejected stores, fostering a tendency to let them remain under WIP or SIT. Open warrants also allow the factory a convenient window to book items of expenditure: material or labour when required, although there is no production against them.

The Board stated (September 2014) that instructions have since been issued to reactivate Stock Review committee.

Conclusion

A protracted process meant as a deterrent leads to a tendency to "hide" rejections by categorising stores under WIP or SIT even as delays in fixing accountability defeated the purpose. The current procedure to exhaust all options of potential usage had in effect failed and led to build-up of non-active stores.

Recommendation

- **The *Board may simplify the process for declaration of items as surplus and their disposal to ensure timely action on items that have become "non-active" stores.***

- ***The Board may fix viable timelines for constitution of and the submission of reports by the Board of Enquiry as well as for action on these reports.***

8.2.10.3 Controls in accounting of inventories

The receipt, utilisation and issue of stores are recorded in the Stores Department and in the Accounts Section. The Factories use the Production Planning Control (PPC) system on UNIX platform since 1993. The Accounts Office uses a separate database in FOXPRO that manually collects data through a CD from the PPC package.

As discussed earlier, the inventory module of the accounting software has several deficiencies. The sub-modules of the inventory module did not contain data on scheduled date *vis-a-vis* actual date of submission of bills against supply of stores, reasons for warrant outstanding beyond the authorised period of six months and booking of only labour/ only material against those warrants. The inventory module did not also indicate the reasons for high incidence of SIH, surplus stores as well as non-utilisation /disposal of such stores

The two software packages have not been integrated leading not only to sub-optimal use of PPC package but also led to discrepancies in data that remained un-reconciled. Mention was made on this issue in Paragraph 5.4.1 of the Audit Report No 3 of 2006. The Ministry provided (December 2009) the following status on the issue:

- A Committee had been set by the Principal Controller of Accounts (Factories) Kolkata to examine the reasons for differences between Management Information System generated by two systems and to suggest necessary modification to ensure seamless flow of date across the systems.

- The Report submitted by the Committee was not accepted by the Board. Principal Controller of Accounts (Fys) Kolkata was then requested to re-convene the Committee to elaborate the report.

The Board stated (September 2014) that moving towards a common database between two organisations was a major task that would need to address the requirements of both the organisations and as such, it was difficult to give a definite time line. However, efforts were being taken in a phased manner and are being monitored regularly to ensure early migration towards a common database.

We found persistence of differences in the sampled Factories, which totaled to ₹ 214 crore. The difference was as high as ₹ 165 crore as of 31 March 2013 in Ordnance Factory, Medak. The cases are discussed in **Annexure XVII**. The Board's specific response to cases brought out in the Annexure was awaited (September 2014).

We also found accounting errors in different Factories. An illustrative list as detected in Gun& Shell Factory, Cossipore as discussed below:

- Store worth ₹ 3.96 crore was taken on charge with zero value, under-stating inventory.

  The Board stated that (September 2014) necessary rectification has been carried out by preparation of receipt/issue voucher according to the procedure laid down in the books.

- Scrap valued at ₹ 2.84 crore was taken on charge as input material and not as reduction of input cost, thus overstating cost of production.

  The Board while contradicting the figure of ₹ 2.84 crore stated (September 2014) that debit item number 9 of stores account showed a nil balance. The reply substantiates the fact that accounting errors do exist in the system which requires to be reconciled.

- Overhead expense of ₹ 4.01 crore included stores and finished components consumed thus overstating overheads and under-stating stores.

The Board stated that (September 2014) replacement and rectification work on defective items was accounted as overheads.

However, the details of replacement/repair works undertaken were not furnished.

Conclusion

The non-integration of databases maintained by the Factory and of the Accounts office, led to discrepancies which remained un-reconciled.

Recommendation

- ***The Board may draw a time-bound plan for seamless integration of the two databases***

8.2.11 Monitoring by top level management

The Board is presented with a report on inventory on a quarterly basis. An examination of the minutes of the meetings did *not* reveal a comprehensive review or a risk-based examination of high-value items of stock holding. In the absence of a sustained and focused review, the Factories did not get the benefit of a clear direction from the Board to mitigate the build-up of stores-in-hand.

From a review of the Minutes of the meetings of the Board it was observed that out of 36 meetings held, between April 2010 and March 2013, issues relating to inventory were discussed only in 17 meetings. The deliberations in these meetings were general. For instance: the Board directed (July 2011) all its Operating Divisions to interact with the Senior General Managers/General Managers to work out the plan to liquidate the slow-moving and non-moving stores in phases and watch the progress on the monthly basis. But here too, no firm quantity target was fixed for liquidation of slow-moving and non-moving stores or a specific timeframe for their disposal was fixed.

Conclusion

The review of inventory holding by the Board was not comprehensive and did not yield clear and firm directions to the factories.

The matter was referred to the Ministry in March 2014; their reply was awaited (September 2014).

8.3 Indigenous production of MBT Arjun and T-90 Bhisma Tanks

8.3.1 Introduction

8.3.1.1 In order to achieve self-reliance in manufacture of Armoured Fighting Vehicles, Ministry of Defence (Ministry) sanctioned a project in May 1974 for design and development of first indigenous tank of India *i.e.* Main Battle Tank – Arjun by Defence Research and Development Organisation (DRDO) at a cost of ₹ 16 crore. The scope of the project was to manufacture 12 prototypes by April 1982. The DRDO completed its work on the design of MBT Arjun in March 1995 at a cost of ₹ 306 crore; the Ordnance Factory Board (Board) was tasked (1999) to establish the facilities for its manufacture.

8.3.1.2 In 2000, the Army reported a 38 *per cent* shortage of tanks against its authorised holding of 3,717 tanks. The steps taken by the Ministry during 2000-2004 to fill this need were:

- Import of 124 fully formed T-90 tanks (February 2001) from a Russian firm M/s Rosoboronexport (ROE) at a total cost of ₹ 1,774 crore;
- Import of 186T-90 tanks (February 2001) as 86 Semi-knock down (SKD) and 100 Complete Knock-Down (CKD) at a cost of ₹ 2,312 crore with transfer of technology (TOT) for manufacture of T-90 tanks by the Board and training of Indian personnel;
- Phased production and issue of 124 Main Battle Tank – Arjun (MBT Arjun) by the Board over the period 2002-07. The Board was sanctioned ₹ 100 crore (May 2002) to set up the facilities for manufacture of 30 MBT Arjun per annum; and
- Indigenous production of 300T-90 Bhisma tanks (T-90 tanks) with ToT from M/s ROE over the period 2006-10. The Ministry sanctioned ₹ 96 crore (December 2003/ February 2004) for developing infrastructure for indigenous manufacture of 100 T-90 tanks per annum.

The Heavy Vehicles Factory at Avadi (HVF) was assigned the task of the roll-out of the indigenously produced/ assembled MBT Arjun and T-90 tanks. In all, 734[145] tanks were to be made available to the Army by 2010. **Annexure-XVIII** gives the details of the agencies involved.

8.3.1.3 Our Audit Reports of 1998 and 2006[146] had covered the development of MBT Arjun. The Public Accounts Committee (PAC) in its Report[147] directed (December 2003) the Ministry to:

- Closely monitor the production schedule at HVF to make available the requisite number of MBT Arjun to the Army within the stipulated time; and
- Ensure that the infrastructural facilities created were utilised optimally so that the desired volume of production of MBT Arjun would enable progressive reduction of import content to 45 *per cent*.

8.3.1.4 We conducted audit in five Ordnance Factories[148] and the Armoured Vehicles Headquarters Avadi (AVHQ) to review the production and issue of MBT Arjun and T-90 tanks up to 2012-13, with particular reference to the

[145] MBT Arjun – 124, T-90 tank (FF) – 124, T-90 tank (SKD/CKD) – 186, T-90 tank (Indigenous) - 300
[146] Paragraph 26 of Report No. 7 of 1998 and 3.8 of PA Report No. 3 of 2006 of the Comptroller & Auditor General of India
[147] Report No. 57 of 2003-04 placed in the Parliament in December 2003
[148] Heavy Vehicles Factory Avadi (HVF), Engine Factory Avadi (EFA), Ordnance Factory Medak (OFMK), Gun Carriage Factory Jabalpur (GCF), Opto Electronic Factory Dehradun (OLF)

directions of the Public Accounts Committee. The AVHQ at Avadi comprises five Ordnance Factories including HVF, Avadi and functions under the direct control of the Board.

8.3.2 Indigenous production of MBT Arjun

8.3.2.1 The Army placed an indent (March 2000) on the Board for delivery of 124 MBT Arjun within a tentative schedule of 2000-06. In 2002, the production schedule was shifted to 2002-09. The HVF was tasked to produce 15 MBT Arjun under the Limited Series Production (LSP) by 2004. The bulk production of 109 MBT Arjun was to commence after the field trials by the Army.

8.3.2.2 Table-45 provides the year-wise production and issue of MBT Arjun. Despite the fact that the production schedule was shifted from 2002-07 to 2002-09, the Board could not produce on time, the quantity indented by Army. There was a slippage in production; production picked up only in 2006-07.The cumulative production of 122 MBT Arjun was still short of the indent by two MBTs which were under production and three MBTs were under inspection as of December 2013. The delays in production led to cost escalation by more than 2.5 times: from ₹ 17 crore per MBT to ₹ 44 crore.

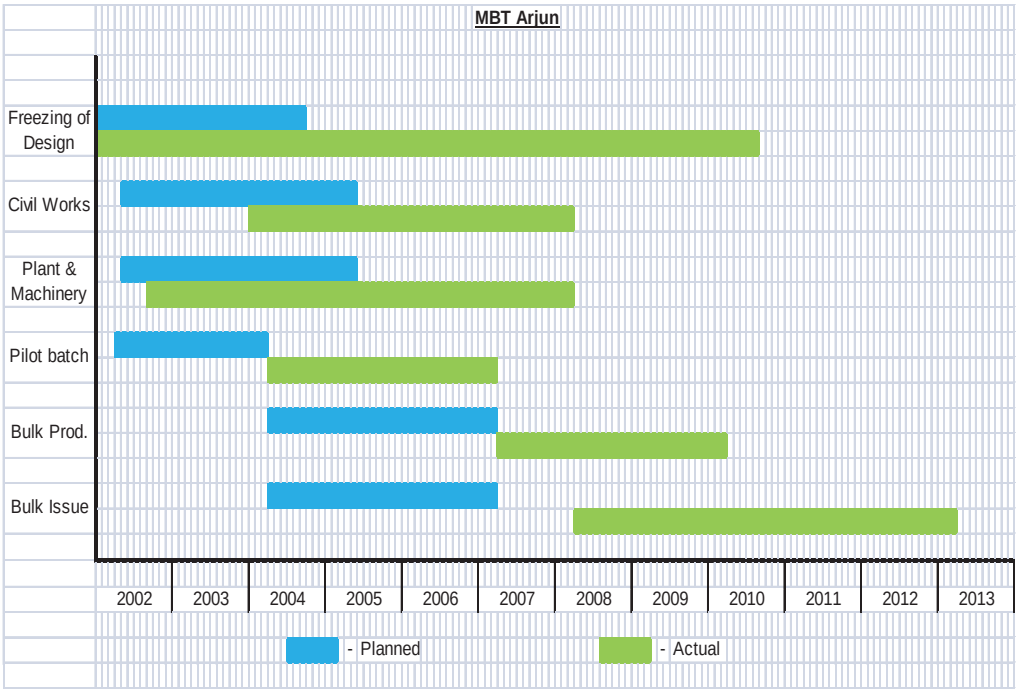
Table-45

Year	Schedule		Production		Issues	
	No.	Cum.	No	Cum.	No	Cum.
2002-03	2	2	Nil	Nil	Nil	**Nil**
2003-04	6	8	5	5	Nil	**Nil**
2004-05	9	17	6	11	5	**5**
2005-06	19	36	18	29	Nil	**5**
2006-07	30	66	24	53	Nil	**5**
2007-08	30	96	18	71	9	**14**
2008-09	28	124	30	101	18	**32**
2009-10			21	122	37	**69**
2010-11			Nil	122	33	**102**
2011-12			Nil	122	11	**113**
2012-13			Nil	122	6	**119**
Total	**124**		**122**	**122**	**119**	**119**

8.3.2.3 The Ministry stated (May 2014) that though the production was completed as per original design, changes in design affected the timely delivery. Ministry's reply is not entirely acceptable. Frequent and several amendments to the design significantly affected the production but tardiness in creation of infrastructural facilities at the Ordnance Factories, also led to delays in meeting the Army's indent as commented in Paragraph 8.3.2.4 and

8.3.2.7. Chart-16 illustrates the timeliness in achievement of the milestones against the targets.

Chart-16: Timeliness in achievement of milestones against targets



8.3.2.4 Delays in Civil Works

The Ministry sanctioned ₹ 23 crore (May 2002) for civil works at HVF to augment the capacity of HVF in tank production, in order to meet its commitment on MBT Arjun. Civil works had two main components:

- *Provision of facilities for Assembly Shop*: The decision to use pre-fabricated structure was taken (September 2003) by the Ministry 16 months after the sanction. The Administrative Approval for this component was eventually given in January 2004, 20 months after the sanction. The Administrative Approval was revised in May 2005 due to price escalation of steel and cement as discovered in tendering. The work was completed in June 2006. Pending completion of the civil works, HVF used its existing facilities and by 2005-06, produced 29 MBT Arjun, of which five MBTs were issued (2004-05) to the Army. The production could pick up in full steam in 2006-07, once the infrastructure of which the civil works was a part, was put in place. Ministry stated (May 2014) that the lowest offer for civil works relating to assembly shop had exceeded the sanctioned amount which involved financial concurrence from the user and was accordingly processed for issue of revised Administrative Approval(May 2005). It was also stated that the work was completed within the stipulated time, a claim that is

not acceptable since the work targeted for completion in July 2005 was completed only in June 2006.

- *Strengthening of test track*: The existing test track in HVF had been reported to be damaged and a need was felt to strengthen the track for testing of MBT Arjun. A team[149] constituted to finalise the requirements was convened (August 2005) 39 months after the Ministry's sanction of the project (May 2002). The Administrative Approval for this work was received by HVF, Avadi only in April 2006 and the work completed in March 2008. By this time, 71 MBT Arjun had already been manufactured, of which 14 were issued to the Army. The Ministry did not provide to us the impact of the delay in completion of this work on production and issue of MBT Arjun.

8.3.2.5 *Delays in production of critical assemblies*

The HVF, Avadi was to receive the assemblies of the bare structure of the tank: the hull and the turret, from the Ordnance Factory Medak (OFMK). Hull is the lower part of the tank consisting of chassis and automotive system (Engine and Power pack), while turret is the upper part of the tank for mounting the weapon system. Against the schedule to provide 109 sets of hull and turret during 2002-08, OFMK could provide only 72 hulls and 75 turrets during 2002-11 to HVF. Six years taken to procure and commission the plant and machinery (September 2002 to March 2008) and delays in receipt of armour plate from Steel Authority of India Limited were main reasons for the inability of OFMK to meet its commitment.

Meanwhile, HVF, Avadi began (2007) manufacture of the hull and turret, thus ending its dependence on OFMK. While the resolution of the issue would have streamlined the production of MBT Arjun, the plant and machinery installed at a total cost of ₹ 51 crore in OFMK, remained unutilised since 2011.

Ministry stated (May 2014) that hull and turret were also manufactured at HVF to comply with manufacturing programme and that there was no adverse impact on production of the complete tank at HVF. The reply sidestepped the delays consequent of the shift and the idling of machinery purchased for the purpose.

8.3.2.6 *Problems in sourcing major assemblies*

The HVF, Avadi began production of MBT Arjun based on the design provided by DRDO with tie-ups for supply of assemblies from sources identified by the DRDO after evaluation between June 2005 and May 2008.

[149] Recee-cum-costing-cum-siting Board comprising Officers from the HVF, MES, DGQA and DRDO was ordered to study the scope of conducting repair of the test track.

The field trials and accelerated usage-cum-reliability trials by Army of MBT Arjun produced under Limited Series Production (LSP) indicated quality problems in respect of major assemblies. The modification of designs by DRDO led to delays in supply of modified assemblies and in repair of defective parts, which in turn delayed the production of MBT Arjun as indicated in Table-46.

MBT – Arjun and its major assemblies

Table-46: Delays in supply of major assemblies

Assemblies	Supplier	Delays	Comments
Gunner's Main Sight (GMS): Fitted on turret weapon system to control aiming, tracking and ranging before firing.	Bharat Electronics Limited (Defence PSU)	51 months (1st order) 30 months (2nd order)	Repair of defective components at a cost of ₹1.2 crore.
Commander's Panoramic Sight (CPS): Part of the turret weapon system, enables the commander to acquire a target independent of gunner.	Bharat Electronics Limited (Defence PSU)	9 months	Modified design led to delays.
Hydraulic suspension unit (HSU): Fitted on chassis and automotive system for cushioning the impact, shock and vibration of the hull.	(a) Kirlosker Pneumatic Co. Ltd. (b) Bharat Earth Movers Limited Bangalore	25 months	10 units of HSU were declared beyond economical repair and 18 units were yet to be sent by HVF to M/s BEML for repair.
Gun Control System (GCS): Fitted on turret weapon system, serves to control the turret in traverse and gun in elevation.	Bharat Heavy Electricals Limited, Bhopal	8 years	High cycle time for repair through OEM, M/s B.R.Germany led to delays.
Power pack (Propulsion unit, engine and transmission): Fitted in chassis and automotive system of the hull to supply power for driving the tank	a) RENK, Germany b) MTU Germany	5 years	Repair of nine power packs was awaited. Decision was taken to source 10 new power packs from Germany.

The Ministry stated (May 2014) that the modifications required by the Army were incorporated by DRDO and that rectifications were made by the manufacturers free of cost under warranty. But the fact remains that the defects had the impact of delays in production and issue of MBT Arjun to Army.

8.3.2.7 *Changes in design*

Mention was made in Report No. 3 of 2006 of the Comptroller and Auditor General of India about the frequent changes in design leading to delay in development of MBT Arjun. The development of MBT prototype was to be completed by April 1982 but after going through several modifications in design, the prototype was cleared by the Army in 1998.

Given this concern on several changes in design, the Scientific Advisor to the Raksha Mantri had confirmed (2004) in a note to the Ministry that the design for MBT stood frozen. This was, however, not the case. We found that 316 amendments to design of various assemblies were carried out even after freezing of the design and up to August 2010. The changes were mostly justified by the Ministry in its reply (May 2014) as necessitated for product improvement and modifications based on user's feedback on quality problems.

The reply does not take cognizance of the fact that even after clearing the production after acceptance of the prototype (1998), the designs continued to be re-worked for 12 years thereafter and frozen only in 2010.

The most significant setback to production of MBT Arjun was the change in requirements put forth by the Army in February 2007. The tanks produced by HVF, Avadi were to be issued to the Army after inspection at the factory site in the Joint Receipt Inspection by the representatives of HVF, DRDO and Army. The issued tanks were put through two trials - the Field Trial and the Accelerated usage-cum-reliability trials (AUCRT), by the Army. Joint Receipt Inspection was conducted (March 2005) for first five MBT Arjun manufactured (2003-04) in the pilot phase[150], one year after production. The inspection of the second lot of nine pilot MBT Arjun, took place in February 2007, two years after production. By 2007, 53 MBT[151] had already been produced by HVF, Avadi. It was during this inspection in February 2007 that Army reported water ingress in the fighting compartment of tank while crossing shallow parts of a river and raised two additional requirements in the design of the MBT Arjun *viz.* zero level ingress of water in the fighting compartment and lead time for fording (time from tank's entry into water to exit from water) to be minimised to 30 minutes.

[150] Limited Series Production
[151] 15 under Limited Series Production and 38 under bulk production

We noticed that the corresponding benchmark fixed by the Army for T-90 tank was more relaxed, allowing 2.5 litres[152] of water ingress. The requirement of zero level water ingress for medium fording was not stipulated in the Army's requirements (GSQR of 1985) or in subsequent stages of development which had seen many changes in design. In fact, the Joint Action Plan (of Army and DRDO), in August 1999, had cleared the medium fording capability of MBT Arjun. This issue was also not raised in the Joint Receipt Inspection of the first batch of pilot MBT Arjun.

The new requirements necessitated the DRDO to modify the design of the second lot of nine pilot MBT Arjun. The same got modified and were issued to Army by September 2007. The first lot of five pilot tanks was brought back from Army, got modified and issued to Army till October 2007. Balance 39 tanks of the bulk production were dismantled, reworked and issued to the Army in 2008-10. The whole task of dismantling and reassembly of 53 MBTs entailed an additional cost of ₹ 84 lakh.

The Ministry stated (May 2014) that modifications were considered essential to improve overall performance from user's perspective. The reply undermines the impact of the modifications in derailing the production and issue of MBT Arjun, which was a significant factor that led to an import of T-90 tanks that cost ₹ 4,913 crore in November 2007 as discussed in Paragraph 8.3.4. The reply also does not address why the benchmarks on MBT Arjun regarding water ingress and fording, were more stringent than the corresponding requirements on T-90 tank.

Medium fording was one of the eight instances we noticed, where Army placed benchmark of parameters on MBT Arjun which were more stringent in comparison to those placed on T-90 tanks. These are detailed in **Annexure XIX**. We could not assess the impact of these benchmarks on the performance of the two tanks from our scrutiny of the Report on comparative trials of MBT Arjun and T-90 tank (February/ March 2010- referred to in Paragraph 8.3.2.8). While we appreciate the Army's quest for improving the quality of MBT Arjun, the imposition of more stringent parameters precluded a level playing field and more importantly, the inability to freeze the designs led to several changes in design, consequent delays in acceptance of MBT Arjun by the Army and in the overall, the production and issue of MBT Arjun.

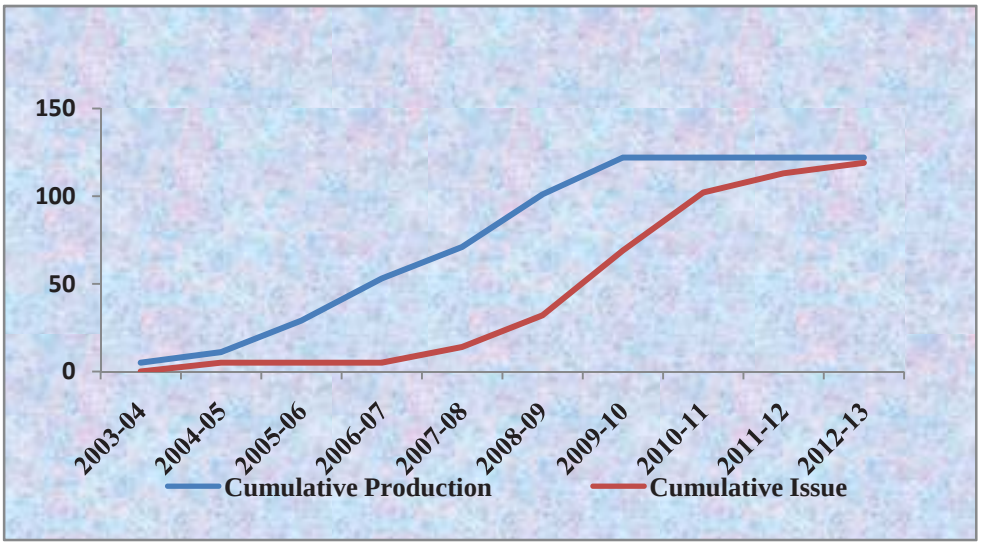
8.3.2.8 Testing and issue of MBT Arjun

The production of MBT Arjun picked up in 2005-06 when the cumulative production reached 29 MBT. In 2006-07, HVF, Avadi stepped up the production to 53. We found that the issue of MBT Arjun to the Army lagged

[152]Permissible limit of water ingress for medium fording was derived with reference to acceptable limit of 5 litre of water ingress for full-dip fording as mentioned in the trial directive for T-90 tank

behind production. The joint inspections of the manufactured MBT[153] which was an essential requirement before issue, was inexplicably delayed. Till March 2008, HVF produced 71 MBT Arjun, of which only 14 (20 *per cent*) were tested in joint inspections. But close on the heels of the second import of T-90 tank contracted in November 2007 as discussed in Paragraph 8.3.4, the inspections and issues of MBT Arjun picked up and within the next three years, 102 MBT Arjun out of 122 produced were accepted by the Army, as illustrated in Chart-17.

Chart-17: Cumulative production and issue of MBT Arjun



Comparative field trials of MBT Arjun with T-90 tanks took place in February/ March 2010. Till such time, the Army had been consistently reporting quality problems in MBT Arjun; this was also reported to the Standing Committee on Defence (2007-08). The comparative trials were on four parameters *viz.* fire power, survivability, reliability and miscellaneous issues of the tank with weightage of 40, 35, 15 and 10 respectively. As per the trial report, MBT Arjun performed marginally better than the T-90 tank in accuracy and consistency of firepower. However, T-90 tank performed better in lethality and missile firing capability. The Army concluded (April 2010) that "Arjun had performed creditably and it could be employed both for offensive and defensive tasks with same efficacy of T-90 tank." The Army also recommended upgrades[154] to make the Arjun tank a superior weapon platform. We were informed (February 2014) that the Mark-II version of MBT Arjun was under trials by the Army and that it would include the upgrades recommended by the Army.

We found that the MBT Arjun and T-90 tank were not exactly comparable in missile firing ability; the higher score of T-90 tank was mainly due to missile

[153] Joint inspections were to be carried out by HVF, DRDO and the Army

[154] The upgrades recommended were among others, inclusion of anti-tank missile, increase in penetrating power of ammunition and mounting of explosive reactive armour panels

firing ability which was not in the design of MBT Arjun. Barring missile firing ability, the scores of MBT Arjun and T-90 tank would be 25.77 and 24.50 respectively in firepower. In the overall comparative score, T-90 tank scored 75.01, marginally higher than MBT Arjun which scored 72.46, mainly because of higher score on missile firing ability of T-90 tank.

8.3.2.9 *Future of MBT production facilities*

The Public Accounts Committee had urged (December 2003) the Ministry to utilize the infrastructural facilities optimally so that the desired volume of production of MBT Arjun would enable increase of the indigenous content to 55 *per cent*. The Ministry assured the Committee that a production level, initially of 300 MBT Arjun to be raised to 500 tank later, would reduce the import content to under 30 *per cent*.

However, barring the initial indent of 124 tanks, the Board did not receive any further indents for MBT Arjun. Production has come to standstill since 2009-10 and to that extent, capacity created at a cost of ₹ 87 crore[155] for annual production of 30 MBT Arjun awaits utilization against Ministry's decision for fresh orders. Meanwhile, HVF, Avadi holds idle inventory of ₹ 128 crore reflected as "Work-in-progress", which remains unutilised in the absence of fresh orders. The cost per MBT Arjun was ₹ 21crore (2009-10), against which the import content was ₹ 13 crore. This brings the level of indigenisation in MBT Arjun to 38 *per cent* only. The initial development project on MBT Arjun had envisaged that barring the engine, all components/assemblies would be indigenously produced. Problems in sourcing major assemblies other than engines have been discussed in Paragraph 8.3.2.6.

The Ministry told (May 2014) us that imported items could not be indigenized due to non-availability of technology/ design on these items. This reply does not comprehensively cover the indigenization issue because items that were designed for manufacture by defence PSUs (Paragraph 8.3.2.6) were also being imported for the production of MBT Arjun.

8.3.3 Indigenous production of T-90tanks

The Board received (November 2004) the indent for manufacture of 300 indigenous T-90 tanks which was scheduled for supply during 2006-10. A production schedule was fixed to meet the indent: 50 tanks in 2006-07, 100 tanks annually in 2007-08 and 2008-09 and balance 50 tanks in 2009-10. However, the production started only in 2009-10 and gathered momentum in 2010-11. Table-47 details the production and issue of T-90 tanks against the targeted schedule.

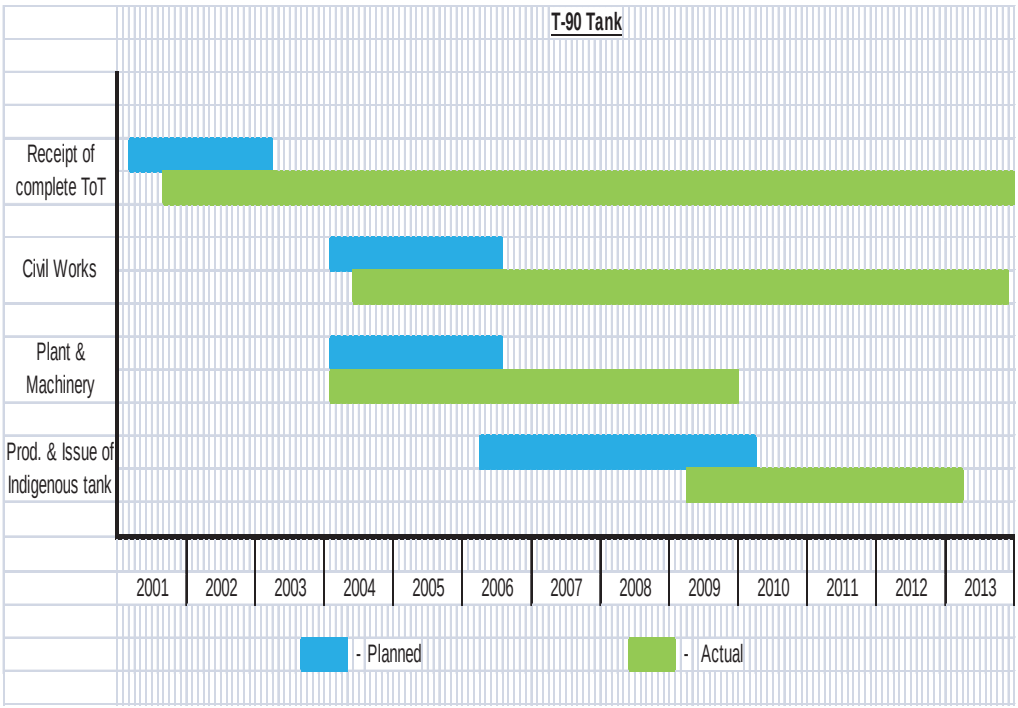
[155]The initial sanction of May 2002 was for ₹100 crore but due to reduction in scope of plant & machinery, the actual expenditure was only ₹87 crore

Table – 47

Year	Schedule	Production	Issue
2006-07	50	Nil	Nil
2007-08	100	Nil	Nil
2008-09	100	Nil	Nil
2009-10	50	24	14
2010-11		51	36
2011-12		60	65
2012-13		90	52
Total	300	225	167

Chart-18 summarises the delays in different stages of production that led to the Board's inability to meet the indent for T-90 tanks on time.

Chart-18: Timeliness in achievement of milestones



8.3.3.1 *Translation of design documents*

The Russian Firm, M/s Rosoboronexport (ROE) was expected to transfer the design details in the Transfer-of-Technology (ToT) documents by March 2003. The documents were in Russian; the Army/Ordnance Factories' efforts to get translated documents from ROE, failed. The documents were received between September 2001 and January 2003 following which HVF, Avadi concluded four contracts between September 2003 and September 2006 for translation of the documents. The translation was completed by July 2007 after

the expiry of scheduled delivery period of first batch of 50 indigenous tanks by 2006-07. In all, the translation of ToT documents took almost six years.

The Ministry stated (May 2014) that translation of critical documents for indigenous manufacturing was carried out with available resource of Russian translators at HVF and there was no delay in production due to pending translation. The reply is not acceptable because delay in translation of ToT documents had certainly impacted on the indigenous production of T-90 tanks as production could not commence without the availability of translated documents.

8.3.3.2 *Development of production facilities*

While according sanction of ₹ 96 crore in February 2004 for setting up facilities[156]for production of T-90 tanks, Ministry did not lay down a time frame for the installation of facilities at Avadi. But the Board set an internal target date of July 2006. The facilities were installed in November 2013, more than seven years later, at a total cost of ₹ 95 crore (break-up of cost being - Plant and machinery: ₹ 71 crore and Civil works: ₹ 24 crore).

We found that the civil works were close to schedule in Engine Factory, Avadi. But two components of works at HVF, Avadi *viz.* Assembly Shed and Tank Storage Accommodation were completed in September and November 2013 after a delay of seven years. The delays were because when put to tender, the estimates were revealed to be unreasonable which necessitated reduction in the scope of work.

The procurement and commissioning of plant and machinery kept pace with the schedule except in case of two items at HVF, Avadi. These items being: Boring and milling machine (required for manufacturing gear boxes) and Special purpose Automatic Rolling machine (required for manufacturing torsion bars). The delay of around three years in commissioning (March/December 2009) the two vital machines was due to delays in procurement and in completion of civil foundation. The HVF had to resort to import (November 2007 – February 2009) of gear boxes and torsion bar at a cost of ₹ 31 crore, till such time the facility was created for the two assemblies.

The Ministry admitted (May 2014) that due to delayed procurement of automatic rolling machine, torsion bars were imported to meet the production target. On the other hand, the gears were imported because of the lead time in development of the gear box with the new design.

[156]Facilities were to come up at Heavy Vehicles Factory Avadi, Engine Factory Avadi, Ordnance Factory Medak and Opto Electronic Factory Dehradun

8.3.3.3 Non-receipt of design documents for critical assemblies

We found that ToT documents in respect of some critical assemblies[157] were not transferred by the Russian manufacturer, ROE, even after lapse of 12 years as of July 2013. An important component was the gun system (including barrel) for which the design had not been received as of May 2014. In fact, the Ministry cited this issue as the main reason for slippage in indigenous production of T-90 tank.

Ordnance Factories were using "modified chemistry"[158] on an earlier version of the tank: T-72, which was also based on ToT from the same firm, ROE. Both T-72 and T-90 tanks have similar gun barrel assembly. In the absence of the ToT designs for the T-90 barrel, the Board suggested use of "modified chemistry" for the barrel. But the Director General of Quality Assurance (DGQA) did not concur (February 2006) with the proposal. The Ministry intervened in March 2006 to insist for field trials of modified chemistry barrels. The first lot of modified chemistry barrels was put through field trials in July 2008 and then again in September 2010. Eventually, the DGQA cleared the use of modified chemistry barrel in November 2010.

Thus, it took four years for a decision on the use of modified chemistry barrels in T-90 tank. As the schedules were slipping, indigenous production of T-90 tank was undertaken with fully imported gun assembly in 2007. The import continued till 2012 till the production of the modified chemistry barrel gained steam. The total cost on import of 175 gun assemblies was ₹ 119 crore. In addition, the Ordnance Factory Kanpur imported (2007-10) the barrel with other components of the gun at a cost of ₹ 59 crore.

The preceding analysis illustrates the impact of delayed decision making on the indigenous production of T-90 tank. It also highlights the continued reliance of the Ordnance Factories on import of various assemblies/components. In all, ₹ 2,372 crore, representing 62 *per cent* of the total cost of indigenous production of 225 T-90 tanks (₹ 3,813 crore), was spent on import of assemblies as of March 2013. **Annexure-XX** gives further details on the import.

8.3.3.4 Continued reliance on imports: impact on indigenisation

The indigenisation plan on T-90 tank envisaged reduction of import content from 80 *per cent* in 2007-08 to 15 *per cent* in 2010-11 with four assemblies[159] identified for perennial import. The Ministry claimed (May 2014) 76 *per cent*

[157] 130 mm Armour plate, specification for Armour steel, sensors for GO27 and Modified GO27, specification GOST B5192-78.
[158] The ordnance factories changed (2000) the composition of materials used in the barrel of the gun assembly.
[159] 7.62 PKTM Gun, Tadiron Radio Set, Gyro Directional Indicator and Ventilation system

indigenisation in production of T-90 tanks, a claim that was not supported with data.

We sought (May 2013) details of item-wise achievement in indigenisation. HVF, Avadi did not provide the details but informed us that six critical assemblies/components[160] which were planned for indigenisation, were yet to be indigenised. These items had been imported from M/s ROE at a total cost of ₹ 226 crore during 2007-11. The reasons provided were: quality issues in production; inability to source components from domestic suppliers and non-availability of ToT designs from ROE.

Ministry stated (May 2014) that the indigenisation and import content were two different aspects. While indigenisation was acquiring the technology to manufacture the tanks, importation was to meet the production target due to lead time involved in indigenous source development and capacity building. The reply is silent on the fact that the factories could not achieve the planned indigenisation within the stipulated time schedule resulting in continuous dependence on imported product supports. The Ministry did not provide a time bound plan for achieving the indigenisation goals, whereby constraints of lead time do not force the country for high reliance on import of assemblies.

8.3.3.5 *Quality problems in indigenous T-90 tanks*

During March 2010 to November 2013, HVF received 45 defect reports (DRs) from the Army relating to minor and major defects in the indigenous T-90 tanks. The defects mainly pertained to failure of gear box and defects in auto/electrical portion of the tanks. A Working Group was proposed (March 2012) to address these deficiencies which was not formed. The HVF, Avadi constituted (November 2004) a Failure Review Board (FRB) at factory level to investigate the reasons for defects at the users end. The FRB discussed (September 2013) the major failures and recommended remedial measures. Accordingly, HVF implemented:

- a process audit to eliminate non-conformances in assembling process;
- introduction of 100 *per cent* pre-fitment and component level inspection and additional quality assurance checks at local supplier's premises;
- extensive trials of samples supplied by the local firms after introducing improvements and before their induction into regular production; and
- deputing of HVF's teams to field locations to ensure technical and maintenance support to the users.

Ministry told us that the FRB was a quality tool which facilitated timely action on defects. The delay in discussion of the FRB (September 2013), even when

[160] Electric smoke generation switch, Smoke generation system, Hull electrical assembly, Fire fighting system, Ventilation system, AAGM

the Army was raising quality concerns since March 2010, was not however, commented upon by the Ministry.

8.3.3.6 *Future production of T-90 tank*

The production of T-90 tank at HVF, Avadi was short of the indent of November 2004 for 300 tanks, by 75 tanks as of March 2013. Even as the production was underway against the first indent, the Army placed a second indent for 236 T-90 tanks in December 2013.

Meanwhile, the Ministry sanctioned (September 2011) ₹ 971 crore for capacity augmentation of T-90 tank production by March 2014. This was expected to raise the capacity of Ordnance Factories from 100 *per cent* to 140 *per cent* of T-90 tanks. It is noteworthy that ₹ 96 crore was sanctioned (February 2004) for creating production capacity for 100 T-90 tanks, whereas augmentation of capacity from 100 to 140 tanks is slated for ₹ 971 crore, a ten times increase in estimation over a period of seven years. Reasons for the extraordinary increase were not provided by the Ministry, in its response of May 2014.

As of March 2014, only an amount of ₹ 17 crore had been spent on the augmentation project and in the revised schedule, the project is expected to be completed in December 2016. The Board appears to have put the augmentation plan on a slow track as of now.

8.3.4 Import of T-90 tank

The Ministry had planned (February 2001) to meet the Army's requirement of tanks through import from Russia of 124 fully formed T-90 tanks supplemented by the assembling of 186 T-90 imported in semi-knocked down (SKD) and completely knock-down (CKD) form. Indigenous production of MBT Arjun and T-90 tanks was expected to add 424 tanks[161] to the Army's arsenal by 2010. The indigenous production lagged behind the schedule for variety of reasons, but mainly due to frequent changes in design of MBT Arjun as discussed in Paragraph8.3.2.7. With regard to T-90 tank, production was hampered mainly due to non-transfer of technology on critical assemblies by the Russian firm as well as delays in decision-making in the Ministry on alternatives as discussed in Paragraph 8.3.3.3.

The frequent changes in design of MBT Arjun and delays in decision-making on alternatives for problems in T-90 tanks, were both within the control of the Ministry. Absence of timely and effective intervention by the Ministry on these issues, significantly derailed the indigenous production of tanks. This created a situation of shortage and was decided to be mitigated by fresh

[161] The production of 124 MBT Arjun and 300 T-90 was originally scheduled to be completed by 1985-2000 and 2006-10 respectively

imports of 124 Fully Formed T-90 tanks and 223 T-90 tanks in SKD valuing ₹4913 crore in November 2007.

The decision to import T-90 tanks was based on the recommendation of the Chief of Integrated Headquarters in September 2007 that import was an operational necessity to make up the deficiency of tanks. While on the one hand, the Army delayed field trials of MBT Arjun and made frequent changes to its design as discussed in Paragraph 8.3.2.7, it cited critical requirement of tanks as the reason for the need for fresh imports.

In response to our query on the import of T-90 tanks, the Ministry replied (May 2014) that import was the jurisdiction of the Army, a reply which does not take cognizance of the fact that the decision for import was taken by the Cabinet Committee on Security based on a note submitted by the Ministry.

8.3.5 Mechanism to monitor the augmentation of tank fleet in Army

Steering Committee (SC)[162] chaired by the Secretary, Defence Production, Ministry of Defence was formed to meet every quarter to monitor the progress of production / issue of MBT Arjun and its induction in Service. We observed that, the SC met only on ten occasions in eight years (2002-10), on an average once in 10 months. No Steering Committee meeting was held after July 2010. The follow-up on the decisions taken in the meetings was inadequate partly because the meetings were not held regularly. The Steering Committee was not able to enforce its decisions in critical areas. For instance, the fourth meeting in July 2006 decided that the design documents would be frozen but changes in design continued well into 2010, which had an adverse impact on the production schedule.

There was no Steering Committee at the Ministry level for review of production and issue of indigenous T-90 tank. However, 10 Institutionalised Interaction and Special Board meetings were held between Army and the Board during 2008-09 to May 2013. The Minutes of monthly meetings of the Ordnance Factory Board indicate that major issues were discussed mainly in seven meetings held during 2010 to 2013 out of 67 Board meetings held during 2008 and 2013.

Important decisions taken in these meetings and their actual implementation are indicated in **Annexure-XXI.** It would be seen from the Annexure that there were cases where decisions were not implemented or implemented partially but belatedly. Thus, monitoring of production of MBT Arjun and T-90 tanks by the Ministry and the Board were not adequate and effective.

[162] Co-Chairman- Director General (R&D), Members- Chairman (OFB), DGQA, CC (R&D), Additional DGOF (AV), Additional FA (MoD), Additional Director General (WE), Joint Secretary (OF), Director (CVRDE).

Conclusion

The Ministry planned to achieve self reliance in manufacture of tanks by a phased induction of MBT Arjun during 1985-2000, the schedule later shifted to 2002-09. The production of indigenous T-90 tanks based on Transfer of Technology from Russia was slated to be accomplished during 2006-10.

However, production of the indigenous tanks did not meet the schedule planned for timely fulfillment of Army's needs. In numbers, the Ordnance Factories have met the indent for MBT Arjun (119 out of 124 indented); there is a gap of 133 against the indent for 300 T-90 tanks. The production of MBT Arjun was derailed due to frequent changes in design, contrary to the assurance in 2004 that the design had been frozen. Introduction of new requirements not envisaged in the original GSQR by the Army led to dismantling of already manufactured MBTs. Delays in the Ordnance Factories in erection of infrastructure facilities and problems in sourcing quality assemblies, added to the woes in production of MBT Arjun.

The Transfer of Technology for indigenous production of T-90 tank was marred by delays in translation of design documents and the Russian firm's failure to share designs on critical assemblies like the gun assembly. The problem was compounded by delays in decisions on alternative solutions on these designs. A case in point is the DGQA thwarting the proposal by the Ordnance Factories for using "modified chemistry" proposed for the barrel for T-90 tank. This was despite the fact that the Factories had experience with "modified chemistry" for barrel of T-72 tanks (precursor to T-90 tank); the T-72 and T-90 tank use similar gun barrel. The result: impact of delays was mitigated by fresh imports of T-90 tanks (and kits) from the very same firm in November 2007 worth ₹ 4913 crore, an import our analysis shows was unjustified given the production profile of MBT (production began to keep pace with the planned schedules by 2005-06) and the inexplicable delays in decision-making on the T-90 tank production issues. In addition, ₹ 2372 crore was spent on import of critical assemblies/components of T-90 tank, which formed 62 *per cent* of the total cost of indigenous production of T-90 tanks.

The Public Accounts Committee had opined that with regular production of MBT Arjun, the indigenous content in production would be increased. But after the initial indent of 124 MBT Arjun in 2000, the Ordnance Factories have not received any further indents from the Army for MBT Arjun. Production of MBT Arjun has come to a standstill since 2009-10 and to that extent, capacity created at a cost of ₹ 87 crore remains underutilized. On the other hand, a second indent of 236 T-90 tanks was placed in December 2013 even as the production against the first indent was short by 75 tanks. Another project for augmentation of the production capacity of T-90 tanks was sanctioned by the Ministry (September 2011), progress on which was negligible.

8.4 Capacity addition in Ordnance Factories

8.4.1 Introduction

8.4.1.1 Modernisation in the Ordnance Factory Board (Board) is a continuous process for replacement of outdated machines with new machines for achieving higher productivity, reduction in cost of production and improving quality of the products.

8.4.1.2 Our past Audit Reports[163] had highlighted deficiencies in the areas of procurement, receipt and commissioning of plant & machinery (P&M). Action Taken Notes[164]of the Ministry of Defence had assured the Parliament of the remedial measures taken to mitigate the shortcomings pointed in Audit. The present audit was to review the impact of the measures in this regard.

8.4.1.3 We conducted audit in 10[165] out of 39 Ordnance Factories and the Board at Kolkata for the period from 2009-10 to 2011-12[166]. The selected factories spent ₹ 755 crore during 2007-12 on new machinery. They together held P&M worth ₹ 1,376 crore as of 31 March 2012 which represented 50 *per cent* of the total P&M held in all Ordnance Factories. Table-48 represents population and sample selected in audit.

Table-48: Population and sample

Major issues	Population		Sample	
	Number	Value (₹ in crore)	Number	Value (₹ in crore)
Receipt	631	787.07	475	754.57
Commissioning, utilisation and other aspects	1087	1,102.25	731	1,022.81

Note: Machine valuing less than ₹10 lakh not considered in the population

8.4.2 Constraints to Audit

Our Audit Report of 2004 had pointed out the deficiencies in documentation which limit a review of the benefits of modernisation. The Ministry in its Action Taken Note of February 2006had informed of the Board's instructions to all factories to maintain the basic documentation in standard formats

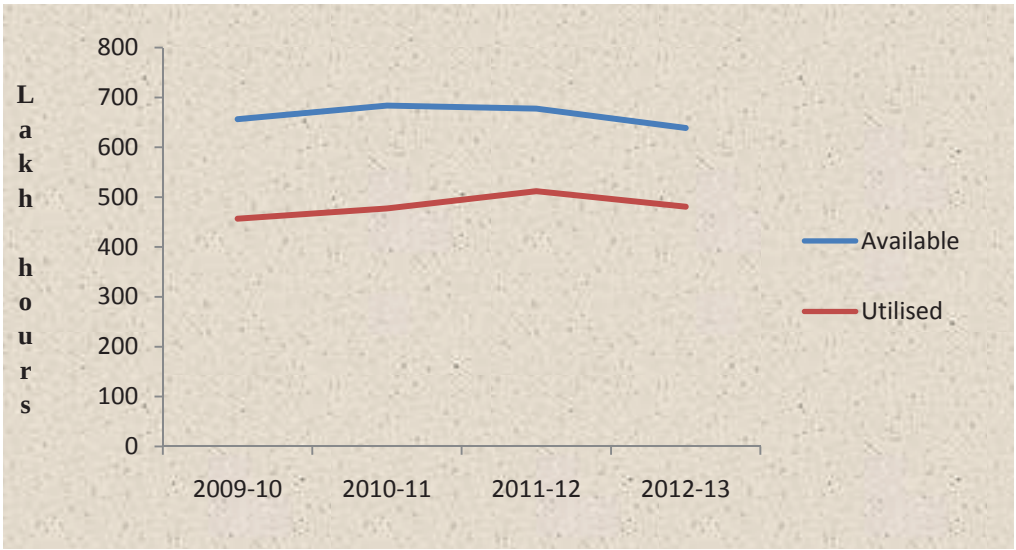
[163] Paragraph 7.3 of Audit Report No. 6 of 2004, Report No. 19 of 2007 and Report No. 15 of 2010-11 of the Comptroller and Auditor General of India
[164] February 2006, December 2008 and June 2010
[165] Ordnance Factory Ambajhari (OFAJ), Heavy Vehicles Factory Avadi (HVF), Ordnance Factory Kanpur (OFC), Rifle Factory Ishapore (RFI), Small Arms Factory Kanpur (SAF), Gun & Shell Factory Cossipore (GSF), Gun Carriage Factory Jabalpur (GCF), Field Gun Factory Kanpur (FGK), Ammunition Factory Kirkee (AFK) and Ordnance Factory Khamaria (OFK)
[166] subsequently updated in July/August 2014 for 2012-13, wherever stated in this Report

including machine-wise Production Log Book[167]. But none of the ten factories maintained these documents in the prescribed format. Hence, we could not examine the capacity utilisation of individual machine with reference to the records. While accepting the facts, the Board clarified (June 2013) that production data could be generated at Gun and Shell Factory Cossipore for only stand-alone tooled up machine. It was also stated that Ordnance Factory, Kanpur maintained Production Log Book along with requisite details, which we found was factually not correct. In fact, Ordnance Factory, Kanpur itself confirmed (May 2012) to us that history card and log book of the machines were not maintained in their production sections.

8.4.3 Impact of new machines

8.4.3.1 The objective of purchase of modern machinery is to maintain the existing capacity (when the old machinery is being replaced) as well as to augment the capacity (when new machinery is added). We examined the availability and utilisation of machines in three years (2010-13) in the sampled factories and found that the machine availability came down over the years despite procurement (Chart 19). These factories together spent ₹ 755 crore during 2007-12 on procurement for replacement of old machinery and augmentation of machine capacity.

Chart-19: Machine hours



8.4.3.2 The decrease in machine hours was marked, in excess of 10 *per cent* in three factories *viz.* Ordnance Factory, Kanpur; Rifle Factory, Ishapore; and Gun Carriage Factory, Jabalpur as given in Table-49.

[167] The log book should include the date, components manufactured, warrant number and date, quantity produced, accepted and rejected and signature of competent authority.

Table-49: Machine hours availability

Factory	Ordnance Factory, Kanpur	Rifle Factory, Ishapore	Gun Carriage Factory, Jabalpur
Main product line	Gun barrel, ordnance of tank, shell body of ammunition	Rifle, pistol, revolver	Mortar, gun, spare barrel
Machine hours availability (in lakh hours)			
2010-11	76.41	88.81	104.81
2011-12	45.44	68.38	105.50
2012-13	47.71	67.31	92.49

8.4.3.3 Our audit showed that the reduction in machine availability, particularly in the above-mentioned factories, was the result of a combination of factors, *viz.*

- Pace of replacement of machinery lagging behind condemnation/ capacity de-rating of old machines
- Delays in receipt and in commissioning of new machines
- High incidence of breakdowns

8.4.3.4 Subsequent paragraphs detail these findings.

8.4.4 Timeliness in installation

8.4.4.1 Delays in receipt

The supplier, after satisfactory pre-despatch inspection, is required[168] to despatch the machinery to the factory as per the delivery period stipulated in the purchase order. We examined the status of delivery of 475 machines in the selected factories and found delay in delivery in respect of 170 machines (36 *per cent*) valuing ₹ 343 crore (Table-50). Further,33 machines (₹ 50 crore) were received after delay of more than nine months beyond the original delivery schedule, while another 16 machines were yet to be received by four factories as of March 2013.

Table-50: Delayed receipt of machinery

Factory	No. of machines	Value (₹ in crore)	Range of delays beyond delivery schedule				
			Up to 3 months	3-9 months	9-12 months	More than 12 months	Yet to be received
OFAJ	15	15	9	2	1	3	0
OFC	47	118	19	13	2	6	7
FGK	23	98	6	14	0	0	3
HVF	28	51	5	11	4	3	5
OFK	14	25	5	6	1	1	1
AFK	9	5	6	1	2	0	0
RFI	14	18	2	2	0	10	0
SAF	5	4	4	1	0	0	0
GCF	7	5	5	2	0	0	0
GSF	8	4	1	7	0	0	0
Total	**170**	**343**	**62**	**59**	**10**	**23**	**16**

[168] Paragraphs 6.5.1, 6.8 and 6.5.7 of OFB's guidelines

8.4.4.2 We examined the reasons for belated receipt of 62 machines in eight factories[169]. Illustrative cases of delayed receipt of machines are given in **Annexure XXII**. The factories could not enforce the conditions of the supply orders and take firm steps when confronted with poor performance of suppliers. There were also delays on the part of factories in deputing their teams for on-site pre-dispatch inspection and in sending trial components for such inspection. There were also instances where the suppliers requested for modifications in specifications after the supply order was placed with delays in finalisation of revised specifications.

8.4.4.3 *Delays in commissioning*

The Board did not fix time schedules for commissioning machinery although the factories are required (circular of July 2000) to incorporate specific time schedule for commissioning in the supply orders. The machine is considered as commissioned once it achieves the prescribed performance standards in the trial run.

8.4.4.4 Out of 10 factories, only Small Arms Factory, Kanpur specifically mentioned the time schedule for commissioning in 21 (75 *per cent)* out of 28 supply orders test-checked by us. In the absence of specific time frame for commissioning in the supply orders for other nine factories, we considered six months[170] from the date of receipt as reasonable time for commissioning of machines. Table-51 summarises the results. We found that 211 machines (29 *per cent*) valued at ₹ 317 crore were commissioned after six months, while 11 other machines valuing ₹ 47 crore were not commissioned in five factories as of March 2013.

Table-51: Time taken for commissioning of machinery

(₹ in crore)

Factory	No. of machines commissioned with delay	Value	Number of machines with time taken for commissioning (months)				Machines not commissioned (up to March 2013)	
			6-9	9-15	15-18	>18	Number	Value
OFAJ	64	135	17	29	3	15	2	13.74
OFC	27	41	11	15	1	0	1	0.15
HVF	8	44	2	4	0	2	1	0.55
OFK	7	6	3	4	0	0	0	0
AFK	5	3	2	2	1	0	4	29.16
RFI	27	29	6	8	0	13	0	0
SAF	6	6	3	3	0	0	3	3.59
GCF	49	46	14	19	0	16	0	0
GSF	18	7	6	5	0	7	0	0
Total	**211**	**317**	**64**	**89**	**5**	**53**	**11**	**47.19**

[169] OFK (11), GCF (7), HVF (9), OFC (28), FGK (2), AFK (1), RFI (1) and SAF(3)
[170] This time limit was earlier accepted as a criterion in the Performance Audit on 'Procurement of stores and machinery in Ordnance Factories' (Report No. 19 of 2007).

8.4.4.5 Specific cases of delays in commissioning of machines are illustrated in **Annexure XXIII.** Difficulties in establishing the prescribed performance standard in terms of quality, capacity and cycle time (time taken to manufacture a particular component in a machine) in the trial run, were the main reasons for delay in commissioning the machines. In some cases, these difficulties were an offshoot of compromises in pre-dispatch inspection (before the machine is despatched by the supplier) as discussed in Paragraph 8.4.5.3. Delays in completion of civil works for erection of the machinery also delayed the commissioning of the machines. Two case studies are illustrated below to substantiate the finding.

Case study 1

Ordnance Factory, Kanpur placed an order on M/s Goratu, Spain in October 2009for procurement of one Heavy Duty CNC Lathe machine at ₹ 8 crore. During the pre-dispatch inspection at the firm's premises, the team from the Factory did not prove the cycle time. The machine received in June 2011 (against scheduled delivery by January 2011) was belatedly commissioned in July 2012 mainly due to the firm's inability to prove the job and cycle time. Moreover, the machine went under breakdown since September 2012, within two months of commissioning and was yet to be put into operation as of March 2013.

Case Study 2

Ammunition Factory, Kirkee received the Totally Integrated Plant for .22" ammunition in August 2010 from a foreign firm at a cost of ₹ 27 crore with scheduled commissioning by November 2009. In the pre-commissioning trial, performance standards were to be established on production of practicing grade ammunition as well as match ammunition. However, only practicing grade ammunition was established, due to which the plant could not be commissioned as of March 2013. Delays were also attributed to non-completion of civil works and provisioning of AC plant.

8.4.4.6 The Board's response (June 2013) to the cases illustrated in **Annexure XXIII** and our comments are given in Table-52.

Table-52: Board's response and our comments

Board's response	Audit comments
• There was no mention of time frame for commissioning of machines in the guidelines. ***(Gun Carriage Factory Jabalpur, Rifle Factory Ishapore - Sl. No. 5 and 8 of Annexure XXIII)***	• Reply is not acceptable because guidelines specifically require the factory managements to include the commissioning clause in the supply orders. Failure to include the same led to non-imposition of penalty on the defaulting suppliers for delayed commissioning of the machines.
• Delay was due to non-availability of the site and non-synchronisation of civil work for erection of machines in certain cases. ***(Ammunition Factory Kirkee- Sl. No. 4 of Annexure XXIII)***	• Reply itself indicates factory's failure to make the site available as well as to synchronise the civil works, which led to delayed commissioning.
• Delay in commissioning was regularly reviewed by the top management to decide action plan. ***(Gun and Shell Factory Cossipore- Sl. No. 6 of Annexure XXIII)***	• In the quarterly review meetings, the Board did not indicate the bottlenecks for commissioning. Operating Members were requested by the Board to expedite the commissioning without giving any specific directions to sort out the bottlenecks.
• 90 *per cent* payment was made to the firm after receipt of the machine and 10 *per cent* made after commissioning. ***(Ordnance Factory Khamaria- Sl. No. 3 of Annexure XXIII)***	• Deferment of 10 *per cent* payment after commissioning cannot justify non-realisation of value for money towards 90 *per cent* investment on machines for a considerable period.
• Efforts were made to commission the Flow Forming Machine from outside sources. ***(Ordnance Factory Ambajhari- Sl. No. 7(a) of Annexure XXIII)***	• Non-commissioning of the machine led to outsource machining of the indented components valuing ₹ 92.27 crore during March 2009 to June 2012.
• The machine was commissioned with proving of the stipulated cycle time. ***(Ordnance Factory Kanpur- Case Study 1)***	• The machine could not be put to intended use due to breakdown since September 2012 (Two months after much delayed commissioning).

The Board did not furnish reply to the instances (Sl. No. 2(d) and (e) of Annexure XXIII) pertaining to Heavy Vehicles Factory Avadi.

8.4.5 Quality assurance

8.4.5.1 Two important stages in procurement provide quality assurance: Pre-dispatch inspection and Pre-commissioning trial runs. The Factories are also required to measure the tangible results of induction of new machinery by reducing the estimates on cost of production of items produced in the new machines.

8.4.5.2 *Pre-dispatch inspection*

Before receipt of machines by the OFs, pre-despatch inspection (PDI) is carried out at supplier's premises to ensure that machines conform to the desired quality and specifications as per the contract. General Managers of the

factories are to function as Inspection Authorities to ensure efficient PDI because 80/90 *per cent* payment is released to suppliers on proof of despatch/receipt of the machine after clearance in PDI. Supply orders should indicate the basis[171] for carrying out PDI by the authorised representative of the factory.

8.4.5.3 We examined PDI of 286 machines (189 supply orders) valuing ₹ 362 crore in seven[172] factories. Except for Small Arms Factory, Kanpur, there were inadequacies and shortcomings in PDI of 32 machines valuing ₹ 63 crore in six factories as detailed in **Annexure-XXIII**. The deficiencies included: failure to prove the required cycle time/components, deficient testing of the manufacturing process**,** acceptance of machines despite repeated failure and significant deviations in technical features against contractual terms. As pointed out in Paragraph 8.4.4.5, these deficiencies led to delay in final commissioning of the machines as well as acceptance of some machines by compromising the quality, as discussed in subsequent paragraphs.

8.4.5.4 The Board's response (June 2013) to the cases illustrated in **Annexure XXIII** and our comments are given in Table-53.

Table-53: Board's response and Audit comments

Board's response	Audit comments
Proving of cycle time was not possible within the limited time during PDI. (***Ordnance Factory, Kanpur- Sl. No.1 of Annexure XXIII)***	Timeframe for carrying out the PDI including proving of cycle time was decided mutually between the OF and suppliers.
Two machines were commissioned and working satisfactorily. Commissioning of Gear box test stand was completed and its performance was under observation. (***Heavy Vehicles Factory, Avadi- Sl. No. 2(a,b,c) of Annexure XXIII)***	Reply is silent as to why the PDI team cleared the Horizontal Broaching machine for dispatch without proving the six components. HVF also failed to utilise the punch press for the intended components due to quality constraints.
Machine operation was same for all types of components. Hence, PDI was carried out with one component. (***Ammunition Factory Kirkee-Sl.No. 4(a) of Annexure XXIII)***	Proving trial of one component in PDI did not absolve the PDI team's responsibility of carrying out trial of seven components.
Factory could not supply trial components of correct size to the supplier due to non-availability. Hence, the supplier was suggested to arrange trial component of required size, which led to delay. (***Gun Carriage Factory Jabalpur- Sl.No. 5(a) of Annexure XXIII***)	Reply is not acceptable because the factory is responsible to arrange right sized trial components for ensuring PDI in time.
The PDI team assessed that deficiencies were minor in nature and M/s HMT would respond to arrange the required accessories and spares on urgent basis. (***Gun and Shell Factory, Cossipore- Sl.No. 6 of Annexure XXIII***)	GSF did not explain reasons for delay of 4 years in commissioning the machine and that too with higher cycle time of 9 hours against contractual cycle time of 27 minutes.

[171] Paragraphs 8.1 and 8.3.1 of Board's guidelines (May 2001) for procurement of plant and machinery in Ordnance Factories
[172] OFC, HVF, OFK, AFK, GCF, GSF & SAF

8.4.5.5 *Pre-commissioning trial*

The factories are also required[173] to accept the machines only when they are successfully commissioned after carrying out trial and guarantee runs for a mutually agreed period for proving the cycle time and components as per the supply order.

8.4.5.6 We found that four factories[174] accepted 32 machines valuing ₹59 crore out of 213 belatedly commissioned machines valuing ₹317 crore despite inadequacies found in performance trial runs (**Annexure XXIV)**. Machines were accepted and commissioned despite deficiencies found in pre-commissioning trials. One case study is given below to substantiate the audit finding.

Case Study 3

Gun and Shell Factory, Cossipore commissioned five CNC machines valued at ₹ 1.7 crore in September 2009. The machines were accepted and commissioned with a much higher cycle time, exceeding by 94 to 186 *per cent* the cycle time prescribed in the supply order.

8.4.5.7 *Impact on cost of production*

The Factories are required[175] to measure the tangible benefits of introduction of new machines by revising the material/labour estimates and percentage of unavoidable rejection (UAR) of the produced items downwards after commissioning. We found that the Factories did not maintain any database with regard to the number of components that required revised cost estimates consequent to commissioning of new machines.

8.4.5.8 We examined cost estimates of the components relating to 202 machines in respect of eight factories[176] and observed that:

- Estimates for the components relating to 80 *per cent* machines (161) were not revised downwards.
- For Heavy Vehicles Factory, Avadi and Field Gun Factory, Kanpur, only labour estimates were revised downwards for components relating to 58 and 53 *per cent* machines respectively.

8.4.5.9 The response of the Board (June 2013) on the cases pertaining to five factories and our comments are tabulated below:

[173] Paragraphs 10.3.7 to 10.3.9 of OFB's guidelines of May 2001
[174] GCF, OFC, HVF and GSF
[175] As per instruction of OF Board's Chairman under his DO letter dated 30.3.2004/1.4.2004
[176] HVF, OFK, OFC, SAF, FGK, OFAJ, GSF and RFI

Table-54: Response of the Board and Audit comments

Board's response	Audit comments
Relevant estimates were revised as and when new CNC machines came into operation. ***(Rifle Factory, Ishapore)***	Estimates for 2 components (Bracket and Breach Block) were not revised after commissioning of 10 machines. Though estimates for 4 components involving 9 machines were revised, labour-hours indicated in the estimates were still higher than the cycle times accepted for the machines.
Estimates were revised whenever there was scope for revision, consistent with process improvement. ***(Gun and Shell Factory, Cossipore)***	Estimates were not revised as per cycle time established for the components in respect of 16 machines, test checked by us.
Revision of estimates was taken up whenever there was change in process of manufacture and reduction in cycle time. ***(Heavy Vehicles Factory, Avadi)***	Revision of estimate was carried out in 2 out of 13 cases test checked by us; the purchase proposals envisaged for revision of estimates for all 13 cases.
Downward revisions of estimates were done for 14 principal products during 2005-06 to 2011-12. ***(Ordnance Factory, Kanpur)***	The reply is not factually correct because Additional **GM of the factory** had indicated non-revision of estimates for the designated components in respect of 40 machines in his Note dated 19 October 2011.
Question of revision of estimates did not arise as the components earlier manufactured by CNC machines were shifted to new CNC machines. ***(Small Arms Factory, Kanpur)***	During 2007-08 to 2011-12, eight CNC machines were procured against conventional machines but no revision of estimate was carried out by the factory.

The Board did not furnish any reply to non-revision of estimates by Ordnance Factory, Ambajhari; Field Gun Factory, Kanpur and Ordnance Factory, Khamaria.

8.4.5.10 Our analysis of the production trend of components through conventional as well as CNC machines in two factories (Gun and Shell Factory, Cossipore and Rifle Factory, Ishapore), revealed use of conventional machines despite availability of CNC machines that the Board must take cognizance of. Rifle Factory, Ishapore manufactured four components (bracket, breech block, piston extension and hammer) in conventional machines during 2008-13, though CNC machines had the capacity to meet the

targeted workload. Similarly, Gun and Shell Factory, Cossipore manufactured fuze 162 MK-8 (for ammunition) through conventional machines during 2009-12, in spite of capacity available with the CNC machines to produce the same. The cost of production through conventional route being higher, the continued use of these machines over the more efficient CNC machines, was questionable. A test check in these factories showed a tendency to prefer the conventional machines which are more labour intensive.

8.4.5.11 The response of the Board (June 2013) and our comments are given in Table-55.

Table-55: Response of the Board and Audit comments

Board's response	Audit comments
Production system should have the liberty to allocate machines for different components dynamically. No extra expenditure was incurred for the components manufactured in conventional machines. ***(Rifle Factory, Ishapore)***	Reply is not acceptable because the factory had to incur extra expenditure in manufacturing components in conventional machines due to their higher cycle time and unavoidable rejections as compared to CNC machines. Moreover, the objective of purchase of CNC machines is to reduce cost which was not realised.
The factory was forced to utilise conventional machines to meet the enhanced target of Fuze 162 as the supplier (M/s HMT) failed to prove the stipulated cycle time for new CNC machines. ***(Gun and Shell Factory, Cossipore)***	The reply is not correct because even with the reduced cycle time achieved, capacity of CNC machines (393846 nos) was sufficient to meet the actual production (60499, 123062 and 112906) of fuzes during 2009-10 to 2011-12.

8.4.6 Utilisation of machinery

The rated capacity of a machine is calculated as numbers of particular component manufactured per hour based on cycle time needed to manufacture the component on the machine[177]. The Management told us that utilisation of the machine at the level of 65 *per cent*[178] and above is considered acceptable for production viability and economic return on investment.

8.4.6.1 We checked capacity utilisation of 340 machines for the years 2009-10 to 2012-13 in the six factories out of sample of 731 machines in ten factories.

[177] Normal capacity of a plant in production shop was to be reckoned on the basis of its working in two shifts (eight hours in each shift) daily for 25 days per month. Thus machine-hours per annum are worked out to 3840 hours after deducting 20 *per cent* towards breakdown, tool setting time, absenteeism, *etc.*

[178] Considering 80 *per cent* machine efficiency and 80 *per cent* human efficiency

The same exercise could not be carried out in four factories *viz.*Field Gun Factory, Kanpur; Ammunition Factory, Kirkee; Rifle Factory, Ishapore and Gun and Shell Factory, Cossipore as we did not get machine-wise and year-wise production data/production log book, cycle time involved or because the factories had not assessed the rated capacity of the machines. Details of percentage of utilisation of machines in respect of six factories are shown in **Annexure-XXV.**

8.4.6.2 Only 55 to 59 *per cent* of the machines were utilised above 65 *per cent* of the capacity, while 21 to 24 *per cent* of the machines were utilised up to 30 *per cent* of the capacity (Table-56). The incidence of under-utilisation was highest in Small Arms Factory, Kanpur (100*per cent*), Ordnance Factory, Kanpur (96*per cent*), Gun Carriage Factory, Jabalpur (56 to 75 *per cent*) and Ordnance Factory, Khamaria (44 to 59 *per cent*).

Table-56: Percentage of utilisation of machines

Year	Number of machines checked[179]	Range of percentage of utilisation		
		0 to 30	31 to 65	Above 65
		Number of machines		
2009-10	340	76 *(22)*	78 *(23)*	186 *(55)*
2010-11	340	70 *(21)*	71 *(21)*	199 *(58)*
2011-12	340	74 *(22)*	65 *(19)*	201 *(59)*
2012-13	340	80 *(24)*	65 *(19)*	193 *(57)*

Note: Figure in parenthesis indicates percentage of number of machines under each category to total number of test checked machine.

8.4.6.3 Illustrative cases are given in **Annexure XXVI.** The high incidence of under-utilisation was because the production targets for items were reduced or because the project, in which the machine was a part, was delayed. For instance, machines bought in Ordnance Factory, Khamaria for production of 30mm cartridge case at a cost of ₹ 2crore remained un-utilised since purchase because the factory did not get the production orders. Similarly, two machines worth ₹ 5 crore commissioned in December 2008 and February 2009 at Ordnance Factory, Kanpur for production of new items: 130mm and 155mm cargo ammunition, remained unutilised because the development project was delayed[180]. The machines that were lying un-utilised were then diverted for other alternative purposes and yet, remained under-utilised. For instance, four machines purchased for manufacture of 81 mm mortar and tail unit (part of the shell body of the ammunition) at a cost of ₹ 1.4 crore could not be used in Ordnance Factory, Kanpur because the workload was withdrawn from the

[179] Number of machines checked was less than the sample size in respect of OFC, HVF, SAF and GCF due to availability of data in respect of production related machines only.
[180]Following the ban of Israeli firm, IMI, who was involved in the co-production

Factory. The Factory was using these machines for manufacture of other components, which was at best a compromise.

8.4.6.4 We also examined the production performance/achievement reports *vis-a-vis* targets[181]of the selected 10 factories and found that nine factories, except Heavy Vehicles Factory, Avadi, failed to meet the targets in respect of 17 to 100 *per cent* items. Under-utilisation of the capacity is a contributing factor for shortfall in achievement of the targets in factories.

8.4.7 Breakdown

8.4.7.1 Our analysis of utilisation of machines revealed high incidence of breakdowns as an area of concern. We examined 398 machines[182] in the five factories (Ordnance Factory, Ambajhari; Ordnance Factory, Khamaria; Rifle Factory, Ishapore; Gun Carriage Factory, Jabalpur and Gun and Shell Factory, Cossipore). A similar analysis could not be undertaken in respect of Ordnance Factory, Kanpur; Heavy Vehicles Factory, Avadi; Field Gun Factory, Kanpur and Ammunition Factory, Kirkee for want of supporting data. No major breakdown was noticed in Small Arms Factory, Kanpur.

8.4.7.2 The details are given in Table-57**,** which can be summarised as under:

- 37 to 55 machines (9 to 14 *per cent*) remained under breakdown for more than one month's duration in a particular year during 2009 to 2012;
- The breakdown period exceeded six month's duration in a year in respect of 14 to 15 machines in five factories every year; and
- Maximum instances of breakdown were observed in Gun Carriage Factory, Jabalpur and Rifle Factory, Ishapore.

8.4.7.3 Further, in four factories (Ordnance Factory, Khamaria; Ordnance Factory, Ambajhari; Rifle Factory, Ishapore and Gun and Shell Factory, Cossipore), 15 machines valuing ₹16 crore were lying under breakdown for over a period of 20 to 100 months since their commissioning due to various technical problems.

8.4.7.4 High incidence of breakdown was due to various reasons. These included inadequate preventive maintenance schedule whereby machines are put to continuous use or because electronic parts were not covered during preventive maintenance. Delays in repair and in putting the machines on production line after rectification also led to prolonged periods under break-down. Details of factory-wise breakdown of machines are given in Table-57.

[181] Given by OFB for items for the Services, Ministry of Home Affairs and sister factories
[182] OFAJ-110, OFK-81, RFI-70, GCF-58, GSF-79.

Table-57: Details of factory-wise breakdown

Year	Period of breakdown	Number of machines under breakdown					
		OFAJ	**OFK**	**RFI**	**GCF**	**GSF**	**Total**
2009	31 to 90 days	0	0	10	11	1	22
	91 to 180 days	0	1	4	11	2	18
	above 180 days	0	2	5	5	3	15
	Total	**0**	**3**	**19**	**27**	**6**	**55**
2010	31 to 90 days	0	0	3	11	1	15
	91 to 180 days	1	0	1	9	1	12
	above 180 days	0	3	8	1	2	14
	Total	**1**	**3**	**12**	**21**	**4**	**41**
2011	31 to 90 days	0	0	1	21	0	22
	91 to 180 days	0	0	2	4	1	7
	above 180 days	3	3	5	0	3	14
	Total	**3**	**3**	**8**	**25**	**4**	**43**
2012	31 to 90 days	0	0	5	9	1	15
	91 to 180 days	0	0	3	3	1	7
	above 180 days	3	3	6	1	2	15
	Total	**3**	**3**	**14**	**13**	**4**	**37**

8.4.7.5 The Board's response (June 2013) and our comments are given in Table-58.

Table-58: Response of the Board and Audit comments

Board's response	Audit comments
Breakdown of machines was normal and attended to on urgent basis. Delay in repair/restoration was unavoidable and there was no production loss as there was in-built additional capacity for war scenario. (***Rifle Factory, Ishapore and Gun and Shell Factory, Cossipore***)	Reply is not specific as to what remedial measures had been taken to curb the high incidence of breakdown (24 to 79 months for certain machines). The claim of 'No production loss' is not correct as RFI and GSF failed to achieve production target of19 to 86 *per cent* items and 38 to 69 *per cent* items respectively during 2009-12.
Preventive maintenance schedule and monitoring of condition of critical machines were strictly adhered to. ***(Ordnance Factory Khamaria)***	Maintenance of machines was not efficient and effective as there were prolonged breakdown of three machines for 30 to 100 months.

The Board did not furnish replies to the cases of breakdown of machines pertaining to Gun Carriage Factory, Jabalpur and Ordnance Factory, Ambajhari.

8.4.8 Internal controls

8.4.8.1 According to the Board's guidelines with respect to laid down timeframe, target and expenditure, regular monitoring is required to be done at the Board through periodical reports of factories as relevant in each case. The factories generate monthly reports on the status of un-commissioned machinery which were also placed quarterly in the Board's meetings. Our scrutiny revealed that the reports did not indicate the specific reasons for delay in commissioning the machines along with the agency responsible for such delay. There was also no mention in the monthly reports about corrective action taken to commission them expeditiously.

8.4.8.2 The Board meets once a month to discuss different issues related to the factories. Scrutiny of the minutes of the Board meetings revealed that despite persistent deficiencies in pre-despatch inspections, receipt and commissioning, utilisation of machinery and their documentation, the Board did not flag those effectively nor did it recommend the corrective action to plug the shortcomings so as to ensure efficient and effective running of machines and to achieve the benefits intended for.

Conclusion

Addition of machinery in the factories did not enhance the capacity in production. In fact, the machine hours available in the factories showed a downward trend in 2010-13. Delays in receipt and in commissioning of machinery led to a time lag in reaping the benefits of modernisation. Quality controls in pre-dispatch inspection and pre-commissioning trials were compromised which led to delays in commissioning and in some cases, acceptance of machinery that was below par. High incidence of under-utilisation and of breakdowns, undoubtedly affected the ability of the factories to meet the targets placed on them. These issues which have a direct bearing on the performance of the Board, did not receive the attention due from the top management.

The matter was referred to the Ministry in March 2013; their reply was awaited (September 2014).

Procurement of Machinery / Stores

8.5 Extra expenditure due to delay in commissioning and improper handling of machine

Delayed commissioning and improper handling of an imported machine resulted in avoidable expenditure of ₹ 2.06 crore on import and extra expenditure of ₹ 0.55 crore on repair of the machine.

Ordnance Factory Board (Board) approved (November 2004) ₹ 10.8 crore for purchase of a CNC grinding machine[183] for Engine Factory Avadi (Factory),Tamil Nadu to replace an old condemned Crankshaft Pins Grinder and to meet the shortfall in standard machine hours of existing other two old grinding machines. The machine was to be used for grinding operation of Pin and Journal of the raw Crankshaft forgings for tank and infantry combat vehicle engines.

A global tender enquiry was issued (July 2005) by Factory for supply, erection and commissioning of CNC grinding machine. But the tender was not finalized since the Factory was directed by Armoured Vehicles Headquarters Avadi (March 2007) to recast the specification of machine. The Factory thereafter issued (August 2007) a global tender for the same item with recasted specification. The tender was finalized (April 2009) and an order was placed on M/s. Cinetic Landis Limited, U.K. (Firm) for supply, erection and commissioning of the grinding machine at a total value of ₹ 8.17 crore[184]. Thus, there was time lag of 49 months in placement of order from the date of Board's approval as against six months provided in the Board's circular of July 1998. The contractual conditions stipulated that:

- The machine was to be delivered by 28 February 2010 and commissioned by 31 May 2010;
- The Factory would carry out the pre-dispatch inspection before delivery of the machine at the firm's works. The Factory would provide five crankshaft forgings each of tank and infantry combat vehicle engine as trial components to the firm to enable them to prove cycle time stipulated in the order while grinding these crankshafts forgings during pre-dispatch inspection.
- The firm would dispatch the machine after the Factory approved the test certificate on trial samples inspected during pre-dispatch inspection ;

[183]CNC Crank Shaft Pins ands Journal Grinding Machine
[184]Great Britain Pound (GBP) 11,11,996.75 equivalent to₹ 8.17 crore at the exchange rate of 1 GBP = ₹ 73.51

- The firm assured free replacement of defective material, if any, during the guarantee period of 12 months reckoned from the date of commissioning.

The firm requested the Factory for dispatch of the five trial components each by October 2009 to enable pre-dispatch inspection by March 2010. But the Factory could supply the components to the firm only by February 2010. Owing to this delay, the delivery period was extended from 28 February 2010 to 30 June 2010.

Following the PDI (May 2010), the machine was received in July/August 2010. We noticed that the PDI report (May 2010) did not indicate the Factory's approval of the test certificates of trial components prior to dispatch of the grinding machine. Despite this, Factory released ₹ 6.78 crore to the firm towards 90 *per cent* of the order value in violation of the supply order.

Against the scheduled period of commissioning by November 2010, the firm actually commissioned the machine 14 months later, in February 2012. The delay was attributed to a variety of reasons[185]. The Factory accepted the machine and released the balance contractual amount of ₹ 1.01 crore in March 2012.

Our scrutiny revealed that owing to delay in receipt and commissioning of the grinding machine, Factory imported 150 crankshaft between May 2011 and February 2013 against its two supply orders of October 2010 (50 crankshafts) and November 2011(100 crankshafts) at a higher cost of ₹ 2.06 crore, when compared with Factory's in-house cost, to meet its requirement of crankshafts for tank engines.

The Factory utilized the machine till January 2013 when it broke down owing to defects in wheel spindle. As the machine was under warranty period (up to February 2013), the Factory approached the firm for replacement of the defective part. The firm did not accede to the request on the ground that wheel spindle had developed defects due to misuse of the machine. The Factory eventually got the part repaired from the firm in October 2013 at a cost of ₹ 55.28 lakh.

The Board accepted (July 2014) the delays but clarified that the machine was actually commissioned in April 2011; the commissioning report being signed later in February 2012 to protect Government interests. The reply is not factually correct because had the machine been actually put into operation in April 2011, there was no requirement of import of 100 crankshafts against its supply order of November 2011.

[185]Delay in deputation of service engineers, non-supply of spares, deficiency in training imparted to the operators, interruption in achievement of cycle time/abrupt stoppage of machine on 17 occasions *etc.*

Thus, delay in supply and commissioning of a new grinding machine coupled with improper handling of the machine led to avoidable extra expenditure of ₹ 2.06 crore on import of crankshaft and ₹ 0.55 crore on repair of the machine.

The matter was referred to the Ministry in June 2014; their reply was awaited (September 2014).

8.6 Avoidable extra expenditure on procurement of components

Procurement of Copper Tube/Aluminium Alloy extruded Rod by Ordnance Factory Kanpur (OFC) from Ordnance Factory Katni/Ordnance Factory Ambarnath, despite material cost of those sister factories being higher than the total trade cost, led to avoidable extra expenditure of ₹3.99 crore.

Mention was made in Audit Paragraph 8.4of the Comptroller and Auditor General of India's Report No 6 of 2005 that in deviation of Ordnance Factory Board (Board)'s Circular (October 1997), Ordnance Factory Dehu Road, Maharashtra procured component (Tail Adapters)[186]from Ordnance Factory Kanpur (OFC), Uttar Pradesh though material cost alone of Tail Adapters supplied by Ordnance Factory Kanpur (OFC), Uttar Pradesh was higher than the trade cost of finished goods, leading to an additional expenditure of ₹ 3.04 crore.

Ministry in their Action Taken Note (ATN) stated (November 2009) that Board had reviewed (November 2006)the policy guideline on trade procurement *vis-à-vis* Inter Factory Demand expenditure and issued a Circular (December 2006) directing Senior General Managers/General Managers of all Ordnance Factories, to procure 100 *per cent* of the total requirement of any item from trade if the material cost of that item at the component making factory is more than the total trade cost. Board's Circular also stipulated that wherever the (i) marginal cost or (ii) direct material cost, as per cost estimates furnished by sister factories (Inter Factory Demand manufacturing factories) are found to be higher than the trade price, procuring factory should intimate the position to the Inter Factory Demand manufacturing factory. Based on such inputs, Inter Factory Demand manufacturing factories should review their material and labour estimates, manufacturing process and material usage rates so as to prune down the redundancies contained therein and reduce the cost to bring it at comparable level with the trade price. Finance Division at Board should also be kept informed about such cases, who in turn should maintain a data bank of such cases for utilization in pricing decisions and review of issue prices during subsequent years.

[186] A component used to fit Tail Unit with Shell body of ammunition by adjustment.

During 2010-11, Ordnance Factory Kanpur, Uttar Pradesh procured Copper Tube and Aluminium Alloy extruded Rod, a component required for manufacture of 105 mm IFG ammunition and Tail unit 8A[187] respectively, from trade firms as well as from Ordnance Factory Katni, Madhya Pradesh and Ordnance Factory Ambarnath, Maharashtra.

We examined (February 2013) the cost pattern at Ordnance Factory Katni, Madhya Pradesh/Ordnance Factory Ambarnath, Maharashtra and noticed that the unit material cost of Copper Tube (₹ 509.31) at Ordnance Factory Katni, Madhya Pradesh during 2010-11 had exceeded the total unit cost of finished goods ex-trade (₹ 499.16). Similarly, unit material cost of Aluminium Alloy extruded Rod at Ordnance Factory Ambarnath, Maharashtra (₹ 260.60) during 2010-11 had outstripped the total unit cost of finished goods ex-trade (₹ 189.70). Despite this abnormal material cost trend at Ordnance Factory Katni, Madhya Pradesh/Ordnance Factory Ambarnath, Maharashtra, as compared to trade prices, Ordnance Factory Kanpur Uttar Pradesh , in violation of Board's Circular (December 2006) purchased 43,591 Kg Copper Tube from Ordnance Factory Katni, Madhya Pradesh against one Inter Factory Demand(March 2010) at the rate of ₹ 900 per Kg and procured 65,385 Kg Aluminium Alloy extruded Rod from Ordnance Factory Ambarnath, Maharashtra against two Inter Factory Demands placed during 2010-11at the rate of ₹ 533 per Kg. During the same time, Ordnance Factory Kanpur Uttar Pradesh also purchased 80,264 Kg Copper Tube from trade at much cheaper rate of ₹ 499.16 per Kg as well as 7,434 Kg Aluminium Alloy extruded Rod at rate of ₹ 189.70 per Kg against two supply orders (April 2010 - September 2010).

We observed that though Inter Factory Demands were repeatedly placed at higher rates in violation of existing Circular, neither did the Ministry nor Board address this issue in any of its Board meetings held after issue of its Circular of December 2006.

While justifying the procurement at higher cost from Ordnance Factory Katni Madhya Pradesh/Ordnance Factory Ambarnath Maharashtra, Ordnance Factory Kanpur Uttar Pradesh stated (May 2013) that in maximum cases Inter Factory Demand items were costlier than trade because of overheads, included in the Inter Factory Demand cost.

The reply is not acceptable as procurement from sister factories had been resorted to, though material cost was itself higher than total trade cost. This violated Board's own Circular of December 2006 which instructed Senior General Managers/General Managers of all Ordnance Factories to procure 100 *per cent* requirement from trade if the material cost of the item at component

[187] A component used in the 51mm Mortar Bomb to stabilize the direction of the ammunition during its flight.

making factory was more than the trade cost. Further, neither Ordnance Factory Kanpur Uttar Pradesh informed the trade price to Inter Factory Demand supplying factories (Ordnance Factory Katni, Madhya Pradesh and Ordnance Factory Ambarnath, Maharashtra) to review their manufacturing process and material usage to bring their cost comparable to the trade price nor referred such cases to Finance Division of Board for maintaining appropriate data bank for use in pricing decisions and review of issue prices during subsequent years. This, ultimately resulted in avoidable extra burden of ₹3.99 crore.

Thus, procurement of 1.09 lakh Kg Copper Tube and Aluminium Alloy extruded Rod from Ordnance Factory Katni, Madhya Pradesh /Ordnance Factory Ambarnath, Maharashtra, at a significantly higher cost than the trade cost in violation of Board's Circular of December 2006, resulted in extra expenditure of ₹ 3.99 crore.

The matter was referred to the Ministry in June 2014; their reply was awaited (September 2014).

8.7 Acceptance of defective stores before bulk production clearance

Acceptance of defective stores before receipt of clearance for bulk production in violation of the Ordnance Factory Board's instruction led to a loss of ₹ 93.61 lakh.

Adrushy Mine of Mark-II version, an anti - tank land mine used by the Indian Army, was developed through an indigenous Transfer of Technology by the Armament Research and Development Establishment Pune (ARDE), a laboratory of the Defence Research and Development Organization (DRDO). Army placed an indent (September 2006) on Ordnance Factory Board (Board) for supply of 20,000 mines.

The production of mines[188] was to be in phased manner with a pilot batch of 55 mines initially with a subsequent scale-up to 10,000 mines. Clearance for Bulk Production (BPC) was to be accorded after the clearance of the pilot batch of filled [189] mines in user trials. The target for meeting the indent was placed by the Board on Ordnance Factory Chanda (Factory), Maharashtra.

The Factory was directed by the Board to procure the first 5,000 empty hardware from the sources of ARDE. Against the limited tender enquiry to

[188] A mine has for components-empty hardware, fuse assembly, package assembly and key combination set

[189] Empty hardware is assembled with fuse assembly, packing assembly and key combination set. It is thereafter filled with chemical/explosive at Ordnance Factory Chanda.This is known as filled mines

two ARDE sources, the supply order was placed (March 2007) for 5,141[190] empty hardware on M/s. Auro Engineering Private Limited, Pune (Firm) at unit cost of ₹ 10,650 with ARDE Pune as the Inspecting Authority.

The Board had specifically directed (February 2007) the Factory to include in the supply order a condition that 55 numbers would be supplied within eight weeks and full delivery would be completed within four months from the date of BPC clearance. Audit scrutiny (June 2012) revealed that the 'delivery schedule' of the supply order placed by the Factory had conflicting conditions. At one place, it stipulated supply of 55 numbers by 31 May 2007 and bulk manufacturing/supply at the rate of 1,000 per month after BPC only. But in another place, the supply order provided firm delivery schedules of 55 numbers by 31 May 2007 and the balance 5,086 empty hardware by 31 October 2007.

The Firm supplied (August 2007) 55 empty hardware to the Factory after getting inspection clearance (July 2007) from ARDE as per supply order. The Firm also intimated (10 September 2007) the Factory that they had already undertaken bulk manufacture of 5,100 empty hardware for inspection by September 2007 and October 2007 in two batches. The Factory advised (19 September 2007) the Firm that bulk manufacture was not in order pending receipt of BPC[191] and re-scheduled (December 2007) bulk delivery schedule to April 2008 in anticipation of receipt of BPC.

In March 2008, the Firm again requested the Factory to take delivery of 1,000 empty hardware. They offered to replace empty hardware free of cost in the event of any defect observed subsequently. The Factory sought (April 2008) clearance from ARDE for purchase of 1000 empty hardware, on receipt (8 May 2008) of which, the Factory accepted (26 May 2008) delivery of 1000 empty hardware at a cost of ₹ 126.73 lakh. Further, instead of recovering a performance security deposit of ₹ 66.23 lakh (10 *per cent* of the total value of the contract) as required under the supply order[192] the Factory recovered a performance security deposit of ₹ 33.12 lakh (5 *per cent* of the total value of the contract). As a result, the performance security deposit was under recovered by ₹ 33.11 lakh. This was clearly an undue benefit to the firm.

We observed that pilot lot of 55 empty hardware was rejected in the trial tests of ARDE (2009). Joint inspection was carried (March/April 2010) by the ARDE and Factory on 555 out of 1,000 empty hardwares received from the firm, of which 507 numbers failed in the tests due to defects in quality of gaskets and cracks on body of the empty hardware leading to leakage at various points. The remaining 48 numbers were accepted. Factory made

[190] Of the 5141 sets empty hardware ordered for 55 sets empty hardware are meant for pilot lot and remaining 5086 sets meant for bulk supply
[191] Bulk production clearance of the filled mines
[192] As per clause 9 (a) of the tender instruction enclosed with the Supply Order

(March 2010 to January 2011) repeated requests to the Firm to replace the rejected empty hardware, which was not done. Ultimately, entire lot of 1,000 empty hardwares was finally rejected (June 2010) by ARDE and Factory. However, no penal action was initiated by the Factory. This also raises question on ARDE's initial clearance of empty hardware.

Thus, placement of an order with a deficient delivery schedule, accepting the delivery of 1,000 empty hardware even before clearance for bulk production , in violation of the Board's instruction led to a loss of ₹ 93.61 lakh.

The matter was referred to the Ministry in August 2014; their reply was awaited (September 2014).

8.8 Avoidable procurement

Incorrect assessment of requirement of a Chemical used for production of propellant by Ordnance Factory Itarsi led to avoidable procurement of Chemical at a cost of ₹ 0.66crore.

Ordnance Factories (OFs) plan[193] the purchase of raw materials (or direct materials) on the basis of the annual estimated requirement of products projected by the Defence Forces. Factories under the Chemical Group are authorized[194] to hold inventory equivalent to four months' requirement. In exceptional circumstances inventory in excess of this level can be held, but only with the approval of the Member of the Operating Division in the Ordnance Factory Board.

Ordnance Factory Itarsi (Factory), Madhya Pradesh produces propellants used for manufacturing 130 mm and 105 mm ammunition[195]. A raw material for the production of the propellant is Potassium Sulphate (Chemical). We found that while estimating the requirement, the unit requirement of Chemical was taken as 0.5793 kg per 130 mm ammunition as against the standard requirement of 0.0793 kg per 130 mm ammunition. As a result, the requirement of the Chemical was projected at 1,01,563.60 kg, nearly five times the actual requirement, as per Table 59 below:

[193] Paragraph 2.2.9 of Material Management and Procurement Manual (MMPM), 2010 of the Board
[194] Paragraph 2.2.3.1 of the MMPM specifies the authorized level for holding
[195] Ammunition for 130 mm Reducing Variable Charge and 105 mm Indian Field Gun

Table-59

1	Annual requirement of ammunition 2011-14		
	(i)	130 mm	2,07,296 nos
	(ii)	105 mm	1,21,500 nos
2	Standard requirement of Chemical per ammunition		
	(i)	130 mm	0.0793 kg
	(ii)	105 mm	0.0058 kg
3	Total **requirement of Chemical for 3 years** 2011-14[196] (Sl. No: 1*Sl. No:2)		
	(i)	130 mm	16,438.6 kg
	(ii)	105 mm	704.7 kg
	(iii)	**Total**	**17,143.3 kg**
4	Stock balance of Chemical as of December 2011		19,227.7 kg
5	Actual requirement of Chemical to be purchased during 2011-14 (Sl. No: 3 – Sl. No: 4)		(-) 2,084.4 kg
6	Requirement of Chemical worked out by OFI		
	(i)	130 mm (at the rate of 0.5793 kg per ammunition)	1,20,086.6 kg
	(ii)	105 mm	704.7 kg
	(iii)	Total	1,20,791.3 kg
7	**Projected requirement of Chemical by OFI** (Sl. No: 6 – Sl. No: 4)		**1,01,563.6 kg**
8	Excess provisioning		**1,01,563.6 kg**

Source: *- Enclosure to Store Holder Inability Sheet No 21 dated 9 December 2011*

The error made at the level of Junior Works Manager (JWM) of Material Control Office, while assessing the requirement of chemical to be procured, was not detected by the Deputy General Manager, Provisioning and the Local Accounts Office (LAO). The approval for the provisioning was given (December 2011) on Store Holder's Inability Sheet [197]in which the relevant column on "monthly required quantity" was left blank.

Accordingly, the Factory placed (March/ May 2012) two supply orders[198] for supply of 101.6 tonne of Chemical against which 79 tonne was received at a total cost of ₹ 66.2 lakh by April 2013 and July 2013 when both the supply orders were short closed. The orders were short-closed by the General Manager on the ground of "change in production pattern". Audit scrutiny revealed that reasons attributed by the Factory for short closure of their two supply orders was incorrect because the Factory continued to manufacture

[196] Indicates requirement from January 2012 to March 2014 after considering the opening balance of material as of December 2011.
[197]Is a demand requisitioned by the planning section of the factory detailing the quantity of items to be procured after considering the target for the end product, per unit requirement of item as extracted from the material estimate, stock in hand and shop, dues in quantity against the existing supply orders
[198] M/s. Impex Chemicals Corporation (55 tonne), M/s. Surabhi Industries (46.6 tonne)

propellant[199] during 2013-14 and 2014-15 (till August 2014). The proposal for short closure of one order was not placed[200] before the Tender Purchase Committee.

As of July 2014, the Factory held 72 tonne of Chemical valuing ₹ 60.3 lakh which at the current level of consumption of 5.86 tonne of Chemical per annum, can meet the requirement for next 12 years.

In response to the audit observation, the Factory while accepting (July 2014) the excess provisioning claimed that the surplus stock would be consumed in sister Ordnance Factories[201]; so far it had received a requirement of 3600 kg from the Cordite Factory Aruvankadu, Tamil Nadu. Even after the above transfer of Chemical, the Factory would still be left with a stock of 68.40 tonne of Chemical valuing ₹ 57.32 lakh, which at the current level of consumption would be sufficient for meeting the requirement for more than 11 years. This is a pointer to the failure of internal controls that a requirement of five times the actual was projected for an item that constitutes a regular item of production for the Factory and yet it went undetected at higher levels of the management at the time of giving approval for procurement of chemicals.

Thus, incorrect assessment of requirement of Chemical for production of propellant by the Factory led to unnecessary procurement of Chemical at a cost of ₹ 66.2 lakh.

The matter was referred to the Ministry in August 2014; their reply was awaited (September 2014).

8.9 Injudicious procurement leading to uneconomical manufacture

Despite adequate stock of magazine assemblies through inter factory demand, the Rifle Factory Ishapore bought spring platforms at a cost of ₹ 1.27 crore which was avoidable and led to higher cost of production by ₹ 0.34 crore.

Procurement of stores from sister ordnance factories is termed as "inter-factory demands" (IFD) in the Ordnance Factory Board (Board). Rifle Factory Ishapore, West Bengal relies mainly[202] on IFD of magazine assembly from

[199] 127000 numbers during 2013-14 and 28000 numbers during 2014-15 (upto August 2014)
[200] The short closure of the order was required to be placed before the Competent Financial Authority as per Para 6.11.7 of MMPM-2010 of the Board.
[201] Surplus stores in one factory are intimated to other sister factories under the Ordnance Factory Board through the Mutual Aid Scheme
[202] Rifle Factory Ishapore was manufacturing magazine assembly of 5.56mm Rifles by assembling magazine rounds and spring platform sourced from Ordnance Factory Dum Dum and Trade sources respectively. In view of satisfactory performance of magazine assembly supplied by Ordnance Factory

Ordnance Factory Dum Dum, West Bengal for production of 5.56mm Rifles. A magazine assembly comprises spring platforms and magazine rounds.

We found (February 2013) that the Rifle Factory Ishapore, West Bengal made an avoidable purchase of 5,68,991 spring platforms at a cost of ₹ 1.27 crore from three trade firms during May 2011 to January 2013 despite adequate supply of magazine assemblies through the IFD route (Table-60):

Table-60

		2011-12	**2012-13**	**2013-14**
1	Target for rifles	64,549	67,456	57,216
2	Requirement of magazine assemblies (Sl.No. 1 x 5 nos)	3,22,745	3,37,280	2,86,080
3	Opening balance of magazine assemblies	10,329	94,930	1,34,176
4	Opening balance of magazine rounds	1,43,280	Nil	Nil
5	Opening balance of spring platform	26,056	3,17,695	5,68,991
6	IFD placed for magazine assemblies on OFDC	3,22,745	4,53,226	-
7	Magazine assemblies received from OFDC	1,92,365	3,97,745	1,93,226
8	Magazine rounds procured from OFDC	70,000	Nil	1,82,718
9	Spring platform procured from trade	5,04,919	2,51,296	Nil
10	Spring platform ought to have been procured from trade ((4)+(8)-(5)) as these were procured against orders placed prior to January 2011	1,87,224	Nil	-
11	Excess procurement of spring platform (9-10)	3,17,695	2,51,296	-
7	Value of avoidable trade purchases of spring platform	₹ 0.71 crore	₹0.56 crore	-

With an excess stock of spring platforms, the Rifle Factory Ishapore, West Bengal had to procure magazine rounds from Ordnance Factory Dum Dum, West Bengal during 2013-14, assembly of which led to excess cost of ₹ 34 lakh. Even after this measure, the Rifle Factory Ishapore, West Bengal was left with excess stock of magazine assemblies, magazine rounds and spring platforms aggregating ₹ 3.35 crore[203] in mismatched condition as of January 2014.

In reply, the Board stated (June 2014) that the IFD supplies were inadequate to meet the targets and hence the need for trade procurement. This is not borne from the data as tabulated. The Board also contended that extra cost due

Dum Dum, the General Manager directed (January 2011) the factory to stop procurement of spring platform from trade and to source complete magazine assembly from Ordnance Factory Dum Dum.

[203] 181937 magazine assemblies valuing ₹ 1.55 crore, 112718 magazine rounds valuing ₹ 0.68 crore and 498991 spring platform valuing ₹ 1.12 crore.

to in-house manufacture of magazine assembly at the Rifle Factory Ishapore, West Bengal was only ₹ 3.95 lakh and not ₹ 0.34 crore as worked out by Audit. But we worked out the extra cost based on the data obtained from the original document *viz* cost card at Rifle Factory Ishapore, West Bengal.

Thus, procurement of spring platform at a cost of ₹ 1.27 crore was avoidable and led to higher cost of production of magazine assemblies at Rifle Factory Ishapore, West Bengal.

The matter was referred to the Ministry in March 2014; their reply was awaited (September 2014).

Manufacture

8.10 Defective manufacture of mines

Manufacture of defective mines by Ordnance Factory Chanda/High Explosive Factory Kirkee coupled with their failure to seal the joints properly led to segregating of mines valuing ₹ 35.97 crore at Army Depots without repair/replacement.

Anti Tank Mine- a type of land mine designed to damage and destroy vehicles including tanks and armored fighting vehicles- is required by the Indian Army. Anti Tank Mines 1A ND[204] (mines) is developed by the Armament Research and Development Establishment, Pune (ARDE) and High Energy Materials Research Laboratory, Pune (HEMRL) on behalf of the Indian Army. Ordnance Factory Chanda (OFCh), Maharashtra, has been entrusted with the assembly and filling of the mines since December 2004. High Explosive Factory Kirkee, Maharashtra supplies Tri Nitro Toluene (TNT), a chemical, to Ordnance Factory Chanda, Maharashtra.

All the hardware and filled Anti Tank Mine manufactured by Factories are duly inspected by the Inspectorates[205] of Director General of Quality Assurance, New Delhi before issue to the Army.

During 2008-09 to 2010-11, Ordnance Factory Chanda, Maharashtra manufactured and issued 2,71,794 mines to the Army depots, after due inspection by the inspectorates. During receipt inspection[206] (May 2010 and

[204] 1A is a version of the Anti Tank and ND stands for Non-Detective

[205] Controllerate of Quality Assurance (Ammunition) Kirkee, Controllerate of Quality Assurnce (Military Explosives) Kirkee and Senior Quality Assurance Establishments stationed at Chanda and Kirkee

[206] Receipt inspection refers to inspection by the Army depots on receipt of mines from the Ordnance Factory

June 2010), Army depots, however, observed TNT exudation[207] from the joints of mine body and socket provided for assembly of anti lifting mechanism in 54 lots comprising 1,07,244 mines valuing ₹ 35.97 crore. Further, other lots developed manufacturing defects such as side plug missing, mine body broken, base plug missing and body scratched.

In order to investigate the reasons for the exudation of TNT, a Joint Committee (Committee), constituted (June 2011) with the representatives from Army, Ordnance Factory Board, Inspectorates, ARDE and HEMRL, held series of meetings between June 2011 and October 2012. In the first meeting of the Committee investigating this issue held on 27 June 2011, Controllerate of Quality Assurance (Ammunition) Kirkee (CQA/A) emphasized the urgent need to look into the matter of exudation from mines received at various depots and suggested that time bound actions were to be initiated to settle the issue to ensure user's satisfaction and also to avoid accident.

In the test report (February 2012), CQA had attributed exudations to low set point[208] of TNT fillings in the mines which exudated at elevated temperature during storage of mines, while ARDE ascribed (October 2012) the same to improper joint sealing also. As a remedial measure, the Committee recommended (October 2012) to: (i) clean the exudated mines lying at depots with Carbon Tetra Chloride/Acetone for dynamic testing to ascertain its serviceability for which modalities would be forwarded by CQA/A to Ordnance Factory Chanda, Maharashtra; (ii) frame detailed repair procedure by Ordnance Factory Chanda, Maharashtra for approval by CQA/A after carrying out dynamic testing of the mines duly cleaned; and (iii) forward few lots of mines from random batches (50 *per cent* exudated and 50 *per cent* unexudated) from 2004-05 vintage to the CQA/A by the Army depots to ascertain the set point of TNT for creating data bank to serve as a reference point. The Committee did not, however, address other defects[209] of the mines, observed by the Army.

We observed that even after lapse of more than three years the modalities for undertaking repair of defective mines at Army depot were not formulated (May 2014) since exudated mines collected from Army depots when 'filled with inert[210]' and high explosive and applied with proposed sealant by Ordnance Factory Chanda, Maharashtra turned brownish during environment testing (December 2013) at ARDE. This had an effect on environment in the form of air pollution. Accordingly, the Committee directed Ordnance Factory Chanda, Maharashtra to forward further quantity of sealant to HEMRL for

[207] Exudation is due to low set point of TNT fillings in the mines which had exudated at elevated temperatures during storage of mines.
[208] Low set point means low melting point of TNT
[209] side plug missing, mine body broken, base plug missing and body scratched
[210] Mines without explosives

testing. The performance of sealant[211]subsequently issued to HEMRL by Ordnance Factory Chanda, Maharashtra was found satisfactory (April 2014) subject to evaluation in environmental test by ARDE, scheduled to be held during July- October 2014.

The Board, while accepting the facts, stated (July 2014) that the methodology for repairs/rectification of mines had since been finalized and after receipt of the report of the efficacy of sealant applied on affected mines after environmental tests from ARDE, action for bulk rectification would be initiated. However, the reply did not specify the time schedule by which the bulk rectification would be completed. Further, reply was silent on action taken to rectify the other defects observed by the Army.

Thus, manufacture of defective mines by Ordnance Factory Chanda, Maharashtra /High Explosive Factory Kirkee, Maharashtra coupled with their failure to seal the joints properly led to idling of mines valuing ₹ 35.97 crore in segregated condition at Army Depots without repair/replacement, thereby adversely affecting the anti tank mine operation of the Indian Army.

The matter was referred to the Ministry in June 2014; their reply was awaited (September 2014).

Miscellaneous

8.11 Loss of revenue due to differential selling price

Differential selling price adopted by Ordnance Factory Board (Board) and non-compliance by two factories of the Board's order for revision of selling price of Rifle led to a loss of revenue of ₹ 1.37 crore.

Ordnance Factories at Trichy, Tamil Nadu and Ishapore, West Bengal sell 0.315 Sporting Rifles (rifles) in the market to private arms dealers. The selling price for items sold in the market is fixed by the Ordnance Factory Board (Board)[212].

In September 2011, the Board revised the unit selling price of rifles from Trichy factory to ₹ 43,200; the selling price of rifles from Ishapore factory was retained at the prevailing rate of ₹ 40,000. This was revised in November 2012 to ₹ 45,900 for both factories.

We noticed (September 2013) that on the instructions of the General Manager, Trichy factory sold 1220 rifles (September 2012 to November

[211]Sealant is an adhesive applied to seal the joints of the mines
[212] As per Para 7.3 of Guide to Civil Trade Activities of Ordnance Factories

2012) at ₹ 40,000 each. The approved selling price was ₹ 43,200 and thereafter ₹ 45,900. The differential from the approved rate caused a loss of revenue of ₹ 61.76 lakh. Similarly, the Ishapore factory sold 1270 rifles at unit rate of ₹ 40000 during November 2012 to March 2013, although the selling price had been revised by the Board to ₹ 45,900 with effect from November 2012. This led to a loss of revenue of ₹ 74.93 lakh.

The Ministry clarified (August 2014) that the Trichy Factory had begun to receive complaints on higher pricing and in fact suffered low off take of rifles. This was raised by the GM with the Board which gave verbal orders to the Factory to bring down the selling price on par with the Ishapore factory, *i.e*. at ₹ 40,000. The Board took a view that timely remedial action helped to liquidate the accumulated stock and avert a possible loss of ₹ 8 crore.

It is also indicative of the fact that the Board had been taking injudicious decisions regarding the selling price (September 2011and November 2012) without keeping in view the likely effect of sale at the two factories and thereby failing to enforce compliance to its own instructions. There was nothing on record to support the claim of complaints or of the impact on off take. The decision taken informally, in verbal discussions, to reduce the selling price led to loss of revenue of ₹ 61.76 lakh. The two factories also did not comply with second revision by the Board in November 2012. The total loss of revenue to the Board was ₹ 1.37 crore on account of non-compliance to the two orders of revision of selling price of the sporting rifles.

8.12 Excess payment of royalty charges

Heavy Alloy Penetrator Project Trichy paid an excess royalty charges of ₹ 1.01 crore to the Tamil Nadu Government owing to payment on the basis of maximum contracted demand instead of actual consumption of water during April 1996 to March 2013.

Heavy Alloy Penetrator Project Trichy, Tamil Nadu (Factory)[213] was drawing water from the river Cauvery to meet its needs on the basis of permission (September 1986) granted in this regard by Public Works Department of State Government of Tamil Nadu (Government). Royalty charges were payable in advance for the maximum contracted demand; the advance was to the adjusted against actual consumption of water during the year. The permission required the Factory to enter into an agreement with the Government before drawing water.

We observed (April 2013) that the agreement by the Factory with Government (April 1996[214]) provided for advance payment of royalty charges

[213] HAPP came into existence in March 1990

[214]Factorydrew water without an agreement till March 1996 and from April 2006 onwards.

for the maximum contracted demand which would not be adjustable in case consumption of water fell below this demand. A reading of the agreement revealed that though the clause was detrimental to the Factory's interests and deviated from September 1986's order, the Factory failed to raise the same with Government. However, the actual consumption of water was always less than the contracted demand. At the instance of Audit, the Factory assessed (November 2013) the royalty charges payable at ₹ 97.17 lakh based on actual quantity of water consumed, against ₹ 1.98 crore already paid based on the maximum contracted demand for water during April 1996 to March 2013. Accordingly, the Factory sought a refund of excess royalty of ₹ 1.01 crore which was yet to be recovered (August 2014).

Thus, Factory paid an excess royalty charges of ₹ 1.01 crore to the Tamil Nadu Government owing to payment on the basis of maximum contracted demand instead of actual consumption of water during April 1996 to March 2013.

The matter was referred to the Ministry in March 2014; their reply was awaited (September 2014).

8.13 Undue benefit to a private power utility provider

Failure of Ordnance Factory Board/Gun and Shell Factory Cossipore to recover the lease rent and premium from a private electricity supplier as per the prescribed rates resulted in revenue loss of ₹2.64 crore and led to undue benefit to the private electricity supplier.

According to the policy guidelines (August 1990) of the Ministry of Defence (Ministry), defence land required for establishing facilities[215] by the Central/State Government etc are required to be licensed for such purpose on a nominal fee of rupee one per annum, for an initial period of thirty years and thereafter, the license be renewed if the facility/services being provided is mainly for the benefit of the factory and its employees. As and when the sites are not required the site should revert to the factory. The guidelines also provide for recovery of license fee for use of defence land by the unauthorized occupants for the unauthorized period. The rates shall be fixed, initially for a period of five years by the General Manager in consultation with the Defence Estates Officer (DEO) having jurisdiction in the area and Member (Finance) of Ordnance Factory Board (Board). In case lease is renewed, new license fee is required to be enhanced by at least 25 *per cent* over the existing license fee.

Indian Railways had been using a railway line passing through the Gun and Shell Factory Cossipore, West Bengal's (Factory) land measuring 1661 square

[215] Police force, Telephone Exchange, Post/Telegraphic office, Electricity substation, State Transport Authority

meters for carrying coal wagons to New Cossipore Generating Station of CESC Limited till November 1999. Thereafter, the Factory did not take over the site; instead, on the request of the Railways (November 1999), unauthorizedly allowed CESC Limited to use the line for carrying coal to the New Cossipore Generating Station.

The Factory approached (February 2002) the Board to allow CESC Limited to use the land at commercial rate of ₹ 2.52 lakh per annum (being 5 *per cent* of market rate of land of ₹ 50.40 lakh) worked out in consultation with DEO, Kolkata. But the Board directed (June 2002) the factory to collect annual rent of ₹ 5.04 lakh (10 *per cent* of the market rate of land) based on Director General of Defence Estates (DGDE) rate communicated (October 2001) to Ordnance Factory Ambajhari, Maharashtra by Estate officer, Mumbai circle for leasing of land for commercial use. Accordingly, the Factory, entered (August 2002) into an agreement with CESC Limited at an annual rent of ₹ 5.04 lakh for a period of five years. However, the Board/Factory did not collect the requisite premium of ₹ 50.40 lakh at 10 times [216]the annual rent from CESC Limited.

We further noticed that for renewal of agreement for another period of five years (August 2007 to July 2012), the Factory, instead of fixing the annual rent at ₹ 16.14 lakh[217], allowed (December 2008) the CESC Limited to use the land at the annual rent of ₹ 5.54 lakh, without the approval of the Board. This also fell below the annual rent of ₹ 6.30 lakh *i.e.* increase of minimum of 25 *per cent* over the existing annual rent of ₹ 5.04 lakh as required under the Ministry's guidelines. Again, the factory did not collect the premium charges of ₹ 1.61 crore at 10 times the annual rent worked out on the basis of 10 *per cent* of the commercial market value of the land under Cantonment Land Administration Rules. After expiry of the agreement in July 2012, the factory did not renew the agreement and directed the CESC Limited to stop using the Railway track. But the CESC Limited did not respond. No legal action was action against CESC Limited.

Thus, failure of the Board/Factory to recover the lease rent and premium from a private electricity supplier as per the prescribed rates resulted in revenue loss of ₹ 2.64 crore[218]for the period August 2002 to July 2012 and led to undue benefit to the private electricity supplier.

Board stated (January 2014) that Factory had not fixed lower rate by surpassing them since it was directed to fix the rent by consulting DEO by observing the Ministry's guidelines and without referring the matter once again to them for approval. Board also added that the perception of loss is a matter of judgment.

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[216] As per Rule 6(ii) of the Chapter 17 to the Cantonment Land Administration Rules and DGDE communication of October 2001

[217] At the rate of 10 per cent of the commercial market rate of ₹ 161.40 lakh

[218] Premium charges of ₹ 0.50 crore and ₹ 1.61 crore for the period August 2002 to July 2007 and August 2007 to July 2012 respectively and under recovery of ₹ 0.53 crore as annual rent for the period August 2007 to July 2012.

The reply is not acceptable because the Factory failed to comply with the direction of the Ministry as well as the Board in fixing the annual rent that led to loss of revenue. Further, Board's contention regarding 'perception of loss is a matter of judgement' is also not factually correct because the Factory/Board actually sustained revenue loss due to non-fixation of lease rent and premium charges in tune with the Ministry's guidelines.

The matter was referred to the Ministry in March 2014; their reply was awaited (September 2014).

8.14 Avoidable payment of electricity charges

Failure of Ordnance Factory Kanpur to comply with the requirement of 'interlocking' between two feeders meant for supply of powers under Indian Electricity Rules as well as inordinate delay in replacement of power transformers resulted in avoidable payment of ₹ 3.66 crore towards demand and electricity charges at higher rate.

To augment and integrate the power supply of Ordnance Factory Kanpur, Small Arms Factory Kanpur and Field Gun Factory Kanpur, Uttar Pradesh the Ministry of Defence (Ministry) accorded (March 2006) sanction for a new 132/33 Kilo Volt (KV) sub-station at Armapur at a cost of ₹ 22.89 crore. The work was to be executed through M/s Uttar Pradesh Power Corporation Limited, Lucknow (UPPCL) and M/s Kanpur Electricity Supply Company Limited, Kanpur (KESCO) as deposit work. It was also decided to surrender existing 11 KV and 6.6 KV feeders to M/s KESCO after installation and commissioning of proposed new lines of 132/33 KV.

We observed that the installation and commissioning of new lines at 132 KV was completed (May 2009). After energizing of new lines, 11 KV feeder was surrendered immediately to KESCO. However, Ordnance Factory Kanpur could not hand over the 6.6 KV feeder to KESCO because one of the two 3 Mega Volt Ampere (MVA) 11/6.6 KV transformers was damaged due to occurrence (July 2008) of fire. Consequently, 6.6 KV feeder had to be utilised to give the power-supply to production shops, maintenance sections, main administrative building and allied establishments.

The Board of Enquiry, constituted (July 2008) by Ordnance Factory Kanpur to enquire into circumstances leading to electrical fire, concluded (September 2008) that fire had occurred as no interlocking arrangement existed between 11 KV and 6.6 KV supply system and as a result, 'wrong switching could not be ruled out', leading to 'heavy flashover and fire'.

Though the Joint Director/Engineering Services of the Board had pointed out during Safety audit as early as in February/March 1994 that there was no interlocking arrangement between 6.6 KV and 11 KV supply, as required under Indian Electrical Rules, no action was taken by Ordnance Factory Kanpur to set right the deficiency even after a lapse of 14 years for which no reason was recorded. We observed that this displayed lack of monitoring by the top factory management on the follow-up action on the Safety audit report.

We further noticed that two 3 MVA transformers of 6.6 KV feeder had out lived their shelf life in 1986 and 1990 respectively. Ordnance Factory Kanpur had failed to take action to replace them even after lapse of nearly two decades. It was only in August 2008 after the fire accident that Ordnance Factory Kanpur action for replacing the two old transformers and obtained Board's sanction in April 2009. Again, Ordnance Factory Kanpur took excessive time and ultimately placed a supply order on a private firm for supply and commissioning of two transformers after nearly a year in February 2010 in violation of Paragraph 14 of the Defence Procurement Manual, 2005 which requires that supply order be placed within 22 weeks from the date of approval of the competent authority. The new transformers were commissioned in January 2011 and the old 6.6 KV feeder was handed over to KESCO in March 2011.

Failure on the part of Ordnance Factory Kanpur to comply with the requirement of interlocking between two feeders meant for supply of power under Indian Electricity Rules as well as inordinate delay in handing over 6.6 KV feeder resulted in Ordnance Factory Kanpur incurring an additional expenditure of ₹ 3.66 crore towards higher electricity charges and demand charges [219]during May 2009 to February 2011.

While accepting (April 2014) the payment of ₹ 3.66 crore as avoidable charges in response to the Audit query (February 2014), Ordnance Factory Kanpur contended that they had saved ₹ 8.68 crore approximately by energizing 132/33 KV system. The reply is not acceptable as additional expenditure of ₹ 3.66 crore incurred due to delay in handing over 6.6 KV feeder cannot be set off against the savings of ₹8.68 crore by energizing 132/33 KV system as stated as the dedicated new substation was sanctioned to achieve more reliability in supply of power and savings of ₹ 2.22 crore per annum as well. The reply was also silent as to why no action was taken to set right the deficiency in interlocking system, despite the same being brought to their notice during safety audit in February/March 1994.

[219]Electricity charges refer to charges which are variable with reference to actual units of electricity consumed whereas the demand charges are fixed charges which are levied with reference to the contract demand of electricity.

The matter was referred to the Ministry in June 2014; their reply was awaited (September 2014).

8.15 Recoveries at the instance of Audit

At the instance of Audit, seven Ordnance Factories recovered ₹ 2.18 crore.

During the course of Audit (February 2011 to January 2013), we observed instances of excess payments, irregular payments, under/non-recovery of charges etc. Factories recovered ₹ 2.18 crore as per the details given in the **Annexure-XXVII.**

The matter was referred to the Ministry in August 2014; their reply was awaited (September 2014.